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Environment and Planning Committee



Inquiry into tackling climate change in Victorian communities

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Legislative Assembly Environment and Planning Committee

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About the Committee

Functions

The Environment and Planning Standing Committee is established under the Legislative Assembly Standing Orders Chapter 24—Committees.

The committee's functions are to inquire into and report on any proposal, matter or thing connected with the Department of Environment, Land, Water and Planning and related agencies.

The standing committee must inquire into, consider and report to the House on any proposal, matter or thing that is relevant to its functions and has been referred to the committee by resolution of the House.

The standing committee may inquire into, consider and report to the House on any annual report or other document relevant to the functions of the committee that is tabled in the House.

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This report is available on the Committee's website.

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Terms of reference

Inquiry into tackling climate change in Victorian communities

On 1 May 2019, the Legislative Assembly agreed to the following motion:

That this House:

An inquiry into what urban, rural and regional communities in Victoria are doing to tackle climate change and how the Victorian Government could support these communities to the Environment and Planning Committee for consideration and report no later than 30 June 2020.*

*The Speaker advised the House on 2 June 2020 that the Legislative Assembly Environment and Planning Committee had extended its reporting date for the Inquiry into tackling climate change in Victorian communities to 3 December 2020. This extension was agreed to by the Committee under the resolution of the House on 23 April 2020.

Chair's foreword

I have been greatly impressed throughout this Inquiry by the breadth and depth of action that many Victorian communities are taking to tackle climate change. The evidence provided to the Committee confirms that many of our urban, rural and regional communities are already working to adapt to the reality of climate change and to mitigate its future impacts. The continued efforts of these communities, and the lessons, support and inspiration that they provide to others, will be crucial to achieving Victoria's legislated goal of net zero greenhouse gas emissions by 2050. This goal, which is enshrined in the state's *Climate Change Act 2017*, is consistent with the *Paris Agreement* to keep the global temperature rise to well below 2 degrees Celsius above pre-industrial levels.

The science tells us that Victoria's climate has already changed due to the increased concentration of greenhouse gases in the atmosphere since pre-industrial times. The State has experienced an increase in average annual temperature of just over 1 degree Celsius, along with a decrease in autumn and winter rainfall and a significant increase in the risk of bushfire. However, these changes pale beside the predicted impacts if we allow average annual temperatures to increase by more than 2 degrees Celsius. In Victoria, such an increase would lead to a doubling of the number of very hot days each year, significant sea level rise, further declines in snowfall and rainfall, and longer fire seasons, with a rise in the number of very high fire danger days.

As the recent report of the Royal Commission into National Natural Disaster Arrangements found, the 2019-20 bushfire season began during Australia's hottest and driest year on record and ended with over 24 million hectares burnt around the nation. Tragically, 33 people were killed and over 3,000 homes were destroyed. It has also been estimated that almost three billion animals were killed or displaced, while many threatened species and habitats experienced serious harm. For many Australians, the unprecedented scale and ferocity of our 'Black Summer' bushfire season brought home the reality that we are already living with the effects of climate change. It also brought home the reality that governments must do more.

Longer and more dangerous fire seasons are just one of a range of predicted impacts if we fail to tackle climate change. As the Independent Expert Panel on Interim Emissions Reduction Targets for Victoria outlined in its 2019 Final Report, scientists estimate that we are headed for a global climate of 4 degrees Celsius warmer than pre-industrial times if emissions continue to grow at the rate of recent decades and do not peak until 2100. Warming of this magnitude would have negative impacts across a range of areas, including: human health (in the form of heatwaves, reduced air quality and mental health); significant damage to public and private infrastructure and increased maintenance costs; loss of alpine environments; increased risk of water shortages, combined with increased risks of flooding due to more intense downpours when it does rain; significant declines in agricultural production; threats to Aboriginal cultural

heritage; irreversible loss of biodiversity; and up to 0.9 metres of sea level rise by 2100, resulting in increased flooding, erosion, loss of beaches and damage to coastal infrastructure.

In recent years, an increasing number of governments and communities have taken up the fight to prevent such a future and I am proud to serve a state that is among the world's leaders in this fight.

In addition to demonstrating the range and scale of action that is now being taken by so many Victorian communities, this Inquiry has confirmed that tackling climate change makes economic sense. This is increasingly true for individuals, families and businesses right across Victoria. It is also increasingly true for state governments and the federal government, as demonstrated by a growing range of research and evidence. However, a key theme of this Inquiry is that while action to tackle climate change already makes economic sense for many of our local governments, many others have a greater need for support from the Victorian Government, both in the form of finance and expertise. I am particularly pleased that this report contains a wide range of recommendations aimed at delivering this support.

Many of the Victorian Government's existing policies will help to boost the efforts of local government and local communities in the fight to tackle climate change, while also creating the jobs of the future. For example, the Victorian Renewable Energy Target (VRET) (25% in 2020, 40% in 2025 and 50% by 2030) is estimated to create up to 10,000 jobs. Nationally, recent economic modelling by Deloitte Access Economics estimates that Australia's economy could add over 250,000 jobs by 2070 if it reaches net zero emissions, along with the rest of the world, in time to limit global average warming to 1.5 degrees Celsius. The economic opportunities associated with decarbonising our economy are enormous and strengthening the partnership between our state and local governments, in the various ways identified by this Inquiry, will be key to seizing them.

Despite the immense opportunities associated with the emergence of the net zero emissions economy, it is incumbent on all levels of government to pursue a 'just transition'. That is, a transition that is managed in a way that minimises the impact on communities and individuals who might otherwise have to bear an unfair share of the costs of transition. The Committee's awareness of this imperative has also informed a number of the findings and recommendations in this report.

Climate change is already affecting agriculture across our state, with particular crop varieties becoming unviable in certain areas due to reduced rainfall, higher temperatures and increases in the frequency and severity of extreme weather events, such as heatwaves. However, as this Inquiry has demonstrated, our farming communities are highly adaptable and in many cases are already making the changes required to maintain their productivity through innovation and diversification. With the support of organisations such as Agriculture Victoria, Landcare and local Catchment Management Authorities, many of our farmers are increasingly working to both reduce their greenhouse gas emissions and to sequester more carbon in the landscape,

including through innovative practices such as agroforestry. I am particularly pleased that this report contains several recommendations aimed at supporting our agricultural communities to continue to play a central role in the state's journey towards carbon neutrality.

Victoria's recent success in bringing the nation's most serious COVID-19 outbreak under control demonstrates that when we work together as a community, we can meet the greatest of challenges. Climate change may be the greatest collective challenge we will face in our lifetimes. It may also be the greatest collective challenge that our children and grandchildren will face in their lifetimes. But on the evidence gathered by the Committee during this Inquiry, I am convinced that Victoria is well placed to continue leading the nation in this fight. That is in no small measure due to the passion and commitment of so many individuals, businesses, community organisations and local governments within our urban, rural and regional communities.

On behalf of the Committee, I would like to thank the many stakeholders who made submissions, attended public hearings and hosted the Committee at site visits around the state. The Committee is very grateful for the contributions of time, experience and insight from such a wide range of individuals, community organisations, farmers and local governments.

I would also like to thank my fellow Committee Members for their commitment to the Inquiry. The Deputy Chair, Mr David Morris MP, deserves special thanks for his constructive and bipartisan approach. Bipartisan reports on climate change have been somewhat of a rarity in Australian parliaments and the Committee's achievement in this respect owes much to the Deputy Chair's dedication to the work of the Committee. I also extend the Committee's thanks to the secretariat for their support, especially when the pandemic necessitated a shift to remote working arrangements during the final stages of the Inquiry.



Darren Cheeseman MP
Chair

Executive summary

Reducing greenhouse gas emissions and managing the impacts of climate change requires action from all levels of government, all economic sectors and all sections of society. Community organisations in Victoria play a key role in tackling climate change across urban, regional and rural communities. The Committee received evidence from a broad variety of stakeholders across Victoria, which revealed a vast breadth of activity and deep commitment to community action on climate change. Despite this level of commitment and engagement, there are many barriers to further action by communities. Targeted government support may further assist communities to reduce Victoria's greenhouse gas emissions and increase their resilience to the impacts of climate change.

Victorian communities are engaged in a broad range of activities to tackle climate change

Victoria's urban, regional and rural communities are involved in a broad and diverse range of activities aimed at tackling climate change. These activities include greenhouse gas emissions reduction, adaptation to the impacts of climate change, and a wide range of education and lobbying efforts. Communities across Victoria, from metropolitan Melbourne to the Mallee, and Warrnambool to Wodonga, are developing locally customised actions to address the climate change priorities in their area.

Communities are reducing greenhouse gas emissions by installing or purchasing renewable energy, retrofitting homes and businesses to use less energy, installing electric vehicle chargers, minimising waste, recycling and participating in community gardens. Farmers and community groups are planting trees, including for agroforestry, that will help sequester carbon dioxide from the atmosphere, reducing net emissions.

Communities are also adapting to the impacts of existing and future climate change by preparing for emergencies, developing more infrastructure that can withstand climate change impacts, minimising water usage, and adapting farming practices to future climates.

Communities are mitigating the urban heat island effect by planting urban forests and adopting sustainable planning and building practices to adapt to a warmer future.

Many activities, such as tree planting and home energy efficiency improvement, are aimed at both emissions reduction and climate change adaptation. Stakeholders also emphasised the many social, economic and environmental benefits of a range of climate change actions. These include improved human health and wellbeing, community cohesion, economic development and biodiversity.

Education on climate change, its impacts and how individuals and households can help tackle it, is a strong focus of many community groups, who use social media, seminars, word-of-mouth and festivals to promote community climate action. Many organisations deliver programs targeted at schools and school students to understand and implement sustainability measures. Other organisations promote emergency preparedness, implementation of agricultural practices, including projected climate change impacts on farm yields, or home energy efficiency retrofitting. Citizen science is another key area of knowledge exchange through which Victorians are contributing to a detailed understanding of the impacts of climate change on society and the environment.

There is a broad range of organisations involved in climate change action. These include businesses, households, informal community groups, incorporated associations, Aboriginal corporations, local government, schools, universities and peak bodies. While many organisations have climate action, sustainability or other environmental goals as their main focus, others are tackling climate change as part of their broader mission within their communities.

Renewable energy and energy efficiency are important areas of community focus

Electricity generation is Victoria's largest source of greenhouse gas emissions and presents opportunities to decarbonise other sectors, such as transport and direct combustion. Many Victorian communities are engaged in reducing the use of electricity and switching its generation to renewable sources. These include community energy groups, which are specifically focused on the adoption and development of renewable energy projects in their local area or region.

The rapid take-up of rooftop solar by households, industry, community and government organisations is a clear example of the ongoing energy transition. Many organisations are facilitating the adoption of rooftop solar through the provision of innovative finance or information to enable better decision making. Some projects, such as community investment in commercial rooftop solar systems, enable communities to come together to support rooftop solar even when individuals are unable to do so individually.

Innovation is a cornerstone of the approach of many community energy groups. Examples of this include the development of microgrids, alternative electricity tariffs to support renewable energy development, community electricity retailing and a range of proposals for mid-scale renewable energy generators. The aggregation of electricity demand into buyers' groups for the purchase of renewable energy through power purchase agreements is another emerging feature of the electricity market in Victoria. Some of these innovations have been facilitated through the Community Power Hub pilot program. Expansion of this program would support the development of local renewable energy by other communities.

While there is significant interest from community groups in developing mid-scale grid-connected renewable power generation, few of these projects have come to fruition. Stakeholders identified the technical and regulatory complexities of the

electricity system as barriers to greater participation by community energy groups. Addressing broader challenges in the National Electricity Market would likely assist community energy groups to realise their proposed projects. Providing direct support to community energy groups to manage the technical and financial complexities of developing renewable energy projects would also support an increase in mid-scale renewable energy generation.

There is substantial scope to improve the energy efficiency of new and existing dwellings to reduce emissions and improve comfort and safety, especially during heatwaves. Community groups and local governments are helping homeowners understand the energy efficiency of their homes and providing advice on steps they can take to improve. Other organisations support low income households to upgrade the energy efficiency of their homes, for example, by installing draught-proofing or insulation. Stakeholders proposed many measures to improve building energy efficiency, such as the raising of standards for new dwellings, the introduction of minimum standards for rental and public housing, and mandatory disclosure of building energy efficiency.

Many communities see themselves as leaders in tackling climate change

Many Victorian communities see themselves as playing a leadership role in climate change action. Communities are developing strategies, joining partnerships and lobbying decision makers. These activities provide a foundation for more tangible emissions reduction and climate change adaptation actions. Some communities have ambitions to reach 100% renewable electricity or net zero emissions well in advance of the State of Victoria.

Many communities, either on their own or with external support, have taken a community development approach in preparing plans, strategies and actions to tackle climate change. Examples include community-based emergency management, the development of net zero emissions community transition plans, regional renewable energy roadmaps, and other local climate resilience plans. These plans have facilitated locally supported actions and many communities are seeking financial and other resources to put these plans into action or develop plans for their own communities.

Local government plays a key role in community climate change action

The Committee received a substantial amount of evidence about the climate change actions of local governments. Many have made pledges under the TAKE2 program to reduce their operational emissions and some have also committed to emissions reduction targets for their communities. Councils are reducing their emissions through the installation of rooftop solar, energy efficiency upgrades and the purchase of electric

vehicles for local government fleets. Reducing organic waste and diverting it from landfill is another key initiative to reduce greenhouse gas emissions, especially for those local governments that operate landfills.

Local governments also collaborate on climate action through a range of networks and organisations. The Victorian Greenhouse Alliances, of which almost all Victorian local governments are members, are a world-leading example of collaboration for climate action. Their key initiatives include one of the largest energy-efficient public lighting upgrades in the world and a local government renewable energy power purchase agreement.

Local governments play a key role in the planning system and many have adopted Environmentally Sustainable Design local planning policies to improve the sustainability of new developments in their communities. There is scope to improve how the planning and building systems in Victoria deliver a built environment that minimises greenhouse gas emissions and is resilient to the impacts of climate change.

Victorian communities are looking to government for support to help them tackle climate change

Many stakeholders called for the Victorian Government to provide targeted support that would leverage existing community leadership on climate change action. These include such measures as inventories of local emissions, improvements to educational resources on climate change action, and increased support for Victorians to participate in programs like the Victorian Residential Efficiency Scorecard. Targeted funding programs would also help community groups deliver on their priority actions.

Many stakeholders also look to the Victorian Government for support through its broader leadership on climate change, for example, through strong emissions reduction targets, the adoption of electric vehicles and more robust planning and building standards. Helping communities across Victoria to develop and implement community transition plans would energise community climate change action across the state and ensure that communities continue to play a key role in tackling climate change.

Findings and recommendations

2 Leadership, strategy and advocacy

RECOMMENDATION 1: That the Victorian Government collaborate with communities and other partners to produce local emissions inventories for all regions in Victoria. 21

RECOMMENDATION 2: That the Department of Environment, Land, Water and Planning prepare implementation plans for each Regional Renewable Energy Roadmap detailing measurable actions and target dates for the achievement of those actions for the Department and other key actors. 23

FINDING 1: The impacts of climate change and the transition to a zero emissions economy will not be equally shared among Victorian communities, including those in different parts of the state, with different local industries, and with different social and economic characters. 24

RECOMMENDATION 3: That the Victorian Government strengthen its approach to community engagement under the *Climate Change Act 2017*. 26

FINDING 2: The Victorian Greenhouse Alliances are a leading example of collaboration for climate change action. A key strength of the Greenhouse Alliance model is that it facilitates action to tackle climate change through the establishment of consensus between the individuals who represent member municipalities. 33

RECOMMENDATION 4: That the Victorian Government work to strengthen the Greenhouse Alliances and provide assistance to enable local governments to fully participate as members of their respective Alliance. The Government should also work to extend coverage of the Greenhouse Alliances to all Victorian local governments. 34

FINDING 3: Local community advocacy has been a key factor behind Victorian local governments recognising and responding to the challenges of climate change. 38

3 Education and knowledge sharing

FINDING 4: Victoria is fortunate to have a wide range of community groups that are actively engaged in educating the public and working to promote action to tackle climate change. 44

FINDING 5: Victorian community organisations and local councils are effective and innovative in their delivery of education and engagement programs, within resource constraints, to improve the understanding of climate science and drive emissions reduction action by individuals and households. 50

FINDING 6: Culturally and linguistically diverse communities may not be receiving adequate information that empowers them to reduce their emissions and adapt to climate change. 51

RECOMMENDATION 5: That Victorian Government agencies, such as Sustainability Victoria, assess how effectively climate change and sustainability behaviour change programs are reaching culturally and linguistically diverse communities and examine what further work is required to tailor programs to these communities. 51

RECOMMENDATION 6: That Sustainability Victoria work with local government and community organisations to develop an integrated strategy for behaviour change programs on emissions reduction and climate change adaptation. 52

RECOMMENDATION 7: That all Victorian Government-funded behaviour change campaigns on emissions reduction and climate change adaptation are transparently evaluated and that all evaluation reports be published. 53

FINDING 7: Communities across Victoria are helping to build scientific understanding of the impacts of climate change, which will in turn assist communities and government organisations to better manage these ongoing impacts. 55

RECOMMENDATION 8: That Sustainability Victoria work with schools and the Department of Education and Training to improve the accessibility of the ResourceSmart Schools program and expand the number of non-profit partners involved in delivering the program. 56

FINDING 8: Climate change impacts such as more intense droughts, bushfires and heatwaves will have substantial physical and mental health impacts on Victorians. 59

FINDING 9: Many Victorians are concerned by the broader relationship between mental health and climate change. 59

RECOMMENDATION 9: That the Victorian Government research the link between climate change and mental health and how this should be incorporated into treatments by clinicians. 59

RECOMMENDATION 10: That the Victorian Government consider the contribution of climate change in its implementation of the recommendations of the Royal Commission into Victoria's Mental Health System. 60

4 Community energy

RECOMMENDATION 11: That the Victorian Government work with regulators, electricity distributors and other stakeholders to establish a pilot microgrid in a bushfire-prone area of Victoria that is capable of operating while disconnected from the main electricity grid during an emergency. 72

RECOMMENDATION 12: That the Victorian Government advocate to the Commonwealth Government and other governments for reforms to the ring-fencing regulations that would enable electricity distributors to access the full benefits from battery infrastructure, while maintaining appropriate safeguards. 73

RECOMMENDATION 13: That the Department of Environment, Land, Water and Planning collaborate with the Essential Services Commission and community energy groups to develop reform proposals that would better enable the development of community-owned batteries and local energy trading. 74

RECOMMENDATION 14: That the Community Power Hubs engage with Aboriginal Corporations to explore the development of community energy projects. 79

FINDING 10: There is substantial ambition across Victoria for the development of mid-scale community energy projects. However, community energy groups in Victoria continue to face a number of challenges and barriers, which to date have limited the development of mid-scale projects in the state. 79

FINDING 11: Local governments, state-owned corporations and businesses are supporting renewable energy development in Victoria through power purchase agreements. 86

RECOMMENDATION 15: That the Department of Environment, Land, Water and Planning provide assistance to organisations to enter into power purchase agreements, including facilitating the aggregation of organisations into renewable energy buyers’ groups. 86

RECOMMENDATION 16: That the Victorian Government ensure its upcoming Victorian Renewable Energy Target auction sources 100% renewable electricity to cover the consumption of all Victorian public service bodies, public entities and state-owned infrastructure that are not already sourcing 100% renewable electricity to the maximum practical extent. 88

RECOMMENDATION 17: That the Department of Treasury and Finance in consultation with the Department of Environment, Land, Water and Planning commission modelling on different purchasing models, including a centralised purchase model, for government electricity consumption to ensure Victorian Government agencies are receiving the best possible price now and into the future. 89

RECOMMENDATION 18: That the Department of Environment, Land, Water and Planning commission and then publish further modelling of the economic and social benefits of local investment in renewable energy projects in Victoria’s regions. 90

RECOMMENDATION 19: That the Victorian Government extend and expand the Community Power Hub pilot program in support of the Victorian Renewable Energy Target. 92

FINDING 12: Victorian local governments and community organisations are finding a range of innovative ways to increase the uptake of solar power on Victorian buildings and to improve access for low income households. 98

FINDING 13: A range of issues within the electricity network and market, particularly grid constraints, curtailment and connection delays, are hampering community energy projects in Victoria, by reducing investment opportunity and certainty, delaying project completion and increasing technical complexity. 100

FINDING 14: The electricity grid is rapidly transitioning to renewable energy and will be capable of operating with very high levels of renewable energy. However, the operation of the National Electricity Market will require reform to enable these very high levels of renewable energy to be integrated into the grid. These market reforms, depending on the nature of the reforms and how they are implemented, could better enable participation by some stakeholders, such as consumers with rooftop solar and community energy groups, in the reformed market. **104**

RECOMMENDATION 20: That the Victorian Government advocate for electricity system and market reforms that enable the development of community energy projects and facilitate the installation of rooftop solar by households and businesses. **105**

RECOMMENDATION 21: That in order to maximise the capacity for new renewable energy projects, the Victorian Government work with the New South Wales Government to accelerate the planning of VNI West to enable construction of the new transmission infrastructure by 2026–27 at the latest. **111**

RECOMMENDATION 22: That the Department of Environment, Land, Water and Planning conduct a registration of interest process to understand the scale, type and location of potential projects in renewable energy zones with increased capacity due to priority transmission upgrades. This should be done with a view towards a future transparent and market-led allocation of connection capacity in these renewable energy zones. **113**

RECOMMENDATION 23: That the Department of Environment, Land, Water and Planning, as part of its annual reporting on the Victorian Renewable Energy Target, publish data on the ownership and business structure of renewable energy generation in Victoria, including small scale generation. **113**

RECOMMENDATION 24: That the Victorian Government establish a dedicated Community Energy Target component within the Victorian Renewable Energy Target. **115**

RECOMMENDATION 25: That the Department of Environment, Land, Water and Planning commission research to understand the impact of a community energy feed-in tariff on household retail electricity prices and model this against other policy options for long-term revenue support for community energy projects. **118**

RECOMMENDATION 26: That the Victorian Government develop formal mechanisms to support the development of mid-scale community energy projects—with a capacity of between 1 MW and 10 MW—in Victoria. **120**

RECOMMENDATION 27: That the Victorian Government develop one or more pilot social access solar gardens in Victoria. 121

FINDING 15: Large variation between quoted and actual connection costs create substantial uncertainty for mid-scale renewable energy developers and are a major barrier for this type of project. 123

RECOMMENDATION 28: That the Department of Environment, Land, Water and Planning work with stakeholders to develop and regularly publish data on available capacity, estimated connection costs and projected demand for connections for mid-scale renewable energy project connections in the Victorian electricity distribution network, to provide greater guidance and investment certainty for these projects. 124

5 Energy efficiency and buildings

RECOMMENDATION 29: That the Victorian Government collect and publish consistent data on the sustainability performance or rating of all new government construction projects and upgrades with a value over \$2 million. 128

RECOMMENDATION 30: That the Victorian Government establish a Sustainable Government Buildings Community of Practice to collaborate on best practice environmentally sustainable design in Government building projects. This group should include representation from the Department of Treasury and Finance, Victorian Government Architect, Sustainability Victoria, and all Victorian government building and infrastructure authorities. 132

RECOMMENDATION 31: That the Sustainable Government Buildings Community of Practice, as its first item of business, work to harmonise Victorian Government sustainability guidelines for Government building projects. This should include consultation with industry groups and experts. 132

RECOMMENDATION 32: That the Victorian Government provide Victorian Residential Efficiency Scorecard assessments for any home receiving assistance through the Victorian Solar Homes program. 138

RECOMMENDATION 33: That the Victorian Government phase in a subsidy available to all homeowners who undertake Victorian Residential Efficiency Scorecard assessments. 138

FINDING 16: Existing sustainability and energy efficiency rating systems for buildings are fit for purpose and each has a distinct purpose. However, the diversity of rating schemes and their use of technical language has the potential to confuse consumers. **139**

RECOMMENDATION 34: That the Victorian Government investigate the feasibility, benefits and costs of a mandatory disclosure scheme for residential building energy efficiency to provide prospective buyers and tenants information on the energy efficiency of a dwelling. This investigation should include detailed consultation with industry and consider:

- a. whether disclosure should occur during a sale or lease, or both
- b. at what point in the process disclosure should occur
- c. what rating or information should be included on any certificate of disclosure
- d. the time period of validity of any certificate of disclosure
- e. how disclosure should operate for new homes, including for dwellings purchased off-the-plan.

141

FINDING 17: Home energy efficiency upgrade programs have health, comfort and wellbeing benefits in addition to lowering the cost of energy bills and reducing carbon dioxide emissions. **145**

RECOMMENDATION 35: That the Victorian Government significantly increase the scale of programs to upgrade the energy efficiency of the homes of low income Victorians. **145**

RECOMMENDATION 36: That the Victorian Government investigate minimum energy efficiency standards for public and private rental dwellings. This should include consultation with tenancy and property owners' associations and industry. Any new standards should be implemented for public housing well in advance of their introduction to the private market. **148**

RECOMMENDATION 37: That the Victorian Government strongly consider the installation of rooftop solar PV when retrofitting public housing dwellings. **148**

6 Local government

RECOMMENDATION 38: That the Department of Environment, Land, Water and Planning expedite the release of the findings and data from reviews that address local government roles and responsibilities related to climate change. **153**

RECOMMENDATION 39: That the Victorian Government consider the establishment of a long-term infrastructure fund to support local organisations in mitigating the consequences of climate change on public infrastructure, especially infrastructure that mitigates climate change-related hazards. **154**

FINDING 18: Environmental Upgrade Finance is a highly effective financing mechanism for energy efficiency upgrades and the installation of rooftop solar PV. Expansion of Environmental Upgrade Finance across all local government areas in Victoria would enable more businesses and homeowners to access this form of capital for enhancing energy efficiency and rooftop solar. **156**

RECOMMENDATION 40: That the Department of Environment, Land, Water and Planning consult with local governments that do not offer Environmental Upgrade Finance to understand the barriers to its broader adoption and introduce reforms to expand it across all local government areas. **156**

RECOMMENDATION 41: That the Victorian Government resume Sustainability Victoria's Local Government Energy Saver Program to provide targeted support to resource-constrained councils across regional Victoria and consider extending the program to a larger number of councils. **159**

RECOMMENDATION 42: That the Department of Transport fund its equitable share of major road lighting upgrades, where the operating costs of the lighting are shared with local government. This funding should be provided up front, rather than in arrears. **162**

RECOMMENDATION 43: That the Victorian Government consider reforms to the responsibilities for installation, operation and funding of street lighting to better enable future upgrades for energy efficiency. This should include consideration of the installation of metering on street lights. **163**

RECOMMENDATION 44: That the Victorian Government instruct the Essential Services Commission to consider the impacts of climate change in its regulation of water corporations, including pricing reviews. **165**

FINDING 19: Despite substantial potential for emissions reduction and climate change adaptation through Victoria’s planning system, there is limited connection between the *Planning and Environment Act 1987* and the *Climate Change Act 2017*. 172

RECOMMENDATION 45: That the Victorian Government seek to amend the *Planning and Environment Act 1987* and/or the *Climate Change Act 2017* to ensure that consideration of climate change receives stronger emphasis in the Victorian planning system. 173

FINDING 20: The introduction of a single state-wide Environmentally Sustainable Design policy would improve the energy efficiency of the built environment, deliver greater consistency for industry and enable better resource allocation to policy implementation by local governments. 176

RECOMMENDATION 46: That the Victorian Government amend the State Planning Policy Framework to include a single Environmentally Sustainable Design policy. 176

FINDING 21: The planning system presents substantial opportunities for climate change adaptation, particularly to mitigate heatwaves and other extreme weather events. 178

FINDING 22: Minimum standards for energy efficiency in new residential construction are standard among the residential design and construction industry. Relatively few new dwellings significantly exceed these standards. 179

RECOMMENDATION 47: That, as part of the implementation of the *Trajectory for Low Energy Buildings*, the Victorian Government seek clear advance guidance for construction businesses on target energy performance standards that will form part of any planned updates to the National Construction Code beyond 2022. 181

RECOMMENDATION 48: That the Department of Environment, Land, Water and Planning consult with local government and the building industry on options to improve the alignment of planning and building regulation to better consider climate change impacts and environmentally sustainable design. 182

RECOMMENDATION 49: That the Victorian Government explore options for improving compliance with sustainability requirements of planning and building. 184

RECOMMENDATION 50: That the Victorian Government provide funding to the development of a regional fast charging network as set out in the *Charging the Regions Outcomes Report*. 187

RECOMMENDATION 51: That the Victorian Government support the integration of electric vehicles into local government fleets including through:

- a. provision of technical support to regional councils so they have the capability for fleet integration
- b. exploration of financing options for less well-resourced councils. 188

RECOMMENDATION 52: That the Department of Treasury and Finance integrate electric vehicles into the Victorian Government fleet. 188

FINDING 23: The Committee anticipates that implementation of the recommendations of the *Inquiry into recycling and waste management* will address the issues related to waste management raised by stakeholders in this report. 192

7 Community initiatives on water, transport, waste management and food

FINDING 24: Victorian communities recognise that saving water is an important climate adaptation measure and have taken steps to reduce their water usage and increase water harvesting. 195

RECOMMENDATION 53: That the Victorian Government advocate to the Australian Government for the adoption of vehicle emissions standards consistent with or better than Euro 6 and for strong consideration of separate CO₂ emissions or fuel efficiency standards for passenger and light commercial vehicles. 197

RECOMMENDATION 54: That the Victorian Government commence a phased replacement of the public bus fleet with electric buses, utilising learnings from its electric bus trial. 199

RECOMMENDATION 55: That the Victorian Government use electric buses to pilot innovative and flexible modes, such as demand-responsive transport, for the expansion of public transport services to areas with less access. 199

RECOMMENDATION 56: That the Victorian Government explore options to have the metropolitan train network powered by 100% renewable energy. 200

FINDING 25: Victorian communities are working to minimise waste going to landfill with a focus on reducing the prevalence of single-use items and promotion of the repair of damaged goods. 203

FINDING 26: Victorian communities are deriving a range of social and health benefits, learning about food production, and reducing emissions associated with food miles and food waste by contributing to community gardens. 205

RECOMMENDATION 57: That the Victorian Government establish a small grants program for neighbourhood houses and community groups to establish, maintain or improve community gardens. 205

RECOMMENDATION 58: That the Victorian Government work urgently with food rescue and relief organisations to identify priority areas for assistance to increase the amount of food diverted from waste and meet higher demand, including through the identification of opportunities to rescue food at all points in the supply chain. 206

8 Agriculture and urban forestry

RECOMMENDATION 59: That the Department of Environment, Land, Water and Planning work with Agriculture Victoria, Greenhouse Alliances, Catchment Management Authorities, the Bureau of Meteorology, CSIRO, farmers and other stakeholders to produce regional projections of climate impacts on agriculture. These projections should be made available through online tools, and support should be provided to farmers to ensure they can integrate them into their businesses. This work should seek to expand on the approach taken by projects such as the North East Catchment Management Authority's *Embedding Climate Adaptation in Agriculture*. 211

RECOMMENDATION 60: That the Victorian Government increase extension support to Victorian farmers to better enable them to adapt to and mitigate climate change. This should include increased funding for existing extension activities by organisations such as Catchment Management Authorities and Landcare, the upskilling of agronomists and other advisors in the private sector and the employment of more extension officers by Agriculture Victoria and/or the Department of Environment, Land, Water and Planning. 216

FINDING 27: Many of the agricultural practices required for climate change adaptation and mitigation are already being adopted by Victorian farmers through their commitment to sustainable farming and the diversification of their business models.

218

FINDING 28: Planned grazing has significant potential to improve both the long-term viability of grazing enterprises and their contribution to carbon sequestration. While peer learning, particularly as promoted by organisations such as Landcare and the Catchment Management Authorities, has made a significant contribution to the uptake of planned grazing and related practices, there is a need for funding to further promote its uptake.

221

RECOMMENDATION 61: That Agriculture Victoria investigate the outcomes of planned grazing in Victoria, with a view to the potential for its wider promotion through existing extension activities.

221

FINDING 29: Agroforestry in the form of multipurpose forests on farms has unique potential to contribute to the production of forest products, improve long-term farm viability and help tackle climate change through sequestration of carbon across much of Victoria.

226

RECOMMENDATION 62: That the Victorian Government:

- a. introduce measures to ensure that public investment in land conservation and biodiversity within agricultural land, including through Landcare, allows for a degree of carefully planned agroforestry
- b. ensure that any codes of practice for forestry on farms are outcome oriented rather than prescriptive and recognise the right of farmers to harvest their agroforestry crops, while also allowing for innovation in harvesting practices
- c. invest in a state-wide landholder and community education extension program on the benefits of agroforestry, including support for farmer networks, industry engagement, the Master TreeGrower Program and Peer Group Mentoring
- d. support agroforestry harvesting, milling and drying trials with industry, including brokers, harvesting contractors, transport companies, timber processors, builders and furniture makers, to boost the take-up of agroforestry practices and the marketing of its products.

227

FINDING 30: Community forestry may offer benefits for some rural communities, for example, as a way of utilising previously degraded Crown land.

229

FINDING 31: The Mornington Peninsula represents a food bowl of both regional and state-wide significance. The development of the Hinterland Environmental Water Scheme and the Tyabb-Somerville scheme would have major economic, carbon sequestration and bushfire suppression benefits, while enabling agricultural producers in the region to significantly expand their output. 236

RECOMMENDATION 63: That the Government investigate business models, including pricing and economic incentives, that would underpin and promote the take-up of recycled water by agricultural enterprises. 236

FINDING 32: Many local governments, along with Landcare and other community groups, are engaged in the planting of trees in urban areas to improve streetscapes, reduce the urban heat island effect, and achieve other social and environmental benefits. 241

RECOMMENDATION 64: That the Victorian Government investigate opportunities for the integration of underutilised Crown land into biolink projects with revegetation and protection activities to be led by local Landcare and other community groups. 246

9 Disaster resilience

FINDING 33: Community-based emergency management can deliver a range of benefits including improved disaster resilience. It works best when approaches are bottom-up and community focused. There are opportunities for learnings to be shared among engaged communities and facilitating organisations. 253

FINDING 34: The adoption of a systematic and coordinated approach to existing community-based emergency management programs would be required to scale up the number of communities involved. 254

RECOMMENDATION 65: That Emergency Management Victoria assume a leadership role in ensuring that the lessons from different community-based emergency management approaches are shared in an ongoing way and work to scale these up to more communities across Victoria. 254

FINDING 35: Climate-change related hazards, including heatwaves and bushfires, can have serious and substantial impacts on human health. Victorian local governments and community groups are developing and delivering programs to increase the preparedness of the Victorian community for these disaster events. 260

RECOMMENDATION 66: That Emergency Management Victoria and the Department of Health and Human Services ensure that when Municipal Emergency Management Plans and Municipal Public Health and Wellbeing Plans are reviewed, they adequately plan for heatwaves with a focus on heat impacts on people who are especially vulnerable, including people who are registered on the Victorian Vulnerable Persons Register. All local councils should also be required, under their government disaster plans, to advertise the locations where vulnerable persons can seek refuge during heatwaves and other emergencies. 261

RECOMMENDATION 67: That Emergency Management Victoria work with the community sector to develop a framework to improve the sector’s resilience and business continuity. 263

RECOMMENDATION 68: That the Victorian Government establish a program to install renewable off-grid generation and storage systems at emergency facilities to ensure continued operations during an emergency. 265

10 Financing community climate action

RECOMMENDATION 69: That the Department of Environment, Land, Water and Planning review the New Energy Jobs Fund, particularly the benefits and outcomes delivered by its rounds of grant funding to date, with a view to providing further rounds of grant funding in the future. 269

FINDING 36: The amount of community interest in climate change action funding from the Victorian Government is far higher than the amount of funding available. This can result in frustration given the substantial amount of time and effort that is invested by community volunteers in preparing grant applications. 270

RECOMMENDATION 70: That, given the substantial time and effort invested by community groups in preparing grant applications for climate change action projects, the Victorian Government introduce a two-stage process with an initial expression of interest stage for the purpose of shortlisting applicants. 270

FINDING 37: Complex and lengthy grant application processes can disadvantage organisations that are smaller or have less grant writing experience. 274

FINDING 38: Securing ongoing funding can be a barrier for the implementation of successful pilot projects. 276

RECOMMENDATION 71: That the Victorian Government commit at least \$20 million to fund the development and implementation of community transition plans in at least 20 communities across the State.

278

RECOMMENDATION 72: That the Victorian Government fund staff across Victoria to support community climate change action groups.

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Acronyms and terms

AEMO	Australian Energy Market Operator, the entity responsible for operating the National Electricity Market in Australia's eastern and south-eastern seaboard and the Wholesale Electricity Market in Western Australia.
Agroforestry	A combination of agriculture and forestry, where trees are cultivated on agricultural land.
Ballarat Renewable Energy and Zero Emissions (BREAZE)	A community group focused on sustainability and community energy projects based in Ballarat. They hosted the Ballarat Community Power Hub.
Barwon Region Alliance for Community Energy (BRACE)	A community energy group based in the Barwon region.
Behind-the-meter	A renewable energy installation that is primarily used by the occupier of the site, rather than for export or sale to the electricity grid. Behind-the-meter systems are often sized to minimise or eliminate any export of electricity.
BESS	Built Environment Sustainability Scorecard—a sustainability rating system that measures a range of Environmentally Sustainable Design elements in a development proposal against benchmarks.
Carbon dioxide equivalent (CO ₂ -e)	A standard unit for measuring the emissions from a particular project or economic sector. It accounts for the different impacts on global warming of different greenhouse gases. Emissions from these gases, such as methane and nitrous oxide, are treated as though they were the equivalent amount of carbon dioxide.
Carbon neutral	See Net zero.
Carbon sequestration	The long-term removal of carbon dioxide from the atmosphere. This can occur through the planting of forests, changing land management practices, or the capture and storage of carbon dioxide emissions in reservoirs deep underground.
CASBE	Council Alliance for a Sustainable Built Environment—an association of Victorian councils that seeks to increase environmental sustainability in the built environment through planning and design approaches.
Catchment Management Authority (CMA)	Victorian Government agencies responsible for the integrated planning and coordination of land, water and biodiversity management in each of ten catchment and land protection regions.
CERES	A Melbourne-based environmental education centre, urban farm and social enterprise hub.
Citizen science	Public participation or collaboration in scientific research.
Country Fire Authority (CFA)	A volunteer-based fire and emergency service that serves most of country Victoria. It is a Victorian statutory authority.
Climate change	Changes to the long-term climate, including averages and extremes, that are being caused by an enhanced greenhouse effect due to human emissions of greenhouse gases.
Climate change adaptation	Measures to manage or adapt to the harmful impacts of climate change.
Climate change mitigation	Measures to reduce or eliminate the emissions of greenhouse gases and extract greenhouse gases from the atmosphere.

Climate emergency declaration	A statement by a government, business or other organisation that climate change represents a severe threat and requires immediate action.
COAG Energy Council	The former Ministerial forum for the Commonwealth, states and territories and New Zealand to work together in the pursuit of national energy reforms. It is being replaced by the Energy National Cabinet Reform Committee.
Coastal erosion	The loss of land or long-term removal of sediment and rocks along a coastline due to actions of the sea, including sea level rise due to climate change.
Community-based emergency management	The development of emergency management plans, strategies or projects with strong involvement from or leadership by the community.
Community climate action	Any activity by an individual, group, business, local government or collective aimed at addressing the causes or impacts of climate change.
Community energy	Community energy refers to community participation in renewable energy or energy efficiency projects. Examples include collecting community donations to install solar panels on a community building or a community investing in the construction of a small wind or solar farm.
Community Power Hubs	A model for developing local community energy projects and expertise with high levels of community involvement, funded by the Victorian Government.
CSIRO	Commonwealth Scientific and Industrial Research Organisation, Australia's national science research agency.
DC	Direct current—a reference to the type of charging technology that fast and ultra-fast electric vehicle chargers use.
DELWP	Department of Environment, Land, Water and Planning—the Victorian Government department responsible for energy and climate change issues.
Disaster resilience	The capacity of individuals, institutions, businesses and systems to adapt, survive and thrive no matter what kind of disasters or other shocks they experience.
Distribution network	The network that delivers electricity from substations to homes and businesses at high and low voltages via powerlines. In Victoria the distribution network typically operates at voltages of 415 V and 66 kV.
DNSP	Distribution Network Service Provider, a regulated company which owns, maintains and operates a distribution network. In Victoria these are Powercor, AusNet Services, Jemena, CitiPower and United Energy.
Economic, Education, Jobs and Skills Committee (EEJSC)	A former joint investigatory committee of the 58th Parliament of Victoria.
Electricity distributor	See DNSP.
Electricity grid	The transmission and distribution network that delivers electricity from generators to consumers.
Energy efficiency	Reducing the energy, typically electricity, required to undertake an activity, such as heating or cooling a home.
Environmental Upgrade Finance	A type of loan that enables businesses and households to install solar panels and undertake energy efficiency upgrades. The loan is tied to the property and repaid through council rates.

Acronyms and terms

Emergency Management Victoria (EMV)	The Victorian Government agency that leads Victoria's system for managing emergencies and enhancing disaster resilience.
EPA	Environment Protection Authority—Victoria's independent environmental regulator.
ESD (ecologically/environmentally sustainable design/development)	Design, construction and building management practices that achieve high levels of environmental sustainability in buildings and other developments.
Essential Services Commission (ESC)	The independent economic regulator of the electricity, gas, water, transport and local government sectors in Victoria.
EV	Electric vehicle—a vehicle that uses batteries or fuel cells to generate electricity to power the vehicle's motion.
Feed-in tariff	A rate paid for electricity fed back into the electricity grid from a renewable energy generator.
Food Organics and Garden Organics (FOGO)	A waste management stream of food and garden waste, including kitchen scraps, lawn clippings, small branches and garden debris.
Front-of-meter	As opposed to behind-the-meter, an energy generation or storage system that is connected directly to the electricity grid and optimised to sell electricity in the National Electricity Market.
Green Star (rating system)	A national, voluntary rating system for sustainable buildings and communities.
Greenhouse Alliances	Eight networks, composed of 70 of Victoria's 79 municipalities and a variety of other organisations, that aim to facilitate regional action and collaboration on emissions reduction and climate change adaptation.
Greenhouse gas	Any gas which contributes to the greenhouse effect by trapping heat in the Earth's atmosphere. These include carbon dioxide, water vapour, nitrous oxide, methane and ozone.
GW	Gigawatt, a measure of installed energy generation capacity equal to 1,000 MW.
GWh	Gigawatt hours, a measure of energy generated over a period of time equal to 1,000 megawatt hours.
Hinterland Environmental Water Scheme (HEWS)	A proposal to connect the Mornington Peninsula's hinterland region to a permanent supply of high-quality recycled water.
Integrated Water Management (IWM)	A holistic approach to managing water resources that considers the full water cycle to maximise social, environmental and economic outcomes.
Inverter	An electronic device that connects solar PV, battery and most modern wind turbines to the electricity grid. Inverters ensure that the output of the generator matches the alternating current of the grid.
Islandable microgrid	A microgrid that is capable of independent operation if electricity supply to the main grid is lost.
kV	Kilovolt—a measure of the voltage of electricity distribution and transmission lines.
kW	Kilowatt—a measure of installed energy generation capacity equal to 1,000 watts.
kWh	Kilowatt hours, a measure of energy generated over a period of time equal to 1,000 watt hours.

Land use, land-use change and forestry (LULUCF)	Net greenhouse gas emissions resulting from direct human-induced land use, change in land use and forestry activities. This includes emissions or sequestration associated with the clearing or planting of forests and from other practices that change emissions and sequestration in forests, croplands and grazing lands.
Landcare	A community-based organisation which involves local volunteers in land and environmental management, most commonly associated with tree planting.
Microgrid	A small electricity grid—a combination of electricity generators and users, wires to connect them and a control system.
Mt	Million tonnes.
Municipal Association of Victoria (MAV)	The peak body for local government in Victoria.
MW	Megawatt, a measure of installed energy generation capacity equal to 1,000 kW.
MWh	Megawatt hours, a measure of energy generated over a period of time equal to 1,000 kWh.
NABERS	National Australian Built Environment Rating System—a star rating system that measures, out of six stars, the environmental performance of apartment and commercial buildings, including offices, hospitals, hotels, shopping centres and data centres.
NatHERS	Nationwide House Energy Rating Scheme—a star rating system that assesses, out of ten, the energy efficiency of a home based on its design. It only assesses energy efficiency from a heating and cooling perspective.
National Construction Code (NCC)	The technical standards for the design and construction of buildings and other structures throughout Australia. It is published and maintained by the Australian Building Codes Board.
NEM	National Electricity Market—the wholesale electricity market and power system for eastern and southeastern Australia, which covers most of Queensland, New South Wales, the Australian Capital Territory, Victoria, South Australia and Tasmania.
Net zero	Net zero emissions, or carbon neutrality, an emissions reduction position where any emissions produced by an organisation or community are offset by carbon sequestration actions locally or elsewhere.
<i>Paris Agreement</i>	The <i>Paris Agreement</i> is a 2016 agreement within the United Nations Framework Convention on Climate Change. It addresses emissions reduction, climate change adaptation and finance. Its primary aim is to strengthen global action and seek to keep the global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C.
Planned grazing	The use of a range of management tools to create a particular pasture landscape that meets the goals of the land manager.
Power purchase agreement (PPA)	A longterm contract for the purchase of electricity output from an electricity generation project or facility.
PV	Photovoltaic, a technology for the direct conversion of sunlight into electricity. It is the most common form of electricity generation from sunlight.
Recycled water	Wastewater that has been collected and treated for re-use for a variety of non-drinking purposes.

Acronyms and terms

Renewable energy	Energy produced through natural resources that are constantly replaced and never run out on a human timescale. Examples include the use of sunlight, wind, rain, tides, waves, and geothermal heat.
Renewable Integration Study (RIS)	A project undertaken by AEMO to develop necessary market and technical reforms to enable high levels of renewable energy to be integrated into the NEM.
Ring-fencing	Rules in the National Electricity Market that prohibit transmission and distribution companies from engaging in wholesale or retail electricity market activities to preserve competition.
Split incentive	Split incentives occur with many energy efficiency or renewable energy measures where the entity responsible for the capital investment is not the same entity that stands to gain from reduced energy bills. Split incentives most often occur with rented buildings but can also refer to situations where budgetary treatment of capital, debt and operating expenditure presents a barrier to similar investment.
Stationary energy	Energy producing activities at a fixed location, including electricity and the use of gas in household and commercial heating and cooking. It also includes heating for industrial purposes.
Sustainability Victoria (SV)	A Victorian Government statutory authority that facilitates and promotes environmental sustainability in the use of resources.
Sustainable Development Goals (SDGs)	A set of 17 interconnected goals adopted by all nations, which aim to achieve a better and more sustainable future. Measurable targets for these goals are to be achieved by 2030.
TAKE2	A Sustainability Victoria program for registering the voluntary emissions reduction pledges of a range of organisations across the Victorian community.
Transmission network	The network that delivers electricity from power stations to substations and distribution networks at high voltage via transmission lines. In Victoria the transmission network typically operates at voltages of 220 kV and 500 kV.
Totally Renewable Yackandandah (TRY)	A community energy group with the objective of meeting 100% of Yackandandah's electricity needs using renewable energy.
Urban forestry	The practice of managing trees, forests and ecosystems in and around urban communities to maximise social and environmental benefits.
Urban heat island effect	The phenomenon of urban areas being warmer than the surrounding countryside due to reduced vegetation and increased pavement, buildings and other surfaces that absorb and retain heat.
V	Volt, a measure of the voltage of electricity distribution lines.
Victoria State Emergency Service (VICSES)	The Victorian Government agency responsible for overseeing the response to floods, storms, earthquakes, landslides and tsunamis and providing a range of emergency assistance to Victorian communities.
Victorian Climate Projections 2019 (VCP19)	A dataset of high-resolution climate projections for Victoria prepared by the Department of Environment, Land, Water and Planning and the CSIRO. It provides projections out to 2100 for two greenhouse gas emissions pathways.
Victorian Council of Social Service (VCOSS)	The peak body for Victoria's social and community sector.
Victorian Farmers Federation (VFF)	The peak body for farmers and agricultural businesses in Victoria.

Victorian Residential Efficiency Scorecard (VRES)	A scale for use by residents and homeowners to understand the comfort and energy efficiency levels of their homes.
Victorian School Building Authority (VSBA)	A statutory authority responsible for the construction of new schools and renovations of existing schools.
VRET	Victorian Renewable Energy Target—a Victorian Government commitment to generate 40% of Victoria’s electricity from renewable sources by 2025 and 50% by 2030.
VRET reverse auction scheme	A competitive process where proposed large-scale renewable energy projects bid for financial support from the Victorian Government—to help meet the VRET.
Wodonga Albury Towards Climate Health (WATCH)	A climate change advocacy group in the Albury-Wodonga region.
Zero-carbon economy/Zero emissions economy	An economic system in which the production of goods and services results in zero net emissions of greenhouse gases.
Zero net energy	Net zero emissions in the stationary energy sector.

On 1 May 2019, the Parliament of Victoria's Legislative Assembly gave the Environment and Planning Committee terms of reference to conduct an inquiry into tackling climate change in Victorian communities. The terms of reference directed the Committee to investigate what urban, rural and regional communities in Victoria are doing to tackle climate change and how the Victorian Government could support these communities.

Community climate action includes initiatives to reduce greenhouse gas emissions and to minimise the negative impacts of climate change on communities. Many actions aim to combine these objectives and deliver on other social, economic and environmental benefits. Other actions seek to ensure that the advantages of emissions reduction and adaptation projects are equitably distributed within communities. Community climate actions include developing community energy projects, enhancing energy and water efficiency, reducing waste, creating forests in urban and rural areas, educating the community, preparing for disasters and advocating for broader policy change. There is a diverse range of organisations involved in community climate action, including informal groups, well-established environmental non-profits, local governments, universities, businesses and networks of organisations.

There are many excellent examples of community climate action in Victoria that are explored throughout this report. Indeed, some examples are recognised as nation and even world leading. These include Victoria's Greenhouse Alliances, which coordinate climate action among local governments and have led the second largest public lighting energy efficiency program in the world, and the CERES Community Environment Park, which leads a range of education and demonstration initiatives in Victoria and internationally.

The interest in, and engagement with, this Inquiry demonstrates the enormous ambition throughout Victoria to act on climate change in locally-driven and innovative ways. The Committee has heard from many different organisations on a broad range of actions to tackle climate change. This ambition is demonstrated by the many communities, such as Hepburn Shire, with plans and strategies to achieve 100% renewable energy or net-zero emissions as early as 2025. While their actions are diverse, community organisations share a commitment to a zero-emissions, prosperous and climate-resilient future for Victoria.

Community organisations face many barriers in continuing to act on climate change. Challenges can be wide ranging and depend on the location and type of activity that communities are trying to implement, and the access that community has to the necessary skills and resources. However, some challenges are shared by many diverse community groups. The recommendations in this report aim to facilitate greater community climate change action and provide broader support to Victorian communities in adapting to and mitigating climate change.

1.1 Background

1.1.1 Climate change in Victoria

The Committee heard from many Victorians who have noted changes in the environment due to climate change. Mr Ian Onley, farmer and member of the Latrobe Valley Sustainability Group, explained the changes that he has observed at his family farm in Gippsland:

I grew up on a dairy farm, became a boilermaker and welder and returned to work on the same dairy farm at 26, 10 years later. My farm is situated on Merriman Creek, near Gormandale. That creek had always been a reliable stream and was never known to stop running until 2006. In 2019 it stopped again for about three months, leaving the valley without its traditional water supply and with the platypus and fish in drying pools. Around the year 2000 I had to cease vegetable production because of water scarcity and turned to egg production. The changes have been noticeable for about 20 years and are getting worse.¹

Mr Gil Hopkins, Acting Executive Officer, Wimmera Mallee Sustainability Alliance, outlined the extent of the environmental changes that he has observed in the west of the state:

I think a lot of people just do not understand what is happening with the environment. We live in the bush. The changes that are happening are incredible, but people just do not know.²

Professor David Karoly, Leader, Earth Systems and Climate Change Hub, CSIRO and Honorary Professor at the University of Melbourne, explained how these most recent changes compare to projected changes from climate models:

[W]hat you see [Figure 1.2 below] is that in the period from 2000 to 2019, or 2018—the projected changes, that funnel, is the full range of projections across the climate models—we are tracking at the worst case, the hottest, in year-by-year temperatures across Victoria. And not only is it getting hotter—if you look at the right-hand panel [Figure 1.3 below], which is wintertime rainfall, showing this pronounced decline in wintertime rainfall over Victoria with lots of year-to-year variability; we know that some winters are wet, some are dry—but we are tracking at the worst case of drying in winter as well. And it is not just winter, it is most of the cool season.³

1 Mr Ian Onley, Member, Latrobe Valley Sustainability Group, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 32.

2 Mr Gil Hopkins, Acting Executive Officer, Wimmera Mallee Sustainability Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 23.

3 Professor David Karoly, Leader, Earth Systems and Climate Change Hub, CSIRO, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 5; Professor David Karoly, Leader, Earth Systems and Climate Change Hub, CSIRO, *Presentation*, supplementary evidence received 26 February 2020, p. 4.

Dr Mark Norman, Chief Conservation Scientist, Parks Victoria, outlined some of the impacts of climate change that are already being observed in Victorian ecosystems and the ‘major transition’ that many are undergoing:

The New South Wales drought has completely killed the bogong moths that fly across Queensland and New South Wales to feed the mountain pygmy possums. They will probably be extinct in the wild in three years’ time. Now that stuff is happening everywhere. We have got staff that go out and used to see a hundred legless lizards and little native mammals, and they have not seen one now for three surveys.⁴

At Warby-Ovens National Park out of Wangaratta the canopy is so see-through now that there is no cover for arboreal possums to move through. At Mount Macedon the eucalypts are spontaneously dying on the north faces. Even the fire we flew over at Walhalla for the first time burnt to the creek lines, the dry creek lines, on the south and east faces. That is unprecedented.⁵

Under the *Climate Change Act 2017*, which is discussed further in Section 1.1.3, the Victorian Government must prepare a report every 5 years that summarises the best available science and data relevant to climate change in Victoria. The first of these reports—*Victoria’s Climate Science Report 2019*—was published by the Department of Environment, Land, Water and Planning (DELWP) in 2019 and provides big picture information on climate change, a summary of observed changes to Victoria’s climate, information about climate science and climate modelling, projections for Victoria’s future climate, and information on how to use climate science to support decision making.⁶ The remainder of this section highlights some of the key findings of this report.

Observed changes in Victoria’s climate

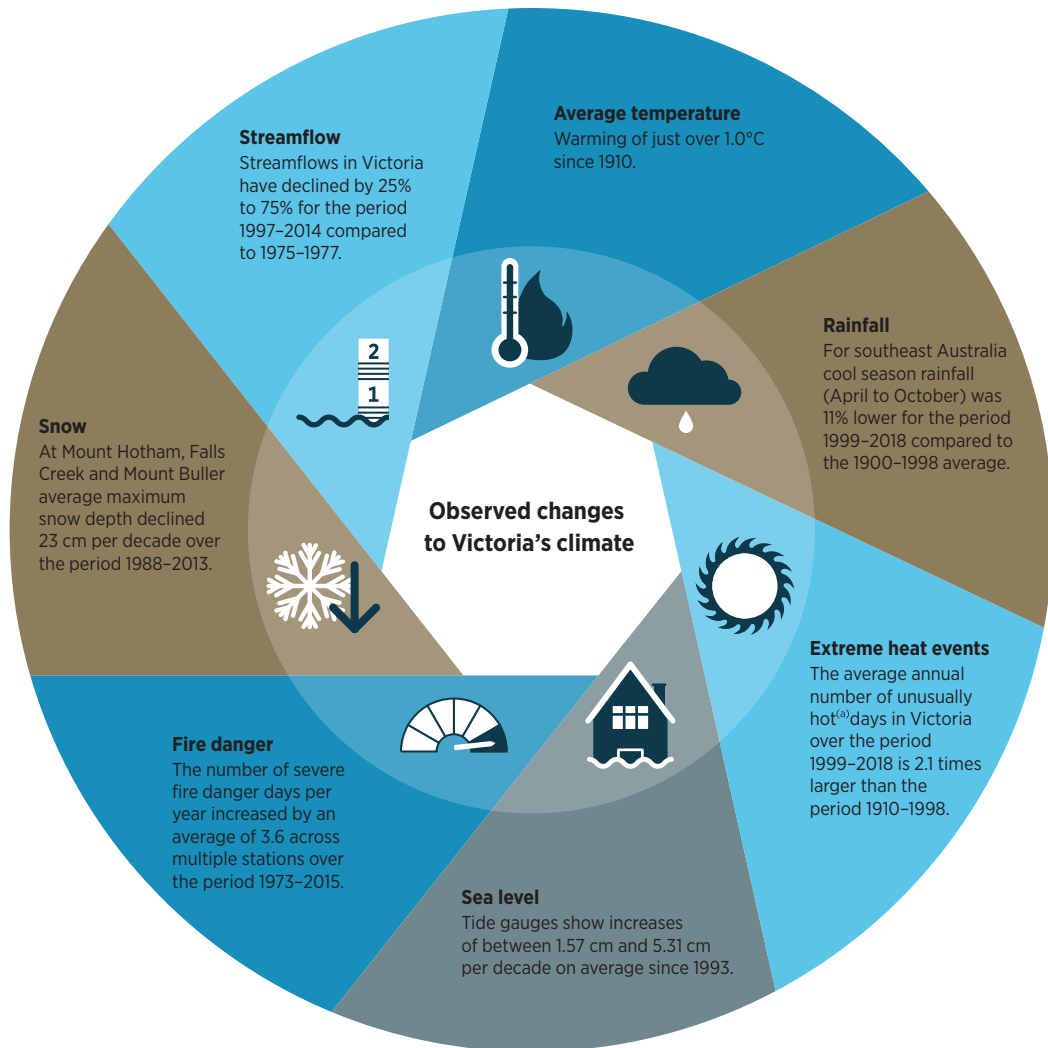
Victoria has a temperate climate with variations across the state, from alpine conditions in the mountains of the Great Dividing Range, to the wet hilly areas of Gippsland and hot dry weather in the northwest. Victoria’s rainfall is highly variable with different conditions from area to area, year to year, and decade to decade. For much of the State, most of the rain falls in the cool season from April to October. A range of seasonal climate influences, including the El Niño Southern Oscillation, Indian Ocean Dipole and Southern Annular Mode, impact Victoria’s climate, especially its rainfall, from season to season. Despite this variability, long term records show that Victoria’s climate is changing, as outlined in Figures 1.1, 1.2 and 1.3 below.

⁴ Dr Mark Norman, Chief Conservation Scientist, Executive Director of Environment and Science, Parks Victoria, public hearing, Melbourne, 28 October 2019, *Transcript of evidence*, p. 30.

⁵ *Ibid.*, p. 32.

⁶ Department of Environment, Land, Water and Planning, *Victoria’s Climate Science Report 2019*, State of Victoria, Melbourne, 2019.

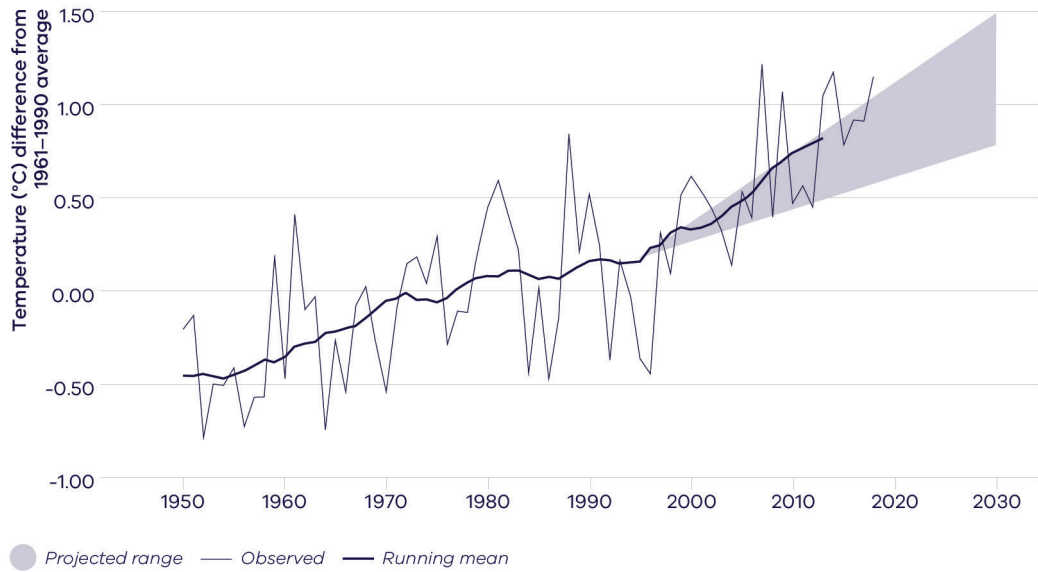
Figure 1.1 Observed changes to Victoria's climate



a. Days that are in the 99th percentile of temperatures for that month in the long-term average.

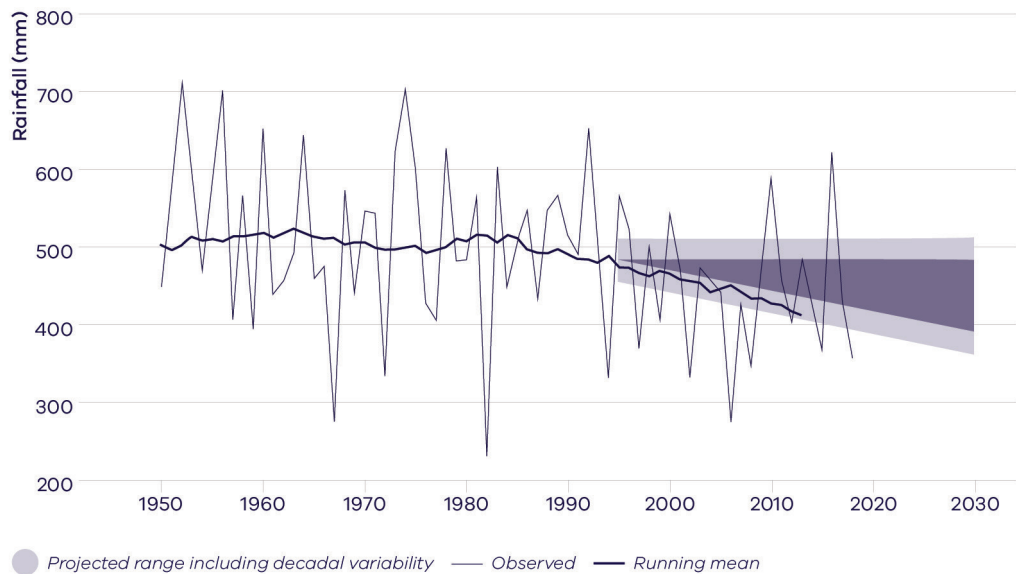
Sources: Department of Environment, Land, Water and Planning, *Victoria's Climate Science Report 2019*, State of Victoria, Melbourne, 2019; Bureau of Meteorology, CSIRO, *State of the Climate 2018*, Commonwealth of Australia, 2018; Bertrand Timbal et al., *Climate change science and Victoria*, Bureau of Meteorology, 2016; Sonya Louise Fiddes, Alexandre Bernardes Pezza, Vaughan Barras, 'A new perspective on Australian snow', *Atmospheric Science Letters*, vol. 16, no. 3, 2015, pp. 246–252.

Figure 1.2 Observed and projected range of annual average temperatures in Victoria



Source: Department of Environment, Land, Water and Planning, *Victoria's Climate Science Report 2019*, State of Victoria, Melbourne, 2019, p. 29.

Figure 1.3 Observed and projected range of winter rainfall in Victoria



Source: Department of Environment, Land, Water and Planning, *Victoria's Climate Science Report 2019*, State of Victoria, Melbourne, 2019, p. 30.

Future changes in Victoria's climate

Victoria's Climate Science Report 2019 summarises the latest available climate projections out to the 2090s, which include national models, modelling undertaken for the Victorian Climate Initiative, and the Victorian Climate Projections 2019 (VCP19). The VCP19 are local level climate projections for Victoria and were published in conjunction

with a detailed technical report, reports containing findings for ten regions of Victoria, and datasets to help specialists understand climate change impacts on local Victorian communities and industries.⁷

Victoria's future climate will depend on global greenhouse gas emissions over the coming decades. Climate scientists use four standard scenarios, known as Representative Concentration Pathways (RCPs), to project a range of possible future climates and enable them to compare the results of different models for the same emissions scenario. For Victoria, local-scale projections are available for two scenarios of global emissions:

- RCP 4.5, which sees global emissions peak around 2040 and global average temperatures 1.7°C to 3.2°C higher than pre-industrial levels by 2100. This is considered a 'medium' emissions scenario, under which there would only be a 20% chance of remaining within the 2°C target of the *Paris Agreement* by 2100.⁸
- RCP 8.5, which sees global emissions continue to increase and remain high, and global average temperatures 3.2°C to 5.4°C higher than pre-industrial levels by 2100. This is considered a 'high' emissions scenario under which all models exceed the 2°C target of the *Paris Agreement* by 2060.⁹

Table 1.1 summarises the projections of Victoria's future climate under these two scenarios.

Table 1.1 Projections of future climate in Victoria

Climate Variable	2030s	2050s	2090s
Average temperatures	Increase by between 0.55°C and 1.3°C compared to 1986–2005.	Under a medium emissions scenario, increase by between 0.9°C and 1.8°C compared to 1986–2005. Under a high emissions scenario, increase by between 1.4°C and 2.4°C compared to 1986–2005.	Under a medium emissions scenario, increase by between 1.3°C and 2.2°C compared to 1986–2005. Under a high emissions scenario, increase by between 2.8°C and 4.3°C compared to 1986–2005.
Extreme temperatures	Extreme temperatures are likely to increase by a similar amount to average temperatures, but with high regional variability. In some parts of the state, extreme maximum temperatures could increase by as much as twice the increase in average temperatures under a high emissions scenario.		Under a high emissions scenario, parts of Victoria could experience days of 55°C in summer and 33°C in winter.
Average rainfall	Rainfall projections have more uncertainty than temperature projections, but Victoria is likely to get drier over the long term. Rainfall is projected to decline in every season except summer, with greater declines on the western slopes of the Victorian Alps.		

⁷ Department of Environment, Land, Water and Planning, *Victorian Climate Projections 2019: Victorian Climate Projections 2019 delivers local-scale projections of Victoria's future climate*, 2019, <<https://www.climatechange.vic.gov.au/adapting-to-climate-change-impacts/victorian-climate-projections-2019>> accessed 18 December 2019.

⁸ JM Clarke, et al., *Victorian Climate Projections 2019: Technical report*, CSIRO, Melbourne, 2019, p. 71; Department of Environment, Land, Water and Planning, *Victoria's Climate Science Report 2019*, p. 23.

⁹ Ibid.

Climate Variable	2030s	2050s	2090s
Extreme rainfall	Extreme rainfall events are projected to become more intense with a 7% increase in intensity estimated for each degree of warming.		
Fire danger	-	Under a high emissions scenario, a 60% increase in high fire danger days for Bendigo, Ballarat and Shepparton compared to 1986–2005.	-
Snow	Snow depths and snow extent are projected to continue to decrease.	Snow cover and volume would decline by 70% to 86% under a high emissions scenario.	
Sea level rise	An increase of around 12 cm compared to 1986–2005.	For the 2070s, sea levels are expected to increase by 32 cm under a medium emissions scenario and 42 cm under a high emissions scenario compared to 1986–2005.	

Source: Department of Environment, Land, Water and Planning, Victoria's Climate Science Report 2019, State of Victoria, Melbourne, 2019, pp 28–36.

However, as Professor Karoly explained to the Committee, the above projections are based on the previous generation of climate models (CMIP5). A significant number of the next generation of climate models (CMIP6) predict an additional 1 degree Celsius of warming in Australia in 2100 in a high emissions scenario.¹⁰

That is, this new generation of models shows that under a high emissions scenario, average temperatures for Australia in 2090 are likely to be 2.7–6.3°C higher relative to 1995–2014 average temperatures, compared to the 2.5–5.1°C range predicted by the previous generation of models.¹¹

Under a lower emissions scenario consistent with the implementation of the *Paris Agreement*, the new generation of models do not show a significantly increased upper range of temperature projections compared to the old generation of models. This scenario projects average temperatures in Australia in 2090 would likely be 0–2°C higher relative to 1995–2014 average temperatures.¹²

The new generation of models is expected to be incorporated into Victorian projections in DELWP's next climate science report in 2024.

1.1.2 Victoria's greenhouse gas emissions

Under the *Climate Change Act 2017*, which is discussed further in Section 1.1.3, the Victorian Government must report annually on Victoria's greenhouse gas emissions. The *Victorian Greenhouse Gas Emissions Report 2019* is the second report prepared under the *Climate Change Act 2017* and the most recent available as at October 2020.¹³

¹⁰ Professor David Karoly, *Transcript of evidence*, p. 7; Professor David Karoly, *Presentation*, p. 6.

¹¹ M. R. Grose, et al., 'Insights From CMIP6 for Australia's Future Climate', *Earth's Future*, vol. 8, no. 5, 2020.

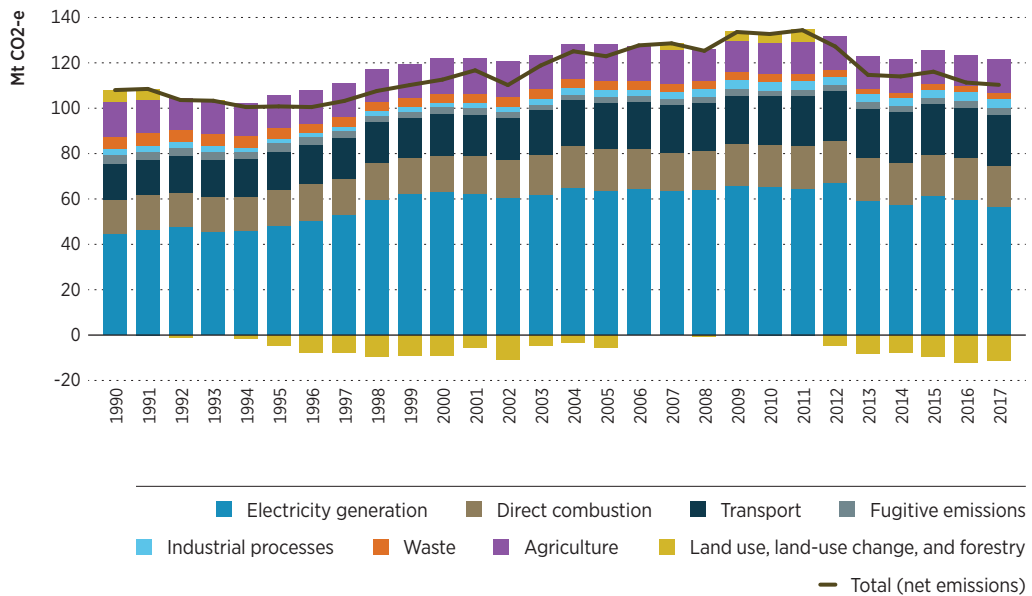
¹² Ibid.

¹³ Department of Environment, Land, Water and Planning, *Victorian Greenhouse Gas Emissions Report 2019*, State of Victoria, Melbourne, 2019.

This report provides an overview of Victoria’s greenhouse gas emissions from 1990 to 2017, the latest year for which official data was available, and a breakdown of the sectors and sources of those emissions, including an explanation of trends over time. The remainder of this section highlights the key findings of this report.

In 2017 Victoria’s emissions were 110.3 million tonnes (Mt) of carbon dioxide equivalent (CO₂-e), comprising 50.9% from electricity generation, 20.6% from transport, 16.4% from direct combustion, 13.5% from agriculture, 3.4% from industrial processes and product use, 3.0% from fugitive emissions, and 2.4% from waste. Land use, land-use change and forestry (LULUCF) provided net sequestration of 11.2 Mt CO₂-e, which is equivalent to -10.2% of net emissions.¹⁴ Figure 1.4 shows Victoria’s annual greenhouse gas emissions between 1990 and 2017.

Figure 1.4 Greenhouse gas emissions in Victoria



Source: Department of Environment, Land, Water and Planning, Victorian Greenhouse Gas Emissions Report 2019, State of Victoria, Melbourne, 2019, p. 6.

Victoria’s emissions have fallen by 10.3% since 2005, which is the reference year in the *Climate Change Act 2017*, with these reductions being driven by an increase in sequestration in the LULUCF sector of 6.0 Mt CO₂-e and a reduction in emissions from electricity generation of 7.4 Mt CO₂-e. Smaller reductions occurred in agriculture, waste and direct combustion, while emissions increased from transport, fugitive emissions from fuels, and industrial processes and product use. Excluding LULUCF, Victoria’s emissions fell by 5.2% or 6.7 Mt CO₂-e between 2005 and 2017.¹⁵

Between 2005 and 2017, per capita emissions fell by 29% to 17.4 t CO₂-e, which is below the national average of 21.7 t CO₂-e. Victoria’s emissions intensity, or the amount of

¹⁴ Ibid., p. 11.

¹⁵ Ibid., pp. 4-13.

greenhouse gases emitted compared to the size of the Victorian economy, also fell by 34% between 2005 and 2017.¹⁶

After discussing Australian emissions sources and projections, Professor Karoly summarised the findings of a 2019 United Nations climate summit:

There is not a lot of good news in this. I have talked about a bunch of these things already. We are already at 1.1 degrees Celsius above pre-industrial levels, halfway to the Paris target—or a little more than halfway. From 2015 to 2019 was the warmest five years globally. Climate impacts are hitting harder and sooner, a worse case than predicted even a decade ago. Unfortunately, there continues to be annual growth in carbon dioxide emissions, and we set in 2018 a new record. Emissions which had been hoped to peak in 2020 are now not expected to peak globally until 2030. That is not consistent with stopping CO₂ warming.

So what do we need to do in terms of current policies if we are going to realistically seek to limit emissions to only 2 degrees above preindustrial levels? We have to treble our current commitments, which would be consistent with if rather than a 26 to 28 % target for Australia in 2030 we had a 75 % emission target in Australia by 2030. Admittedly this is for all countries, and I think Australia is part of ‘all countries’. It does mean limiting global warming to below 2 degrees, and this is all based on pre the latest climate model simulations, and reductions in greenhouse gas emissions are required in all sectors.¹⁷

This establishes the clear challenge for Victorian communities to continue to play their part in tackling climate change.

1.1.3 Victoria’s climate change policy framework

Victoria’s climate change policy framework is underpinned by the *Climate Change Act 2017*, which establishes: emissions reduction targets; planning and reporting requirements; policy objectives to embed climate change in Government decision making; a pledging model; and provisions for forest, soil and land carbon sequestration.¹⁸ Ms Kylie White, Deputy Secretary, Environment and Climate Change, DELWP, explained that

[the Act] provides Victoria with a legislative foundation to manage climate change risks, maximise the opportunities that arise from decisive action and drive our transition to a climate-resilient community and economy with net zero emissions by 2050.¹⁹

Emissions reduction targets

The *Climate Change Act 2017* establishes a long-term emissions reduction target of net zero by 2050. Under the Act, Victoria’s emissions are defined as any emissions of

¹⁶ Ibid., pp. 9–10.

¹⁷ Professor David Karoly, *Transcript of evidence*, p. 11.

¹⁸ Department of Environment, Land, Water and Planning, *Submission 141*, received 26 September 2019, pp. 9–10.

¹⁹ Ms Kylie White, Deputy Secretary of Environment and Climate Change, Department of Environment, Land, Water and Planning, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 32.

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greenhouse gases in the state, minus any sequestration of greenhouse gases in the state, minus any offsets procured from outside the state. The Government must set interim emissions reduction targets for each five-year period until 2050, based on expert advice. The Government was due to announce the first two interim targets in March 2020 after consideration of the recommended ranges of 32% to 39% by 2025 and 45% to 60% by 2030 by its Independent Expert Panel.²⁰ As at October 2020, these targets had yet to be announced. The Committee understands that this delay is due to the COVID-19 pandemic and public health emergency.²¹ Targets for 2035 will next be determined in 2023.²²

Strategy, planning and reporting

The *Climate Change Act 2017* requires the Government to prepare and publish a climate change strategy every five years from 2020. The strategy must contain an emissions reduction and climate change adaptation component and consider other elements of the policy framework under the Act. Public consultation on a draft of the strategy is also required under the Act. The first strategy is required to be prepared by 31 October 2020.²³

In addition to the adaptation content in the climate change strategy, the Act requires adaptation action plans to be prepared every five years from 2021. These plans must outline the responsibilities of Government and others, how existing policies are addressing climate adaptation and further actions that may be necessary. Adaptation action plans must be prepared for a range of systems in Victoria, including the built environment, education and training, health and human services, natural environment, primary production, transport and water cycle systems. A *Pilot Water Sector Climate Change Adaptation Action Plan* was prepared in advance of the legislated 2021 requirements to test processes for developing adaptation action plans and share learnings.²⁴

The Act also requires the Government to periodically prepare and publish a number of other reports to provide transparency, accountability and inform the community:

- Climate science reports every five years, as discussed in Section 1.1.1
- Greenhouse gas emissions reports every year, as discussed in Section 1.1.2
- Reports on achievement against the interim emissions reduction targets within two years of the end of each interim target period.²⁵

²⁰ Independent Expert Panel on Interim Emissions Reduction Targets for Victoria, *Interim Emissions Reduction Targets for Victoria (2021–2030)*, 2019.

²¹ Sophie Vorrath, 'Victoria delays setting interim emissions targets, again, as Covid digs in', *Renew Economy*, 31 July 2020, <<https://reneweconomy.com.au/victoria-delays-setting-interim-emissions-targets-again-as-covid-digs-in-53222>> accessed 21 September 2020.

²² *Climate Change Act 2017* (Vic) s 10(3).

²³ *Climate Change Act 2017* (Vic) s 29(1).

²⁴ Department of Environment, Land, Water and Planning, *Submission 141*, p. 17.

²⁵ *Ibid.*, p. 9.

Policy objectives and decision making

The *Climate Change Act 2017* states that Government decisions, policies, programs and processes should consider climate change. The Act sets out policy objectives and guiding principles to embed climate change into Government decision making. These policy objectives are: emissions reduction, building resilience, supporting industries and communities to transition to a net zero economy, and promoting social justice and equity.²⁶ The Act also provides for the issuing of guidelines for Government departments and agencies on how they should implement the policy objectives and guiding principles. Of particular relevance to the current Inquiry, one of the guiding principles of the Act is community engagement:

It is a guiding principle of this Act that community involvement in decisions, policies, programs or processes relating to climate change that may affect members of the community or members of the community in future generations, especially members of vulnerable or marginalised communities, should be facilitated and this includes—

- a. providing appropriate information to the community; and
- b. providing opportunities for the community to be involved in the decision, policy, program or process; and
- c. providing for appropriate and adequate public consultation with the community.²⁷

In addition to consideration of these policy objectives, guiding principles, and any guidelines, the Act also requires certain decisions and actions to have regard for the potential impacts of climate change and their contribution to Victoria's greenhouse gas emissions. As at October 2020, these decisions relate to:

- Ministerial approval of Regional Catchment Strategies
- Ministerial consideration of a Marine and Coastal Policy and Marine and Coastal Strategy
- the works approval and licensing decisions of the Environment Protection Authority (EPA)
- the EPA's recommendation of new or amended state environment protection policies and waste management policies
- preparation, amendment or review of a Flora and Fauna Guarantee Strategy, action statements for listed species, flora and fauna management plans, and interim conservation orders
- preparation of the State Public Health and Wellbeing Plan or a municipal public health and wellbeing plan
- Ministerial consideration of a Sustainable Water Strategy.²⁸

²⁶ *Climate Change Act 2017* (Vic) s 22.

²⁷ *Climate Change Act 2017* (Vic) s 27.

²⁸ *Climate Change Act 2017* (Vic) sch 1.

Emission reduction pledges

The *Climate Change Act 2017* requires the Government to make a whole-of-government emissions reduction pledge every five years from 2020, to be incorporated into its climate change strategy. This pledge is for actions undertaken by government agencies to reduce emissions caused by their operations and activities, and an estimate of the amount of emissions reduction these actions will achieve.

The Act also requires the Government to make emissions reduction pledges for various emissions reduction sectors every five years from 2020. These sector pledges will likely be prepared for the energy (including electricity generation, transport, direct combustion and fugitive emissions), industrial processes and product use, agriculture, waste and LULUCF sectors.²⁹ Like the whole-of-government pledge, the sector pledges will contain actions to be undertaken by the Government to contribute to the reduction of emissions and an estimate of the amount of emissions reduction these actions will achieve.

Local governments in Victoria may also make voluntary pledges for emissions reduction within their influence under the Act. These pledges will contain actions undertaken by councils to contribute to the reduction of emissions and an estimate of the amount of emissions reduction the actions will achieve. These pledges can be made every five years from 2020. Of the 79 local governments in Victoria, 49 have made voluntary pledges under the Act.³⁰

Carbon sequestration

The *Climate Change Act 2017* contains several provisions to encourage the sequestration of carbon in vegetation and soils on private and Crown land, and to enable the owners of this sequestered carbon to economically benefit from it.

On private land, the Act recognises proprietary rights for forestry, carbon sequestration and soil carbon as an interest in the land. It also provides for the creation of forestry and carbon management agreements on private land to ensure the land is managed to sequester carbon in vegetation or the soil.³¹

The Act also provides for Crown land to be managed for carbon sequestration, including through entering into carbon sequestration agreements with third parties for the management of specific areas of Crown land.³² These agreements can grant organisations, such as the not-for-profit Greenfleet Australia, access to Crown land for sequestration activities like tree planting and ensure that they legally own that sequestered carbon.³³

²⁹ *Climate Change Act 2017* (Vic) ss 43–5.

³⁰ Ms Kylie White, *Transcript of evidence*, p. 33.

³¹ Victoria, Legislative Assembly, 2016, *Parliamentary debates*, vol. 4553, Book 16.

³² *Ibid.*

³³ Department of Environment, Land, Water and Planning, *Carbon sequestration a first*, 2016, <<https://www.climatechange.vic.gov.au/media-releases/carbon-sequestration-a-first>> accessed 23 December 2019.

1.2 Scope of the Inquiry

When calling for submissions, the Committee asked organisations to consider climate change mitigation and adaptation actions being taken by individuals and organisations, examples of best practice models, including those from interstate and overseas, and ways in which the Government can best support Victorian communities in their efforts.

The Committee has not limited its definition of community or climate change action, with the scope of the Inquiry being largely driven by the submissions received from community and interested organisations.

The timing of the current Inquiry coincided with the conduct or conclusion of several other inquiry and public consultation processes that address components of community climate change action. Notable among these was the process for setting interim emissions reduction targets discussed in Section 1.1.3. Many submissions to the Inquiry discussed these targets and all those that recommended a specific target called for targets at the higher end of the range or stronger than those recommended by the Independent Expert Panel.³⁴ The Committee notes that the setting of interim targets is a separate process to the current Inquiry and looks forward to the announcement of the first two targets by the Government.

1.3 Inquiry process

The Committee called for public submissions to this Inquiry in July 2019. Advertisements appeared in *The Age*, *The Border Mail*, *Ararat Advertiser*, *The Ballarat Courier*, *The Bendigo Advertiser*, *La Trobe Valley Express*, *Sunraysia Daily*, *Shepparton News*, and *Warrnambool Standard* as well as on Facebook and Instagram. The Committee also arranged for notice of the subsequent public hearings to be included on the Parliament of Victoria's Twitter and Facebook pages.

The Committee Chair wrote directly to over 240 key stakeholders, inviting each of them to make submissions to the Inquiry. These stakeholders included local and state environmental organisations, community energy groups, Landcare groups, industry associations, universities, and government departments and bodies at the federal, state and local levels.

³⁴ Friends of the Earth, *Submission 145*, received 12 November 2019, pp. 4–5; Brotherhood of St Laurence, *Submission 142*, received 26 September 2019, p. 3; South East Councils Climate Change Alliance, *Submission 136*, received 12 September 2019, p. 5; Law Institute of Victoria, *Submission 134*, received 11 September 2019, p. 2; Port Phillip EcoCentre, *Submission 133*, received 11 September 2019, p. 3; Mornington Peninsula Shire, *Submission 127*, received 2 September 2019, p. 5; City of Melbourne, *Submission 120*, received 2 September 2019, pp. 15–17; Northern Alliance for Greenhouse Action, *Submission 118*, received 1 September 2019, p. 4; Moreland City Council, *Submission 116*, received 30 August 2019, p. 4; Dr Colin Hocking, *Submission 105*, received 26 August 2019, pp. 1–2; Community Power Agency, *Submission 99*, received 26 August 2019, p. 11; CERES, *Submission 96*, received 26 August 2019, p. 5; City of Port Phillip, *Submission 93*, received 26 August 2019, p. 4; SECAN (South East Climate Action Network), *Submission 87*, received 26 August 2019, p. 1; Beyond Zero Emissions, *Submission 75*, received 26 August 2019, p. 1; Coalition for Community Energy, *Submission 65*, received 26 August 2019, p. 4; Hepburn Wind, *Submission 64*, received 26 August 2019, p. 7; Dr Blanche Verlie, et al., ENV11212 Course Coordinator, School of Global, Urban and Social Studies, RMIT University, *Submission 59*, Attachment D, received 25 August 2019, p. 1; Dr Blanche Verlie, et al., ENV11212 Course Coordinator, School of Global, Urban and Social Studies, RMIT University, *Submission 59*, Attachment C, received 25 August 2019, p. 1; Dr Blanche Verlie, et al., ENV11212 Course Coordinator, School of Global, Urban and Social Studies, RMIT University, *Submission 59*, Attachment B, received 25 August 2019, p. 1.

The Committee received 162 submissions. A list of stakeholders that made a submission can be found in Appendix 1. The Committee was also briefed in closed session by the Department of Environment, Land, Water and Planning; Sustainability Victoria; and the Department of Health and Human Services. The Committee held 15 days of public hearings between September 2019 and March 2020. Five days of public hearings were held in Melbourne and ten in regional Victoria (Ballarat, Bendigo, Traralgon, Bairnsdale, Mornington, Geelong, Warrnambool, Mooroopna, Wangaratta and Mildura). Appendix 1 also lists the witnesses who gave evidence to the Committee at the public hearings.

The Committee also undertook site visits in Creswick, Daylesford, Hepburn, Bendigo, Newstead, Riverslea, Sale, Paynesville, Perry Bridge, Mount Martha, Bamba, Cooriemungle, Violet Town, Yackandandah and Mildura. The Committee visited a range of local initiatives in these areas and received valuable information from the individuals and groups coordinating these projects. Appendix 1 also lists who the Committee met with on these site visits.

The Secretariat also conducted desktop research to inform the Committee on a range of issues covered in the report.

The Committee's work on the Inquiry was delayed by the COVID-19 public health emergency. Under suspensions to standing and sessional orders agreed by the Legislative Assembly on Thursday 23 April 2020, the Committee agreed at its meeting on 4 May 2020 to extend the reporting date for this Inquiry to 3 December 2020. On 2 June 2020, the Speaker advised the House of the extended reporting date.

1.4 Outline of the report

This report discusses the evidence the Committee received on what Victoria's urban, regional and rural communities are doing to tackle climate change in 10 chapters:

- Chapter 1 provides an introduction to the Inquiry, its context, scope and conduct.
- Chapter 2 examines the ways in which Victorian communities are leading in climate change action, how they are developing strategies to tackle climate change and how they are advocating for broader policy change.
- Chapter 3 explores a range of education and knowledge sharing initiatives.
- Chapter 4 details community energy initiatives, including innovations since a Victorian Parliamentary inquiry of 2017, and the barriers still facing mid-scale projects.
- Chapter 5 outlines energy efficiency and other activities to make the built environment more sustainable and resilient.
- Chapter 6 looks at a broad range of actions by local governments to address climate change.
- Chapter 7 examines a range of community initiatives and suggestions on how to reduce emissions from transport and waste and adapt to a drier future climate.

- Chapter 8 summarises the adaptation challenges facing agriculture, on-farm emissions reduction activities and carbon sequestration through small-scale agroforestry and urban greening.
- Chapter 9 discusses projects aimed at improving community disaster resilience, including through the use of renewable energy.
- Chapter 10 discusses options for providing increased financial and other support to community climate and sustainability groups.

The *Paris Agreement* recognises the importance of all levels of government and various actors in addressing climate change. The scale of the challenge requires leadership and the coordination of effort among urban, regional and rural communities in Victoria. Victorian communities are leading change through partnering with others, developing strategy and plans, and calling for change in their communities through the lobbying of decision-makers. These efforts form the foundation of other more tangible emissions reduction and climate change adaptation activities by Victorian communities.

2.1 Targets and pledges

Pledges for specific emissions reduction targets or actions are a common feature of many local government and community strategies and plans. TAKE2 is a Sustainability Victoria program for the registration of voluntary pledges by a range of organisations across the Victorian community. The program is intended to give businesses and organisations already committed to emissions reduction, an opportunity to showcase their commitment and inspire others to join in making their own pledges. Sustainability Victoria views the program as supporting the State's 2050 net-zero target under the *Climate Change Act 2017*.¹ Ms Claire Ferres Miles, Chief Executive Officer, Sustainability Victoria, explained the outcomes of the TAKE2 program to date:

To date we have 13 000 pledges across Victoria with a reach that is far beyond that. For example, there are 110 educational institutions with 270 000 university students; 49 local governments, which is representing 83 per cent of Victoria's population, with a number of councils that have already set net zero emissions targets for their entire community; 730 businesses with 400 000 employees; and 188 community groups with 187 000 members. Collectively these organisations participating in the TAKE2 program have an emissions footprint of 33 megatonnes of carbon, so the program has a significant potential to influence significant levels of abatement.²

Many local governments have made pledges under the TAKE2 program and 29 have set targets for net-zero emissions for council operations earlier than 2050.³ Some councils and other organisations are already carbon neutral through the purchase of offsets for emissions remaining after ongoing reduction efforts.⁴ Others are working to minimise the use of offsets in meeting their emissions reduction targets.⁵

¹ Sustainability Victoria, *Submission 141*, Attachment A, received 26 September 2019, p. 9.

² Ms Claire Ferres Miles, Chief Executive Officer, Sustainability Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 24.

³ Sustainability Victoria, *Submission 141*, Attachment A, pp. 35–8.

⁴ For example: Business Council of Co-operatives and Mutuals, *Submission 104*, received 26 August 2019, p. 9; City of Melbourne, *Submission 120*, received 2 September 2019, p. 8; Moreland City Council, *Submission 116*, received 30 August 2019, p. 2.

⁵ Mr John Baker, CEO, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 19.

Stakeholders frequently linked their targets with plans and strategies to meet them. Mr Bernie O'Sullivan, Director, Strategy and Growth from the City of Greater Bendigo, discussed the City's strategy, targets, and the level of ambition they represent:

The *Greater Bendigo Environment Strategy 2016–2021* is one of our key platform documents that is guiding our approach to tackling climate change and protecting and conserving the natural and built environment that we have here in Bendigo. It contains key targets for the City of Greater Bendigo and the community out to 2036. Some of those include by 2036 a 100 per cent renewable energy community, zero net carbon emissions and zero waste to landfill. None of these targets are going to be achieved by a business-as-usual approach. We need to change our approach and we need to keep stepping up the action, both from a local government point of view but in partnership with State Government, Federal Government and business and community.⁶

The following sections will explore plans and strategies that communities are using to operationalise their targets and pledges.

2.2 Whole-of-community planning

Communities around Victoria are also developing plans and strategies to switch to 100% renewable energy, reduce emissions and adapt to climate change. Newlands and East Coburg Community Hubs are developing Neighbourhood Climate Change Action Plans to achieve net zero emissions for neighbourhood house operations and support further community action.⁷ Baw Baw Sustainability Network has partnered with Beyond Zero Emissions to develop a community transition plan for net zero emissions in the stationary energy sector by 2027.⁸

Some community organisations explicitly link their work to the Sustainable Development Goals (SDGs).⁹ Ms Mary Farrow, Manager of Emerald Community House, explained to the Committee that

the sustainable development goals of the UN [are] a big part of the work we do, so we start everything with that.¹⁰

The Sustainable Development Goals are an evolution of the Millennium Development Goals—which ran from 2000–2015 and focused principally on poverty reduction—and are intended to be universally applicable across all nations and elements of society. Each of these goals has specific and well-framed targets to act as a report card against

6 Mr Bernie O'Sullivan, Director, Strategy and Growth, City of Greater Bendigo, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 3.

7 Newlands and East Coburg Community Hubs Inc (NECCHI), *Submission 92*, received 26 August 2019, p. 1.

8 Baw Baw Sustainability Network (BBSN), *Submission 81*, received 26 August 2019, p. 2.

9 See for example: Deakin University, *Submission 158*, received 6 March 2020, p. 2; South East Councils Climate Change Alliance, *Submission 136*, received 12 September 2019, p. 5; Ms Mary Farrow, Manager, Emerald Community House, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 29.

10 Ms Mary Farrow, *Transcript of evidence*, p. 29.

achievement.¹¹ There are 17 SDGs, several of which address issues of direct relevance to community action on climate change and to themes that have been raised by submissions and witnesses in this Inquiry:

- take urgent action to combat climate change and its impacts (SDG 13)
- sustainable agriculture (SDG 2)
- sustainable management of water (SDG 6)
- access to sustainable energy (SDG 7)
- sustainable economic development and consumption (SDGs 8 & 12)
- sustainable and resilient infrastructure, industry, cities, and settlements (SDGs 9 & 11)
- sustainable use of marine resources, land ecosystems and forests (SDGs 14 & 15).¹²

To date there has been limited discussion of the SDGs within state and local government in Australia, although many large corporations, including Victorian water corporations, have integrated them into their strategic planning and corporate social responsibility.¹³

The most comprehensive example in Victoria of community planning for climate change action is Hepburn Z-NET (Zero-Net Emission Transition) which aims to achieve zero net emissions by 2029 for the entire community of Hepburn Shire. The planning phase of the Hepburn Z-NET project occurred during 2018 and delivered a highly detailed carbon emissions profile, a set of options for how the community could reach zero net emissions, a *Community Transition Plan* which provides the roadmap for the community's journey, and a range of other modelling. A key objective of the project is to ensure that the *Community Transition Plan* enables fair distribution of the benefits of transitioning to net zero emissions and mitigates the potential burdens on vulnerable community members. The development of these outputs was funded by Sustainability Victoria, Hepburn Shire Council, Hepburn Wind, the Samsø Energy Academy and Diversicon Environmental Foundation. The *Community Transition Plan* was developed with strong input from the local community and other key stakeholders.¹⁴

Ms Taryn Lane, General Manager, Hepburn Wind, explained the ambition behind the project and how members leveraged their existing networks to bring on board the necessary technical expertise. However, she also noted that not all communities would be able to achieve the same degree of leverage or scale in developing such a project:

¹¹ Jeffrey D. Sachs, 'Goal-based development and the SDGs: implications for development finance', *Oxford Review Of Economic Policy*, vol. 31, no. 3-4, 2015.

¹² *Transforming our world: the 2030 Agenda for Sustainable Development*, GA Res 70/1, UN GAOR, 70th sess, 4th plen mtg, Agenda Items 15 and 116, UN Doc A/RES/70/1 (21 October 2015, adopted 25 September 2015)

¹³ Impact Investment Fund, 'How corporate Australia is embracing Sustainable Development Goals', <<https://www.impactinvestmentfund.com.au/newsroom/2017/12/3/how-corporate-australia-is-embracing-sustainable-development-goals>> accessed 30 January 2020; Melbourne Water, *Delivering on the Sustainable Development Goals*, (n.d.), <<https://www.melbournewater.com.au/media/7451/download>> accessed 30 January 2020.

¹⁴ Hepburn Z-NET, *Submission 41*, received 22 August 2019, p. 1.

We really set ourselves up as a lighthouse community. We are an incubator for innovation. We want to be—some of these things are not completely replicable and are not completely scalable. The fact that we could bring in in-kind of a three-to-one in-kind leverage for this project because of existing connections with universities and different things is not necessarily going to be replicable. The level of community engagement is not necessarily going to be replicable.¹⁵

The *Community Transition Plan* looks at all emissions sectors and lays out a three-phase roadmap to net zero emissions. While the Plan will not achieve zero emissions in absolute terms by 2029, it aims to offset remaining local emissions through the export of renewable electricity and local afforestation.

Phase One from 2019–2021 will see the addition of a small solar farm at the Hepburn Wind site, completion of a bioenergy demonstration project, commencement of reforestation, and further research and planning on reduction of transport and agricultural emissions.¹⁶

Phase Two from 2022–2024 will deliver zero net energy with the construction of further mid-scale renewable energy, microgrids, storage, waste reduction initiatives and pilot projects to reduce agricultural emissions such as ‘climate smart farms’.¹⁷

Phase Three from 2025–2029 will see an increasing transition to electric vehicles, further renewable energy generation, the implementation of soil carbon and livestock initiatives, continued reforestation and the development of sustainable firewood sources, and a reduction in waste emissions to negligible levels.¹⁸

Hepburn Shire Council has allocated some staff resourcing to the Community Transition Plan’s implementation, but many of the projects it envisions are currently unfunded.¹⁹ Ms Lane discussed the need to resource both the development of these plans and a portion of their implementation:

We want to see in the next [Victorian Government] budget at least five other lighthouse communities getting a go like this, not just being supported to do a master plan but being supported to have implementation funding. So it has to be a four-year program—it cannot just be to do the master plan—and help the communities that have a very strong track record to really get there as fast as possible.²⁰

Financial assistance for community planning and projects is discussed further in Section 10.2.5.

¹⁵ Ms Taryn Lane, General Manager, Hepburn Wind, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 20.

¹⁶ Hepburn Z-NET, *Community Transition Plan*, 2019, p. 12.

¹⁷ *Ibid.*, p. 13.

¹⁸ *Ibid.*, p. 14.

¹⁹ Hepburn Z-NET, *Submission 41*, p. 2.

²⁰ Ms Taryn Lane, *Transcript of evidence*, p. 20.

Understanding options for whole-of-community action on emissions reduction requires detailed local emissions inventories. Mr Dominic Murphy, Sustainability Officer, Hepburn Shire Council, explained what was required for the Hepburn Z-NET project:

[T]he Z-NET project is a very powerful framework, and what is being done with the Z-NET project is looking at what local emissions are. So getting actual substation data around how much electricity we use in the shire; how much fuel is burnt in vehicles; how many cows, sheep, pigs; how much land is set aside for cropping; what the land cover is; and the land use, and then using greenhouse accounting factors to develop a local bespoke emissions baseline and incorporating those specific actions which were put forward by community into projects which can address those emissions. I think that is very powerful in that we can push projects as hard as we want but when we look to state- or federal-level aggregated datasets the impact and the effort that people were putting into these projects is not reflected. They do not see those outcomes, and also every shire, every city, every region is going to be different. There are vastly different industry sectors, social conditions, community sentiment, and by having a framework where we can look to what we want to do locally, people can take ownership of that.²¹

Many submissions called for similarly detailed local emissions inventories as a critical precursor for community planning on emissions reduction.²² The non-profit organisations Ironbark Sustainability and Beyond Zero Emissions have led the development of the ‘Snapshot’ tool which will contain basic emissions profiles for every municipality in Australia.²³ However, these profiles are not as comprehensive and detailed as that produced for the Hepburn Z-NET project. The Committee believes that the Victorian Government has a strong role to play in the provision of this data to communities as it has access to relevant data and expertise in emissions accounting, for example through the production of its annual Greenhouse Gas Emissions Reports. Production of local emissions data could form an addendum to these annual reports. Care would need to be taken to ensure that the emissions accounting approach used in these inventories is best suited to fostering local actions on emissions reduction. For example, it may not be appropriate for the emissions associated with large industrial facilities to be included in its neighbouring community’s inventory. The focus of a local emissions inventory and its accounting approach should be on assisting communities to develop local initiatives, including transition plans, and providing a meaningful indicator of a community’s progress over time

RECOMMENDATION 1: That the Victorian Government collaborate with communities and other partners to produce local emissions inventories for all regions in Victoria.

²¹ Mr Dominic Murphy, Sustainability Officer, Hepburn Shire Council, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 19.

²² See for example: Ms Genevieve Barlow, spokesperson, Renewable Newstead, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 10; Macedon Ranges Shire Council, *Submission 69*, received 26 August 2019, p. 8; Beyond Zero Emissions, *Submission 75*, received 26 August 2019, p. 1.

²³ Snapshot, *Snapshot – community climate tool*, 2020, <<https://snapshotclimate.com.au/about>> accessed 15 May 2020.

2.2.1 Regional Renewable Energy Roadmaps

One example of community planning projects funded by the Victorian Government are the Regional Renewable Energy Roadmaps. These have been prepared for each Department of Environment, Land, Water and Planning (DELWP) Region to outline the community's vision for the development of renewable energy across regional Victoria. In its submission, DELWP noted that the Roadmaps were not 'intended to be an explicit pathway to 100% renewables or zero net emissions for regions' but that they would provide guidance to proponents of renewable energy projects and help direct appropriate investment.²⁴

Several stakeholders noted their participation in, or facilitation of, the Roadmap projects while discussing the potential for renewable energy in their regions.²⁵ Some highlighted the Roadmaps as examples of extensive community consultation.²⁶ Mr Rob Law, Executive Officer, Central Victorian Greenhouse Alliance—which facilitated the development of the *Loddon Mallee Region Renewable Energy Roadmap*—explained the development of the Roadmap and its vision:

We are working on a project with DELWP at the moment to develop this regional road map across the Loddon Mallee councils, and that is really looking at how communities can benefit the most from this transition, understanding what the community's concerns are around things to be aware of with the rollout of large-scale solar and rooftop solar and all these sorts of things and then sort of charting a pathway, I suppose, about how we move through that transition over the next 10 years.²⁷

While most of the Roadmaps focused on the development of renewable energy in their respective regions, the Grampians region, through the Grampians New Energy Taskforce, prepared a more comprehensive roadmap with a target of net zero emissions in the region.²⁸

The Committee considers that the Roadmaps provide an excellent introduction and overview of renewable energy developments, including community energy, in each of the regions. They bring together important data, case studies and information on the challenges and opportunities of renewable energy across Victoria. Each Roadmap is different in scope, layout, detail and the range of partners involved in its development.

While most of the Roadmaps outline high-level priorities and recommendations, they do not identify any specific entities for actioning them. Furthermore, the Roadmaps contain no implementation plans, no attached funding and no review

²⁴ Department of Environment, Land, Water and Planning, *Submission 141*, received 26 September 2019, p. 15.

²⁵ Swan Hill Rural City Council, *Submission 160*, received 10 March 2020, p. 1; Loddon Shire Council, *Submission 73*, received 26 August 2019, p. 2; Gippsland Climate Change Network, *Submission 33*, received 19 August 2019, p. 5; Mount Alexander Shire Council, *Submission 114*, received 29 August 2019, p. 8; Central Victorian Greenhouse Alliance, *Submission 113*, received 29 August 2019, p. 4; Bass Coast Shire Council, *Submission 36*, received 21 August 2019, p. 4.

²⁶ Goulburn Broken Greenhouse Alliance, *Submission 140*, received 25 September 2019, p. 8; Mr Rob Law, Executive Officer, Central Victorian Greenhouse Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 30.

²⁷ Mr Rob Law, *Transcript of evidence*, p. 28.

²⁸ Grampians New Energy Taskforce, *Grampians Regional Roadmap to Net Zero Emissions*, Department of Environment, Land, Water and Planning, 2020.

cycle or other means to give effect to the visions they articulate. The Committee considers it important to leverage the extensive consultation and effort contained in the development of the Roadmaps and recommends that the Victorian Government resource the implementation of the Roadmaps through the development of implementation plans.

RECOMMENDATION 2: That the Department of Environment, Land, Water and Planning prepare implementation plans for each Regional Renewable Energy Roadmap detailing measurable actions and target dates for the achievement of those actions for the Department and other key actors.

2.3 Support for communities in transition

The impacts of climate change and the transition to a zero-carbon economy will not be experienced evenly across Victorian communities.

2.3.1 Inequality of climate change impacts

Many submissions discussed the potential for climate change to worsen existing inequalities. Ms Emma King, CEO, Victorian Council of Social Service, explained how the impacts of climate change will be felt inequitably across our society:

We know that climate change will hit people who are already living in poverty. It will hit them first and worst. This includes but it is not limited to people on fixed or low incomes; public and community housing tenants; people with a disability or people with other health challenges; Aboriginal people; and those living in farming, coastal or rural communities. Climate change is not just an environmental issue; it is the defining social, health and economic issue of our time. It will make people sicker, it will exacerbate mental illness and it will increase pressure on household budgets, which means that when we respond to climate change it is people, and specifically people who are doing it tough, who must be our key concern.²⁹

A submission from the Women's Climate Justice Collective summarised the extensive academic research into the unequal impacts of extreme weather events and ecological change. These include: increases in family violence after disasters; loss of cultural heritage sites and the disruption of First Nations peoples' relationship with Country; men experiencing higher rates of injury and death during bushfires; elderly first generation migrants experiencing social isolation during emergencies and difficulty accessing information, community activities and social support; and evacuation procedures failing to cater for persons with a disability, among many others.³⁰

²⁹ Ms Emma King, Chief Executive Officer, Victorian Council of Social Service, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 27.

³⁰ Women's Climate Justice Collective (Vic), *Submission 153*, received 30 January 2020, pp. 2–4.

2.3.2 Transition support for at-risk communities

Many stakeholders mentioned the need to diversify local economies and support regions that have historically depended on fossil fuels or will be heavily impacted by climate change. A particular focus of many stakeholders was the Latrobe Valley, which has a strong tradition of coal mining and coal-based electricity generation, and the potential impacts on this region from the transition to a renewable energy-based electricity generation system.³¹ Cr Darren Howe, Deputy Mayor of Latrobe City Council, discussed the focus of industry transition for the region:

[A]t the core of the transition is a strong need to drive the region's employment and economic growth, given that the Latrobe Valley region has borne, and is expected to continue to bear, a significant economic cost of the structural change to a low-emissions source of energy. The contraction of coal and the electrical industry in Latrobe City has had, and is expected to have, a significant disruptive impact on the productivity, economic and social outcomes across this community.³²

FINDING 1: The impacts of climate change and the transition to a zero emissions economy will not be equally shared among Victorian communities, including those in different parts of the state, with different local industries, and with different social and economic characters.

To meet this challenge, some stakeholders have discussed targeted employment and retraining to support individuals in exposed industries.³³ One example of a community-led initiative to support workers in transitioning industries is the Earthworker Cooperative, which is 'committed to developing a network of sustainable worker-owned enterprise throughout Australia.'³⁴ The worker-owned Earthworker Energy Manufacturing Cooperative, whose development was supported by the Earthworker Cooperative, is located in the Latrobe Valley and provides jobs manufacturing high quality solar hot water systems.³⁵ There are many other green social enterprises operating in Victoria, including those that are community, member or worker owned.³⁶ In addition to tackling climate change, these organisations provide employment opportunities, greater civic engagement and aim for other social outcomes.

Submissions proposed a range of measures to ensure support is provided to those most exposed to climate impacts and transitioning industries. Many referenced the Latrobe Valley Authority's place-based work and the potential to scale it up into a

³¹ See for example: Energy Australia, *Submission 47*, received 22 August 2019, p. 2; Dr Colin Hocking, *Submission 105*, received 26 August 2019, p. 6; Mr Russell Northe MLA, Member for Morwell, *Submission 110*, received 27 August 2019, p. 4.

³² Cr Darren Howe, Deputy Mayor, Latrobe City Council, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 11.

³³ Jewish Ecological Coalition, *Submission 130*, received 8 September 2019, p. 2; Centre for Urban Research, Climate Change Transformations (CCT) Research Group, *Submission 135*, received 11 September 2019, p. 10.

³⁴ Business Council of Co-operatives and Mutuals, *Submission 104*, p. 8.

³⁵ Earthworker Energy Manufacturing Cooperative, *Earthworker Energy Manufacturing Cooperative: We make great solar hot water systems. We make a difference.*, 2018, <<https://earthworkerenergy.coop>> accessed 6 February 2020.

³⁶ Business Council of Co-operatives and Mutuals, *Submission 104*, pp. 7-9; CERES, *Submission 96*, received 26 August 2019, p. 4.

‘Just Transition Authority’ and establish a Minister for Transition.³⁷ Such a body would need to be able to coordinate the activities of all sectors and increase the involvement of community, as well as support grassroots action.³⁸ A coordinating and collaborative body could also assist in the integration of knowledge of the differential impacts of climate change and severe weather into government policy and practice by engaging with researchers in universities and social justice organisations.³⁹

The Victorian Council of Social Service recommended that planning for economic transition ‘must be place-based, empowering local people to identify and develop innovative local solutions, and help build stronger communities that are better equipped to overcome poverty and long-term disadvantage.’⁴⁰ There are already examples of place-based planning and other initiatives related to climate change occurring in Victoria. Cr Natalie O’Connell, Mayor, East Gippsland Shire Council, discussed how the Shire is piloting this approach to address the diversity of their community:

The number and diversity of places across the shire means that council has a significant task in working with those communities to understand and to increase their capacity to plan for the future and to recognise the actions that they can take themselves ... Most recently this has seen council piloting an approach to the development of place and community plans across several quite different communities to understand how best to develop this place-based approach.⁴¹

Support for communities to develop climate action plans, including those that assist in transition, is discussed in Section 10.2.5.

In addition to the potential for communities to be impacted by the economic transition, some submissions noted that access to renewable energy and other emissions reduction products is an issue for many people. Renters, low-income people and public housing tenants experience difficulty in accessing rooftop solar and lowering their electricity bills.⁴² Programs to support these people are further discussed in Chapters 4 and 5.

Many stakeholders called for an increase in the level of community input into government climate policy, including increased, stronger and more diverse levels of engagement with communities.⁴³

³⁷ See for example: Friends of the Earth, *Submission 145*, received 12 November 2019, p. 7; Community Power Agency, *Submission 99*, received 26 August 2019, p. 12; Dr Blanche Verlie, et al., ENV11212 Course Coordinator, School of Global, Urban and Social Studies, RMIT University, *Submission 59*, Attachment D, received 25 August 2019, p. 2.

³⁸ Jesuit Social Services, *Submission 122*, received 2 September 2019, p. 8.

³⁹ Women’s Climate Justice Collective (Vic), *Submission 153*, p. 9.

⁴⁰ Victorian Council of Social Service (VCOSS), *Submission 88*, received 26 August 2019, p. 7.

⁴¹ Cr Natalie O’Connell, Mayor, East Gippsland Shire Council, public hearing, Bairnsdale, 24 October 2019, *Transcript of evidence*, p. 2.

⁴² Brotherhood of St Laurence, *Submission 142*, received 26 September 2019, p. 3.

⁴³ Centre for Urban Research, *Submission 135*, pp. 5–10; City of Darebin, *Submission 124*, received 2 September 2019, p. 5; Neighbours United for Climate Action (NUCA), *Submission 49*, received 23 August 2019, p. 5; Mr Leigh Ewbank, Coordinator, Act on Climate Victoria, Friends of the Earth Melbourne, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, pp. 25–6; Village Well, *Submission 162*, received 13 March 2020, pp. 6–7.

Several submissions focused on a greater need to engage with Aboriginal people and Traditional Owners groups. Climate change has a unique impact on Aboriginal peoples due to spiritual connections with Country and the impacts of climate-related hazards, which can include the destruction of cultural heritage sites and wild food networks. Impacts are further exacerbated by existing inequalities.⁴⁴ Opportunities for stronger engagement with Aboriginal people and Traditional Owners groups are further discussed in relation to community energy projects in Chapter 4 and Indigenous land management in Chapter 9.

The Committee is also mindful that there are other sectors within society that are already experiencing the impacts of climate change more intensely than the general population, including the agricultural sector, people of low socioeconomic status and many businesses.

Some stakeholders suggested that community groups feel unheard through current approaches to consultation.⁴⁵ Mr David Meiklejohn, Executive Officer, Northern Alliance for Greenhouse Action, stated that the group has experienced frustration with Government consultative processes:

[W]e would encourage greater transparency where it is possible and avoiding the so-called 'black hole syndrome', where we are consulted on an issue and then it seems to disappear into a black hole for months, with limited ongoing communication.⁴⁶

Others called for more community-led efforts or increased resourcing for the implementation of community strategies.⁴⁷ Programs to resource the development and implementation of community strategies and plans are discussed in Chapter 10.

Greater consultation and engagement would ensure that the needs of individuals and groups that are more likely to be impacted by climate change or the transition to a zero emissions economy are better accounted for and policy better targeted. The Committee recognises that community engagement is already a component of the *Climate Change Act 2017* but recommends that these approaches are strengthened.

RECOMMENDATION 3: That the Victorian Government strengthen its approach to community engagement under the *Climate Change Act 2017*.

⁴⁴ Women's Climate Justice Collective (Vic), *Submission 153*, p. 2.

⁴⁵ Neighbours United for Climate Action (NUCA), *Submission 49*, p. 5; City of Darebin, *Submission 124*, p. 5.

⁴⁶ Mr David Meiklejohn, Executive Officer, Northern Alliance for Greenhouse Action, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 21.

⁴⁷ For example: Village Well, *Submission 162*, p. 7; Centre for Urban Research, *Submission 135*, p. 6; Hepburn Shire Council, *Submission 119*, received 2 September 2019, p. 10.

2.4 Partnerships

Many stakeholders noted the importance of working with partners in achieving their goals. Partners are able to share workloads, technical expertise, funding or other resources, enhance social license and community ownership, and scale up effort. Partnerships are able to deliver projects at a larger scale, which is seen as a key value from the perspective of small not-for-profits or low-resource councils. In regional Victoria, many projects to tackle climate change would likely be impossible were they not delivered by partnerships. Ms Allison McCallum, Environmental Project Officer, Conservation, Campaspe Shire Council, explained to the Committee the value derived from projects done in partnership:

I would really just like to emphasise that the partnership projects are not only important for regional councils to deliver big projects, they provide support, knowledge and economy of scale that you can participate in and get the same benefits.⁴⁸

One example of partners coming together to deliver a project is Ramp Up Resilience, a communications and engagement project around climate change and disaster resilience that is being piloted in three communities in the Loddon-Mallee. This was led by Make a Change Australia, a not-for-profit consultancy, and brought together state government departments, emergency services, local government, sustainability groups, and the local water corporation, catchment management authority and greenhouse alliance.⁴⁹ Make a Change Australia's Executive Director, Ms Karen Corr, explained the importance of ensuring that all partners are able to derive value from a project:

[It's important to] create partnerships that support and enable the local people to implement their solutions, utilising and supporting existing efforts. When I say partner, I mean ensure this is mutually beneficial. It has got to be of benefit to the organisations who you are partnering with as opposed to, I guess, picking their brains and using them for their volunteer time.⁵⁰

Different partners bring different benefits to a project or collaboration. These can include funding, staff or technical skills, but also social benefits in terms of deep community knowledge and strong engagement. Dr Rowan O'Hagan from the North East Region Sustainability Alliance told the Committee about the benefits of government agencies and community groups collaborating on sustainability projects:

I mentioned before that we work very closely with the government agencies, and the expertise and the collaboration with them is really well appreciated by all the groups, because they have got access to knowledge, resources and information that is really useful to community groups. On the flip side the community groups have really got a

⁴⁸ Ms Allison McCallum, Environmental Project Officer, Conservation, Campaspe Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 7.

⁴⁹ Make a Change Australia, *Submission 103*, received 26 August 2019, p. 1.

⁵⁰ Ms Karen Corr, Executive Director, Make a Change Australia, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 35.

lot to offer the agencies as well in terms of understanding what is happening on the ground, what is realistic and what community sentiment is. So it is really important that those resources are out there in the region and they can be utilised by communities.⁵¹

2.4.1 Knowledge sharing and capacity building

Victorian communities are increasingly sharing information about their efforts to tackle climate change through a growing range of networks, conferences and other initiatives. Peak bodies, such as the Coalition for Community Energy (C4CE), play a particularly important role by actively sharing information with their members, including through events such as the 2015 and 2017 Community Energy Congresses. These Congresses brought together a range of stakeholders in the community energy sector to share learnings and network with other community energy groups. Geelong Sustainability, which was one of the attendees at the Community Energy Congresses, found the opportunity to network with and learn from other organisations particularly valuable.⁵²

Several local government submissions and other witnesses referred to the knowledge sharing made possible by the annual Victorian Greenhouse Alliances Conference (the Victorian Greenhouse Alliances are discussed below at Section 2.4.2). For example, Mr Rob Law, Executive Officer of the Central Victorian Greenhouse Alliance (CVGA), stated:

The final area which is probably harder to measure, but I think is very useful, is around knowledge sharing. We have an annual conference for local government. We had that in July [2019] in Melbourne, and that was attended by about 350 staff across the state to share best practice. We have members' forums quite regularly around different topics, whether that is electric vehicles, energy efficiency in council buildings or street trees and that type of thing.⁵³

Many Victorian local governments are also members of international networks that share information on the effectiveness of various policies and programs. These include:

- The Global Resilient Cities Network (formerly 100 Resilient Cities) which is a city-led collaboration to increase action on urban resilience to protect vulnerable communities from climate change and acute and chronic shocks.⁵⁴ The City of Melbourne, through its Resilient Melbourne project, represents the 32 local governments that comprise Greater Melbourne.⁵⁵

51 Dr Rowan O'Hagan, Member, North East Regional Sustainability Alliance, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 19.

52 Geelong Sustainability, *Submission 107*, received 27 August 2019, p. 3.

53 Mr Rob Law, *Transcript of evidence*, p. 28.

54 Rockefeller Philanthropy Advisors, *Global Resilient Cities Network*, 2020, <<https://www.rockpa.org/project/global-resilient-cities-network>> accessed 11 June 2020.

55 Ms Maree Grenfell, Deputy Chief Resilience Officer, Resilient Melbourne, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 52.

- ICLEI—Local Governments for Sustainability (ICLEI) is a network of more than 1750 local and regional governments which assists its members to develop and implement policy for sustainable urban development.⁵⁶ ICLEI has seven Victorian members.⁵⁷
- The Global Covenant of Mayors for Climate and Energy is an alliance of cities and local governments committed to action on climate change, with a focus on emissions reduction.⁵⁸ It has 12 Victorian members.⁵⁹
- C40 is a network of 96 of the world’s largest cities that collaborate on emissions reduction and sustainable urban development.⁶⁰ The City of Melbourne is a member.⁶¹

Local governments also play a pivotal role in assisting sustainability and climate action groups within their communities to connect and share knowledge with each other. Moreland City Council fosters networking between a variety of grassroots groups, including Climate Action Moreland (CAM), Neighbours United for Climate Action (NUCA) and Upfield Urban Forest group.⁶² Banyule City Council hosts ‘Change Makers’, an annual networking event that brings together environmental volunteers to share knowledge and learn new skills.⁶³

Despite such ongoing knowledge sharing efforts, many submissions called for increased support to network and share knowledge and learnings.⁶⁴ Volunteer community groups face particular challenges in networking with others, including the lack of ready-made networks and limitations on volunteer time.

Recommendations from stakeholders on this point included the development of communities of practice around specific areas. These included a ‘Community Energy Capacity Building Network’, which could build on the existing Community Power Hubs program and regional networks of community energy groups.⁶⁵ The development of stronger links between researchers and practitioners was also suggested. For example, the Centre for Urban Research at RMIT recommended a ‘Climate Change Exchange [to facilitate] the exchange of up-to-date information and research, capability building, and peer-to-peer learning’.⁶⁶

⁵⁶ ICLEI – Local Governments for Sustainability, *ICLEI: About us*, 2019, <https://www.iclei.org/en/About_ICLEI_2.html> accessed 11 June 2020.

⁵⁷ City of Greater Bendigo, *Submission 128*, received 5 September 2019, p. 3; ICLEI - Local Governments for Sustainability (ICLEI Oceania), *ICLEI Oceania Members*, 2020, <<https://www.icleioceania.org/oceania-members>> accessed 25 September 2020.

⁵⁸ Global Covenant of Mayors for Climate & Energy, *About Us - Global Covenant of Mayors for Climate & Energy*, 2020, <<https://www.globalcovenantofmayors.org/about>> accessed 11 June 2020.

⁵⁹ Global Covenant of Mayors for Climate and Energy Oceania, *Signatories to the Global Covenant of Mayors in Oceania*, 2020, <<https://www.gcom-oceania.org/cities>> accessed 25 September 2020

⁶⁰ C40 Cities Climate Leadership Group, *about c40*, 2020, <<https://www.c40.org/about>> accessed 11 June 2020.

⁶¹ City of Melbourne, *Submission 120*, p. 16.

⁶² Moreland City Council, *Submission 116*, p. 3.

⁶³ Banyule City Council, *Submission 109*, received 27 August 2019, p. 1.

⁶⁴ See for example: Bass Coast Shire Council, *Submission 36*, p. 7; Beyond Zero Emissions, *Submission 75*, p. 2; Jesuit Social Services, *Submission 122*, p. 8.

⁶⁵ Coalition for Community Energy, *Submission 65*, received 26 August 2019, p. 3.

⁶⁶ Centre for Urban Research, *Submission 135*, p. 11.

Banyule City Council suggested a website that could facilitate networking among environmental groups with ‘resources, templates, online training, promotion and networking opportunities’.⁶⁷ There already exist many community and government websites that provide resources and case studies of environmental and resilience building initiatives such as the EcoPortal website for north-east Victoria and southern NSW, Monash University Disaster Resilience Initiative’s Compendium of Victorian Community-based Resilience Building Case Studies, and Business Victoria’s Sustainability Resource Directory.⁶⁸ These tend to focus on one topic area, geographic region or sector so there may be benefits in establishing a state-wide portal for community sustainability and climate action groups and initiatives.

A key role of Sustainability Victoria’s Strategic Coordinators is to support networking among community sustainability and climate action groups. Support to community sustainability and climate action groups, including in-kind support to facilitate networks, is discussed further in Chapter 10.

2.4.2 The Victorian Greenhouse Alliances

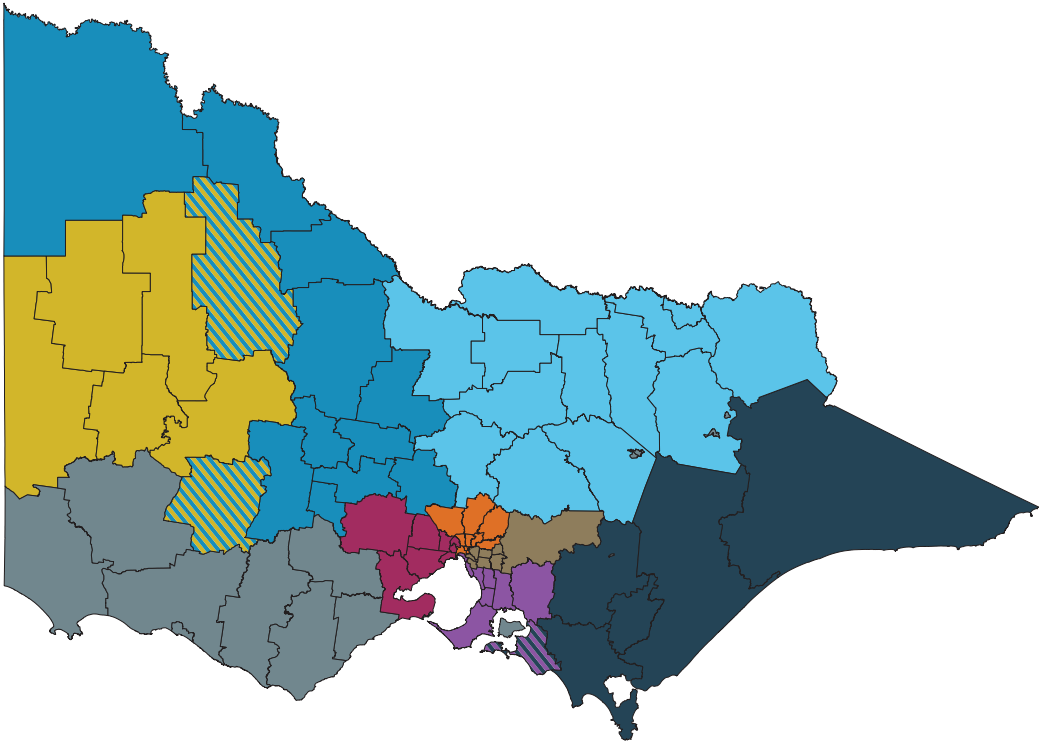
The Greenhouse Alliances are a leading example of a partnership model for climate action. As shown in Figure 2.1, there are currently eight Greenhouse Alliances in Victoria, which cover 71 of the state’s 79 municipalities. Although the eight councils of the Barwon Southwest are not currently members of an alliance, the Committee understands that these councils are in the process of establishing their own alliance for the region.⁶⁹ It should also be noted that some municipalities are members of more than one alliance.

⁶⁷ Banyule City Council, *Submission 109*, p. 2.

⁶⁸ Monash University Disaster Resilience Initiative, *Compendium*, 2020, <<https://www.monash.edu/muarc/research/research-areas/home-and-community/disaster-resilience/case-studies>> accessed 22 April 2020; Business Victoria, *Sustainability Resource Directory - Case Studies*, 2020, <<https://www.business.vic.gov.au/marketing-and-sales/sustainable-business/environmental-sustainability-hub/case-studies>> accessed 7 February 2020; Wodonga Albury Toward Climate Health (WATCH), *Submission 63*, received 26 August 2019, p. 1.

⁶⁹ Ms Lauren Watt, Coordinator, Environmental Sustainability, Surf Coast Shire Council, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 13.

Figure 2.1 Map of the Victorian Greenhouse Alliances



- Central Victorian Greenhouse Alliance (CVGA)
- Eastern Alliance for Greenhouse Action (EAGA)
- Gippsland Climate Change Network (GCCN)
- Goulburn Broken Greenhouse Alliance (GBGA)
- Northern Alliance for Greenhouse Action (NAGA)
- South East Councils Climate Change Alliance (SECCCA)
- Western Alliance for Greenhouse Action (WAGA)
- Wimmera Mallee Sustainability Alliance (WMSA)
- No alliance

Source: Central Victorian Greenhouse Alliance, *Submission 113*, received 29 August 2019, p. 2; Wimmera Mallee Sustainability Alliance, *Submission 66*, received 26 August 2019, p. 1; Goulburn Broken Greenhouse Alliance, *Submission 140*, received 25 September 2019, p. 1; Gippsland Climate Change Network, Participating organisations—GCCN, 2020, <<https://gccn.org.au>> accessed 22 June 2020; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, received 19 September 2019, p.1; Northern Alliance for Greenhouse Action (NAGA), *Submission 118*, received 1 September 2019, p.1; South East Councils Climate Change Alliance, *Submission 136*, received 12 September 2019, p. 1; Western Alliance for Greenhouse Action, *Submission 143*, received 27 September 2019, p. 1.

Each Greenhouse Alliance comprises a network of neighbouring municipalities, which work to facilitate regional action and collaboration on emissions reduction and climate change adaptation. Some alliances also include a variety of other regional bodies, such as the Catchment Management Authorities, or a range of government departments and non-profit organisations. They have a range of different governance structures, which often enable them to operate independently for the purpose of undertaking projects and enabling members to participate as desired.⁷⁰

⁷⁰ Rob Law, et al., *Regional Victorian Greenhouse Alliances: Local Governments Working Together On Climate Change*, Central Victorian Greenhouse Alliance, 2018, p. 9.

The Victorian Greenhouse Alliances have been recognised in Australia and internationally as representing a best-practice model of collaboration.⁷¹ A 2018 report on climate change and Australian local governments—by ICLEI Oceania, Beyond Zero Emissions and Ironbark Sustainability—recommended that other states replicate the Victorian Greenhouse Alliances model.⁷²

The Committee received evidence from all of the Greenhouse Alliances in Victoria, each of which explained the benefits of the model. For example, Mr Rob Law referred to the role of bipartisan collaboration in the Central Victorian Greenhouse Alliance (CVGA):

I think one of the interesting things about our model is that it has demonstrated that you can tackle climate change in a very bipartisan model. I think if you look at our board, for example, there is no sort of political concentration left or right. There are a very broad spectrum of political views on our board and within all the councils as well across our region. But yes, we sort of manage to find common ground on what the issues are locally and tackle them together. I think over that 20-year period we have got enough runs on the board now that councils have a fair amount of trust and pride in the alliance in being able to achieve bigger and better things than perhaps they could have individually.⁷³

The Greenhouse Alliances are also collaborating with each other on projects that cross many parts of the state. Ms Fran Macdonald, Executive Officer, Western Alliance for Greenhouse Action (WAGA), discussed two flagship projects that the Alliance is currently involved in:

WAGA is involved in two very large projects at the moment—which you might have heard about in other hearings actually—which we are undertaking with other greenhouse alliances. One is a joint power purchase agreement to help 48 Victorian councils make the switch to renewable energy

...

How Well Are We Adapting? is another project which actually was started by WAGA but now has 20 councils involved and participating. It is a tool to measure and guide climate change responses by councils ...⁷⁴

Mr Scott McKenry, Executive Officer, Eastern Alliance for Greenhouse Action, informed the Committee about the benefits of the alliance model in terms of return on investment from both a financial and climate mitigation perspective:

We have had a considerable impact since we have started and done quite a lot of work in trying to evaluate and understand that impact. We have had a bit of a clear focus

71 Susie Moloney and Hartmut Fünfgeld, 'Emergent processes of adaptive capacity building: Local government climate change alliances and networks in Melbourne', *Urban Climate*, vol. 14, 2015; Centre for Urban Research, *Submission 135*, p. 6; Western Alliance for Greenhouse Action, *Submission 143*, received 27 September 2019, p. 25.

72 Beyond Zero Emissions, ICLEI - Local Governments for Sustainability (ICLEI Oceania) and Ironbark Sustainability, *Australian Local Government Climate Review*, Beyond Zero Emissions, Melbourne, 2018, p. 26.

73 Mr Rob Law, *Transcript of evidence*, p. 27.

74 Ms Fran Macdonald, Executive Officer, Western Alliance for Greenhouse Action, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 4.

on issues that have a demonstrable return on investment for our councils and our communities. We know from tracking, monitoring and verifying a lot of the projects that we do within the councils and the community that there are also clear financial outcomes as well as the other climate benefits from our programs.⁷⁵

The benefits of partnering to generate a strong return on investment were expanded upon in the *Regional Victorian Greenhouse Alliances* report which enumerated a range of benefits to participating local governments and other members. These included using economies of scale to achieve savings and develop larger projects, achieving better policy outcomes by advocating as a collective, and addressing capacity and resource constraints by collaborating with higher capacity councils.⁷⁶

FINDING 2: The Victorian Greenhouse Alliances are a leading example of collaboration for climate change action. A key strength of the Greenhouse Alliance model is that it facilitates action to tackle climate change through the establishment of consensus between the individuals who represent member municipalities.

Despite the benefits of the Greenhouse Alliance model, limited funding and resources can be an impediment to participation for less well-resourced councils. Mr Gil Hopkins, Acting Executive Officer of the Wimmera Mallee Sustainability Alliance (WMSA), explained the challenge that the Alliance faces:

One of the main points I want to stress is that a low population, especially in some of the shires, makes it very difficult for the councils to participate in a lot of the activities that are there, including grant activities, and now with staff members in councils restricted—you have to restrict the number of staff you have; they tend to grow. But with grants available to councils, they usually put on more staff. So that is always a tendency. So if you do not have the staff, you cannot get the job done basically.⁷⁷

While the alliances facilitate collaboration and the sharing of some resources, some local governments are less able to contribute in terms of membership fees and staff participation, which can represent a barrier to their full participation. This is particularly the case where many of an alliance's members may be less well-resourced councils. Targeted investment from the Victorian Government could help to redress this situation.

As noted above, the lack of an alliance among the councils of the Barwon Southwest represents a significant gap in Victoria's Greenhouse Alliance network. While the Committee understands that work is ongoing to establish a Greenhouse Alliance in this region, support from the Victorian Government could help to expedite the process.⁷⁸

⁷⁵ Mr Scott McKenry, Executive Officer, Eastern Alliance for Greenhouse Action, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 57.

⁷⁶ Rob Law, et al., *Regional Victorian Greenhouse Alliances*, p. 5.

⁷⁷ Mr Gil Hopkins, Acting Executive Officer, Wimmera Mallee Sustainability Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 22.

⁷⁸ Ms Lauren Watt, *Transcript of evidence*, p. 13.

RECOMMENDATION 4: That the Victorian Government work to strengthen the Greenhouse Alliances and provide assistance to enable local governments to fully participate as members of their respective Alliance. The Government should also work to extend coverage of the Greenhouse Alliances to all Victorian local governments.

2.5 Community advocacy and activism

Many of the local governments and community groups that the Committee heard from are engaged in lobbying all levels of government and the business community to take greater action on climate change. Similarly, many of the submissions received by the Committee called on government to take a range of additional or stronger actions on emissions reduction, economic transition and climate justice.

2.5.1 Local advocacy actions

Individuals, community groups, local governments and council alliances have engaged in a variety of activities to advocate for greater policy action on climate change mitigation and adaptation. Many are writing letters and making direct representations to councillors and state and federal members of parliament.⁷⁹ Other groups are engaging through advocacy during elections. For example, Lighter Footprints—a non-partisan action group in the inner eastern suburbs of Melbourne—holds forums for candidates to explain their climate change policies to the local electorates and produces scorecards which assess policy stances against the best available science.⁸⁰ Many groups are attending council meetings and submitting petitions to their council calling for greater action, or for the passage of climate emergency declaration motions.⁸¹ Ms Macdonald discussed one example of an advocacy group—the Westside Climate Action Community—at the public hearing in Geelong:

[Westside Climate Action Community] is really quite a new community group based in the inner west, which is responsible for petitioning some of our councils to declare climate emergency and is really a coming together of a number of much smaller groups that have not been very organised. This group is getting very organised, so I think you are going to hear a lot more from them in the future.⁸²

Many stakeholders informed the Committee that they had provided submissions to a range of other government inquiries, comments on draft reports and responses to other calls for consultation. Some community groups lobby businesses, for example

⁷⁹ See for example: Bayside Climate Change Action Group (BCCAG), *Submission 62*, received 25 August 2019, p. 1; Mordialloc Beaumaris Conservation League Inc, *Submission 15*, received 26 July 2019, p. 2; Environment Victoria, *Submission 159*, received 6 March 2020, pp. 2–3; Ms Dominique La Fontaine, Executive Officer, South East Councils Climate Change Alliance, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 26.

⁸⁰ Lighter Footprints, *Submission 82*, received 26 August 2019, p. 7.

⁸¹ See for example: Bass Coast Climate Action Network (BCCAN), *Submission 79*, received 26 August 2019, p. 1; Surf Coast Shire Council, *Submission 86*, Attachment 1, received 26 August 2019, p. 3.

⁸² Ms Fran Macdonald, *Transcript of evidence*, p. 6.

to declare a climate emergency or eliminate single use plastic bags.⁸³ Other groups attempt to influence the broader conversation by writing letters to the editors of various publications.⁸⁴

Victorian community organisations are also advocating for climate action through the arts. Refuge at City of Melbourne's Arts House is exploring the role of art and culture in preparing communities for the impacts of climate change by bringing together a range of collaborators, such as artists, scientists, emergency services, Elders and other Melburnians.⁸⁵ Save Our Strathbogrie Forest has held concerts, art exhibitions and engaged in participatory art projects with school students and other residents to tell stories of the forest through sculpture, postcard and t-shirt production.⁸⁶

Many community groups informed the Committee of their participation in protests for greater action on climate change.⁸⁷ Submissions from several groups also endorsed the global School Strike movement and local School Strike protests.⁸⁸ The strikes have led to large youth-led protests including those across Australia on 20 September 2019 as part of a coordinated global day of protest.⁸⁹ In some cases, the School Strike movement has led to greater youth engagement with local government. As Ms Sharon Terry, Team Leader Sustainability and Environment, Greater Shepparton City Council, stated at the public hearing in Mooroopna:

[The Shepparton Statement] is a platform council has provided for the youth of Greater Shepparton to voice their concerns or their thoughts around climate change: what does it mean for their future? This can be done through various means: we directly come out to schools; we also have some social media platforms, but we do not know where it is going to end. It really needs to be driven by the youth; we want to hear what their voices are. This project came about from the first climate strikes, where council thought it was important for youth. This is their future, so we need to give them a platform to be engaged.⁹⁰

⁸³ WarrandyteCAN, *Submission 76*, received 26 August 2019, p. 2; Neighbours United for Climate Action (NUCA), *Submission 49*, p. 4.

⁸⁴ See for example: Lighter Footprints, *Submission 82*, p. 6; Bass Coast Climate Action Network (BCCAN), *Submission 79*, p. 1.

⁸⁵ City of Melbourne, *Submission 120*, p. 27.

⁸⁶ Save Our Strathbogrie Forest, *Submission 98*, received 26 August 2019, pp. 3–4.

⁸⁷ See for example: Ballarat Renewable Energy and Zero Emissions Inc. (BREAZE), *Submission 77*, received 26 August 2019, p. 2; WarrandyteCAN, *Submission 76*, p. 2; Save Our Strathbogrie Forest, *Submission 98*, pp. 3–4; Dr Nicholas Aberle, Campaigns Manager, Environment Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 15; Ms Emma Walmsley, Writer and Founder, 350 Mallee Climate Action Group, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, pp. 22–3; Ms Rosemary Gooch, East Gippsland Climate Action Network, public hearing, Bairnsdale, 24 October 2019, *Transcript of evidence*, pp. 21–2.

⁸⁸ Bayside Climate Change Action Group (BCCAG), *Submission 62*, p. 2; Mount Alexander Shire Council, *Submission 114*, p. 10.

⁸⁹ Luke Henriques-Gomes, et al., 'Hundreds of thousands attend school climate strike rallies across Australia', *The Guardian Australia*, 20 September 2019, <<https://www.theguardian.com/environment/2019/sep/20/hundreds-of-thousands-attend-school-climate-strike-rallies-across-australia>> accessed 16 March 2020.

⁹⁰ Ms Sharon Terry, Team Leader, Sustainability and Environment, Greater Shepparton City Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 9.

2.5.2 The climate emergency declaration movement

An important recent development in community advocacy and activism, and a key focus of many local advocacy groups, is the climate emergency declaration movement. While calls for government action on climate change date to at least the late 1970s, language became more urgent in the 2000s with activists and public intellectuals calling for governments and society to move into emergency mode to address the climate crisis.⁹¹ A more recent phase of this movement calls for governments and organisations to specifically declare a climate emergency. Notably, this aspect of the climate emergency movement first emerged in Victoria when the City of Darebin became the first government entity globally to declare a climate emergency on 5 December 2016.⁹² The City of Darebin explained the rationale behind the declaration in its submission to the Inquiry:

Our best hope of avoiding catastrophic climate change and restoring a safe climate is to move into emergency mode. Business as usual and incremental improvements will not effect change quickly enough. To do this we need a coordinated response which involves state and federal governments rapidly decarbonising our economy.

To restore a safe climate as fast as possible will require action by all levels of society: residents, businesses, schools, council and other levels of government must work together.

...

In 2016, Darebin City Council made a formal recognition that we are in a state of climate emergency, and that this requires urgent action by all levels of government.⁹³

The City of Darebin cited an ongoing community campaign involving two groups—‘Darebin Climate Action Now’ and ‘Council and Community Action in the Climate Emergency’—as the driving factor behind its climate emergency declaration.⁹⁴

Since the declaration by the City of Darebin, 32 local governments in Victoria, a further 63 Australian local governments, the Australian Capital Territory Legislative Assembly and the South Australian Legislative Council, as well as more than 1,700 governments worldwide, have adopted climate emergency declaration motions.⁹⁵

While most of the Victorian local governments that have declared a climate emergency are in metropolitan Melbourne, regional and rural areas are also increasingly represented. Cr Jenny O’Connor, Mayor, Indigo Shire Council, discussed some of the

⁹¹ For examples of older calls to enter emergency mode see: David Spratt and Philip Sutton, *Climate‘code Red’: The Case for a Sustainability Emergency*, Friends of the Earth, 2008; Damien Lawson, ‘Stop wasting time and save the planet, Mr Rudd’, *The Age*, 14 June 2009, <<https://www.theage.com.au/politics/federal/stop-wasting-time-and-save-the-planet-mr-rudd-20090613-c6oo.html>> accessed 20 January 2020.

⁹² cedamia, *cedamia: Climate Emergency Declaration and Mobilisation in Action*, 2020, <<https://www.cedamia.org/global>> accessed 11 June 2020.

⁹³ City of Darebin, *Submission 124*, p. 1.

⁹⁴ *Ibid.*, p. 2.

⁹⁵ cedamia, *cedamia: Climate Emergency Declaration and Mobilisation in Action*, 2020, <<https://www.cedamia.org/global>> accessed 30 September 2020.

challenges that the local council overcame in becoming the first rural shire in Victoria to declare a climate emergency, as well as the financial challenges involved in translating the declaration into actions:

[W]e were also the first rural shire in Victoria to declare a climate emergency. That was controversial, to say the least, because among our 32 small communities some of them are very, very conservative, and we also have well-represented climate-denying people in our shire who really clearly do not understand what is really going on and have been fed a load of misinformation, as we know. That is a big problem for us politically. However, we feel we have to take a strong leadership position and wear the fallout from that.

By declaring a climate emergency declaration, the risk to that is that we have these words that do not mean anything. So how do we make that meaningful? The way that we are trying to deal with that, we have actually just employed some expert consultants. We have been able to allocate \$12 000. That is all our budget would allow; we would like to allocate 10 times that.⁹⁶

Submissions from local governments and community groups also highlighted the important role of community campaigning in encouraging councils to make their climate emergency declarations. For example, the Geelong-based Centre for Climate Safety runs the www.climateemergencydeclaration.org website, which catalogues advocacy efforts and provides resources for communities, businesses and government on climate emergency declarations.⁹⁷ Cr Rose Hodge, Mayor, Surf Coast Shire Council, discussed the local community campaign and its impact on the Council's climate emergency declaration:

We had over 1000 signatures for the crisis of climate change. We all say in local government, 'How can we get the young people involved?'. Well, this was led by a 19-year-old girl, and it was fantastic when they all came into the chamber with their petitions and the most respectful questions I have ever been asked. As an older person that has been around in local government quite a few years, it was fabulous to hear these new voices and it was a very proud moment when Surf Coast did say we are in a crisis. We will be working with that, and our officers are working really hard behind the scenes to bring us a program that we can then give to the community.⁹⁸

Mr David Meiklejohn, Executive Officer of the Northern Alliance for Greenhouse Action, also discussed the grassroots, community-driven nature of the climate emergency declaration movement:

The climate emergency movement is a good example of how local governments listen and react to and work with their local communities. It is not a movement which has been imposed top down by local governments; rather, it has emerged from the community demanding stronger action on climate change. It calls on local governments to develop more ambitious emissions reduction targets and to commit more resources.

⁹⁶ Cr Jenny O'Connor, Mayor, Indigo Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 14.

⁹⁷ Centre for Climate Safety, *Submission 74*, received 26 August 2019, p. 1.

⁹⁸ Cr Rose Hodge, Mayor, Surf Coast Shire Council, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 18.

We recognise this is new territory for local governments, and we have been running a lot of workshops and providing background assistance to councils to help them understand what it means to declare a climate emergency and how we might come together to make it work.⁹⁹

The impact of climate emergency declarations on local government emissions reduction activities remains to be seen, as most of these declarations were made in 2019 and 2020. However, some local governments have developed or are developing climate emergency action plans or note the council's declaration when discussing other activities.

FINDING 3: Local community advocacy has been a key factor behind Victorian local governments recognising and responding to the challenges of climate change.

The Committee received 19 submissions calling for the Victorian Government to declare a climate emergency—five from individuals, five from councils, seven from community organisations and one each from a research institution and a Greenhouse Alliance. Many of these submissions suggested that this would be a means for the Government to demonstrate leadership on climate change. For example, the South East Councils Climate Change Alliance argued in its submission that

To continue its leadership, the Victorian Government should consider making its own climate emergency declaration, becoming the first Australian state government to do so. This would clearly signal the critical and existential threat that climate change poses. Declaring a climate emergency would also suggest new avenues for the Victorian Government to respond more effectively to climate change, including developing a carbon drawdown strategy, complementing existing investigative work undertaken in this area by local governments.¹⁰⁰

Several submissions also stated that a clear message from the Victorian Government recognising that climate change is an emergency would support existing messaging from community-based organisations and further drive community action.¹⁰¹ This mirrors the increasing recognition by post-disaster inquiries that declaration of a state of emergency or state of disaster can recognise the gravity of a situation, reassure the public and sharpen the focus of government.¹⁰²

The Committee notes that the Victorian Government already has an established framework to address emissions reduction (outlined in Chapter 1), which includes legislated emissions reduction targets. While the Committee is mindful that the

⁹⁹ Mr David Meiklejohn, *Transcript of evidence*, p. 19.

¹⁰⁰ South East Councils Climate Change Alliance, *Submission 136*, p. 6.

¹⁰¹ For example: CERES, *Submission 96*, p. 5; Ms Nicola McKay, *Submission 70*, received 26 August 2019, p. 1; Macedon Ranges Shire Council, *Submission 69*, p. 6; Dr Blanche Verlie, et al., *Submission 59*, Attachment D, p. 2.

¹⁰² 2009 Victorian Bushfires Royal Commission, *2009 Victorian Bushfires Royal Commission: Final Report: Volume II: Fire Preparation, Response and Recovery*, Parliament of Victoria, Melbourne, 2010, p. 86; Malcolm Hyde, *2013 Tasmanian Bushfires Inquiry: Volume One*, Department of Premier and Cabinet, Hobart, 2013, pp. 72–4; State Emergency Management Committee, *State Emergency Management Plan: Part 2 - Arrangements VI.2*, Government of South Australia, Adelaide, 2018, pp. 41–3.

declaration of a climate emergency, if supported by the Parliament of Victoria, could have a symbolic effect, it is not persuaded that such a declaration would have a practical impact beyond the measures contained in the *Climate Change Act 2017*.

3

Education and knowledge sharing

The Committee received evidence from a wide range of Victorian community groups regarding the extent of their climate change education and engagement activities. This work includes communicating the science of climate change, providing information to individuals and households on how to take energy efficiency and other sustainability actions, and working with schools to integrate climate change and sustainability into lessons and excursions. Many community groups are also working to identify and address the mental health and wellbeing challenges associated with climate change. Many of the groups engaged in advocacy activities (see Chapter 2) are often also engaged in public education activities. Public engagement and education activities are an area of strength for community groups, which by their nature are often more accessible than larger organisations or governments.

3.1 Educating and informing the community

The Committee received evidence of many examples of grassroots education and information activities spanning a wide range of climate change actions. The Committee discusses specific areas of education, particularly where they are integrated into particular programs, in other chapters of this report. For example, Landcare groups, which are a key provider of education and knowledge sharing services within the agricultural sector, are discussed in more detail in Chapter 8. Similarly, many programs that support community preparedness for emergencies also focus on education—these programs are addressed in Chapter 9.

3.1.1 Communicating climate science

Community groups are working to educate themselves and others on the science of climate change, including the current and projected impacts of climate change on Victorian communities. These efforts also encompass the science and engineering of renewable energy and other climate mitigation and adaptation technologies. Groups that focus on informing and educating the community often also see their role as one of empowering people to take part in public conversations about climate change and climate change action. Lighter Footprints—a community group based in Melbourne’s inner east—discussed its knowledge sharing role in its submission:

A primary way we seek to empower our members and our local community is through the transfer of knowledge and information on climate change. We often serve as an interface between lay members of the public and knowledgeable people in academia, industry, politics, administration and other specialised fields which have relevance to climate change policy and action. This provides people with the tools and confidence so they can participate in this important community conversation in a more perceptive, positive and informed way.

Lighter Footprints is effective in this task of knowledge and information transfer because we are well known and respected throughout the Boroondara and surrounding municipalities.¹

A common initiative of many sustainability groups is the organisation of film screenings that explore the science of climate change and efforts to address it.² While many of these involve one-off screenings, some organisations now run film festivals.³ One popular example is the Swanpool Environmental Film Festival which is a joint effort of Swanpool Landcare and the Benalla Sustainable Future Group. One of the Group's members, Mr David Blore, described the significance of the festival as follows:

[L]ocal people and beyond know about the Swanpool Environmental Film Festival. Swanpool has a little cinema centre that became famous when it got going again in the town hall some 25 years ago, and we have used that for seven years for a very successful environmental film festival. Last year's speakers are listed in our submission with three very important and insightful films [the films were *System Error*, *2040*, and a series of short films along with speakers Dr Tilman Ruff AM, Prof Samantha Hepburn, and Prof Tim Reeves]. That has been a very significant success, and as I said that is supported by locals but certainly by people beyond the region.⁴

Other groups have held talks and panel discussions with expert and sometimes high-profile speakers.⁵ These talks and discussion forums have occurred since at least the 1990s. In 1991 the Victorian National Parks Association held a seminar to explore the impacts climate change would likely have on Victoria's ecosystems. The seminar heard from Dr John Busby (then of the Australian National Parks and Wildlife Service), who stated:

Impacts have already occurred and more are coming ... We are, in fact, conducting the kind of large-scale, uncontrolled experiment on the life-support systems of the planet that would be ruled unethical, and prohibited, in any field of science and medicine.⁶

Some organisations are continuing to use traditional media to reach large sections of the public. The Centre for Climate Safety in Geelong hosts a weekly radio show called *The Sustainable Hour* on 94.7 The Pulse FM, which includes presentations by climate experts and celebrities to promote community understanding.⁷ Ballarat Renewable Energy and Zero Emissions (BREAZE) have members featured on a monthly basis in

1 Lighter Footprints, *Submission 82*, received 26 August 2019, p. 4.

2 See for example: Mr Colin Lambie, Member, Bendigo Sustainability Group, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 14; Mr Daryl Scherger, *Submission 60*, received 25 August 2019, p. 1; WarrandyteCAN, *Submission 76*, received 26 August 2019, p. 1; Ms Emma Walmsley, Writer and Founder, 350 Mallee Climate Action Group, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 22.

3 Centre for Urban Research, Climate Change Transformations (CCT) Research Group, *Submission 135*, received 11 September 2019, p. 18.

4 Mr David Blore, Member, Benalla Sustainable Future Group, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 24.

5 See for example: Bass Coast Climate Action Network (BCCAN), *Submission 79*, received 26 August 2019, p. 1; Greater Shepparton City Council, *Submission 108*, received 27 August 2019, pp. 2-3; Lighter Footprints, *Submission 82*, pp. 4-5.

6 Victorian National Parks Association, *Submission 50*, received 23 August 2019, p. 3.

7 Centre for Climate Safety, *Submission 74*, received 26 August 2019, p. 2.

reports on local radio, television and newspapers.⁸ Others, such as Save Our Strathbogrie Forest, have gained coverage in national and international media.⁹

Many people in the community are not comfortable having conversations about climate change with others, despite these conversations being demonstrated to increase community consensus and promote greater action.¹⁰ Focused on social and cultural change, the Gippsland Climate Change Network sponsors the Communities Leading Change program, which is designed to foster difficult conversations in the community about climate change and prompt people to talk to their families, friends and communities about it. Ms Esther Lloyd, Communications Officer, Gippsland Climate Change Network, explained the program and its outcomes:

75 per cent of the people that we surveyed in the community were actually positive about the opportunities that come with change. So transitions produce mixed feelings, but people were mostly positive. Interestingly, 75 per cent of the people surveyed also said, when they thought about what other people felt in the community, that they were scared and angry and so they were not having conversations. They were not talking with their neighbours, they were not talking with their families, and we know social change happens when you have conversations with people you know and trust.

...

So the Communities Leading Change program really came in to upskill local people to take control of this, to help find local solutions together. Really we found even just starting the conversation, realising that you can have a conversation if you are in the environmental sphere, working in the coal mining sphere. All our participants have said the most rewarding thing out of the program ... is actually just being able to meet every couple of weeks with the people who are from different subsets of the community.¹¹

Other initiatives aimed at fostering community conversations on which the Committee received evidence include Climate for Change and Jewish Climate Action Group dinners.¹² The Committee also heard about community groups that have directly engaged with the public through doorknocking campaigns or stalls in shopping centres to enable conversations on climate change.¹³

Some community organisations have also developed resources to support community engagement and conversations about climate change. For example, Psychology for a Safe Climate, a Melbourne-based not-for-profit organisation, initially focused on this work when it formed in 2010. In 2013, it published a booklet *Let's Speak about*

⁸ Ballarat Renewable Energy and Zero Emissions Inc. (BREAZE), *Submission 77*, received 26 August 2019, p. 5.

⁹ Save Our Strathbogrie Forest, *Submission 98*, received 26 August 2019, p. 3.

¹⁰ Matthew H. Goldberg, et al., 'Discussing global warming leads to greater acceptance of climate science', *Proceedings of the National Academy of Sciences*, vol. 116, no. 30, 2019; Nathaniel Geiger and Janet K. Swim, 'Climate of silence: Pluralistic ignorance as a barrier to climate change discussion', *Journal of Environmental Psychology*, vol. 47, 2016.

¹¹ Ms Esther Lloyd, Communications Officer, Gippsland Climate Change Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, pp. 7–8.

¹² Ms Fam Charko, Acting Executive Officer, Port Phillip EcoCentre, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 2.

¹³ Bayside Climate Change Action Group (BCCAG), *Submission 62*, received 25 August 2019, p. 2; Ms Rosemary Gooch, East Gippsland Climate Action Network, public hearing, Bairnsdale, 24 October 2019, *Transcript of evidence*, p. 21.

Climate Change, which provides insight on the psychological challenges of the topic and guidance for people to engage with friends, family and the broader community. The group followed this resource in 2015 with *Facing the Heat*, which shares further stories of conversations about climate change.¹⁴

FINDING 4: Victoria is fortunate to have a wide range of community groups that are actively engaged in educating the public and working to promote action to tackle climate change.

3.1.2 Promoting community action

Many community groups also take a more action-oriented approach to public education, focusing on steps for people to reduce their emissions and adapt to climate change. A variety of communication approaches are used, including brochures, social media, face-to-face workshops, demonstration sites and open houses, and other innovative social marketing approaches.

Traditional information distribution, such as the production of brochures and websites, has been a key focus of many community organisations and local governments as they aim to educate the public. Action guides for individuals and households are a common product of many sustainability groups, including *What You Can Do* from the Bass Coast Climate Action Network, the *Sustainable Living Guide* from Neighbours United for Climate Action, and *Building Resilience* and *Home Grown* from the City of Greater Bendigo.¹⁵

Geelong Sustainability has produced a sustainability directory which provides information on local sustainability groups and other community organisations, sustainable local businesses and farmers, accredited suppliers and installers of renewable energy and energy efficiency services, architects, green builders, recycling centres, and a listing of annual sustainability events.¹⁶ Other organisations have also created resource lists and directories of sustainability information, including those with resources focused more on members of sustainability groups which are addressed in Section 2.4.1.

A variety of sustainability and climate change focused web portals have been developed by local councils, Catchment Management Authorities and sustainability groups. For example, the Corangamite and Glenelg Hopkins Catchment Management Authorities, in partnership with local government and a range of other stakeholders, have developed the South West Climate Change Portal which provides information, advice and tools for communities to manage or respond to climate change.¹⁷ The City of Port Phillip, the City of Whittlesea and the City of Wyndham, in partnership with the

¹⁴ Psychology for a Safe Climate, *Submission 137*, received 13 September 2019, p. 1.

¹⁵ Bass Coast Climate Action Network (BCCAN), *Submission 79*, p. 1; Neighbours United for Climate Action (NUCA), *Submission 49*, received 23 August 2019, p. 3; City of Greater Bendigo, *Submission 128*, received 5 September 2019, p. 5.

¹⁶ Ms Vicki Perrett, President, Geelong Sustainability, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 20.

¹⁷ Vic Catchments, *Submission 141*, Attachment C, received 26 September 2019, p. 3.

Supply Chain Sustainability School, have developed the Local Government Supply Chain Sustainability School, which is an online learning portal for local businesses—especially those that supply local governments—to improve their sustainability.¹⁸ Surf Coast Shire Council has a website—Powered by Positive—which provides information on reducing energy use, installing solar power and access to a directory of local sustainability businesses and suppliers.¹⁹

Many sustainability groups and individuals view Facebook and other social media as an important tool for engaging with and supporting like-minded individuals, sharing sustainability information and promoting the work of their organisations.²⁰ Groups also use Facebook’s livestreaming feature to share video of meetings, talks, lectures, and site visits.²¹ As an online network, Facebook has the advantage of providing a place for people who may have particular interests and backgrounds in common to form groups aimed at promoting and taking action on climate change.

Local governments, community groups and other organisations also run face-to-face training sessions to give people the knowledge and skills they need to take individual action on climate change.²² Improving energy literacy is a key focus of many face-to-face sessions run by community groups. A range of different outcomes, such as understanding electricity bills, knowledge of energy efficient lighting, appliances and other home upgrades, as well as the skills to reduce energy use, are included.²³ Renewable Energy Benalla has undertaken sessions to help implement its *Benalla Stationary Energy Transition Strategy*. Mr David Blore, a Benalla Sustainable Future Group member, explained the content and goals of the group’s energy efficiency sessions:

[These sessions] are about trying to assist our local residents on understanding energy bills—and that can be a challenge for anyone—how to implement energy efficient lighting, reducing your costs that way; draughtproofing; insulation; windows; hot-water systems; and heating and cooling options. We propose that those sessions will be repeated in following years to help contribute to the goal of reducing our energy demand by a third or more over the next 10 years.²⁴

Behaviour modification is an outcome of some training programs. For example, the South East Councils Climate Change Alliance has worked with its council members to deliver face-to-face training to council staff on how to drive more efficiently and safely.

18 Western Alliance for Greenhouse Action, *Submission 143*, received 27 September 2019, p. 14; Supply Chain Sustainability School, *About the VIC Councils Sustainable Supply Initiative*, 2020, <<https://www.supplychainschool.org.au/learn/partner-landing-pages/vcss>> accessed 3 March 2020.

19 Surf Coast Shire Council, *Submission 86*, received 26 August 2019, p. 1.

20 Ms Cori Nelson, *Submission 58*, received 25 August 2019, p. 1; Save Our Strathbogje Forest, *Submission 98*, p. 4; Ms Rosemary Gooch, *Transcript of evidence*, p. 22; WarrandyteCAN, *Submission 76*, p. 2; Ballarat Renewable Energy and Zero Emissions Inc. (BREAZE), *Submission 77*, p. 5; Environment Victoria, *Submission 159*, received 6 March 2020, p. 3.

21 Lighter Footprints, *Submission 82*, p. 5; Ms Vicki Perrett, *Transcript of evidence*, p. 21.

22 See for example: Ms Vicki Perrett, *Transcript of evidence*, p. 20; Western Alliance for Greenhouse Action, *Submission 143*, p. 14; Indigo Shire Council, *Submission 131*, received 9 September 2019, p. 2.

23 For example: Benalla Sustainable Future Group, *Submission 152*, received 23 January 2020, p. 5; Hume City Council, *Submission 54*, received 23 August 2019, pp. 1,6–7; Cardinia Shire Council, *Submission 43*, received 22 August 2019, p. 2.

24 Mr David Blore, *Transcript of evidence*, p. 23.

This enables staff to reduce range anxiety, in the case of electric vehicles, and to reduce emissions and improve fuel economy in other vehicles. Some councils have reported a 15% reduction in fuel use as a result.²⁵

Others seek to promote skills that can be used at home and vocational skills in the sustainability industry. Jesuit Social Services has developed an Ecological Justice Hub in Brunswick which '[p]rovides skills, training and employment support into green economy jobs for people experiencing barriers to employment', alongside workshops on green living at home.²⁶

Information on actions to address climate change is often combined with messaging on the severity of climate change.²⁷ For example, Eastern Climate Action Melbourne has conducted 28 information events since 2013 with titles such as 'Can renewables cut power bills - and save the planet?'.²⁸

Festivals provide another opportunity for face-to-face interaction with the community. Community groups frequently participate in local and regional sustainability festivals by holding stalls and giving presentations. The Committee received evidence from groups involved in local street festivals, the Practically Green Festival in Eltham, the Southern Gippsland Sustainability Festival, and Sustainable Living Festivals in Melbourne, Tatura, and Bendigo.²⁹ Some community groups, such as COTA Green Sages, also present at events and festivals that do not have a sustainability focus with the objective of reaching a broader audience.³⁰

Residents are not the only target of education programs. Ms Krista Milne, Director, Climate Change Action, City of Melbourne, provided evidence on CitySwitch, a national program that council delivers in Melbourne to improve the energy efficiency of commercial buildings:

[It] is absolutely a behavioural change program to work with the tenancies within buildings and then have them also working with their building management to address that sort of behaviour change. That is ... about things that the building owner can do to upgrade their energy efficiency and which enables automation of those sorts of things so lights switch on and off when there are people there.³¹

In some cases, the way information is provided can be more important than the information itself. Ms Joanne Brown, Manager Health and Wellbeing, Southern Grampians Glenelg Primary Care Partnership, used a story to explain the impact of

25 South East Councils Climate Change Alliance, *Submission 136*, received 12 September 2019, p. 2.

26 Jesuit Social Services, *Submission 122*, received 2 September 2019, p. 4.

27 For example: Mr Graeme Anderson, Climate Specialist, Agriculture Services Branch, Agriculture Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 7; SECAN (South East Climate Action Network), *Submission 87*, received 26 August 2019, p. 1; COTA Green Sages, *Submission 132*, received 9 September 2019, p. 1.

28 Eastern Climate Action Melbourne, *Submission 34*, received 19 August 2019, p. 1.

29 WarrandyteCAN, *Submission 76*, p. 1; Lighter Footprints, *Submission 82*, p. 5; Greater Shepparton City Council, *Submission 108*, p. 3; Bass Coast Shire Council, *Submission 36*, received 21 August 2019, p. 5; Mr Colin Lambie, *Transcript of evidence*, p. 14.

30 COTA Green Sages, *Submission 132*, p. 1.

31 Ms Krista Milne, Director, Climate Change Action, City of Melbourne, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 54.

a program that aimed to promote energy efficiency in the home and improve social capital in the community:

The central character to this story is an elderly woman, and she lives in a very small rural community in south-west Victoria. I will just call her Joan today; that is not her real name. She was part of a project that we ran through Southern Grampians Glenelg PCP called Pass the Parcel. This program was around passing a parcel of energy efficiency information around in the community, and within that parcel was a little temperature data logger. The idea was that: how do we engage the community about household energy efficiency?

...

So this project, passing the parcel, was to get the conversations going ... what it did is it gave everybody in the project a little personal picture of what the energy in their home looked like. It was really, really powerful and really, really engaging. We also invited all the participants in the project to a workshop, and we were really lucky to connect with a couple of great environmental engineers locally who ran the workshop.³²

Ms Brown went on to explain how Joan's story illustrates the confidence, knowledge, and social connection that can be built by participating in this type of education program. When Joan was cold-called about insulation, she had the knowledge to ask for advice (from a neighbour who had also participated in the program) and to feel confident in her decision to engage the installers:

Later she [Joan] told me a story about how that insulation created such a nice warm blanket for her home that she felt so much more comfortable in winter that she actually was looking forward to her energy bill, which she had not done in the past. The story and the vision that I always think of that she told me was, 'On hot days, Jo, the butter doesn't melt on the table anymore like it used to, because it's just not as hot in my house'.³³

This story represents not only the energy-saving and emissions reduction benefits of energy efficiency measures, but the social, health and comfort co-benefits of these initiatives. These benefits are discussed further in Chapter 5, in the context of household retrofitting programs.

Some organisations have built or renovated facilities that demonstrate for communities a variety of renewable energy, water saving, energy efficiency and other sustainable technologies. Examples include the Eco Living Display Centre at The Briars on the Mornington Peninsula and the Mildura Eco Village, both of which the Committee inspected during site visits. The Committee also received evidence on the role of the nationally renowned CERES Environmental Park.³⁴

³² Ms Joanne Brown, Manager Health and Wellbeing, Southern Grampians Glenelg Primary Care Partnership, public hearing, Warrnambool, 21 November 2019, *Transcript of evidence*, p. 24.

³³ *Ibid.*, pp. 24–5.

³⁴ CERES, *Submission 96*, received 26 August 2019, pp. 2–3; Ms Melissa Burrage, Manager, Climate Change, Energy and Water, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 22.

Figure 3.1 Eco Living Display Centre at The Briars



Source: Committee Secretariat.

The Mildura Eco Village features a 9 star NatHERS rated education centre, community garden, and a retrofitted 1960s house. (For a detailed discussion on the NatHERS rating system, see Section 5.2.1.) The retrofitted ‘Eco House’ incorporates a range of modern design and sustainability features, including rainwater tanks, water-efficient plumbing, passive design, energy-efficient lighting, airlocks, insulation and draught proofing. Mr Jay Smith, Environmental Sustainability Coordinator, Mildura Rural City Council, outlined the impact of the Eco House within the local community:

With rises in both energy and water costs, the Eco House project demonstrates the significant savings that can be achieved through low-cost retrofitting when it is combined with sustainable living education. The broader outcomes of the Eco House project include the strengthening of community and stakeholder partnerships, leading the community to live more sustainably and to save natural resources; the reduction of household financial pressures in a region identified as being at a low socio-economic level; the promotion of local businesses that sell sustainable products; and a community that is educated and aware of local environmental issues.³⁵

35 Mr Jay Smith, Environmental Sustainability Coordinator, Mildura Rural City Council, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 2.

However, such demonstration centres may not be suited to all communities.³⁶ For example, East Gippsland Shire Council piloted an Energy Information Hub in Bairnsdale but, following an evaluation, found that energy education services needed to be provided across the whole region rather than in one centre. The Shire also found that tailored educational services were required to connect with farmers, low income households and isolated communities.³⁷

Practical demonstration of sustainable technologies, materials and house retrofits can also be installed in other community facilities such as Neighbourhood Houses. Cr Josh Fergeus, Executive Committee Chair, Eastern Alliance for Greenhouse Action, explained how the City of Monash implemented this approach at Mackie Road Neighbourhood House in Mulgrave:

That was something that residents came to us with a very similar question to what you just did: 'Is there any way that we can learn more about this stuff? We want to see how this stuff works. We want to know [what] we could do with our homes, what is cost effective'. So we have actually gone and made that a physical place that people can visit and ask questions of officers and see that in practice.³⁸

Councils are also installing renewable energy technology in public buildings, which includes smart meters and energy control systems for public information.³⁹ For example, as the Committee noted during its site visit, the public reception area of the Eaglehawk Badminton and Table Tennis Stadium in Bendigo contains a display that shows the amount of solar generation and site usage in real time.⁴⁰ Mr Rod Duncan, Board Member, CERES, explained the power of practical demonstrations in driving behaviour change:

CERES is the first place in Victoria where most people ever saw a solar panel. Thirty per cent of Victorians have now got a solar power station on their roof, so we have moved ground.⁴¹

Many stakeholders discussed their involvement in Sustainable House Day, a national initiative during which open houses demonstrate a range of environmentally friendly, energy efficient and renewable energy options.⁴² In 2018, Geelong Sustainability, which has been involved with the program for 11 years, exhibited energy efficiency assessment services and DIY renovation products at an un-renovated weatherboard home.⁴³ In 2019, they exhibited 15 properties with the assistance of 125 volunteers

³⁶ Ms Melissa Burrage, *Transcript of evidence*, p. 22.

³⁷ East Gippsland Shire Council, *Submission 144*, received 30 September 2019, pp. 5,11.

³⁸ Cr Josh Fergeus, Executive Committee Chair, Eastern Alliance for Greenhouse Action, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, pp. 62-3.

³⁹ Goulburn Broken Greenhouse Alliance, *Submission 140*, received 25 September 2019, p. 4.

⁴⁰ Elspeth Kernebone, 'Solar project launched at Eaglehawk Badminton and Table Tennis Stadium', *Bendigo Advertiser*, 28 March 2019, <<https://www.bendigoadvertiser.com.au/story/5979911/gift-that-keeps-on-giving-solar-panels-save-for-club>> accessed 3 March 2020.

⁴¹ Mr Rod Duncan, Board Member, CERES, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 37.

⁴² Baw Baw Sustainability Network (BBSN), *Submission 81*, received 26 August 2019, p. 2; Ballarat Renewable Energy and Zero Emissions Inc. (BREAZE), *Submission 77*, p. 4; Mr Colin Lambie, *Transcript of evidence*, pp. 13-14; Indigo Shire Council, *Submission 131*, p. 2.

⁴³ Geelong Sustainability, *Submission 107*, received 27 August 2019, p. 5.

and 55 subject-matter experts—including architects, builders and energy efficiency assessors—and achieved 2,700 visits. Ms Vicki Perrett, President, Geelong Sustainability, explained some of the outcomes of the 2019 event:

[W]e now conduct a survey of participants, and it is very interesting to see that we are reaching out to a wider audience and that more people are starting to engage with the need to live more sustainably. Sixty per cent of people are coming for the first time. Ninety-eight per cent liked seeing homes firsthand—it helps them understand. So seeing is believing and understanding.⁴⁴

The 2019 event involved a broad variety of homes, including passive solar, limited budget, owner-builder, under-renovation and tiny houses, while live Facebook feeds of the house visits were viewed more than 25,000 times.⁴⁵

FINDING 5: Victorian community organisations and local councils are effective and innovative in their delivery of education and engagement programs, within resource constraints, to improve the understanding of climate science and drive emissions reduction action by individuals and households.

Many of the initiatives discussed above are targeted at an audience that can readily access and understand the material. However, many Victorians face language, cultural and other barriers in accessing and understanding information on sustainability and energy efficiency.⁴⁶ The Committee received limited evidence of groups seeking to inform culturally and linguistically diverse (CALD) Victorians, with some notable exceptions:

- Hume City Council, which has produced videos of home energy saving tips in Arabic and Assyrian specifically targeted at Syrian women living in the local government area⁴⁷
- Australian Religious Response to Climate Change, which is a national multi-faith organisation that has prepared comprehensive resources incorporating religious teachings on climate change for Buddhist, Christian, Hindu, Islamic and Jewish faiths.⁴⁸

This limited evidence suggests that there may be a need for Victorian Government agencies producing educational campaigns, such as Sustainability Victoria, to increase investment in programs to engage with culturally and linguistically diverse communities.

⁴⁴ Ms Vicki Perrett, *Transcript of evidence*, p. 20.

⁴⁵ *Ibid.*, p. 21.

⁴⁶ Australian Council of Social Service, *Energy Efficiency and low income households: policy to improve affordability and extreme weather adaptation*, Sydney, 2013.

⁴⁷ Hume City Council, *Submission 54*, p. 1.

⁴⁸ Port Phillip EcoCentre, *Submission 133*, received 11 September 2019, p. 3; ARRCC, *Australian Religious Response to Climate Change: A Multi-Faith Network Committed to Action on Climate Change*, 2020, <<https://www.arrcc.org.au>> accessed 2 March 2020.

FINDING 6: Culturally and linguistically diverse communities may not be receiving adequate information that empowers them to reduce their emissions and adapt to climate change.

RECOMMENDATION 5: That Victorian Government agencies, such as Sustainability Victoria, assess how effectively climate change and sustainability behaviour change programs are reaching culturally and linguistically diverse communities and examine what further work is required to tailor programs to these communities.

3.1.3 Coordination of public education and behaviour change campaigns

Many stakeholders called for greater government investment in education and behaviour change campaigns.⁴⁹ These stakeholders discussed a range of objectives, such as education on climate change, emissions reduction by individuals, the promotion of community energy initiatives, advice on government grants and assistance programs, and climate change adaptation, including emergency preparedness. A recent survey undertaken by Mornington Peninsula Shire Council indicated that a key barrier to undertaking climate action is a lack of information and understanding of the different individual and household steps that are available.⁵⁰

A number of submissions described the Target 155 campaign, as it was originally implemented in the late 2000s, as a highly effective example of a sustainability behaviour change campaign.⁵¹ In its current incarnation, Target 155 encourages Melbourne to reduce its water use to below 155 litres per person per day. Similarly, Target Your Water Use encourages water wise behaviours in regional Victoria. Notably, targeted behaviour change programs are also among the strategies that the Department of Environment, Land, Water and Planning (DELWP) and the water corporations are using to further reduce residential and non-residential water demand.⁵²

The Committee also notes that the Victorian Government has committed to state-wide education and behaviour change programs as part of its Recycling Victoria strategy.⁵³ However, despite the broad variety of programs and the substantial education work

⁴⁹ See for example: Mr Ken Matthews, *Submission 12*, received 25 July 2019, p. 1; Loddon Shire Council, *Submission 73*, received 26 August 2019, p. 2; Community Power Agency, *Submission 99*, received 26 August 2019, p. 12; Mr Leigh Ewbank, Coordinator, Act on Climate Victoria, Friends of the Earth Melbourne, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 26; Ms Sophie Appleby, Writer and Researcher, 350 Mallee Climate Action Group, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 26.

⁵⁰ Mornington Peninsula Shire, *Submission 121*, received 2 September 2019, p. 7.

⁵¹ Friends of the Earth, *Submission 145*, received 12 November 2019, p. 7; Ms Sarah Lucy, *Submission 44*, received 22 August 2019, p. 2; Dr Blanche Verlie, et al., ENV11212 Course Coordinator, School of Global, Urban and Social Studies, RMIT University, *Submission 59*, Attachment A, received 25 August 2019, p. 2; Mornington Peninsula Shire, *Submission 121*, p. 7.

⁵² Department of Environment, Land, Water and Planning, *Submission 141*, received 26 September 2019, pp. 20-1.

⁵³ Department of Environment, Land, Water and Planning, *Recycling Victoria: A new economy*, State of Victoria, Melbourne, 2020.

by local government and community organisations documented in this section, there appears to be no overarching strategy to ensure that these efforts are coordinated in terms of public education.⁵⁴

Mr John Baker, CEO, Mornington Peninsula Shire Council, suggested that the Victorian Government should play a role in coordinating public education and behaviour change campaigns related to climate change:

Education, certainly as far as the network we have here, if we think about it, on the ground there is no better placed organisation than local government to get out into community and actually to facilitate that, so supporting us in the delivery of that with materials, with resources, would be incredibly helpful and very, very useful. But I also think there is a knitting job for the State to do as well around actually pulling a lot of the other State agencies together so this is more of a coordinated approach. Whilst local government has a role within that, and a key role in our view, I think that cannot be achieved if we are not doing that hand in hand with the State.⁵⁵

A collaborative approach to developing a coordinated education and behaviour change strategy would be essential, given the number of stakeholders involved and the number of grassroots initiatives documented by this Inquiry. Ms Fam Charko, Acting Executive Officer, Port Phillip EcoCentre, explained that a coordinated strategy across the Victorian Government would also improve the consistency of messaging and better achieve communication outcomes:

[W]e would really love to see the Victorian Government communicate and educate very effectively on the issues of climate change—but across all of your departments—because sometimes the messaging as it is now can be quite conflicting and is quite confusing to the community.⁵⁶

RECOMMENDATION 6: That Sustainability Victoria work with local government and community organisations to develop an integrated strategy for behaviour change programs on emissions reduction and climate change adaptation.

The effectiveness, including cost-effectiveness, of public behaviour change campaigns for different sustainability actions can be highly variable.⁵⁷ Mere provision of information may not be effective in driving action and a range of physical, psychological and social barriers can prevent people from tackling climate change even if they are motivated

⁵⁴ Ms Melissa Burrage, *Transcript of evidence*, p. 23.

⁵⁵ Mr John Baker, CEO, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 22.

⁵⁶ Ms Fam Charko, *Transcript of evidence*, p. 3.

⁵⁷ Sam C. Staddon, et al., 'Intervening to change behaviour and save energy in the workplace: A systematic review of available evidence', *Energy Research & Social Science*, vol. 17, 2016; Mark A. Andor and Katja M. Fels, 'Behavioral Economics and Energy Conservation – A Systematic Review of Non-price Interventions and Their Causal Effects', *Ecological Economics*, vol. 148, 2018.

to do so.⁵⁸ The Committee has heard that different people are motivated by different factors at different times when adopting sustainability measures such as rooftop solar.⁵⁹ The Committee has also heard about the psychological difficulty involved in understanding and responding to the science of climate change.⁶⁰ Given these challenges, the Committee considers that the design of public education and behaviour change campaigns for emissions reduction and climate change adaptation should be based on the best available evidence to maximise their effectiveness. Rigorous and transparent evaluation would help to ensure that such programs are effective and deliver on their intended outcomes for Victorians.

RECOMMENDATION 7: That all Victorian Government-funded behaviour change campaigns on emissions reduction and climate change adaptation are transparently evaluated and that all evaluation reports be published.

3.2 Citizen science

The development of a detailed understanding of the impacts of climate change on Victorian ecosystems, industries and communities requires the accumulation of substantial data. Communities are helping to address this challenge by participating in citizen science projects, which use ‘crowdsourcing’ for the collection of data by members of the public.

Community planning (discussed in more detail in Section 2.2) was the impetus behind two recent citizen science projects in the Strathbogie Ranges.

The Bogies and Beyond Project, which the Committee heard about during a site visit in Violet Town, was facilitated by the Goulburn Broken Catchment Management Authority, which worked with the local community to develop a natural resource management plan designed to explicitly consider future climate change scenarios. To ensure community values were represented, 25 members of the community were involved in four workshops. These groups included farmers, weekenders, Landcare and Conservation Management Network representatives, a bee keeper, scientists from RMIT and the University of Melbourne, and industry representatives.⁶¹ The first citizen science project to form part of this plan is Tree Storey. Local residents use an app to track the health of trees in their community by collecting photographs and data on tree health at least every 6 months, amidst concerns that climate change is adversely impacting

⁵⁸ R. E. Timlett and I. D. Williams, ‘Public participation and recycling performance in England: A comparison of tools for behaviour change’, *Resources, Conservation and Recycling*, vol. 52, no. 4, 2008; Edward W. Maibach, Connie Roser-Renouf and Anthony Leiserowitz, ‘Communication and Marketing As Climate Change-Intervention Assets: A Public Health Perspective’, *American Journal of Preventive Medicine*, vol. 35, no. 5, 2008; Gardien de Vries, ‘Public Communication as a Tool to Implement Environmental Policies’, *Social Issues and Policy Review*, vol. 14, no. 1, 2020.

⁵⁹ Mr Colin Lambie, *Transcript of evidence*, p. 14.

⁶⁰ Psychology for a Safe Climate, *Submission 137*, p. 1.

⁶¹ Goulburn Broken Catchment Management Authority, *Taking Action on Climate Change in the Strathbogie Ranges: Bogies and Beyond*, Goulburn Broken Catchment Management Authority, Shepparton, 2017.

trees in the Strathbogie Ranges. It is hoped that this data will help scientists and the Catchment Management Authority better understand the health of local trees and implement management actions to preserve them.⁶²

Another notable citizen science project in the Strathbogie Ranges related to climate change seeks to improve the limited understanding of ground water resources in the area. Bore owners will work with scientists to collect data on groundwater variation over the next three to five years.⁶³

The Port Phillip EcoCentre facilitates several citizen science projects through the work of the Port Phillip Baykeeper program. Projects include the monitoring of coastal erosion, undertaking species surveys and observing seasonal changes using the ClimateWatch App.⁶⁴

Elsewhere in the coastal zone, citizen scientists have been tracking and documenting coastal erosion at Inverloch. This work has received media attention and has been credited with prompting the allocation of Victorian Government funding for coastal protection infrastructure.⁶⁵

Some citizen science projects are community initiated, such as the heatwave impacts database developed by Wodonga Albury Towards Climate Health (WATCH). Ms Lizette Salmon, Convenor, WATCH, explained the genesis of the project:

In 2013 I happened to hear at the farmers market that 3000 chickens had died in our area—three or so different producers—after a significant heatwave. And I said, ‘Why isn’t there more discussion about this? I haven’t heard anything about this in the media’, and I was told those producers were concerned because they thought they would cop it from the RSPCA. But they had just not had such significant heatwaves. And then I started wondering, ‘Well, what other impacts are these heatwaves having on crops, livestock, flora and fauna?’⁶⁶

WATCH has recruited more than 100 people from many different professions to provide observations on heatwave impacts. The information is collected during each heatwave and is then collated and distributed on the WATCH website and to local media.⁶⁷

62 Goulburn Broken Catchment Management Authority, *Tree Storey citizen science project*, 2020, <<https://www.gbcma.vic.gov.au/projects/current-projects/bogies-and-beyond/tree-storey-citizen-science-project>> accessed 28 February 2020.

63 Goulburn Broken Catchment Management Authority, *3Bs - Bores of the Bogies & Beyond*, 2019, <<https://www.gbcma.vic.gov.au/projects/current-projects/bogies-and-beyond/3bs-bores-of-the-bogies-beyond>> accessed 28 February 2020.

64 Port Phillip EcoCentre, *Submission 133*, p. 3.

65 Friends of the Earth, *Submission 145*, p. 3; South Gippsland Conservation Society Incorporated, *Submission 27*, received 13 August 2019, p. 1.

66 Ms Lizette Salmon, Convenor, Wodonga Albury Towards Climate Health, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 33.

67 Wodonga Albury Toward Climate Health (WATCH), *Submission 63*, received 26 August 2019, p. 1.

FINDING 7: Communities across Victoria are helping to build scientific understanding of the impacts of climate change, which will in turn assist communities and government organisations to better manage these ongoing impacts.

3.3 Engaging with schools and students

Many education activities focus on school students, with climate change forming part of a broader discussion on sustainability and the environment. School programs are a focus of larger sustainability centres, such as the CERES Environmental Park and the Port Phillip EcoCentre, which have multi-component programs that include excursions by students to their venues and incursions where schools are visited by centre staff or volunteers.⁶⁸ Smaller sustainability groups, such as the Bayside Climate Change Action Group, have also visited schools to present talks.⁶⁹ Other school outreach activities have included a World Environment Day Children’s Writing Competition, which was auspiced by Ballarat non-profit BREAZE.⁷⁰

One of the long-established leaders in sustainability education in Victoria is CERES, which hosts approximately 10,000 students each week at its Brunswick East site.⁷¹ Mr Rod Duncan, Board Member, CERES, explained the organisation’s award-winning track record:

Our Director of Learning Innovation, one of our key senior staff members, has just been awarded by her peers nationally [the] Environmental Educator of the Year this year. There were some Environment Victoria Banksia awards—there is a row of them on the mantelpiece.⁷²

CERES offers dozens of courses for children and adults, as well as train-the-trainer programs. Mr Duncan also informed the Committee that

The School of Nature and Climate is a new package that we have just announced, which is taking those education and training programs across that spectrum from preschoolers to retirees and packaging them under one umbrella, which allows us to see where the gaps are and where the opportunities are.⁷³

Other organisations, such as the Port Phillip EcoCentre, are also involved in the delivery of climate change and sustainability education programs to school students.⁷⁴

⁶⁸ CERES, *Submission 96*, pp. 3–4; Ms Fam Charko, *Transcript of evidence*, p. 1.

⁶⁹ Bayside Climate Change Action Group (BCCAG), *Submission 62*, p. 2.

⁷⁰ Ballarat Renewable Energy and Zero Emissions Inc. (BREAZE), *Submission 77*, p. 2.

⁷¹ Mr John Burne, Infrastructure Manager and Board Member, CERES, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 38.

⁷² Mr Rod Duncan, *Transcript of evidence*, p. 38.

⁷³ Ibid.

⁷⁴ Ms Fam Charko, *Transcript of evidence*, pp. 2–3.

The Committee notes that many schools often have difficulty in finding the resources to engage in off-campus activities. Moreover, as Ms Charko stated, government investment in school programs would be highly beneficial ‘because we can be more effective and we can basically teach more schools and get more people involved.’⁷⁵

Sustainability Victoria operates the ResourceSmart Schools program, which supports schools to undertake sustainability upgrades while integrating sustainability into their curriculum and community. Schools in the program participate in face-to-face facilitation, an online sustainability framework and Environmental Management System, and 5 Star certification system. Multiple reviews of the program have demonstrated substantial program benefits to schools in terms of reduction in resource use and at-home behaviour change.⁷⁶ Organisations such as CERES partner in the delivery of the program.⁷⁷ Sustainability Victoria suggested that ResourceSmart Schools could be expanded, including by scaling up a pilot that has been conducted in early learning centres.⁷⁸ However, Ms Melissa Burrage, Manager, Climate Change, Energy and Water, Mornington Peninsula Shire Council, stated that there are significant challenges to participation in ResourceSmart Schools, which have caused some schools to withdraw. Ms Burrage recommended that the program be made more accessible:

Sustainability Victoria is the primary area responsible for this education piece, but there are some challenges with that. ResourceSmart Schools, for example, is quite an onerous program. We are seeing schools that have previously been part of that withdrawing from that because it is too onerous and too hard for them, and we need to make these programs really accessible and not onerous, so they can bite off as much as they can chew rather than needing to be all-encompassing.

So while there are some success stories in there, I think we can make it better accessible and work in collaboration with other groups, like we work closely with the Dolphin Research Institute, the Biosphere and so forth and the Catchment Management Authorities.⁷⁹

RECOMMENDATION 8: That Sustainability Victoria work with schools and the Department of Education and Training to improve the accessibility of the ResourceSmart Schools program and expand the number of non-profit partners involved in delivering the program.

Beyond support to programs that engage with schools and school students, many submissions also advocated for greater inclusion of sustainability and climate change into the curriculum and from earlier ages, including through advocacy to the Australian Curriculum, Assessment and Reporting Authority.⁸⁰

⁷⁵ Ibid., p. 6.

⁷⁶ Sustainability Victoria, *Submission 141*, Attachment A, received 26 September 2019, pp. 18–19.

⁷⁷ Mr Rod Duncan, *Transcript of evidence*, p. 38.

⁷⁸ Sustainability Victoria, *Submission 141*, Attachment A, pp. 18–19.

⁷⁹ Ms Melissa Burrage, *Transcript of evidence*, p. 23.

⁸⁰ Centre for Urban Research, *Submission 135*, p. 13; Hepburn Shire Council, *Submission 119*, received 2 September 2019, p. 13.

3.4 Climate change and mental wellbeing

The mental health and wellbeing impacts of climate change represent an emerging issue on which the Committee received evidence from a number of stakeholders. Ms Charko explained the emergence of this issue within the communities that the Port Phillip EcoCentre engages with:

Something that is really coming up and we have only just really started to talk about—and you may notice this also from the farming communities in drought-stricken areas—is climate change grief and the psychology around climate change and the burdens that are being put on the community just by knowing that their children are going to grow up and they will not have the same kind of opportunities as their parents have had. That kind of grief is a real thing. It is real and it is really hard.⁸¹

The mental health impacts of disasters such as bushfires have long been acknowledged.⁸² Research from the Beyond Bushfires initiative found that five years after the Black Saturday bushfires of February 2009, 22% of people in high impact communities were reporting symptoms of mental health disorders at approximately twice the rate of low impact communities and what would be expected in the general population.⁸³ The physical health impacts of climate change-related hazards, especially heatwaves, are further discussed in Chapter 5 in the context of home energy efficiency and Chapter 9 in the context of disaster resilience.

Dr Charles Le Feuvre, Vice-President of Psychology for a Safe Climate, informed the Committee of the two emerging phenomena of ecological grief and eco-anxiety:

Ecological grief—the grief felt in relation to experienced or anticipated ecological losses, including the loss of species, ecosystems and meaningful landscapes due to acute or chronic environmental change.⁸⁴

Eco-anxiety—a source of stress caused by watching the slow and seemingly irrevocable impacts of climate change unfold, and worrying about the future for oneself, children, and later generations.⁸⁵

The understanding of these phenomena is still at an early stage, including how they relate to individuals' values and proximity to environmental degradation.⁸⁶ Nevertheless, groups are developing projects and programs to address these emerging

⁸¹ Ms Fam Charko, *Transcript of evidence*, p. 2.

⁸² Y. Neria, A. Nandi and S. Galea, 'Post-traumatic stress disorder following disasters: a systematic review', *Psychological medicine*, vol. 38, no. 4, 2008; Ana Fernandez, et al., 'Flooding and Mental Health: A Systematic Mapping Review', *PLOS ONE*, vol. 10, no. 4, 2015.

⁸³ Lisa Gibbs, et al., *Beyond Bushfires: Community Resilience and Recovery Final Report*, University of Melbourne, Melbourne, 2016.

⁸⁴ Ashlee Cunsolo and Neville R. Ellis, 'Ecological grief as a mental health response to climate change-related loss', *Nature Climate Change*, vol. 8, no. 4, 2018.

⁸⁵ Susan Clayton, et al., 'Impacts on Individuals', in *Mental Health and Our Changing Climate: Impacts, Implications and Guidance*, American Psychological Association, and ecoAmerica, Washington D.C., 2017; Dr Charles Le Feuvre, Vice-President, Psychology for a Safe Climate, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 3.

⁸⁶ Jon Barnett, et al., 'A science of loss', *Nature Climate Change*, vol. 6, no. 11, 2016; N. A. Marshall, et al., 'Our Environmental Value Orientations Influence How We Respond to Climate Change', *Frontiers in Psychology*, vol. 10, no. 938, 2019.

psychosocial phenomena. Psychology for a Safe Climate is a Melbourne-based group of psychologists, psychiatrists and counsellors that originally formed to foster improved engagement by community on the topic of climate change. Dr Le Feuvre discussed the workshops that Psychology for a Safe Climate has developed for individuals and groups who are working in the area of climate change:

These workshops have been found to be helpful to participants, giving relief and expression of their deepest feelings, fostering acceptance of their own feelings and a connection with others as they realise they are not alone in their often troubled emotional state.

The experience of confronting difficult feelings—paradoxically, we have found—gives strength to people’s engagement with climate change in whatever capacity they are contributing.⁸⁷

The members of other environmental groups are working to process their emotions related to climate change in a wide range of ways. For example, Ms Charko referred to the work of discussion groups at the Port Phillip EcoCentre through which ‘people come together and they do artworks and they talk about the grief of the loss of wild places and the grief of lost opportunities for their children and the next generation’.⁸⁸

The Committee is particularly concerned about the mental health impacts of climate change on young people, given the extent of their engagement in movements such as the School Strike for Climate and Climate Emergency Declaration. As Dr Le Feuvre stated:

I do think one thing is that actually there is evidence that taking action and protesting is good for your mental health when you are feeling anxious and helpless about it ... [but] as time goes on and things are not done [young people may become] even more anxious and depressed, and we think that those people do particularly need to be supported.⁸⁹

While engagement in climate action such as public protests may have mental wellbeing benefits, negative reactions from other sections of the community may also have negative impacts. Ms Emma Walmsley, Founder, 350 Mallee Climate Action Group, discussed some of the responses to events that have been organised by the group and the impacts on her mental wellbeing:

Nasty letters in the paper, comments online and even derogatory personal messages to me have made the work harder. I felt very exposed by putting myself in the public eye for this work, and especially after the candidates forum and the climate strike I was pretty anxious and depressed in the following weeks. It has also taken a toll on my family, and I personally found last year to be my busiest and my most challenging and stressful year yet. Still, I am really proud of all that the group has achieved in only a year...⁹⁰

⁸⁷ Dr Charles Le Feuvre, *Transcript of evidence*, p. 2.

⁸⁸ Ms Fam Charko, *Transcript of evidence*, p. 2.

⁸⁹ Dr Charles Le Feuvre, *Transcript of evidence*, p. 9.

⁹⁰ Ms Emma Walmsley, *Transcript of evidence*, p. 23.

Ms Sophie Appleby, another member of the 350 Mallee Climate Action Group, mentioned the damage to her mental wellbeing from negative community reactions and the need for urgent investment in mental health support services in their region:

I am not sure that I have the answers, but it is something that I am now really passionate about. I went to seek support and was told, 'Well, you will have to wait four or six weeks', or whatever it was. There was just nothing.⁹¹

Councillors from northeast Victoria discussed the impact of drought and disasters on mental health in their areas, the large number of psychological stressors that their communities experience and the limited access to mental health services at a public hearing.⁹² Cr Jenny O'Connor, Mayor of Indigo Shire Council, recommended that the government invest in local services in regional areas rather than bring in specialists from elsewhere:

[Y]ou need to be working with the community health centres regionally, the local hospitals and schools and the people that are working with the most affected communities and of course through the farming associations, like their people.⁹³

The Committee notes that little research has been conducted on the relationship between mental wellbeing, climate change and climate action in Australia, including on eco-anxiety and ecological grief. However, the evidence the Committee has taken during the Inquiry is compelling in demonstrating substantial and complex impacts. Further research is needed to better understand how mental wellbeing is impacted by climate change and what treatments and social supports are most effective in mitigating negative impacts. As climate change is one of a variety of stressors on people, including young people, the Committee believes that it should be considered as part of the mental health and wellbeing reforms currently under consideration by the Royal Commission into Victoria's Mental Health System (which is due to deliver its final report in February 2021).

FINDING 8: Climate change impacts such as more intense droughts, bushfires and heatwaves will have substantial physical and mental health impacts on Victorians.

FINDING 9: Many Victorians are concerned by the broader relationship between mental health and climate change.

RECOMMENDATION 9: That the Victorian Government research the link between climate change and mental health and how this should be incorporated into treatments by clinicians.

⁹¹ Ms Sophie Appleby, *Transcript of evidence*, p. 28.

⁹² Cr Rebecca Bowles, Murrindindi Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 23; Cr Kat Bennett, Wodonga City Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 23; Cr Jenny O'Connor, Mayor, Indigo Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 23.

⁹³ Cr Jenny O'Connor, *Transcript of evidence*, p. 23.

RECOMMENDATION 10: That the Victorian Government consider the contribution of climate change in its implementation of the recommendations of the Royal Commission into Victoria's Mental Health System.

4 Community energy

4.1 Background

Community energy refers to community participation in renewable energy or energy efficiency projects. Examples include gathering community donations to install solar panels on a community building or a community investing in the construction of a small wind or solar farm. These projects can be a practical way for communities to directly contribute to greenhouse gas emissions reduction and mitigate climate change. Community energy was the most referenced community climate change mitigation action in the submissions received by the Committee.

The former Economic, Education, Jobs and Skills Committee (EEJSC) conducted the *Inquiry into community energy projects* (the Community Energy Inquiry) during 2016 and 2017. In view of the recency of the Community Energy Inquiry and the rapidity of change in the renewable energy sector, the Committee decided that the current Inquiry should focus on what has changed since 2017.

This chapter summarises the Community Energy Inquiry and its outcomes, the continued increase in rooftop solar PV and household batteries, recent innovations in the community energy sector and the current state of play in behind-the-meter—where a renewable energy installation is primarily for use by the occupier of the site of the installation, rather than export or sale to the electricity grid—community energy projects. The chapter concludes with an examination of what more could be done to encourage the development of mid-scale community energy projects. Energy efficiency is examined in Chapter 5.

In this chapter, and throughout the report, the Committee refers to the capacity of a range of energy generation systems and to amounts of electricity consumed or saved. For context and comparison, Table 4.1 provides some key Victorian electricity generation capacity figures, Table 4.2 provides some key Victorian electricity demand figures, and Table 4.3 provides some key Victorian electricity usage figures.

Table 4.1 Comparison of electricity generation in Victoria

Example of electricity generation	Size of generation capacity
Amount of renewable energy capacity required by 2025 to meet the Victorian Renewable Energy Target (VRET) target for that year	11,354 MW
Amount of installed renewable energy capacity in Victoria at 30 June 2019	6,098 MW
Capacity of Loy Yang A coal power station—the largest single power station in Victoria	2,210 MW
Capacity of the Stockyard Hill Wind Farm—the largest wind farm under construction in Victoria	530 MW
Capacity of the Macarthur Wind Farm—the largest wind farm operating in Victoria	420 MW
Capacity of Dartmouth Power Station—the largest hydroelectric power station operating in Victoria	150 MW
Capacity of the Numurkah Solar Farm—the largest solar farm operating in Victoria	128 MW
Capacity of a typical household rooftop solar system	5 kW

Sources: Victoria, *Victoria Government Gazette*, No. S 567, 23 December 2019; Department of Environment, Land, Water and Planning, *Victorian Renewable Energy Target: 2018–19 Progress Report*, State of Victoria, Melbourne, 2019; Dylan McConnell, Simon Holmes à Court and Steven Tan, *OpenNEM: An Open Platform for National Electricity Market Data*, 2020, <<https://opennem.org.au/facilities/vic/>> accessed 25 May 2020; Stockyard Hill Wind Farm, *Stockyard Hill Wind Farm*, 2020, <<https://www.stockyardhillwindfarm.com.au/>> accessed 25 May 2020; Neoen, *Numurkah Solar Farm*, 2020, <<https://numurkahsolarfarm.com.au/>> accessed 25 May 2020; Solarquotes, *5 kW Solar System—Solar Power Quotes and Information*, 2020, <<https://www.solarquotes.com.au/systems/5kw/>> accessed 25 May 2020.

Table 4.2 Comparison of electricity demand in Victoria

Example of electricity demand	Size of demand
Victoria's peak electricity demand in 2019–20—the maximum recorded demand for electricity which usually happens during a summer heatwave	9,618 MW
Victoria's peak electricity demand in winter 2019	7,601 MW

Source: Australian Energy Regulator, *Seasonal peak demand - regions*, 2020, <<https://www.aer.gov.au/wholesale-markets/wholesale-statistics/seasonal-peak-demand-regions>> accessed 25 May 2020.

Table 4.3 Comparison of electricity use

Example of electricity use	Size of electricity use
Victoria's annual electricity generation in 2018–19	47,455,000 MWh
Amount of renewable energy generated in Victoria in 2018–19	10,124,000 MWh
Amount of electricity generated in 2018–19 by the Hepburn Community Wind Farm	11,076 MWh
The amount of electricity stored in the Ballarat Energy Storage System—the largest battery in Victoria	30 MWh
Annual average electricity consumption for a Victorian household	4,984 kWh
Amount of electricity stored in the battery of a Tesla Model 3 Standard Range	50 kWh

Sources: Department of Environment, Land, Water and Planning, *Victorian Renewable Energy Target: 2018–19 Progress Report*, State of Victoria, Melbourne, 2019; Hepburn Wind, *Generating Results: Hepburn Wind Annual Report 2019*, Hepburn Wind, 2020; Energy Australia, *Ballarat Battery Storage*, 2020, <<https://www.energyaustralia.com.au/about-us/energy-generation/ballarat-battery-storage>> accessed 25 May 2020; Acil Allen Consulting, *Energy Consumption Benchmarks: Electricity and Gas for Residential Customers*, Report to the Australian Energy Regulator, 2017; Electric Vehicle Database, *Tesla Model 3 Standard Range Price and Specifications*, 2020, <<https://ev-database.org/car/1060/Tesla-Model-3-Standard-Range>> accessed 25 May 2020.

4.2 Inquiry into community energy projects

The terms of reference for the Community Energy Inquiry asked the EEJSC to consider the benefits of community energy projects, whether they can be expanded beyond solar and wind, the role of different forms of community ownership, best practice models from interstate and overseas, and ways to encourage their uptake including in metropolitan areas. The EEJSC's final report, tabled in September 2017, made ten recommendations to the Government and included thirteen findings.¹

The Community Energy Inquiry found there are a range of economic, social and environmental benefits that can flow to communities from community energy projects:

- They can help diversify community income by retaining funds that would otherwise accrue to electricity retailers and businesses outside the community.²
- Reduced energy costs are a key benefit for community organisations installing behind-the-meter rooftop solar PV, which lets them reinvest savings in operations to benefit the community.³
- Community energy projects are more likely to source labour, goods and equipment locally, creating jobs and benefiting local economies.⁴
- Local ownership and participation in decision making on energy projects can empower communities and foster a sense of pride and social cohesion in communities.⁵
- Benefit sharing from renewable energy projects has seen investment in a broad range of community projects and is also increasingly a feature of large-scale renewable energy developments.⁶
- Community energy projects can provide individuals and households who cannot otherwise access renewable energy generation, such as renters and apartment owners, the opportunity to participate.⁷
- Environmental benefits can flow not just from direct emissions reduction, but greater awareness of energy efficiency and environmental issues, and increased acceptance and support for renewable energy.⁸
- When deployed appropriately, community energy projects can also contribute to strengthening the electricity grid and reducing its vulnerability to extreme weather events.⁹

1 Parliament of Victoria, Economic, Education, Jobs and Skills Committee, *Inquiry into community energy projects*, September 2017.

2 Ibid., pp. 15–16.

3 Ibid., pp. 16–17.

4 Ibid., pp. 17–20.

5 Ibid., pp. 20–2.

6 Ibid., pp. 22–3.

7 Ibid., pp. 23–4.

8 Ibid., pp. 24–6.

9 Ibid., pp. 27–8.

Despite the extensive benefits of community energy projects, the Community Energy Inquiry also addressed concerns regarding energy security and affordability, and consumer and investor protection. The report found that these can be managed through appropriate planning, regulation and policy to ensure benefits are maximised.¹⁰

The Community Energy Inquiry explored a range of models for communities to own or participate in energy projects. These included:

- different business structures for communities to invest in and own renewable energy generation¹¹
- projects funded through donation¹²
- partnerships between communities and developers or local governments¹³
- bulk buy programs which create economies of scale for technologies like rooftop solar PV.¹⁴

Each model has different merits and communities will select the most appropriate for their needs.¹⁵ The Community Energy Inquiry found that some of the most successful projects were those that involved partnerships between community groups and organisations that can provide technical expertise and manage financial risk.¹⁶

A range of barriers were found to impact community energy projects, particularly those that are seeking to install mid-scale (which it considered to be projects of 100 kW to 10 MW capacity) renewable generation in front of the meter. These can include:

- restrictions on raising funds or substantial compliance requirements¹⁷
- the need to seek an electricity retail licence¹⁸
- planning and local government restrictions¹⁹
- volatility in the wholesale electricity market²⁰
- high fixed costs associated with grid connection.²¹

Although these barriers also apply to large renewable energy projects, they are particularly difficult for small community groups who lack technical expertise to manage them.

¹⁰ Ibid., pp. 29–35.

¹¹ Ibid., pp. 37–42.

¹² Ibid., pp. 47–9.

¹³ Ibid., pp. 43–7.

¹⁴ Ibid., pp. 50–1.

¹⁵ Ibid., pp. 37–53.

¹⁶ Ibid., pp. 81–3.

¹⁷ Ibid., pp. 57–8.

¹⁸ Ibid., pp. 58–9.

¹⁹ Ibid., pp. 60–1.

²⁰ Ibid., pp. 62–3.

²¹ Ibid., p. 65.

The Community Energy Inquiry also examined the barriers facing community energy projects in metropolitan areas. These are mostly similar to those faced by regional and rural communities but there are additional challenges mainly due to higher housing density, a greater number of apartments and a higher proportion of renters. The unsuitability of wind and bioenergy projects for built-up areas restricts most projects to behind-the-meter rooftop solar PV, which can make it difficult to find an appropriate site with good solar resources and a willing building owner and occupier. Split incentives for landlords and tenants, owners' corporation regulations and a reduced sense of community in urban areas also reduced people's willingness to participate in a community energy project.²²

The report explored a range of policy options that could be used to support community energy projects to negotiate these barriers, including examples from other states and territories and overseas.

The report made ten recommendations and the Government tabled its response to the Community Energy Inquiry in March 2018 in which it supported all the recommendations in full, part or principle. A summary of the recommendations and the Government's response to each is provided in Table 4.4.

Table 4.4 Community Energy Inquiry recommendations and Government Response

#	Recommendation	Summary of Government Response
1	The Victorian Government support the recommendations of the Finkel review that aim to enhance system security and reduce consumers' electricity bills, while being mindful of the cost impact on renewable energy development.	The Government supported this recommendation in full and continues to support the implementation of the Finkel Review through the COAG Energy Council.
2	The Victorian Government include community engagement or part-ownership as one of the evaluation criteria for the VRET reverse auction scheme with a weighting of at least 20%.	The Government supported this recommendation in part. Community engagement and benefit sharing has been included in the evaluation criteria in the VRET reverse auction scheme with minimum requirements and a 15% weighting. The Government believed that a 15% instead of 20% weighting was appropriate given the minimum requirements. As part of these minimum requirements the project developer must work directly with the community throughout all stages of the project, ensure community concerns are understood and reflected in alternatives developed, and provide feedback to the community on how their input influenced decisions.
3	The Victorian Government work with the COAG Energy Council to support regulatory changes that make local energy trading viable while also protecting grid security and vulnerable consumers.	The Government supported this recommendation in part. The Government supported the intent of this recommendation and supports pilot projects on local energy trading. The Government did not support regulatory changes to network pricing, noting that the Government is working with the COAG Energy Council as it assesses alternative models for the design of the electricity market as recommended by the Finkel review.
4	The Victorian Government replace grant funding for community energy projects with a loan fund.	The Government supported this recommendation in part. Primary financial support for community renewable energy projects is through grants, though the Government may consider funding models involving loans in the future.

²² Ibid., pp. 95–9.

#	Recommendation	Summary of Government Response
5	Any financial support the Victorian Government gives to community energy groups has strict criteria to assess a project's financial viability and capacity to become self funded.	The Government supported this recommendation in part. The primary financial support for community renewable energy projects is through the New Energy Jobs Fund which has financial viability and project sustainability assessment criteria.
6	The Victorian Government continue funding and consider expanding Community Power Hubs to other Victorian regions if results from the pilot program show they are valuable to the development of the community energy sector.	The Government supported this recommendation in part. At the time it tabled its response it was awaiting the conclusion of the Community Power Hub pilot in mid-2019 and the results of the program's evaluation. This is discussed further in Section 4.3.6.
7	The Victorian Government support the development of platform solutions for community energy projects through financial mechanisms tied to the Victorian Renewable Energy Target.	The Government supported this recommendation in principle. The Government does recognise the benefit of platform solutions in helping create economies of scale for community energy projects, however, it does not consider the VRET an appropriate mechanism for this.
8	The Victorian Government work with the COAG Energy Council to develop incentives for electricity distributors to make grid connection less costly for community energy projects.	The Government supported this recommendation in principle. The Government acknowledged the challenges for community energy groups associated with network connection but does not believe the COAG Energy Council is the appropriate forum to address this issue. The Government is working with distributors to improve the clarity and accessibility of information on network connection costs and constraints.
9	The Victorian Government amend the <i>Local Government Act 1989</i> to keep debt accumulated by councils for renewable energy installation using s163 off balance sheet.	The Government supported this recommendation in part. The <i>Local Government Act 1989</i> (Vic) already includes the facility for councils to facilitate the repayment of private loans through municipal rates. The Government included provisions in the Local Government Bill 2019 (Vic) that extend Environmental Upgrade Agreements to residential properties which would achieve the recommendation's objective.
10	That the Victorian Government encourage community energy projects that are based on, or incorporate, energy efficiency measures using financial mechanisms tied to the Victorian Renewable Energy Target.	The Government supported this recommendation in principle. The Government does not consider the VRET an appropriate mechanism to fund energy efficiency measures. Alongside other programs, the Government operates the Victorian Energy Upgrades program which provides households, businesses, and community groups access to discounted energy efficient products and services. This program has been expanded to provide for project-based activities.

Sources: Parliament of Victoria, Economic, Education, Jobs and Skills Committee, *Inquiry into community energy projects*, September 2017; Government of Victoria, *Response to the Parliament of Victoria, Economic, Education, Jobs and Skills Inquiry into Community Energy Projects*, 8 March 2018; Taryn Lane and Jarra Hicks, *Community Engagement and Benefit Sharing in Renewable Energy Development: A Guide for Renewable Energy Developers*, Department of Environment, Land, Water and Planning, Victorian Government, Melbourne, 2017.

4.3 Innovations since the 2017 Community Energy Inquiry

The renewable energy sector is rapidly growing and evolving and community energy is no exception. Victoria is the national leader in community energy with 50 of 105 groups in Australia located in Victoria.²³ The short time since the tabling of the 2017 *Inquiry into community energy projects* has seen many new initiatives and changes in the sector that this section will address in more detail.

²³ Coalition for Community Energy, *Submission 65*, received 26 August 2019, p. 1.

4.3.1 Increase in rooftop solar PV

The Committee heard from many local governments, community organisations and businesses who have installed rooftop solar photovoltaic systems.²⁴ As at March 2020, Victoria’s small-scale solar power installations (residential and commercial solar of less than 100 kW) had a total capacity of 2,083 MW, as shown in Figure 4.1. This represents about 19% of Victoria’s rooftops. Installations have accelerated in the past few years with 944 MW of rooftop solar being installed between September 2017—when the *Inquiry into community energy projects* was tabled—and March 2020.²⁵ Many businesses and other facilities are installing solar systems that are larger than 100 kW and some larger than 1 MW. The largest rooftop solar installations in Victoria in various sectors as at December 2019 were:

- a 2,207 kW system on the Vicinity shopping centre at Broadmeadows Central
- a 1,299 kW system on the Natures Organics manufacturing facility in Ferntree Gully
- a 888 kW system on Camberwell Grammar School
- a 757 kW system on Sale Hospital
- a 533 kW system on the Melbourne Museum
- a 337 kW system on the Wyndham Civic Centre.²⁶

All of these systems have been accredited with the Clean Energy Regulator—which enables them to be counted towards the Federal Government’s Renewable Energy Target—since September 2017.²⁷

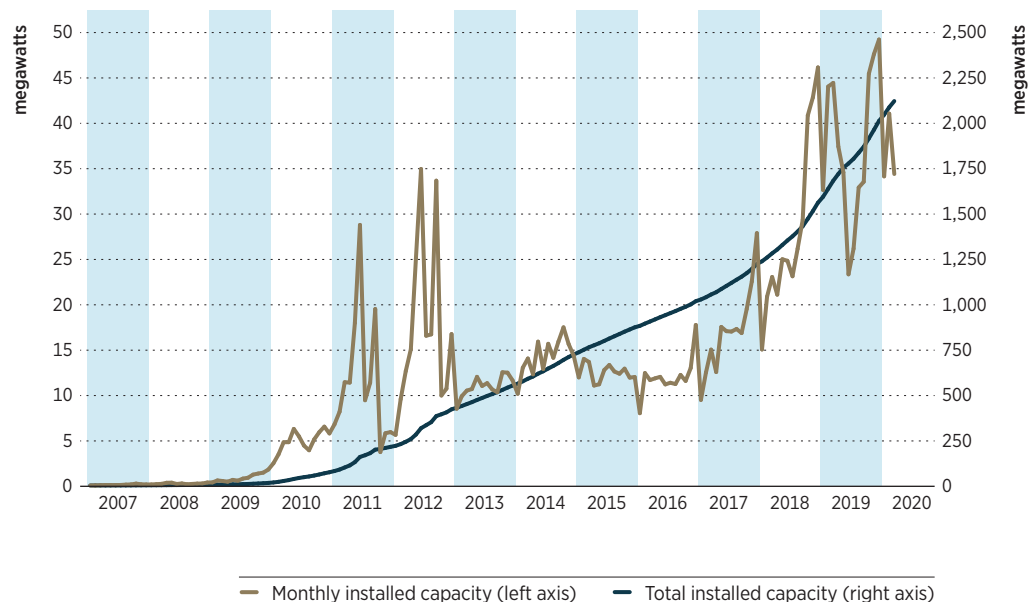
24 See for example: Mr Adrian Ford, Co-convenor, Barwon Region Alliance for Community Energy (BRACE), public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 32; Community Power Agency, *Submission 99*, received 26 August 2019, p. 5; Loddon Shire Council, *Submission 73*, received 26 August 2019, p. 1; Surf Coast Shire Council, *Submission 86*, received 26 August 2019, pp. 5–7; Ballarat Renewable Energy and Zero Emissions Inc. (BREAZE), *Submission 77*, received 26 August 2019, pp. 2–4.

25 Clean Energy Regulator, Historical postcode data for small-scale installations, 18 March 2020, <<http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations/historical-postcode-data-for-small-scale-installations>> accessed 13 May 2020; Clean Energy Regulator, Postcode data for small-scale installations, 20 April 2020, <<http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations>> accessed 13 May 2020; Australian PV Institute (APVI), *Solar Map: funded by the Australian Renewable Energy Agency*, 2019, <<https://pv-map.apvi.org.au>> accessed 13 May 2020.

26 Australian PV Institute, *Large-Scale PV Systems*, <<https://pv-map.apvi.org.au/power-stations>> accessed 28 October 2020.

27 Australian PV Institute (APVI), *Solar Map*.

Figure 4.1 Growth in installation of rooftop solar systems in Victoria



Source: Clean Energy Regulator, Historical postcode data for small-scale installations, 18 March 2020, <<http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations/historical-postcode-data-for-small-scale-installations>> accessed 13 May 2020; Clean Energy Regulator, Postcode data for small-scale installations, 20 April 2020, <<http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations>> accessed 13 May 2020.

The Committee heard from individuals who have themselves installed rooftop solar PV. For example, Mr Phil Day of Wodonga stated in his submission:

Personally we have installed a solar power system with batteries. This is saving about 8 tonnes of carbon per year (4 tonnes at our house and 4 tonnes for the energy we export).²⁸

There is strong interest across the Victorian community from households in generating their own electricity and installing battery storage. There is also substantial scope for installation of further rooftop solar in Victoria. A survey commissioned by Sustainability Victoria in 2017 found that 74% of Victorians were interested in generating their own household electricity needs and feeding excess back into the grid and that 71% were interested in installing solar energy battery storage systems for their home.²⁹ Recent modelling commissioned by the Clean Energy Finance Corporation found that Victoria has 45 GW of rooftop solar potential, which would have an annual energy output of 56,411 GWh.³⁰ By comparison Victoria’s annual electricity generation in 2018–19 was 47,455 GWh.³¹ As rooftop solar continues to grow in Victoria it will present challenges for the management of the electricity grid—which are discussed further in Section 4.5.1.

28 Mr Phil Day, *Submission 30*, received 16 August 2019, p. 1.

29 Sustainability Victoria, *Submission 141*, Attachment A, received 26 September 2019, p. 7.

30 Mike Roberts, et al., *How much rooftop solar can be installed in Australia?*, report for Clean Energy Finance Corporation and the Property Council of Australia, Sydney, 2019, p. 15.

31 Department of Environment, Land, Water and Planning, *Victorian Renewable Energy Target: 2018–19 Progress Report*, State of Victoria, Melbourne, 2019, p. 6.

Behind-the-meter community energy projects are discussed in further detail in Section 4.4.

4.3.2 Microgrids

A microgrid is a small electricity grid with a combination of electricity generators and users, wires to connect them and a control system to operate it all. Microgrids can operate at the level of a single building, street, neighbourhood, or even a whole town. The terms minigrid, nanogrid or picogrid are also used to describe microgrids of various sizes, although there are no precise definitions for these terms. Microgrids with renewable energy often use solar panels and battery storage, although there are a range of other electricity generation and storage technologies being used and smart devices that can manage microgrid demand. Depending on how the microgrid is implemented, it can provide a range of services and benefits for its participants and the broader electricity network. These include providing electricity to places far away from the main electricity grid, better utilising renewable energy generated locally and providing greater reliability in the event of power outages.³²

Microgrids can be connected to the main electricity grid or operate 'off-grid'. For example, the Licola Lions Wilderness Village is in a remote part of Victoria's high country that has no connection to the electricity grid. It has recently augmented its existing diesel generator with solar panels and battery storage which will produce cleaner electricity and save money on diesel.³³

Yackandandah is a leader in microgrid pilots in Victoria, with three small projects being tested or developed around town, and a broader objective to establish a larger microgrid system for the whole town that would enable it to operate during disruptions to the broader electricity network. Much of the work there is driven by Totally Renewable Yackandandah (TRY), whose work was lauded by many other stakeholders.³⁴

TRY has highlighted the role of smart technology in facilitating the roll out of microgrids. Their systems, as well as many other solar and battery installations in the town, are largely using the Mondo Ubi, a smart energy controller. In its submission TRY says that:

The device has capability to visualise, monitor and orchestrate the flows of electricity to optimise the movement of electricity locally to improve local performance, reduce costs, secure a more resilient power supply and optimize the use of local renewable energy.³⁵

³² David Roberts and Alvin Chang, 'Meet the microgrid, the technology poised to transform electricity', *Vox*, 24 May 2018, <<https://www.vox.com/energy-and-environment/2017/12/15/16714146/greener-more-reliable-more-resilient-grid-microgrids>> accessed 7 April 2020.

³³ Gippsland Climate Change Network, *Submission 33*, received 19 August 2019, p. 2; Rachael Lucas, 'Solar-powered Licola Wilderness Village becomes prototype for off-grid communities', *ABC News Online*, 2 December 2019, <<https://www.abc.net.au/news/2019-12-02/licola-goes-off-grid-with-solar/11739220>> accessed 7 April 2020.

³⁴ See for example: Community Power Agency, *Submission 99*, p. 6; Centre for Urban Research, Climate Change Transformations (CCT) Research Group, *Submission 135*, received 11 September 2019, p. 17.

³⁵ Totally Renewable Yackandandah, *Submission 138*, received 16 September 2019, p. 2.

Yackandandah's first microgrid was implemented in 2017 in partnership with Mondo, a subsidiary of AusNet Services. This is in a small estate of 22 dwellings and has 14 participants with rooftop solar, a battery, and a Mondo Ubi. Many of the houses are now able to meet 100% of their electricity needs for about two thirds of the year. TRY hope to take the success of this pilot further. In its submission TRY said:

The density of solar installed in this area is 72% of residences and when we can locate funds, we have a strong aspiration to place a community scale battery at the transformer and work to having the group of houses electrically 'islandable'.³⁶

An 'islandable' microgrid—or microgrid that can operate while disconnected—is one that can continue to supply electricity, even if it is disconnected from the broader electricity grid, for example, in the event of an outage or damage to transmission infrastructure. As at October 2020, most microgrids in Australia are not capable of being operated in this mode.

The second microgrid in Yackandandah was implemented in 2018 in partnership with the University of Technology Sydney, the Australian Renewable Energy Agency and AusNet Services. This is in a rural area to the southeast of the town and has 14 participants out of 85 eligible households with rooftop solar, a battery, and a Mondo Ubi. This microgrid was developed to research how the technology can help stabilise the electricity grid in rural areas. In its submission TRY stated:

This microgrid tested the way in which distributed energy resources can be used to manage network performance in a constrained single wire earth return (SWER) line. This project went on to be recognized by the Clean Energy Council, who awarded AusNet an innovation award in being able to better manage voltage swings in the network.³⁷

TRY, with funding from the Department of Environment, Land, Water and Planning (DELWP), worked again with Mondo to install its third microgrid on the western side of town. There are 33 houses in this microgrid with eight subsidised batteries and a further 12 Mondo Ubis. Installation of this microgrid also involved seven houses receiving ultra-efficient hot water service upgrades that are able to time their operation during daylight hours to maximise the use of available solar power.³⁸

Microgrids are being explored as a solution to the issues of system security and reliability in the electricity grid that are further explored in Section 4.5.³⁹

Research and demonstration are a common focus of microgrid projects in Victoria, as well as achieving emissions reduction. For example, Deakin University have commenced construction of a microgrid at its Waurn Ponds Campus which will help the university

³⁶ Ibid., p. 5.

³⁷ Ibid.

³⁸ Ibid.; Mondo, *Third Microgrid to launch in Yackandandah: A new micro grid, Yackandandah's third, represents another significant step in the town's journey to reach 100% renewable energy by 2020*, media release, Mondo, 16 September 2019.

³⁹ University of Technology Sydney, *Networks Renewed*, 2019, <<https://www.uts.edu.au/research-and-teaching/our-research/institute-sustainable-futures/our-research/energy-futures/networks-renewed>> accessed 12 May 2020.

achieve its carbon neutrality goals. The microgrid will supply 7 MW of solar power, contain battery storage and meet more than half of the campus' energy needs.⁴⁰

Many of the microgrids installed in Victoria have received funding through the Victorian Government's Microgrid Demonstration Initiative. \$10 million in funding supported eight projects across Victoria to install 18 MW of renewable generation and 20 MWh of storage. In addition to the second Yackandandah microgrid described above these projects include:

- installation of solar and battery systems in multi-tenanted apartment buildings in a project led by Ovida
- a pilot Virtual Power Plant which has installed solar and battery storage across 650 residential, commercial and industrial customers which is being led by Origin Energy
- a Microgrid Energy Market Operator (MEMO) at Monash University's Clayton Campus to coordinate the generation and use of energy on the campus and fine tune the control systems needed to enable a broader roll out across Victoria.⁴¹

Other stakeholders discussed their interest in establishing microgrids in their communities and called for further government investment in these projects.⁴²

Communities are also interested in microgrids to improve the resilience and reliability of their electricity supply, especially during emergencies. Mr Adrian Ford, Co-convenor, Barwon Region Alliance for Community Energy (BRACE), explained to the Committee that

decentralising electricity generation will be important from a climate adaptation perspective, as communities are concerned about security of electricity supply as bushfires become more frequent and severe. Lorne and Apollo Bay, for example, have electricity supply lines traversing difficult and heavily forested terrain. In extreme weather events the Australian Energy Market Operator has indicated it will cut supply to minimise the risk of starting fires. Also, in a significant bushfire event, there is a real risk of damage to electricity supply lines. Either scenario would challenge many residents, particularly the elderly. Southern Otways Sustainable and Mondo Power are working ... to develop a microgrid for their area.⁴³

Mr Ford went on to say that an effective way of addressing these scenarios would be to establish a microgrid within the towns that can operate separately from the main electricity grid—through local generation and storage—for several days. This would enable the electricity to remain on in these towns during an emergency that would

⁴⁰ Deakin University, *Submission 158*, received 6 March 2020, p. 2.

⁴¹ Department of Environment, Land, Water and Planning, *Submission 141*, received 26 September 2019, p. 14.

⁴² Mr Rob Catchlove, *Submission 123*, received 2 September 2019, p. 1; Goulburn Broken Greenhouse Alliance, *Submission 140*, received 25 September 2019, p. 5; Ms Dominique La Fontaine, Executive Officer, South East Councils Climate Change Alliance, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 31; Women's Climate Justice Collective (Vic), *Submission 153*, received 30 January 2020, p. 5.

⁴³ Mr Adrian Ford, *Transcript of evidence*, p. 33.

otherwise require the electricity supply lines to be shut down or result in damage to those lines.⁴⁴

For microgrids to function in this way they must be capable of temporary disconnection from the rest of the electricity grid. However, this presents a range of technical and regulatory challenges to their operation. Such a microgrid would need to be safe to operate, for example, for electricity line workers, and would also need to maintain 'system security' (discussed further in Section 4.5.1). There are also market challenges for such a microgrid. In addition, the current regulatory framework does not allow for an 'on/off switch' to be created for a small part of the network.⁴⁵ Addressing these challenges would require close cooperation between regulators, electricity distributors, the local community and the Victorian Government. The Committee considers the establishment of a pilot project in Victoria as the most appropriate means of solving these technical challenges and developing the necessary regulatory change.

RECOMMENDATION 11: That the Victorian Government work with regulators, electricity distributors and other stakeholders to establish a pilot microgrid in a bushfire-prone area of Victoria that is capable of operating while disconnected from the main electricity grid during an emergency.

Community batteries

Some microgrid proposals, such as TRY's future plans mentioned above, include the installation of community or neighbourhood batteries.⁴⁶ Electricity distribution companies are also interested in neighbourhood batteries to help stabilise the network and avert the need for costly upgrades. For example, United Energy is trialling two 75 kWh battery storage systems on network poles to manage network constraints and help assist peak demand.⁴⁷

Under the 'ring-fencing' rules in the National Electricity Market (NEM), transmission and distribution companies are prohibited from engaging in wholesale or retail electricity market activities to preserve competition. Under these rules, electricity distributors are not able to access the full benefits from these batteries, and some stakeholders have suggested that changes to the current rules would make batteries more financially viable. In a supplementary submission, Energy Networks Australia (ENA), the industry group of electricity transmission and distribution companies, stated:

If networks could engage in the wholesale energy market, they would be better placed to react to peak demand using demand response as well as other services only provided through the wholesale energy market.

⁴⁴ Ibid.

⁴⁵ Jarrad Pilkington, Manager, Energy Policy, Australian Energy Market Operator, Inquiry into tackling climate change in Victorian communities public hearings, response to questions on notice received 8 May 2020.

⁴⁶ Mr Adrian Ford, *Transcript of evidence*, p. 33; Ms Dominique La Fontaine, *Transcript of evidence*, p. 31.

⁴⁷ Tamatha Smith, General Manager, Corporate Affairs, Energy Networks Australia, Inquiry into tackling climate change in Victorian communities public hearings, response to questions on notice received 31 January 2020, p. 3.

Access to other revenue streams could make implementing network support batteries more financially viable and result in deferred or reduced network expenditure in the future as well as lower peak demand prices. This approach would give priority to [the] best customer outcomes.⁴⁸

Ms Violette Mouchaileh, Executive General Manager of Emerging Markets and Services, Australian Energy Market Operator (AEMO), explained to the Committee that changes to the rules are being examined in the context of the Western Australian Government's investment in community batteries:

There are restrictions currently from a regulatory perspective in terms of a network's ability to own that. That is something that is being looked at as part of the Energy Security Board,⁴⁹ given some of the reforms that the Western Australian Government is talking about around storage at the network level and enabling networks to invest in those. So that is something that is being explored, but third parties could absolutely put in storage. The idea there is it is a network or a commercial kind of construct, and how do you use that storage, both for the community and for the local network, and then ... offer services for the whole of the system so that those values are actually released to manage things at various levels?⁵⁰

Although not subject to the same ring-fencing restrictions as distribution networks, community energy groups seeking to purchase and sell electricity on a local basis, including through community batteries, also face regulatory challenges around local energy trading explored below.

RECOMMENDATION 12: That the Victorian Government advocate to the Commonwealth Government and other governments for reforms to the ring-fencing regulations that would enable electricity distributors to access the full benefits from battery infrastructure, while maintaining appropriate safeguards.

Local energy trading

While microgrids are a type of physical infrastructure, there are also opportunities to develop local market infrastructure, such as local energy trading. In a supplementary submission, ENA discussed the transition towards distributed energy resources and the regulatory challenges in designing local solutions:

The energy sector's transition is demanding more integrated solutions such as commercial or industrial entities sharing their solar or battery resources, but the licensing framework restricts what communities can achieve without obtaining a licence from the Essential Services Commission.⁵¹

⁴⁸ Ibid.

⁴⁹ The Energy Security Board was established by the COAG Energy Council to develop long-term market reforms for the National Electricity Market (NEM).

⁵⁰ Ms Violette Mouchaileh, Executive General Manager, Emerging Markets and Services, Australian Energy Market Operator, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 33.

⁵¹ Tamatha Smith, response to questions on notice, p. 2.

Most projects involving the sale of electricity in Victoria require a licence from the Essential Services Commission, with the exception of on-site community energy projects such as those discussed in Section 4.4.2. ENA informed the Committee that while there can be exemptions from this requirement, they are difficult to obtain.⁵²

Several submissions called for regulatory reform to enable some form of local energy trading between households on the distribution network.⁵³ Localised energy trading could support and be enabled by the further development of microgrid infrastructure, such as community batteries, and offer other benefits such as incentivising optimal charging of electric vehicles.⁵⁴ However, as the EEJSC found in its report, market reforms to enable local energy trading could expose consumers to more volatile electricity prices, disadvantage some consumers and potentially increase prices overall.⁵⁵ Any market reforms that would permit local energy trading would need careful design to maximise benefits and minimise costs.⁵⁶

RECOMMENDATION 13: That the Department of Environment, Land, Water and Planning collaborate with the Essential Services Commission and community energy groups to develop reform proposals that would better enable the development of community-owned batteries and local energy trading.

4.3.3 Mid-scale community energy projects and proposals

Most of the activity by the community energy groups that the Committee heard from has been small scale and behind-the-meter. There are very few examples of community energy projects in Victoria that are mid-scale. This report defines ‘mid-scale’ as a project that has a capacity of between 1 MW and 10 MW, and which is designed for and operated to export electricity to the grid, rather than for use on the same site as the project.⁵⁷

Victoria’s first, and—as far as the Committee is aware—only, fully community-owned mid-scale renewable energy generator is Hepburn Wind’s Leonards Hill wind farm. The wind farm features two turbines that together have a capacity of 4.1 MW and generate enough electricity to power the entire town of Daylesford, making it the first zero-net energy town in Australia. The turbines were built in 2011 after a seven-year effort to plan, develop, and build the wind farm. It is owned by 2,000 community members who contributed capital to the project.⁵⁸ Ms Taryn Lane, General Manager, Hepburn Wind,

⁵² Ibid.

⁵³ Moreland City Council, *Submission 116*, received 30 August 2019, p. 4; Northern Alliance for Greenhouse Action, *Submission 118*, received 1 September 2019, p. 3; Hepburn Wind, *Submission 64*, received 26 August 2019, p. 7; Mr Rob Catchlove, *Submission 123*, p. 1.

⁵⁴ Centre for New Energy Technologies (C4NET), *Submission 91*, received 26 August 2019, p. 3.

⁵⁵ Parliament of Victoria, Economic, Education, Jobs and Skills Committee, *Inquiry into community energy projects*, pp. 73–5.

⁵⁶ Frontier Economics, *Valuing the impact of local generation on electricity networks*, report for Energy Networks Association, Melbourne, 2015.

⁵⁷ This definition is consistent with some submissions, for example: Coalition for Community Energy, *Submission 65*, pp. 3–4.

⁵⁸ Hepburn Wind, *Submission 64*, pp. 1–2.

outlined the importance of community commitment to the project and the benefits of the wind farm during its eight years of operation:

Our community members invested nearly \$10 million of community capital, and they have really shown that under the right conditions renewables can be embraced and celebrated within a local community.

Now eight years in we have seen an abatement of almost 90 000 tonnes of CO₂ through our energy generation. Our community fund has delivered a benefit of almost \$250 000, and we have delivered 32 kilowatts of donated solar projects and community facilities within that. We work hard to implement climate mitigation projects but also to partner with council and other local stakeholders on climate mitigation programs.⁵⁹

Figure 4.2 Hepburn Community Wind Farm



Hepburn Wind site visit (left to right): Hepburn Wind representatives, Taryn Lane, General Manager, Hepburn Wind, Darren Cheeseman MP (Chair), David Morris MP (Deputy Chair), Nathan Bunt, Committee Secretariat, Paul Hamer MP.

Source: Committee secretariat.

⁵⁹ Ms Taryn Lane, General Manager, Hepburn Wind, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 17.

Hepburn Wind was also instrumental in the development of the Hepburn Z-NET Community Transition Plan, which is discussed further in Chapter 2. Hepburn Wind is seeking to take advantage of its existing electricity grid connection to add a 3 MW solar farm at the same location as the Leonards Hill wind farm.⁶⁰

Although Hepburn Wind is the only fully community-owned wind farm in Victoria, there are other renewable energy generators in Victoria with community co-investment. For example, the 19.4 MW wind farm at Coonooer Bridge, northwest of Bendigo, has 33 neighbouring landowners as shareholders in the wind farm. This co-ownership model, along with a community grants program and other benefits, has been credited with local acceptance of the project.⁶¹

While this section is focused on mid-scale projects, there are a small number of grid-connected small-scale renewable community energy projects in Victoria. The Warburton Mini-Hydro Scheme is a collaboration between Warburton and Yarra Junction Community Bank Branches, Bendigo Bank, Yarra Ranges Council, the Victorian Government, and Powershop. This project has developed a 100 kW mini-hydro station on the site of an old hydroelectric scheme on the Warburton Golf Course and is wholly community owned through Upper Yarra Community Enterprise, which also operates the local community bank branches.⁶²

The Committee received submissions and heard from many other community groups throughout Victoria that are seeking to develop their own mid-scale community energy projects. While these projects are at various stages of development, most are currently at the business case stage, or are seeking investment or developer partnerships. Aside from the Renewable Newstead solar farm and Goulburn Valley Community Energy's Mooroopna solar farm discussed below, the Committee is not aware of any that are currently seeking planning approval or that are under construction.

Renewable Albury Wodonga (RAW) Energy has developed a comprehensive business case for the development of a 2 MW solar farm funded through community investment. This would include a community fund to share the benefits of the project more broadly through energy efficiency and other grants. The business case found that the project would be challenging to undertake but could be done if RAW Energy found the right developer partner.⁶³

⁶⁰ Ibid.

⁶¹ Business Council of Co-operatives and Mutuals, *Submission 104*, received 26 August 2019, p. 5; Giles Parkinson, 'Coonooer Bridge claims highest output of Australian wind farms', *Renew Economy*, 26 July 2016, <<https://reneweconomy.com.au/coonooer-bridge-claims-highest-output-australian-wind-farms-74518>> accessed 7 April 2020; Giles Parkinson, 'Vic wind farm breakthrough, with pioneering share structure', *Renew Economy*, 12 June 2013, <<https://reneweconomy.com.au/vic-wind-farm-breakthrough-with-pioneering-share-structure-75914>> accessed 7 April 2020.

⁶² Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, received 19 August 2019, p. 4; Bendigo Bank, *Warburton community turns on \$1.2 million hydro power plant*, media release, Bendigo Bank, 29 October 2018.

⁶³ Wodonga Albury Toward Climate Health (WATCH), *Submission 63*, received 26 August 2019, p. 1; Moreland Energy Foundation, Alternative Technology Association and Akin Consulting, *Wodonga Community Solar Business Case*, report for City of Wodonga and Renewable Albury Wodonga, 2017.

The Macedon Ranges Sustainability Group (MRSRG) has proposed a hybrid wind, solar and battery storage project for a location in pine forest south of Woodend. MRSRG have partnered with Australian company Windlab to undertake further studies and ultimately develop the project. The site could host up to 8 wind turbines, 24,000 solar panels and 10 MWh of battery storage. A portion of the income from the project would be reinvested into other community projects by MRSRG.⁶⁴

Renewable Newstead is working to attract a commercial developer to the town to construct and operate a 2–9 MW solar farm. Unlike other projects described in this section, this would be a fully commercial project with no direct community investment, although the development of the project would be underwritten by the Victorian Government. To attract a commercial developer, the model developed by Renewable Newstead establishes long-term demand-based electricity tariffs which provides revenue certainty for the developer. The community would benefit from a supply of cheap renewable energy. This tariff model is discussed further in Section 4.3.4. Renewable Newstead is aiming to develop a model that can be replicated in other small regional and rural communities. Renewable Newstead stated in its submission:

This is a first-mover model. It needs to be constructed and demonstrated to show small rural communities, governments, energy retailers and energy infrastructure investors that it's viable for all parties without future subsidy.⁶⁵

As at September 2020, Renewable Newstead has secured land for the solar farm, sought a planning permit and launched an expression of interest process for a consortium to design, construct and operate the solar farm and retail the electricity to the town's residents.⁶⁶

Goulburn Valley Community Energy (GVCE) is a not-for-profit social enterprise that is developing two mid-scale projects. The most advanced is a 21 MW project on leased council land in Mooroopna that is being developed in partnership with Akuo Energy, an international renewable energy developer. As at September 2020, GVCE had submitted its planning application, but had experienced a number of challenges associated with conditions in the broader electricity network and market. This is discussed further in Section 4.5. GVCE has also proposed an approximately 50 MW solar farm in Moira Shire.⁶⁷

⁶⁴ Macedon Ranges Shire Council, *Submission 69*, received 26 August 2019, p. 4; Macedon Ranges Sustainability Group, *Macedon Ranges Community Energy Park*, 2019, <<https://mrsq.org.au/macedon-ranges-community-energy-park>> accessed 7 April 2020.

⁶⁵ Renewable Newstead, *Submission 95*, received 26 August 2019, p. 3.

⁶⁶ Tosh Szatow, 'How a small town solved five key barriers to a 100 per cent renewable energy supply', *One Step Off The Grid*, 21 August 2020, <<https://onestepoffthegrid.com.au/how-a-small-town-solved-five-key-barriers-to-a-100-per-cent-renewable-energy-supply>> accessed 24 August 2020.

⁶⁷ Mr Geoff Lodge, Chief Executive Officer, GV Community Energy, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 28; Greater Shepparton City Council, *Submission 108*, received 27 August 2019, p. 2; GVCE Mooroopna Solar Farm Pty Ltd, *GVCE Mooroopna Solar Farm*, 2020, <<https://www.gvcemooropnasolar.com>> accessed 30 September 2020.

While most examples of proposed projects in Victoria involve wind or solar, the City of Greater Bendigo has proposed a pumped hydro project. Mr Bernie O’Sullivan, Director of Strategy and Growth, City of Greater Bendigo, explained how Bendigo’s unique history and hydrology could enable such a project:

Being a mining town we have got quite shallow groundwater that is quite contaminated, and there is an ongoing project to make sure that this contaminated groundwater does not start appearing around the city. It is being pumped out to the north at the moment, but we have been looking at a project with the State Government around being able to have a pumped hydro system where you can sort of use the water in the mine shafts to have it stored and then come down, turn turbines and generate electricity, but it is hard to get traction on some of those big projects that require more investment to look at their feasibility.

...

Each community is different, each community has ideas, and particular to Bendigo are all these mine shafts from our previous mining history. It would be unique. Some similar things have been done elsewhere, but it would be a first in Australia to be able to effectively pump water up from the underground at a low peak time to storage facilities and then at peak times be able to have the resource to release that water down through turbines and generate electricity. That has the potential to produce up to 50 per cent of Bendigo’s energy needs. We have done an initial investment with the State Government. We each put in a relatively modest amount of money for a study—about \$100 000 worth—and it indicated that yes, there is absolutely potential there.⁶⁸

Bendigo Sustainability Group (BSG) is looking to develop two to three 2 MW solar farms and has sought expressions of interest for possible landowners to host a solar farm and \$4–5 million in community investment to provide capital for its development. Sizing of the solar farm at 2 MW would enable connection to the 22 kV distribution network, and thus more flexibility in the location of the farm. This could provide a model for other communities across Victoria to adopt.⁶⁹

The Ramahyuck District Aboriginal Corporation has developed a proposal for a 6 MW solar farm on land owned by the Corporation in Longford. This would be one of the first grid-connected solar farms on Aboriginal-owned land. It would also provide an income stream for the Corporation and act as a model for other Indigenous landowners.⁷⁰ The Corporation has engaged with the Latrobe Valley Community Power Hub and a range of other stakeholders to conduct pre-feasibility studies with funding from Indigenous Business Australia and the Latrobe Valley Authority. These studies demonstrated

68 Mr Bernie O’Sullivan, Director, Strategy and Growth, City of Greater Bendigo, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, pp. 7–10.

69 Mr Chris Corr, Member, Bendigo Sustainability Group, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 15; Bendigo Sustainability Group, *Community Solar Farm*, 2019, <<https://www.bsg.org.au/community-energy/community-solar-farm>> accessed 7 April 2020.

70 Cr Darren McCubbin, Chair, Gippsland Climate Change Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 2; Sustainability Victoria, *Submission 141*, Attachment A, p. 34; Liz Bell, ‘Ramahyuck Aboriginal corporation hopes to build a solar farm at Longford’, *Gippsland Times*, 12 September 2019, <<https://www.gippslandtimes.com.au/story/6381898/ramahyuck-solar-farm>> accessed 7 April 2020.

project viability and, as at October 2020, modelling, consultation and design work was progressing. The Ramahyuck Solar Farm project has received interest from other Aboriginal Corporations across the country who are interested in developing similar projects. They have also reported interest from government and corporate organisations in the purchase of electricity from the solar farm, when it is complete. This interest is due to both the unique nature of the project and the fact that it would assist such organisations to meet their Aboriginal Procurement targets.⁷¹

There are other examples of Indigenous Victorians engaging in community energy projects including the Taungurung Land and Waters Council operating a behind-the-meter community energy project with DELWP, and Bunjil Energy which is an Indigenous energy company.⁷² The Committee considers that there could be greater engagement by the community energy sector with Traditional Owners and that this should be led by the Community Power Hubs.

RECOMMENDATION 14: That the Community Power Hubs engage with Aboriginal Corporations to explore the development of community energy projects.

In addition to these projects there are many other community energy groups with ambitions to develop mid-scale projects.⁷³ Despite these ambitions and the projects listed above, the limited development of mid-scale projects in Victoria to date speaks to the challenges and barriers faced by these community energy groups. The challenges that continue to face mid-scale community energy projects and the policy changes that may support them are further discussed in Section 4.6.

FINDING 10: There is substantial ambition across Victoria for the development of mid-scale community energy projects. However, community energy groups in Victoria continue to face a number of challenges and barriers, which to date have limited the development of mid-scale projects in the state.

4.3.4 Electricity tariff structures and community retailing

Community energy projects can be supported through the development of innovative electricity tariff structures or the establishment of community-owned energy retailers. In Victoria, as in the rest of Australia, these forms of support are currently in their infancy but two examples have emerged in the past few years.

⁷¹ Andrew Dimarco, General Manager, Economic Development, Ramahyuck District Aboriginal Corporation, correspondence, 8 June 2020.

⁷² Eliza Beck, 'On Country renewable energy partnership gets green light', *ABC News Online*, 9 July 2019, <<https://www.abc.net.au/news/2019-07-09/on-country-renewable-energy-gets-green-light/11292928>> accessed 25 May 2020; Bunjil Energy, *Bunjil Energy*, 2020, <<https://www.bunjilenergy.com.au>> accessed 25 May 2020.

⁷³ Coalition for Community Energy, *Submission 65*; Community Power Agency, *Submission 99*; Benalla Sustainable Future Group, *Submission 152*, received 23 January 2020, p. 5; Mr Adrian Ford, *Transcript of evidence*, p. 32.

Renewable Newstead tariff

Renewable Newstead is a community energy group based in the town of Newstead in the Goldfields region of Victoria. The group aims to develop a grid-connected solar park and to sell the power generated to local residents using a tariff designed for small rural communities.⁷⁴ They hope that their model can be replicated across other small rural towns. Ms Genevieve Barlow, from Renewable Newstead, discussed the aim of the project:

[T]he problem in Newstead is we have a very mixed demographic and you can put up all the solar rebates you like but there are people who simply cannot afford them, or they do not get up. I personally have visited homes as we have done energy audits, and people do not turn on their heating or cooling, mostly elderly people. So what we wanted to do was come up with a model that could support everyone. We did not set out to do something based on climate change; we set out to do a project that would be about serving all of our community. We did some surveys and we knew we had to tackle this through price rather than any ideological value.⁷⁵

Renewable Newstead is aiming to develop long-term retail electricity contracts for their residents. This would provide financial security for the developer of its grid-connected solar park—as with power purchase agreements (PPAs) which are discussed in Section 4.3.5. Ms Barlow explained their proposal for long-term contracts and some of the challenges associated with it:

[W]e need long-term contracts. We need the retailer with the consumer to have long-term contracts, and we think that because the price will be good, people will be loyal to that. Of course it will come with all the normal consumer protections, but we need some legal know-how around that.⁷⁶

Renewable Newstead has been working with Powercor—the electricity distributor for Western Victoria, which includes Newstead—to develop this model, including the development of a trial tariff for Newstead. The tariff is based on a mix of a high fixed charge and low demand charge—as opposed to most residential tariffs which are based on a high usage charge and low fixed charge—to encourage greater utilisation of the distribution network because Newstead is in an unconstrained area of the distribution network.⁷⁷

Usage charges are the most common form of residential electricity tariff and are based on the total amount of electricity consumed over the billing period. This is roughly analogous to how long a customer runs their appliances for. Demand charges are relatively uncommon for residential customers and are based on the peak amount of

⁷⁴ Renewable Newstead, *Submission 95*, pp. 2–4.

⁷⁵ Ms Genevieve Barlow, spokesperson, Renewable Newstead, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 10.

⁷⁶ *Ibid.*

⁷⁷ Powercor Australia, *Powercor 2018 Pricing Proposal*, Melbourne, 2017, p. 15.

electricity being consumed over a particular period. In other words, demand charges are roughly analogous to the peak number of appliances used over a billing period. For the Newstead tariff trial, the demand charge is \$2 per kW per month.⁷⁸

According to Renewable Newstead, the use of demand instead of usage charges would enable customers to be less concerned about the length of time they are running power hungry appliances such as heating or cooling and potentially achieve greater levels of comfort without increasing their electricity bills. Once the tariff is passed onto consumers by an electricity retailer it would still likely include a usage charge for electricity supplied, however, there would be no usage charge from the electricity distributor. Everything else being equal, Renewable Newstead estimates that the trial tariff could reduce customers' bills by 10–30%.⁷⁹

The trial of this tariff is the first step towards offering a long-term retail contract to the people of Newstead.⁸⁰ Powercor is expected to support the trial through to 2022–23, which will allow the development of the solar farm and an appropriate local retail offering.⁸¹

Indigo Power

Indigo Power is a social enterprise established in north east Victoria that aims to assist the region to become 100% renewable by offering electricity through a community-owned energy retailer.⁸² Indigo Power has partnered with Energy Locals to provide the retailing services in their community. Indigo Power are seeking to develop renewable energy assets in the region and have already entered into PPAs with renewable generators. Indigo Power also have plans to develop a 70 kW solar garden with 200 kWh of battery storage.⁸³ As a social enterprise, a portion of Indigo Power's profits are reinvested in local community energy and energy efficiency projects, including a hot water replacement program in partnership with the North East Community Energy Network.⁸⁴

4.3.5 Power purchase agreements

A corporate power purchase agreement (PPA) is a direct agreement between a renewable electricity generator and a private or public sector buyer. PPAs were not a feature of the Australian electricity market until recent years but their prevalence has grown rapidly since 2017. There are a range of structures for these contracts, most of which support the development of new renewable energy projects.⁸⁵ Much of the work

⁷⁸ Ibid.

⁷⁹ Renewable Newstead, *Small town big switch: Newstead's journey to renewable energy*, 2018, p. 13.

⁸⁰ Ibid., p. 16.

⁸¹ Genevieve Barlow, Renewable Newstead, correspondence, 14 April 2020.

⁸² Totally Renewable Yackandandah, *Submission 138*, p. 6.

⁸³ Ibid., p. 7.

⁸⁴ Ibid.

⁸⁵ Business Renewables Centre-Australia, *Corporate Renewable Power Purchase Agreements in Australia: State of the Market 2019*, 2019.

in establishing PPAs is being driven through the Business Renewables Centre Australia (BRCA), which received establishment funding from the Victorian Government. The BRCA has a target of facilitating the establishment of 250 MW of new renewable capacity in Victoria by 2020.⁸⁶ Nationwide, PPAs have driven the development of new renewable energy projects. Notably, 41% of the renewable energy generation capacity supported by corporate PPAs is located in Victoria.⁸⁷

Many of the organisations who made submissions to the Inquiry have participated in corporate PPAs. Three notable corporate PPAs in Victoria are the Melbourne Renewable Energy Project, Zero Emissions Water and the Victorian local government renewable energy PPA. Collectively these and other Victorian renewable energy corporate PPAs will purchase an estimated 2,150 GWh of electricity per annum, equivalent to 5% of Victoria's annual electricity usage.⁸⁸

Melbourne Renewable Energy Project

The Melbourne Renewable Energy Project brought together a range of organisations in Melbourne to purchase electricity from renewable sources and support renewable energy development. It was led by the City of Melbourne, which in its submission stated:

The Melbourne Renewable Energy Project (MREP) is the first time in Australia that a group of local governments, cultural institutions, universities and corporations collectively purchased renewable energy from a newly built facility.

The MREP project has enabled the construction of a new 39-turbine 80 MW capacity wind farm outside the municipality, to supply 88 GWh of renewable energy to 14 organisations in the city through a power purchase agreement. The annual amount of renewable electricity generated through MREP is equivalent to two percent of the municipality's electricity demand.

Since the MREP tender was announced, many other large users across the country have started contracting directly with renewable energy projects as a way of managing risk, reducing costs and driving down carbon emissions.

The Melbourne Renewable Energy Project won the Premier's Sustainability Award last year and has been recognised internationally for its innovation by the Carbon Neutral Cities Alliance.⁸⁹

Other community focused businesses such as Bank Australia, which operates as a cooperative, participated in the MREP. The Business Council of Co-operatives and Mutuals (BCCM) stated in its submission that

Bank Australia's entire Australian operations have been running entirely on renewable electricity from 1 April 2019 ... Bank Australia has a 10-year agreement to purchase

⁸⁶ Ms Claire Ferres Miles, Chief Executive Officer, Sustainability Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 25.

⁸⁷ Energetics, *Corporate renewable energy PPA deal tracker*, 2020, <<https://www.energetics.com.au/insights/knowledge-centres/corporate-renewable-ppa-deal-tracker>> accessed 8 April 2020.

⁸⁸ Ibid.

⁸⁹ City of Melbourne, *Submission 120*, received 2 September 2019, p. 8.

renewable electricity with the Crowlands Wind Farm as part of the Melbourne Renewable Energy Project.⁹⁰

Other partners involved in the Melbourne Renewable Energy Project included Moreland City Council, City of Port Phillip, City of Yarra, NAB, Australia Post, Citywide, NEXTDC, RMIT University, The University of Melbourne, Federation Square, Zoos Victoria and the Melbourne Convention and Exhibition Centre.⁹¹

The success of the first MREP has led the City of Melbourne to facilitate a second consortium of renewable energy buyers to tender for a new PPA. These organisations include RMIT University, Deakin University, Cbus Property, ISPT Property, Fulton Hogan, Citywide Asphalt, and Mondelez International. These organisations will purchase approximately 113 GWh of electricity per year.⁹²

Zero Emissions Water

Victoria's water sector has been a leader in the early embrace of renewable energy. Under the Intelligent Water Networks collaboration, 13 of Victoria's 19 statutory water corporations have collaborated on a joint PPA which delivers more than 78 GWh annually. VicWater discussed the benefits of this PPA in its submission:

By jointly investing in a Large Scale Renewable Energy Project, water corporations can achieve long-term price certainty, reduce their operational risk and complexity, and eliminate emissions ... A new organisation called Zero Emissions Water Ltd (ZEW www.zew.org.au) was established to manage the contract over the next 10 years on behalf of the Corporations involved. This project makes a critical contribution to ensuring the lowest community cost for water corporations' transition to carbon neutrality, by setting a baseline against which other projects can be benchmarked. The scale of this project is such that it will provide a huge boost to the Victorian renewables industry in its own right, underpinning a larger Victorian renewable energy sector that will create more jobs in the future.⁹³

Victorian local government renewable energy power purchase agreement

Many submissions from local councils and the Greenhouse Alliances mentioned their participation in a local government renewable energy buyers' group. The buyers' group, which is coordinated by the Municipal Association of Victoria, will aggregate some or

⁹⁰ Business Council of Co-operatives and Mutuals, *Submission 104*, p. 9.

⁹¹ Moreland City Council, *Submission 116*, p. 3; City of Port Phillip, *Submission 93*, received 26 August 2019, p. 1; Sustainability Victoria, *Submission 141*, Attachment A, p. 17; Sophie Vorrath, 'City of Melbourne leads second "bulk-buy" renewables auction', *Renew Economy*, 22 November 2019, <<https://reneweconomy.com.au/city-of-melbourne-leads-second-bulk-buy-renewables-auction-64091>> accessed 8 April 2020.

⁹² City of Melbourne, *Melbourne Renewable Energy Project: A new generation of energy*, 2020, <<https://www.melbourne.vic.gov.au/business/sustainable-business/mrep/Pages/melbourne-renewable-energy-project.aspx>> accessed 1 July 2020.

⁹³ VicWater, *Submission 141*, Attachment D, received 26 September 2019, p. 3.

all of the electricity demand of 48 Victorian councils—equivalent to approximately 246 GWh of electricity—for 10 years from 2021.⁹⁴

Mr O’Sullivan from the City of Greater Bendigo discussed the importance of this PPA to the council in meeting its emissions reduction targets:

In Greater Bendigo the outcome for us will be 100 per cent renewable energy for all electricity consumption, so [it is] really significant.⁹⁵

Mr Terry Demeo, Director, Infrastructure and Environment, City of Ballarat, outlined the progress of the PPA, its expected cost, and how it is expected to support the development of new renewable energy generation in Victoria:

We are out to market at the moment for a power purchase agreement to purchase renewable power to replace our current contractual arrangements. The target, as I said earlier, in our carbon neutrality plan has 100 per cent renewable as a target.

...

[W]e believe that it will be no more expensive than a brown coal solution.

...

Greenhouse alliances across the State have certainly been the catalysts to bring those councils together and to have done that market analysis work to give confidence in pursuing this course of action, and we have engaged the Municipal Association of Victoria as the procurement agent. The expectation is that it will be predominantly that new wind energy in western Victoria—which we are certainly experiencing, not individually within Ballarat but in the broader region—and that it will be those sources that provide the renewable energy for our agreement.⁹⁶

Ms Bronwyn Chapman, Executive Officer of the Goulburn Broken Greenhouse Alliance, noted how this PPA is a key example of the power of the Greenhouse Alliances and how they can undertake emissions reduction projects at a large scale:

Coming together as alliances means we can really ramp this up, so instead of talking about a project that saves tens of thousands of tonnes of CO₂ we are now starting to work on hundreds of thousands of tonnes of CO₂ saving in a project to purchase renewable energy across 48 councils, and that is a project that is in development and ongoing at the moment, and we hope to be out for tenders this year. Forty-five per cent of Vic councils’ annual electricity use would be in this project, so that is quite substantial.⁹⁷

⁹⁴ Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 3; Jolyon Attwooll, ‘Councils’ clean energy deal delayed a year’, *The Ballarat Courier*, 3 May 2020, <<https://www.thecourier.com.au/story/6743046/councils-clean-energy-deal-delayed-a-year>> accessed 19 May 2020.

⁹⁵ Mr Bernie O’Sullivan, *Transcript of evidence*, p. 3.

⁹⁶ Mr Terry Demeo, Director, Infrastructure and Environment, City of Ballarat, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, pp. 5–6.

⁹⁷ Ms Bronwyn Chapman, Executive Officer, Goulburn Broken Greenhouse Alliance, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 5.

The local government renewable energy PPA was yet to be finalised as at October 2020. The Committee notes the significant progress made by local governments and other organisations in their uptake of renewable energy PPAs and their potential to support the further development of renewable energy projects in Victoria.

Examples of power purchase agreements in other jurisdictions

Although Victoria is the focus of corporate PPA activity in Australia, there are numerous examples supporting projects or involving buyers in other jurisdictions. There are two notable examples of PPAs in NSW which demonstrate the capacity of PPAs to aggregate large numbers of small electricity users into a buyers' group and to support community energy projects.

In what they claim to be a world first in terms of the number of businesses in their buyers' group, Lion and the Australian Hotels Association NSW have partnered to aggregate the energy needs of Lion's Lidcombe brewery and up to 300 pubs and hotels across NSW via a corporate PPA with ENGIE. By aggregating their small electricity needs, the pubs are expected to save approximately 40% on their energy bills. The PPA will also support the construction of the Silverleaf Solar Farm in Narrabri.⁹⁸

In what appears to be another Australian first, the City of Sydney is supporting a community energy project through its recently announced corporate PPA. This will supply 100% of the council's electricity needs. The \$60 million deal will see electricity mostly bought from the 270 MW Sapphire Wind Farm in northern NSW and the 120 MW Bomen Solar Farm near Wagga Wagga, but will also involve the purchase of electricity from the yet-to-be-constructed 3 MW Repower Shoalhaven Solar Farm. This is a community energy project to be built near Nowra by community energy group Repower Shoalhaven in a partnership with developer Flow Power.⁹⁹ The Committee is not aware of any other Australian example of a corporate PPA supporting a mid-scale community energy project in this manner. The potential for this model to support mid-scale projects in Victoria is discussed in Section 4.6.2.

All of these examples demonstrate the value of aggregating organisations into buyers' groups to support renewable energy development and deliver cheaper electricity to buyers. Several community organisations also called for support to help them meet their operational and administrative expenses.¹⁰⁰ For those community organisations with physical facilities, such support could include assistance with electricity bills, which is one of the many drivers for the behind-the-meter community energy projects

98 Rob Harris, 'Pubs clinch state-wide renewable energy deal to cut electricity bills', *Sydney Morning Herald*, 4 October 2019, <<https://www.smh.com.au/politics/federal/pubs-clinch-state-wide-renewable-energy-deal-to-cut-electricity-bills-20191003-p52xxt.html>> accessed 8 April 2020.

99 Michael Mazengarb, 'City of Sydney inks \$60 million deal to go 100 per cent renewables', *One Step Off The Grid*, 22 October 2019, <<https://onestepoffthegrid.com.au/city-of-sydney-inks-60-million-deal-to-go-100-per-cent-renewables>> accessed 8 April 2020.

100 See for example: Beyond Zero Emissions, *Submission 75*, received 26 August 2019, p. 1; Neighbours United for Climate Action (NUCA), *Submission 49*, received 23 August 2019, p. 5; Gippsland Climate Change Network, *Submission 33*, p. 6; Bendigo Sustainability Group, *Submission 106*, received 26 August 2019, p. 1; Lighter Footprints, *Submission 82*, received 26 August 2019, p. 7.

discussed in Section 4.4. While further support for community organisations is discussed in Chapter 10, the aggregation of these organisations into renewable energy buyers' groups may offer a significant avenue for the lowering of their operating expenses.

FINDING 11: Local governments, state-owned corporations and businesses are supporting renewable energy development in Victoria through power purchase agreements.

RECOMMENDATION 15: That the Department of Environment, Land, Water and Planning provide assistance to organisations to enter into power purchase agreements, including facilitating the aggregation of organisations into renewable energy buyers' groups.

Government renewable electricity purchasing

The Victorian Government consumes a large amount of electricity, with public health services alone spending \$122.9 million on electricity in 2018–19.¹⁰¹ One option for the Government to support further development of renewable energy in Victoria is to use its buying power to enter into PPAs with new renewable energy projects. Ms Claire Ferres Miles, Chief Executive Officer of Sustainability Victoria, suggested that negotiating PPAs for portfolios of Victorian Government assets could be a large opportunity for supporting renewable energy development and demonstrating its green credentials:

Is there a way to do a PPA for the whole Victorian school portfolio, for example? And what does that mean if you actually aggregated the energy of 1500 schools across Victoria? That is a fairly big energy pool that you could then use to build a wind farm or solar or something that is quite visible. I think it is about thinking about something like that—a large-scale PPA.¹⁰²

Currently, Victorian Government agencies have the option of purchasing accredited GreenPower through the State Purchasing Contracts, however, the take-up of this option has generally been low due to its additional cost.¹⁰³ For example, only three of the more than 1,500 government schools in Victoria have chosen to purchase 100% GreenPower.¹⁰⁴

GreenPower is an option that most Victorian businesses, households and other organisations have to support renewable energy through their standard electricity contract by paying an additional fee on top of their standard tariff. The electricity retailer uses this fee to purchase Large-Scale Generation Certificates (LGCs) from

¹⁰¹ Robert Fiske, Chief Executive Officer, Victorian Health and Human Services Building Authority, correspondence, 8 May 2020, p. 4.

¹⁰² Ms Claire Ferres Miles, *Transcript of evidence*, p. 28.

¹⁰³ Robert Fiske, correspondence, pp. 4–5; David Martine, Secretary, Department of Treasury and Finance, correspondence, 15 July 2020, p. 4; Department of Education and Training, correspondence, 30 June 2020, p. 8.

¹⁰⁴ Department of Education and Training, correspondence, p. 8.

renewable energy generators. These LGCs are created by renewable energy generators for each unit of renewable energy they produce and are available for purchase under the GreenPower scheme. LGCs are also the mechanism for achieving the Federal Government's Renewable Energy Target.¹⁰⁵

Victorian Government agencies also support renewable energy development through the purchase of LGCs from four Victorian renewable energy projects through its Renewable Certificate Purchasing Initiative.¹⁰⁶ This initiative works similarly to the purchase of GreenPower but may present lower costs for participating agencies.

While more complex to negotiate, PPAs are typically cheaper than the purchase of accredited GreenPower through a retailer.¹⁰⁷ With the falling cost of new wind and solar generation, recently signed corporate PPAs typically have prices well below current wholesale electricity prices.¹⁰⁸ As PPAs often fix a price over the life of the contract, they do present a risk for the consumer that they will pay more over the long term if electricity prices fall substantially.

A number of agencies indicated that PPAs, depending on the contract structure, may not be compliant with government purchasing and financial regulation, or present additional risks for customers.¹⁰⁹ For example, the Department of Education and Training advised that behind-the-meter PPAs for individual schools, which involve the installation of rooftop solar on the site of consumption by another party who then sells the electricity to the user, would breach the *Borrowing and Investment Powers Act 1987* and the *Education and Training Reform Act 2006*.¹¹⁰

The Committee considers it appropriate, given these issues, to consider government electricity purchasing and contract structure separately from government use of renewable energy. The Committee strongly recommends the Victorian Government source all its electricity consumption from renewable energy to both support renewable energy development in the state and to meet its emissions reduction pledge under the *Climate Change Act 2017*.

The Victorian Government can switch to using 100% renewable energy through a variety of means such as:

- using the 100% GreenPower option in existing electricity contracts
- expansion of the Renewable Certificate Purchasing Initiative to the entire Government's electricity consumption

¹⁰⁵ NSW Department of Planning and Environment, *GreenPower for Businesses: Guide*, State of NSW, 2018.

¹⁰⁶ Robert Fiske, correspondence, p. 5.

¹⁰⁷ NSW Department of Planning and Environment, *GreenPower for Businesses*, pp. 30–1.

¹⁰⁸ Timothy de Atholia, Gordon Flannigan and Sharon Lai, 'Renewable Energy Investment in Australia', *RBA Bulletin*, vol. March 2020, 2020.

¹⁰⁹ Robert Fiske, correspondence, p. 5; David Martine, correspondence, p. 5; Department of Education and Training, correspondence, p. 12.

¹¹⁰ Department of Education and Training, correspondence, p. 12.

- enabling agencies to either individually or collectively negotiate LGC-only Power Purchase Agreements
- enabling agencies to either individually or collectively negotiate bundled Power Purchase Agreements.

These options all have differing levels of complexity, cost and compliance concerns with government purchasing and financial regulations. A single initiative could be adopted across government, or individual departments could be left to determine the most appropriate means for achieving the outcome.

In September 2020, the Victorian Government announced the start of a market sounding process for the procurement of at least a further 600 MW of renewable energy in a second round of the Victorian Renewable Energy Target (VRET) auction. This would be equivalent to the amount of power used by every hospital and school in Victoria, Melbourne's train network and a range of other Government infrastructure and services. (The Victorian Government's 2017 Victorian Renewable Energy Target (VRET) auction set a target of 650 MW and delivered 928 MW.) The Government may also form a consortium with private sector electricity buyers in this process, similar to some of the PPAs discussed in this section.¹¹¹ It is the Committee's view that this reverse auction of new renewable energy capacity should supply 100% renewable electricity for the entire Victorian public sector (i.e., all Victorian public service bodies and public entities)¹¹² that are not already purchasing 100% renewable electricity.

RECOMMENDATION 16: That the Victorian Government ensure its upcoming Victorian Renewable Energy Target auction sources 100% renewable electricity to cover the consumption of all Victorian public service bodies, public entities and state-owned infrastructure that are not already sourcing 100% renewable electricity to the maximum practical extent.

For large energy users there are a variety of contractual structures for electricity purchasing. As with the support of renewable energy, these have differing levels of complexity, cost and compliance concerns with government purchasing and financial regulations. Some contractual structures also enable the purchase of 100% renewable energy bundled with the electricity supply contract, including many corporate PPAs detailed in this section.

The Committee has received no evidence on the cost of electricity for the Victorian Government under its current purchasing arrangements, so it is unable to judge whether the use of PPAs by government agencies would represent better value for money as well as a commitment to renewable energy. Nevertheless, there may be

¹¹¹ Minister for Energy, the Environment and Climate Change, *More Renewables To Help Drive Victoria's Economic Recovery*, media release, Victorian Government, 2 September 2020.

¹¹² The organisations that make up the Victorian public sector are divided into public service bodies (Departments, administrative offices and VPSC) and public entities (e.g. hospitals, TAFE institutes and water authorities). See: Victorian Public Sector Commission, *The Victorian Public Sector*, <<https://vpvc.vic.gov.au/about-public-sector/the-victorian-public-sector>> accessed 22 October 2020.

financial benefits to altering current purchasing arrangements as the Government implements the 100% renewable electricity target. Careful assessment and modelling are required to ensure that the current or any new purchasing arrangement would represent the best value for Government.

RECOMMENDATION 17: That the Department of Treasury and Finance in consultation with the Department of Environment, Land, Water and Planning commission modelling on different purchasing models, including a centralised purchase model, for government electricity consumption to ensure Victorian Government agencies are receiving the best possible price now and into the future.

4.3.6 Community Power Hubs

In April 2017, the Victorian Government announced that it would pilot Community Power Hubs (CPHs) in three regional areas over two years to help drive community energy projects. The aim of the CPHs was to coordinate and facilitate the development and expansion of community energy in the regions by building local capacity and skills. The pilot CPHs were located in:

- Ballarat, hosted by Ballarat Renewable Energy and Zero Emissions (BREAZE)
- Bendigo, hosted by the Bendigo Sustainability Group
- the Latrobe Valley, hosted by the Gippsland Climate Change Network.

These organisations were each provided with \$255,000 of funding over two years along with direct support from Sustainability Victoria.¹¹³ This funding was for administration, project development and community engagement only, with the expectation that the capital for projects would be raised through the community, private sector and other grant applications. The original vision for the Community Power Hub program was a network of 10 hubs funded over four years. Although the pilot has formally concluded, the CPHs are being supported over 2019–20 to progress their remaining pipeline of projects.¹¹⁴ Many of the projects discussed in this report, including in this chapter, have been led by the Community Power Hubs.

Over the two years of their pilot the CPHs have collectively financed and commissioned 15 projects with an installed capacity of 1.35 MW alongside other energy efficiency measures. These projects are valued at \$2.2 million of investment capital and are estimated to deliver \$364,000 in annual energy savings to their beneficiaries. Collectively the projects will generate 1,705 MWh of renewable energy and eliminate 1,839 tonnes of CO₂-e emissions every year.¹¹⁵

¹¹³ Jarra Hicks and Taryn Lane, *Community Power Hubs pilot program: Final evaluation*, report for Sustainability Victoria, Sustainability Victoria, 2019, p. 18.

¹¹⁴ Sustainability Victoria, *Submission 141*, Attachment A, pp. 13–15.

¹¹⁵ Jarra Hicks and Taryn Lane, *Community Power Hubs pilot program*, pp. 4, 7.

In addition to the commissioned projects the CPHs have developed a pipeline of proposed projects with 9.7 MW of capacity, worth \$14.7 million. Development of this pipeline would result in flow-on economic benefits of \$45 million.¹¹⁶ Mr Chris Corr, Project Manager for the Bendigo Community Power Hub, explained the effectiveness of the program in leveraging this initial investment in the CPHs into substantial capital for its projects to the Committee:

[T]here are absolutely fantastic outcomes—very glowing outcomes—from the whole project. In particular there, if you look, 13 to 1 was the project leverage on the Government investment through the last two years of those projects, and if all the pipeline projects were developed, that would be 72 to 1, with the Government magnifying all their dollars. So that is an absolutely fantastic result, with thousands of community members engaged.¹¹⁷

Mr Corr went on to explain that a key benefit of community energy projects is that they keep local expenditure on electricity bills within the region:

[I]t is about having 100 per cent community-owned renewable energy. So it is all about keeping our local benefits and jobs here. In urban Bendigo alone there is over \$150 million spent each year on electricity, plus gas, plus the region, so it is a huge amount of money, and we want to keep more of that locally here in Bendigo for local benefit.¹¹⁸

While the *Community Power Hubs pilot program: Final evaluation* did conduct some basic economic modelling to understand the program's impact on co-investment and job creation, the potential economic and social benefits of further local investment in renewable energy warrants additional investigation.

RECOMMENDATION 18: That the Department of Environment, Land, Water and Planning commission and then publish further modelling of the economic and social benefits of local investment in renewable energy projects in Victoria's regions.

Beyond the financial returns, the evaluation of the program commissioned by Sustainability Victoria found it generated substantial community engagement. This included 114 public events and meetings, engagement with over 200 businesses and other organisations, and more than 20,000 connections made across the three host organisations involved.¹¹⁹ The benefits of local ownership of community energy infrastructure and community empowerment through the CPHs were discussed by

¹¹⁶ Sustainability Victoria, *Submission 141*, Attachment A, p. 14; Jarra Hicks and Taryn Lane, *Community Power Hubs pilot program*, pp. 5, 7.

¹¹⁷ Mr Chris Corr, *Transcript of evidence*, p. 16.

¹¹⁸ *Ibid.*, pp. 14-15.

¹¹⁹ Jarra Hicks and Taryn Lane, *Community Power Hubs pilot program*, p. 5.

several stakeholders. Cr Darren McCubbin, Chair of the Gippsland Climate Change Network which hosts the Latrobe Valley Community Power Hub, explained these benefits:

It is a real democratisation of energy, so it is about local communities creating local solutions from simple things like putting PV on your local sports hall or your local kindergarten to much more bigger projects like solar farms at Ramahyuck through the Indigenous corporation and off-grid proposals at Licola.¹²⁰

Sustainability Victoria also noted some of the community engagement benefits of the CPHs in its submission to the Inquiry:

The CPHs have received high levels of support in their local communities, with 83 percent of survey respondents saying they felt the model has been successful. Survey respondents identified that the most valuable role of the CPHs have been to support the development of community energy projects and build local capacity. One community partner described the value of working with the CPH to deliver solar PV on the roof of a community sporting venue, saying: “This was a great experience, we didn’t just achieve [the project], we demonstrated enthusiasm about action on climate change ... this has created positive spirals in our community and generated enthusiasm and positive approaches for making us renewable and sustainable”.¹²¹

The technical skills that were engaged by the CPHs were important and many interviewed during the project evaluation viewed this as one of the key strengths of the model.¹²² Mr Chris Barfoot, Project Officer for the Latrobe Valley Community Power Hub and former Hazelwood worker, explained how the CPHs bring technical and project management skills to community energy projects:

[T]he major thing that is a consistent issue that we deal with is that people lack skills to design, develop, scope, procure and project manage projects, and this has been what the community power hubs have brought to the system. They have become the enabler and the facilitator to allow these projects to happen. We are very proud of what we have managed to achieve, and also in terms of Ballarat and Bendigo, and we believe that is a model which really deserves to be continued and replicated.¹²³

The CPHs also assisted community energy projects in navigating the at times complex grants and funding environment, preparing applications and business cases, and lobbying others for letters of support—addressing many of the concerns around funding raised in Chapter 10. Many people connecting with the CPHs learnt about a range of government support programs through the Hubs including Environmental Upgrade Finance, Solar Homes and ResourceSmart Schools.¹²⁴

¹²⁰ Cr Darren McCubbin, *Transcript of evidence*, p. 2.

¹²¹ Sustainability Victoria, *Submission 141*, Attachment A, p. 14.

¹²² Jarra Hicks and Taryn Lane, *Community Power Hubs pilot program*, pp. 49–56.

¹²³ Mr Chris Barfoot, Board Member, Gippsland Climate Change Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 2.

¹²⁴ Jarra Hicks and Taryn Lane, *Community Power Hubs pilot program*, pp. 59–64.

Several stakeholders called for the extension of the Community Power Hub program for at least four years and its expansion to all six DELWP regions.¹²⁵ This has also been recommended by the *Community Power Hubs pilot program: Final evaluation* which was commissioned by Sustainability Victoria.¹²⁶ Some community groups specifically called for the creation of Community Power Hubs in Northeast Victoria and the Barwon region.¹²⁷ Indeed, a detailed proposal for a Barwon Region Community Power Hub was developed by the Barwon Region Alliance for Community Energy.¹²⁸ Geelong Sustainability explained the rationale and expected benefits from a Community Power Hub in their region in its submission:

As our region is already a hotspot for community and local clean energy, we contend that the Barwon region would be an ideal location for a Community Power Hub. It would enable us to more broadly share knowledge and experience, attract partners and developers and secure funding for a range of community solar and wind projects across the G21 region.¹²⁹

The *Community Power Hubs pilot program: Final evaluation* recommended that funding be increased to enable more administrative staff to be engaged and reduce the reliance of the Community Power Hub Program on volunteers. The evaluation also recommended that seed capital be made available to the program to better leverage external sources of finance.¹³⁰

RECOMMENDATION 19: That the Victorian Government extend and expand the Community Power Hub pilot program in support of the Victorian Renewable Energy Target.

4.4 Behind-the-meter community energy projects

Many local councils and community energy groups have supported the development of behind-the-meter rooftop solar projects. These projects bring together the technical ability of community energy groups and their organising power to achieve projects on a scale beyond that of individual households. Examples of these types of projects explored in this section include solar bulk buy programs for residential households and leveraging community donation or investment to install solar on community facilities.

¹²⁵ Mr Chris Corr, *Transcript of evidence*, p. 16; Goulburn Broken Greenhouse Alliance, *Submission 140*, p. 9; Centre for Urban Research, *Submission 135*, p. 17; Community Power Agency, *Submission 99*, p. 10; Coalition for Community Energy, *Submission 65*, p. 3; Gippsland Climate Change Network, *Submission 33*, p. 2.

¹²⁶ Jarra Hicks and Taryn Lane, *Community Power Hubs pilot program*, pp. 10–12.

¹²⁷ Benalla Sustainable Future Group, *Submission 152*, p. 2; Ms Vicki Perrett, President, Geelong Sustainability, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 25; BRACE (Barwon Region Alliance for Community Energy), *Submission 68*, received 26 August 2019, p. 2.

¹²⁸ Mr Adrian Ford, *Transcript of evidence*, p. 35.

¹²⁹ Geelong Sustainability, *Submission 107*, received 27 August 2019, p. 7.

¹³⁰ Jarra Hicks and Taryn Lane, *Community Power Hubs pilot program*, pp. 10–12.

4.4.1 Bulk buy solar programs

Some of the largest rooftop solar projects that the Committee heard about were bulk buys. In a bulk buy, a local sustainability group, council or other non-profit acts as an aggregator for individual households who want to purchase solar panels and seeks to negotiate a lower price but high quality product directly with installers.

One of the first bulk buy programs in Victoria was the Mount Alexander Solar Homes run by the Mount Alexander Sustainability Group. This has evolved into the More Australian Solar Homes program, which is operated as a separate not-for-profit by the Central Victorian Greenhouse Alliance. Mount Alexander Shire has 31% of its dwellings with rooftop solar, which is the fourth largest proportion in Victoria.¹³¹ In its submission the Central Victorian Greenhouse Alliance set out some of the outcomes of the program:

The MASH program has delivered over 1500 solar systems across the region, reducing CO₂ emissions by over 10,000 tonnes per year and saving households over \$1M per year off their energy bill. It has also raised over \$100,000 in free solar grants to community groups and schools in the region.¹³²

Geelong Sustainability ran a bulk buy program, which has led to 211 households collectively installing 1.3 MW of solar panels and 1.4 MW of battery storage.¹³³ These households have also changed their behaviour, as explained to the Committee by Ms Vicki Perrett, Geelong Sustainability's President:

90 per cent have changed their energy use patterns. They are now running their dishwasher and their washing machine during the day when they are generating, so they are using their clean energy to do things like that ...¹³⁴

A key benefit of bulk buy programs is that they address barriers faced by individuals seeking to purchase and install solar panels. As Ms Perrett explained:

[T]here were three roadblocks: one was about confusion, because people glaze over about the technology and the choices you need to make; the next one was around trust—'Who do I trust to actually get advice from and to install it?'; and then, 'Am I getting good value, what are my warranties like and can I afford to pay for it?'¹³⁵

Geelong Sustainability researched and partnered with a retailer who also engaged with local installers, which met one of Geelong Sustainability's other objectives to grow green jobs in the region. They also used some of the savings from the bulk buy to donate four free solar systems to vulnerable residents.¹³⁶

¹³¹ Mount Alexander Shire Council, *Submission 114*, received 29 August 2019, p. 9; Australian PV Institute (APVI), *Solar Map*.

¹³² Central Victorian Greenhouse Alliance, *Submission 113*, received 29 August 2019, p. 4.

¹³³ Geelong Sustainability, *Submission 107*, p. 2.

¹³⁴ Ms Vicki Perrett, *Transcript of evidence*, p. 23.

¹³⁵ *Ibid.*

¹³⁶ *Ibid.*

North east Victoria has hosted several bulk buy programs with five councils collaborating on a program in 2012. More recent examples include the Bogie Bulk Buy and Dindi Bulk Buy.¹³⁷ Public workshops and education have been a focus of these and other bulk buys. In its submission, the Goulburn Broken Greenhouse Alliance outlined the importance of education in bulk buy programs:

Community education is a central part of council bulk buy projects, unlike many commercial operations. Feedback showed residents value councils as an independent source of information in a complex and sometimes confusing market environment.¹³⁸

Many other stakeholders provided evidence to the Committee about the bulk buy programs that they have either run or advocated.¹³⁹

Solar Saver

Increasingly, local councils are extending bulk buy programs to help low income, elderly and other residents who may have difficulty in financing or negotiating their own solar install.

The City of Darebin's Solar Saver program, which commenced in 2014, resulted in the installation of over 300 systems during the following three years. The program has since been expanded to a further 25 councils across Victoria.¹⁴⁰ Since the program's expansion it has installed a further 434 solar systems with a collective capacity of 1.6 MW, saving households an average of \$260 per year.¹⁴¹ Mr David Meiklejohn, Executive Officer of the Northern Alliance for Greenhouse Action, explained to the Committee how the program works and the benefits to the low income households who install the solar panels:

Home owners were able to install solar at no up-front cost and to pay it back through their rates at a rate that ensured that the energy cost savings they made always exceeded the amount they were paying back to council. In this way, the project not only allowed vulnerable households to reduce their energy costs and to feel more confident about doing things like running air conditioners during heatwaves—anecdotal evidence we gathered during the project had told us there were pensioners who were not running their air conditioners because they were concerned about the high energy costs that would be happening—but it also opened up a new market for solar that had not been well-served by the general commercial sector previously.¹⁴²

¹³⁷ Goulburn Broken Greenhouse Alliance, *Submission 140*, p. 4.

¹³⁸ *Ibid.*

¹³⁹ See for example: Hepburn Wind, *Submission 64*, p. 2; Centre for Urban Research, *Submission 135*, p. 17; Manningham City Council, *Submission 39*, received 21 August 2019, p. 1; LIVE (Locals Into Victoria's Environment), *Submission 56*, received 23 August 2019, p. 3; East Gippsland Shire Council, *Submission 144*, received 30 September 2019, p. 8.

¹⁴⁰ City of Darebin, *Submission 124*, received 2 September 2019, p. 2; Community Power Agency, *Submission 99*, p. 5.

¹⁴¹ Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 3.

¹⁴² Mr David Meiklejohn, Executive Officer, Northern Alliance for Greenhouse Action, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 19.

Independent evaluation commissioned by Eastern Alliance for Greenhouse Action provides further evidence for rooftop solar supporting vulnerable households to use air conditioning without fear of a high electricity bill.¹⁴³ Like other bulk buy programs, the Solar Saver program provides customers with a sense of trust and confidence by having a partner seek and negotiate with solar installers and panel manufacturers on their behalf. Hepburn Shire Council explained in its submission that these benefits, in addition to tailored loan terms, means the Solar Saver program effectively complements the Victorian Government's Solar Homes program:

Council purchases systems for low income households at no upfront cost to the household. This continues to be offered in parallel to the Victorian Government's Solar Homes program, because there are nuances which make Solar Savers more suitable for certain members of the community. These distinctions include the bulk procurement and vetting of solar PV systems/providers, project management on behalf of vulnerable households and the fact that loan terms are longer, allowing households to be 'cash flow positive' from the outset. This program is extremely well subscribed within the Shire.¹⁴⁴

4.4.2 Behind-the-meter community solar

In addition to supporting individual households and businesses to install rooftop solar, community energy groups and local governments are also exploring different models for community participation in behind-the-meter renewable energy projects.

Ballarat Renewable Energy and Zero Emissions (BREAZE), which hosts the Ballarat Community Power Hub, has developed the Social Solar program to help not-for-profits install rooftop solar, especially those in the social housing and disability sector. BREAZE explained the need for this program in its submission:

While many not-for-profit organisations are aware of the cost savings and environmental benefits of solar technology, tight operating budgets generally inhibit the initial capital outlay and so they are disadvantaged while other sectors transition to renewable energy.¹⁴⁵

BREAZE uses its public fund, a registered tax-deductible charity, to gather donations and partly fund these projects. They also assist the organisation to seek other funding including government grants and donations from private and public organisations in BREAZE's community networks. BREAZE funded three Social Solar projects in 2018 including a newly constructed assisted living property in Ballarat West, a social housing rental property in Horsham and a Uniting Church Op Shop whose beneficiaries include Lifeline.¹⁴⁶

¹⁴³ Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 3.

¹⁴⁴ Hepburn Shire Council, *Submission 119*, received 2 September 2019, pp. 5–6.

¹⁴⁵ Ballarat Renewable Energy and Zero Emissions Inc. (BREAZE), *Submission 77*, p. 3.

¹⁴⁶ *Ibid.*

The Bendigo Community Power Hub has also run a donation-based project to install solar panels on social housing in partnership with Community Housing Victoria Limited, which provides a range of long-term and transitional housing services for people who are homeless or at risk of homelessness. The two organisations collaborated to develop a project to address clients' high electricity bills. The project involved the installation of 30 kW of solar panels across eight community housing units in Golden Square, which reduced the tenants' electricity bills by an average of \$480 a year. The Community Power Hub used its expertise to procure local installers, project manage the installation and fund the project on a donation model. Using their local networks, the Community Power Hub raised the necessary funds from 68 community donors over two months.¹⁴⁷

Groups other than Community Power Hubs have also funded solar installations through community donations. Geelong Sustainability formed a Community Owned Renewable Energy (CORE) action group in 2015. One of its first projects was a collaboration with The People's Solar to crowd fund donations for a 9.25 kW solar system for South Geelong Primary School.¹⁴⁸ Donation-based projects face some challenges. Geelong Sustainability stated in its submission that, 'Our review of this project assessed that the donation model was too hard and slow for the relatively small emissions reduction despite a strong social dividend.'¹⁴⁹

Due to this experience Geelong Sustainability has subsequently moved to an investment model for community funded behind-the-meter projects. With funding through the New Energy Jobs Fund, Geelong Sustainability has developed a model and business case for the first project. Under this model a company is created for the purposes of managing the investments and income. Investors fund the purchase and installation of a solar system, which is then leased to the building occupier for a period of 10 years. Investors receive a return from the lease and Geelong Sustainability's public fund receives a donation from this income as well. At the end of the lease period the system is then gifted to the building owner. The raising of investment capital for this project was highly successful, with 20 investors each contributing \$7,500 within a week. This enabled the purchase of two solar systems with a total capacity of 156 kW to be installed on the Multicultural Aged Care facility in North Geelong. As with their previous project, it was installed by a local installer.¹⁵⁰ Ms Perrett explained to the Committee the outcomes of this first investment-based project and Geelong Sustainability's future plans:

We have made our first dividend and interest payment back to the investors, and they will progressively get their interest and their principal back over the next 10 years. At the end of that 10-year cycle the solar system will be gifted, in effect, to the aged-care facility, which will have another 15 years to use it. So there are great positive environmental and community benefits, and we are looking for host site two to make CORE Geelong two happen.¹⁵¹

¹⁴⁷ Sustainability Victoria, *Submission 141*, Attachment A, p. 16.

¹⁴⁸ Geelong Sustainability, *Submission 107*, p. 2.

¹⁴⁹ *Ibid.*

¹⁵⁰ *Ibid.*

¹⁵¹ Ms Vicki Perrett, *Transcript of evidence*, p. 23.

Investment-based projects also face challenges. Ms Perrett explained to the Committee that many organisations they engage with, when presented with the clear financial benefits of installing rooftop solar, will then proceed to install solar themselves:

We have probably done more than 40 solar feasibility assessments. But in a lot of them they look at the return on investment and say, 'Really? It's that sure, is it? We'll go and do it ourselves'. Which is great for the environment, but it does not get us our second project.¹⁵²

Bendigo Sustainability Group, which hosts the Bendigo Community Power Hub, is also working to develop an investment model for rooftop solar. This would likely be similar to the model that Geelong Sustainability has developed. Mr Corr explained how the group believes the model will function:

[T]here is a special purpose vehicle investment model that is absolutely what we have been working on, which we are now launching. So that would be used for the schools, that would be used for those community facilities, potentially all the DELWP-type facilities, because ultimately DELWP and Crown land is mostly your sporting clubs, your racing clubs and community halls—all those sorts of things. So that is so that people could invest money in, local people—so keep it local to the region. They will get their money back and a commercial return over, say, a 10-year period of these agreements. They would be fully funded to operate.¹⁵³

As with Geelong Sustainability's projects, Mr Corr informed the Committee that the Bendigo Sustainability Group foresees significant community demand for investment in rooftop solar:

Bendigonians spend \$150 million on electricity a year, so we do not see any problem getting investors. We have got 60-ish people signed up to our potential interested-to-invest list right at the moment. So that will happen very quickly.¹⁵⁴

Some models of community-owned rooftop solar can face challenges. Mr Corr explained two of the barriers faced by Bendigo Sustainability Group in installing a solar system on the municipal library. The installation is owned by the Bendigo Sustainability Group and they sell the electricity to the local government through a PPA. Mr Colin Lambie, Member, Bendigo Sustainability Group, stated that the project required two ministerial exemptions:

Things have changed, but one ministerial was local government, because it was a contract for 20 years—a power purchase agreement—and it was worth, we thought, more than \$100 000. It ended up being worth only \$60 000, so it probably did not need it then, but it is now worth more than \$100 000 anyway. You know, the tariffs go up and down. So that was one. The other one was the fact that we, the BSG, are selling electricity. We are not an electricity retailer so we had to go to the Essential Services

¹⁵² Ibid., p. 25.

¹⁵³ Mr Chris Corr, *Transcript of evidence*, p. 19.

¹⁵⁴ Ibid.

Commission. They said we could self-assess as not needing a licence, so a bit like a caravan park. Some people said that is a bit of a grey area, possibly not legal. Anyway, they changed the rules and it is clearly acceptable for us to do it. That bit changed.¹⁵⁵

Although the relevant rules around electricity retailing have been changed, local government procurement requirements may still present a barrier for some community organisations looking to install solar panels on local government facilities and sell the electricity produced to the facility occupant. The pace with which local governments are installing their own rooftop solar panels and their participation in the Victorian local government renewable energy PPA discussed in Section 4.3.5 may further restrict the opportunities for this type of project.

There is clearly a substantial effort by community organisations and local governments to engage in behind-the-meter community energy projects ranging from bulk buys to community investment opportunities. This is consistent with the broader increase in rooftop solar PV in Victoria. Although some projects are supported by government grants, many are funded through community donation or investment, or low interest finance mechanisms. Mr Rob Law, Executive Officer of the Central Victorian Greenhouse Alliance, explained how the organisation is increasingly able to run many community energy programs without grant funding:

[T]here is a lot underway in the energy space and the business cases for a lot of energy programs stack up now on their own. We are running lots of solar programs without any external funding and that is fine.¹⁵⁶

Some of the options for behind-the-meter community energy projects appear to be only available to the larger, more experienced community organisations or those that are receiving technical and administrative assistance from the Victorian Government. This type of assistance has been provided through the Community Power Hubs and expansion of the program as per Recommendation 19 would extend this assistance to more regions and organisations.

FINDING 12: Victorian local governments and community organisations are finding a range of innovative ways to increase the uptake of solar power on Victorian buildings and to improve access for low income households.

4.5 Broader challenges in the electricity system and market

Electricity generation, transmission and distribution is currently undergoing a paradigm shift throughout Victoria and the rest of Australia. Large thermal power stations that use coal as fuel are increasingly being retired and replaced by wind and solar power,

¹⁵⁵ Mr Colin Lambie, Member, Bendigo Sustainability Group, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 20.

¹⁵⁶ Mr Rob Law, Executive Officer, Central Victorian Greenhouse Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 32.

often located in very different parts of the country. Households are installing solar power and battery storage, and there are many innovative approaches being adopted by communities, as discussed in Section 4.3.

In response to these developments, a growing number of local governments and communities are seeking to foster renewable energy development locally. For example, Gannawarra Shire Council described how it is seeking to attract investment in solar power, in its submission:

Council has worked over the last decade to attract large scale solar investment to the region. Council has continued its drive to develop the large scale solar industry in its municipality and now prides itself as the solar capital of Australia.

As a small rural Council with limited funds and resources, Council had to find an alternative way to make these large scale solar projects come to fruition. To this end, the Council became “investment ready”. This has involved identifying and mapping the transmission infrastructure network; identifying suitable properties, including desktop analysis of environmental overlays and local infrastructure; discussions and consultation with landowners; and the development of an investment prospectus aimed at worldwide marketing of the local area for renewable energy generation.¹⁵⁷

While many organisations seek to harness this investment, the rapidly changing electricity system is presenting significant challenges.

For example, in September 2019, four Victorian solar farms, Bannerton, Wemen, Gannawarra and Karadoc, and Broken Hill in NSW, had their output curtailed by 50% after concerns arose about system security in this part of the electricity grid.¹⁵⁸ Curtailment is when the output of a renewable energy generator is limited due to insufficient transmission infrastructure or to protect the ‘system security’ of the electricity grid—further explored in 4.5.1. While this curtailment was lifted in April 2020, with the approval of new settings on the solar farms’ inverters, other projects in Victoria seeking to connect to the grid have been placed in a queue as a result.¹⁵⁹

Other renewable energy projects in Victoria have had their connections delayed or been required to undertake additional expensive modelling work. In response, generators, electricity transmission and distribution companies, and the Australian Energy Market Operator (AEMO) have collaborated to develop short-term and interim solutions to the curtailment issues.¹⁶⁰ However, further development of large-scale renewable energy in

¹⁵⁷ Gannawarra Shire Council, *Submission 45*, received 22 August 2019, p. 1.

¹⁵⁸ Mr Geoff Lodge, *Transcript of evidence*, p. 28; Natalie Filatoff, ‘Jolted: AEMO radically curtails output of five large solar farms’, *PV Magazine Australia*, 16 September 2019, <<https://www.pv-magazine-australia.com/2019/09/16/jolted-aemo-radically-curtailed-output-of-five-large-solar-farms>> accessed 3 June 2020.

¹⁵⁹ Giles Parkinson, ‘AEMO to resume new connections after solar constraints lifted in West Murray’, *Renew Economy*, 27 April 2020, <<https://reneweconomy.com.au/aemo-to-resume-new-connections-after-solar-constraints-lifted-in-west-murray-41664>> accessed 28 April 2020; Cr Jason Modica, Mildura Rural City Council, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 6.

¹⁶⁰ Giles Parkinson, ‘Grid “balanced on a knife edge”: AEMO flags more solar delays in Victoria’, *Renew Economy*, 20 December 2019, <<https://reneweconomy.com.au/grid-balanced-on-a-knife-edge-aemo-flags-more-solar-delays-in-victoria-23807>> accessed 15 April 2020.

Victoria will require technical reforms—explored in Section 4.5.1—and for some regions additional transmission infrastructure—explored in Section 4.5.2.

In addition to the negative impacts on large-scale renewable energy generation projects of insufficient transmission infrastructure and related challenges, the Committee also received evidence of negative effects on community energy projects.

For example, Mr Geoff Lodge, CEO of Goulburn Valley Community Energy, which is developing two community solar projects in Victoria’s northeast, expressed concerns about the impact of current conditions on its projects:

The roadblock is the grid is constrained. What it means is there are five commissioned solar projects in the north-west of Victoria that have now ground to a halt. They are operating at about 50 per cent capacity, and they have been instructed through AEMO to redesign and recommission. As part of that process every other project in Victoria, in the north of the state, is put on hold, and that includes our project. This will have a profound impact on investors. It is having a profound impact on our project. And we will not be able to continue in terms of the development, rolling out and commissioning of our project until these studies are done.¹⁶¹

Other stakeholders have also expressed concerns that these broader system issues impact the technical viability, cost and investment risk for community energy projects.¹⁶²

The Committee considers it critically important to address the broader issues in Victoria’s electricity network, including market and technical issues and transmission upgrades, that are preventing further connection of large-scale renewables. The current situation is hampering community participation by reducing the number of projects that communities could have partial ownership of, and through knock-on impacts on smaller scale projects as they seek grid connection or revenue certainty.

FINDING 13: A range of issues within the electricity network and market, particularly grid constraints, curtailment and connection delays, are hampering community energy projects in Victoria, by reducing investment opportunity and certainty, delaying project completion and increasing technical complexity.

4.5.1 Technical and market reforms to integrate renewable energy

While new transmission infrastructure will address congestion in some areas of Victoria and unlock new renewable energy capacity in many parts of the state, other reforms are necessary to fully utilise existing and yet-to-be-constructed renewable energy generation.

¹⁶¹ Mr Geoff Lodge, *Transcript of evidence*, p. 28.

¹⁶² Hepburn Shire Council, *Submission 119*, pp. 10–11; Macedon Ranges Shire Council, *Submission 69*, p. 9; Centre for Urban Research, *Submission 135*, pp. 17–18.

The National Electricity Market (NEM) is the name of the electricity system that covers most of Queensland, NSW, Victoria, Tasmania and South Australia, and of the market that operates across that system. The NEM includes the power stations that generate electricity, the industries and households that use electricity, and the poles and wires that connect them. It is one of the world's longest interconnected power systems, stretching around 5,000 km from Port Douglas in Queensland to Port Lincoln in South Australia and across Bass Strait to Tasmania.¹⁶³

The physics of the electricity system means that the electricity supplied by generators must constantly match the amount of electricity used by consumers. Two key concepts in keeping the electricity system stable are 'reliability' and 'system security'.

Reliability is the term for ensuring that there is sufficient generation and transmission infrastructure to meet demand at any one time. Reliability tends to dominate public discussions around renewable integration with a focus on 'firmed' generation or storage, such as pumped hydro and batteries.

The operation of the electricity system also requires frequency, voltage and other parameters to be kept within acceptable margins across the network, otherwise damage can occur to household appliances, industrial plants and the electricity system itself. The electricity system also needs to be able to respond to faults, for example, damage to the electricity transmission network or a large power station suddenly going offline, while keeping all those parameters within their limits. The maintenance of this balance is referred to as system security.

There are two main types of energy generation in the NEM: synchronous and inverter-based.

Synchronous generators refer mostly to older centralised power plants such as coal, gas or hydroelectric, which make electricity through large spinning generators that are synchronised to the frequency of the grid. Due to their size and spinning mass, they help maintain system security as a by-product of the way they generate electricity. Historically, the small number of large centralised generators also made system security much easier to manage.¹⁶⁴

Inverters are electronic devices that connect solar PV, battery and most modern wind turbines to the electricity grid. Inverters ensure that the output of the generator matches the alternating current of the grid. Presently, inverters are less capable of maintaining system security, particularly in how they are able to respond to faults elsewhere within the electricity network. New technologies, such as grid-scale batteries, can at this stage assist with certain aspects of system security. However, further research and development is required to provide confidence that inverter-based generation can maintain system security on its own.¹⁶⁵

¹⁶³ Australian Energy Market Operator, *The National Electricity Market*, Fact Sheet, Australian Energy Market Operator, 2018.

¹⁶⁴ Australian Energy Market Operator, *Renewable Integration Study: Stage 1 report: Enabling secure operation of the NEM with very high penetrations of renewable energy*, Australian Energy Market Operator, 2020.

¹⁶⁵ Ibid.

In Australia, the bulk of new renewable energy capacity is inverter-based, distributed throughout the electricity network and is growing rapidly. The rapid growth in inverter-based generation in the NEM presents challenges to the maintenance of system security. These challenges and a range of actions to address them are explored in AEMO's *Renewable Integration Study (RIS)*.¹⁶⁶

The RIS shows that renewable energy can, at times, already meet 50% of the NEM's electricity demand. This generally occurs during sunny and moderately windy days during spring and autumn when renewable energy generation is relatively high and demand relatively low. One section of the NEM, South Australia, regularly has more than 80% of electricity supplied by renewables at times.¹⁶⁷

Under favourable policy settings there could be enough installed renewable capacity, at certain times, to meet 100% of demand in the NEM by 2025. However, as at October 2020, it is not technically possible for the NEM to operate at 100% renewable energy while maintaining system security, even when there is sufficient renewable energy supply to meet total demand.¹⁶⁸ A scenario of 100% renewable energy, for example, a sunny windy day where demand is relatively low, would require the NEM to be operating almost entirely on inverter-based generation. The NEM's control systems and the inverters themselves cannot maintain system security, with current technology and software programming. Reduced system security would result in lower quality electricity delivered to consumers and faults would be increasingly likely to cause blackouts—which could even cascade through the entire network. On the other hand, if technical reforms and technological developments do not keep pace with the installation of renewable energy, renewable energy will need to be increasingly curtailed at times of high renewable energy generation.

The technical challenges are compounded by current market rules which are unsuited to managing all aspects of system security. As a result, AEMO has had to increasingly intervene in the NEM when market incentives fail to adequately manage system security. While these interventions are effective in maintaining system security, the RIS states that they may be economically inefficient and may not deliver the best value to the system and ultimately to consumers.¹⁶⁹

With the appropriate set of technical responses and market reforms, as detailed by AEMO in the RIS, renewable energy should be able to meet, at times, 75% of demand in the NEM by 2025 and 100% over the longer term.¹⁷⁰ These technical and market reforms to better manage system security could, depending on how they are implemented, constrain or facilitate the expansion of a range of community energy projects including mid-scale projects, microgrids, virtual power plants, community-owned batteries and other innovations.

¹⁶⁶ Ibid.

¹⁶⁷ Ibid., p. 19; Dylan McConnell, Simon Holmes à Court and Steven Tan, *OpenNEM: South Australia*, 2020, <<https://opennem.org.au/energy/sa1>> accessed 30 September 2020.

¹⁶⁸ Australian Energy Market Operator, *Renewable Integration Study: Stage 1 report*, pp. 13–14.

¹⁶⁹ Ibid., pp. 31–2.

¹⁷⁰ Ibid., p. 13.

As noted above, the growth in rooftop solar is also creating challenges for the operation of the grid, both at a local level in the distribution network and at a broader whole-of-network level. Currently in Victoria there are times when 31% of demand for electricity is met by residential and commercial rooftop solar and this could increase to up to 66% by 2025.¹⁷¹ Under current operating conditions, this would be close to the system security limits in Victoria.¹⁷² Areas with high penetration of small solar systems on homes present particular challenges for the management of system security within the distribution network. Victorian Distribution Network Service Providers are already experiencing challenges maintaining system security locally in some areas.¹⁷³

The Committee notes that there are a range of technical research projects currently underway that aim to address these challenges. These projects are exploring measures such as the configuration of microgrids and inverters to achieve more active management of the distribution network.¹⁷⁴ ENA and AEMO have been collaborating on a project called Open Energy Networks. This project is examining how to best incorporate distributed energy resources, mostly household solar and battery systems, into the wider electricity grid. Ms Tamatha Smith, General Manager, Corporate Affairs, Energy Networks Australia, described the project to the Committee at a public hearing:

In normal language that means that customers can utilise the benefits of their systems, that they are not unnecessarily constrained from export and that ultimately we can harness those resources as an aggregate to use them for system support and security and to support peak load. So there are a huge amount of opportunities. There are parts of networks that do have constraints, and that project is looking at how to address that. One of the key things that AEMO networks need is visibility of what is going on behind the meter; that is what your solar and storage, your battery, are doing at any given point in time, where they are located, so we can figure out what the constraints might be. In Victoria we are very lucky because networks control metering, and we have a ubiquitous rollout of meters. This is not the case in other parts of Australia, and in fact it is the envy of other parts of Australia.¹⁷⁵

Ms Heather Smith, Chair, Coalition for Community Energy, informed the Committee about research at the Australian National University (ANU) and by the distribution networks that aims to address system security by better optimising rooftop solar and potentially integrating community batteries into the grid:

Let us remember that at the moment we do not have any way or any forms for all of the solar panels on people's roofs to be optimised across a community or all of the storage inside people's houses to be optimised for a community. We have virtual power plants that are optimising for the market, not for the network. I know the Total Environment Centre is doing a study and ANU are doing a whole lot of research about community batteries—so trying to tease out that equation.

¹⁷¹ Ibid., p. 39.

¹⁷² Ibid., p. 42.

¹⁷³ Ibid., pp. 39–40.

¹⁷⁴ Totally Renewable Yackandandah, *Submission 138*, p. 5; University of Technology Sydney, *Networks Renewed*.

¹⁷⁵ Ms Tamatha Smith, General Manager, Corporate Affairs, Energy Networks Australia, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 39.

...

I know the networks are having a lot of conversations about how to fix their voltage problems. I mean, they basically have a system that they built for one-way electricity. In dealing with two-way electricity, in South Australia we have had a spike of phone calls to complain about voltage. It is possible that people know about that because their solar panel cuts out. The person at the end of the street furthest away from the transformer loses their solar output at that moment. The power networks are grappling with this problem.¹⁷⁶

The RIS sets out a range of actions aimed at managing the impacts of small-scale solar systems on system security. These include adding the ability for grid operators to switch off or curtail the output of these systems. While a range of measures such as increasing the amount of battery storage, load shifting, and coordination of rooftop solar and other distributed energy resources would help, AEMO's view is that curtailment is required as a backup.¹⁷⁷

The Committee is concerned that households and smaller community organisations with rooftop solar PV could be disadvantaged in the future by such curtailment, reducing the benefit they accrue from having rooftop solar. However, adding the ability to curtail the output of rooftop solar may enable the relaxation of export limits imposed by distributors, which could in turn offset the costs of occasional curtailment.¹⁷⁸ The Committee has also received evidence that export limits appear arbitrary, inflexible and may pose equity concerns.¹⁷⁹ The impact of actions to enable curtailment of rooftop solar PV on households and smaller community organisations needs to be considered as further market and technical reforms are developed and implemented.

While reforms to manage system security as renewable energy generation grows are critical, these reforms need to be developed and implemented in a sensitive manner to ensure that participation by community energy groups and households in the electricity market continues to be supported.

FINDING 14: The electricity grid is rapidly transitioning to renewable energy and will be capable of operating with very high levels of renewable energy. However, the operation of the National Electricity Market will require reform to enable these very high levels of renewable energy to be integrated into the grid. These market reforms, depending on the nature of the reforms and how they are implemented, could better enable participation by some stakeholders, such as consumers with rooftop solar and community energy groups, in the reformed market.

¹⁷⁶ Heather Smith, Chair, Coalition for Community Energy, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 47.

¹⁷⁷ Australian Energy Market Operator, *Renewable Integration Study: Stage 1 report*, pp. 38–43.

¹⁷⁸ *Solar Insiders*, 'Longi's launch, and AEMO's big solar switch', podcast, Renew Economy, 8 May 2020, 39:11, Soundcloud app, <Solar Insiders Podcast: Longi's launch, and AEMO's big solar switch> accessed 8 May 2020.

¹⁷⁹ Mr Ian Onley, Member, Latrobe Valley Sustainability Group, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 33; Hepburn Shire Council, *Submission 119*, p. 11.

RECOMMENDATION 20: That the Victorian Government advocate for electricity system and market reforms that enable the development of community energy projects and facilitate the installation of rooftop solar by households and businesses.

4.5.2 Transmission upgrades

The best locations for solar and wind power are typically not where traditional coal or gas fired power stations are located. This shift in the location of electricity generation will require new transmission infrastructure to get the electricity from solar and wind farms to population centres. However, new or upgraded transmission projects are expensive and difficult to develop.

Ms Tamatha Smith explained both the limited development of transmission infrastructure in Victoria and some of the market restrictions that have prevented investment in recent years:

So [new or upgraded transmission infrastructure] goes through a very stringent regulatory process, and part of that process is a customer benefits test. I do not think the problem is duplication of transmission assets; I think the problem is a lack of them. One issue that there has been in the past is that there were privacy restrictions around proponents knowing, with a wind farm, for example, where another one was going to be developed, so you ended up with lots of projects where lots of resources are—where lots of wind is, for example. We submitted as Energy Networks Australia a rule change to enable sharing of information so that does not occur, and that is just one part of the process to ensure that duplication does not occur. But when it comes to regulated assets like transmission and distribution networks, those regulatory processes are really stringent, and there is definitely no duplication of assets. In fact I do not think there has been a major transmission investment for 25 years in Victoria.¹⁸⁰

Insufficient transmission infrastructure in an area with a lot of new renewable energy development can lead to network ‘congestion’, which occurs when there is insufficient capacity in the transmission network to transmit all the power at times of peak renewable energy generation. The limitations of the transmission network have been particularly acute in western and northern Victoria. The rapid growth in renewable energy projects in these regions is highlighting transmission congestion and other issues, with many facing curtailment and other restrictions.¹⁸¹

Many submissions called for upgrades to the electricity transmission and distribution network to enable more renewable energy generation to be developed in Victoria and to address existing constraints in the network.¹⁸²

¹⁸⁰ Ms Tamatha Smith, *Transcript of evidence*, p. 37.

¹⁸¹ Hepburn Shire Council, *Submission 119*, p. 11; Mount Alexander Shire Council, *Submission 114*, p. 9.

¹⁸² See for example: Macedon Ranges Shire Council, *Submission 69*, p. 9; City of Melbourne, *Submission 120*, p. 21; Centre for Urban Research, *Submission 135*, p. 17; Swan Hill Rural City Council, *Submission 160*, received 10 March 2020, p. 1.

Some industry experts have proposed the use of large batteries in the place of transmission upgrades. Transmission lines are typically not used at their full capacity all the time. A pair of batteries at each end of a transmission line can enable the existing transmission line to be used at its full capacity for more time, providing additional ‘virtual transmission’ capacity. The batteries can absorb and release energy, essentially mimicking a larger capacity transmission line and replacing the need for an upgrade. Batteries have other benefits, including storage and the provision of other network services, a smaller visual impact, and are often cheaper and faster to install.¹⁸³ Some evidence indicated that there is community concern about the visual impact of new transmission infrastructure, which should be minimised where possible.¹⁸⁴ The Committee considers it is important that batteries and other innovative solutions are considered during the planning for upgrades to Victoria’s electricity network.

There are transmission upgrade projects currently under development or proposed in Victoria which would address some of the problems around existing congestion in the electricity transmission network. These projects are detailed in the AEMO’s 2020 Integrated System Plan (the ISP). Ms Nicola Falcon, Group Manager, Forecasting, AEMO, explained the role of the ISP to the Committee:

The ISP provides an integrated road map for the efficient development of the national electricity market over the next 20 years and beyond. It aims to maximise value to end consumers by designing the lowest cost secure and reliable energy system capable of meeting any emissions trajectory determined by policymakers at an acceptable level of risk. It utilises the opportunities provided from existing technologies and anticipated innovations and distributed energy resource, large-scale generation, networks and coupled sectors such as gas and transport.¹⁸⁵

The ISP examines a range of different scenarios to identify the optimal path for developing the transmission network over the next 20 years that will present the most value and least regrets for the overall system. Notably the ISP finds that the VRET will be met in all scenarios. It also finds that in the most ambitious ‘Step Change’ scenario, renewable energy could supply 80% of Victoria’s electricity by 2030.¹⁸⁶ A key feature of the ISP is the identification of committed, actionable and future projects aimed at upgrading the electricity transmission network. The projects most relevant to Victoria are:

- Western Victoria Transmission Network Project (WVTNP)—a committed project
- Project Energy Connect—an actionable project

¹⁸³ David Green, *Australia’s first Virtual Transmission Line: Victoria—South Australia*, 2019, <<https://www.lyonasia.com.au/blog/australias-first-virtual-transmission-line-victoria-south-australia>> accessed 8 April 2020; Giles Parkinson, ‘Big batteries get ready to play main role in next stage of clean energy transition’, *Renew Economy*, 1 April 2020, <<https://reneweconomy.com.au/big-batteries-get-ready-to-play-main-role-in-next-stage-of-clean-energy-transition-58327>> accessed 8 April 2020.

¹⁸⁴ Cr Tony Herbert, Mayor, Warrnambool City Council, public hearing, Warrnambool, 21 November 2019, *Transcript of evidence*, p. 6; Hepburn Shire Council, *Submission 119*, p. 11.

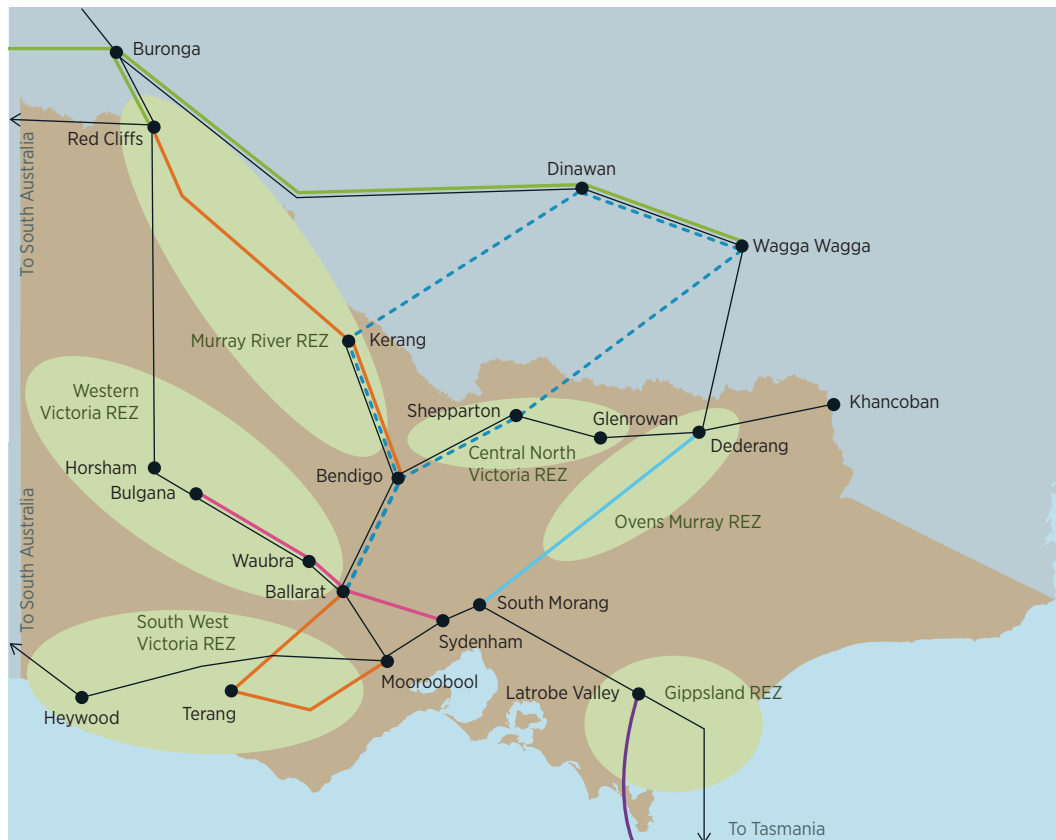
¹⁸⁵ Ms Nicola Falcon, Group Manager, Forecasting, Australian Energy Market Operator, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, pp. 29–30.

¹⁸⁶ Australian Energy Market Operator, *2020 Integrated System Plan: For the National Electricity Market*, Australian Energy Market Operator, 2020, pp. 98–9.

- VNI Minor—an actionable project
- VNI West—an actionable project
- Marinus Link—an actionable project.¹⁸⁷

Figure 4.3 shows a map of the location of these projects, Victoria’s existing transmission infrastructure and proposed renewable energy zones. These projects and options for accelerating their implementation are considered below.

Figure 4.3 Map of existing and proposed electricity transmission links in Victoria and proposed renewable energy zones



- Sub-stations^(a)
- Existing transmission lines^(a)
- Victorian-New South Wales Interconnector West (route TBC)
- Victoria New South Wales Interconnector Minor (upgrade)
- Western Victoria Transmission Network Project (upgrade)
- Energyconnect
- Marinuslink
- Western Victoria Transmission Network Project
- Renewable Energy Zone (REZ)

a. Not all existing transmission lines and substations are shown.

Source: prepared by the secretariat using data from Australian Energy Market Operator, *2020 Integrated System Plan: For the National Electricity Market*, Australian Energy Market Operator, 2020; Western Victoria Transmission Network Project, *Project Information*, 2020, <<https://www.westvictnp.com.au/project-information>> accessed 4 May 2020.

187 Ibid., pp. 14-15.

Western Victoria Transmission Network Project

The WVTNP seeks to upgrade transmission in western Victoria to enable better integration of recently developed renewable energy generation in the region into the electricity network. The upgrades should address constraints in the capacity of the existing transmission network for existing and committed projects and unlock an additional 450 MW of new generation capacity in the Western Victorian Renewable Energy Zone.¹⁸⁸ The upgrades consist of a number of components:

Minor upgrades to existing 220 kV transmission lines from Red Cliffs to Wemen to Kerang to Bendigo, and Moorabool to Terang to Ballarat. This would provide an additional 10% of transmission capacity on these lines.

Construction of a new North Ballarat terminal station and new 220 kV transmission lines from North Ballarat to Bulgana via Waubra. This would provide 1,500 MW of new transmission capacity between these terminal stations.

Construction of new 500 kV transmission lines from Sydenham to North Ballarat. This would provide 5,400 MW of new transmission capacity between these terminal stations.¹⁸⁹

The project received approval from the Australian Energy Regulator in 2019.¹⁹⁰ This means that detailed planning and design work on the project may commence, however, planning and environmental approvals are still required. As of September 2020, community consultation is ongoing as part of a process to determine the proposed route prior to seeking planning and environmental approvals. Modelling of the project shows that it would provide the most benefit if the major upgrades can be completed by 2023. However, the Project Assessment Conclusion Report considered this an unachievable date due to the requirements for land, easements, planning, and environmental approvals which are expected to take approximately two and a half years, including detailed design and planning. If the project passes these approvals, construction is anticipated to last for two years with a current project completion forecast for late 2024.¹⁹¹

During the assessment of the WVTNP, a number of stakeholders proposed an extension of the project with an additional 220 kV double circuit transmission line from Bulgana to Horsham to Murra Warra Terminal Station. This would enable the development of a large amount of new generation capacity in the Western Victoria Renewable Energy Zone. This extension was assessed to have a present value cost of \$85 million and a present value benefit of \$17–39 million.¹⁹²

¹⁸⁸ Ibid., p. 88.

¹⁸⁹ Australian Energy Market Operator, *Western Victoria Renewable Integration Project Assessment Conclusions Report*, Australian Energy Market Operator, 2019, pp. 5–6, 51.

¹⁹⁰ Australian Energy Market Operator, *AusNet Services Group Awarded Contract to Deliver Western Victoria Transmission Network Project*, media release, Australian Energy Market Operator, 17 December 2019.

¹⁹¹ Western Victoria Transmission Network Project, Project Information, 2020, <<https://www.westvictnp.com.au/project-information>> accessed 29 September 2020.

¹⁹² Australian Energy Market Operator, *Western Victoria Renewable Integration* pp. 49–50.

On a purely financial basis the proposed extension has a net cost. However, the extension may offer a number of other benefits that are not accounted for in a pure financial valuation by unlocking additional generation capacity. Further capacity in the region could assist Victoria in meeting its renewable energy and emissions reduction targets and promote further investment in Western Victoria.

Under amendments to the *National Electricity (Victoria) Act 2005*, s 16Y(2)(d) of the Act now enables the Minister to specify an alternative regulatory test that considers a broader range of criteria than market cost and benefit alone.

Project EnergyConnect

Project EnergyConnect will construct a new interconnector between New South Wales and South Australia, enabling electricity to move directly between the two states for the first time and unlocking significant renewable energy capacity in the region. A 330 kV above-ground transmission line will be constructed between Wagga Wagga in NSW and Robertstown in South Australia via Buronga in NSW.¹⁹³

The project also includes a line connecting Buronga in NSW to Red Cliffs in Victoria. This will unlock an additional 600 MW of mostly solar generation capacity in the Murray River Renewable Energy Zone to the southeast of Mildura and enable Victoria to export some of this electricity to NSW and South Australia.¹⁹⁴

The project has received regulatory approval and is currently undergoing detailed planning and design. Construction is expected to be completed by 2022–23.¹⁹⁵

VNI Minor

VNI Minor—or Victoria–New South Wales Interconnector Minor—is a small upgrade to the existing interconnector between NSW and Victoria. It will increase the capacity on the interconnector, likely through the installation of an additional transformer and power flow controllers.¹⁹⁶ The Victorian Government has instructed AEMO to call for expressions of interest for this project to accelerate its development.¹⁹⁷

VNI West

VNI West (Victorian–New South Wales Interconnector West)—also known as Keranglink after one of the possible route options—is a proposed new transmission link between NSW and Victoria. This transmission would also unlock between 3,000 MW and

¹⁹³ ElectraNet, *SA Energy Transformation RIT-T: Project Assessment Conclusions Report*, ElectraNet, 2019, p. 5.

¹⁹⁴ *Ibid.*, pp. 174–5; Cr Jason Modica, *Transcript of evidence*, p. 8; Australian Energy Market Operator, *2020 Integrated System Plan*, p. 89.

¹⁹⁵ ElectraNet and TransGrid, *Project EnergyConnect*, 2020, <<https://www.projectenergyconnect.com.au/index.html>> accessed 30 September 2020.

¹⁹⁶ Tamatha Smith, response to questions on notice, p. 1.

¹⁹⁷ Minister for Energy, the Environment and Climate Change, *Victoria Acts To Secure A More Reliable Energy System*, media release, Victorian Government, Melbourne, 18 February 2020.

4,000 MW of new renewable generation capacity in southern NSW and northern Victoria.¹⁹⁸ Some submissions have singled out this project as needing to be accelerated to enable the development of more renewable energy in northern Victoria.¹⁹⁹

A number of different routes and variations are being examined by AEMO and Transgrid, which include:

- New 500 kV transmission lines between Wagga Wagga and North Ballarat via Shepparton and Bendigo. This would add 1,000 MW of new renewable capacity in the Western Victoria Renewable Energy Zone and up to 2,000 MW of capacity in the Central North Victoria Renewable Energy Zone.
- New 500 kV lines between Wagga Wagga and North Ballarat via Dinawan, Kerang and Bendigo. This option is sometimes known as Keranglink. This would add 1,000 MW of new renewable capacity in the Western Victoria Renewable Energy Zone, 2,000 MW of capacity in the Murray River Renewable Energy Zone and 1,000 MW in the South West NSW Renewable Energy Zone. This alignment is preferred by some stakeholders.²⁰⁰

Under both new route options there is the potential for extension to Glenrowan and/or Red Cliffs to unlock up to an additional 2,000 MW of generation capacity in each of the Central North Victoria and Murray River Renewable Energy Zones. Some of these options may also be staged to enable easier upgrading in the future.²⁰¹

There are a range of factors that need to be considered in selecting the route, capacity and other design of any new interconnector. Ms Falcon explained to the Committee that

the route selection and the scale and need of any interconnector, including that in VNI West, is absolutely based on considering where the interest in renewable generation is and where we can most cost effectively open up those areas from the west. Now, it is not going to reduce completely the congestion—there will still be some curtailment required at times—but the route selection is definitely thinking about where the interest in renewable generation is in that area. The time line, that [2026/2027] time line, is the absolute best case time in that we believe, if we started today, by the time we went through the planning approvals, environmental approvals and then actually started construction, that is the absolute best timing that we would be able to get that transmission line in. It is quite a large bit of infrastructure.²⁰²

Active consideration of the added renewable energy capacity, including the location of demand from renewable energy developers, is one factor that will need to be considered in the route planning for VNI West, as will consultation with the community along any potential corridor for the transmission link. The ISP states that VNI West is

¹⁹⁸ Tamatha Smith, response to questions on notice, p. 1.

¹⁹⁹ Northern Alliance for Greenhouse Action, *Submission 118*, p. 3; Swan Hill Rural City Council, *Submission 160*, p. 2.

²⁰⁰ Cr Simon Clemence, Mayor, Mildura Rural City Council, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, pp. 8–9; Australian Energy Market Operator, *2020 Integrated System Plan*, pp. 8–9.

²⁰¹ Australian Energy Market Operator and Transgrid, *Victoria to New South Wales Interconnector West (VNI West): Regulatory Investment Test for Transmission Project Specification Consultation Report (PSCR)*, Australian Energy Market Operator, 2019.

²⁰² Ms Nicola Falcon, *Transcript of evidence*, p. 39.

required in almost all scenarios and that construction as soon as practicable would present a range of benefits including improved system resilience, additional renewable energy capacity, and mitigate risks associated with an early retirement of a coal generator.²⁰³ Planning for this transmission link needs to be accelerated to ensure that it is constructed by 2026–27 at the latest. As a significant part of the infrastructure would be in NSW, early and effective collaboration with the NSW Government should be prioritised.

RECOMMENDATION 21: That in order to maximise the capacity for new renewable energy projects, the Victorian Government work with the New South Wales Government to accelerate the planning of VNI West to enable construction of the new transmission infrastructure by 2026–27 at the latest.

The Committee notes the estimated timeframe for the project will provide ample opportunity for planning by renewable energy developers in the areas with increased capacity. This will also provide an opportunity for greater consideration of community co-investment as a benefit sharing option for these projects.

Marinus Link

This project would see a second and potentially third High Voltage Direct Current cable connecting Victoria and Tasmania, in addition to the existing Basslink cable. The cable is proposed to run from Burnie in Tasmania to the Latrobe Valley in Victoria under Bass Strait, making landfall somewhere in South Gippsland.²⁰⁴ The Committee notes that there is the potential to co-locate some transmission assets with the proposed Star of the South offshore wind farm, which will be located about 10–25 km offshore of Port Albert in South Gippsland.²⁰⁵ Each of these cables would have a capacity of 750 MW. Although the project would not enable direct connection of new renewable resources in Victoria, it could ultimately enable renewable electricity generated in Victoria to be stored in Tasmania and then sent back during periods of peak demand. This would be dependent on the construction of the proposed ‘Battery of the Nation’ pumped hydro project.²⁰⁶

The optimal timing of the construction of this transmission link is dependent on the pace of renewable energy development in Tasmania and on mainland Australia. The optimal delivery of the first cable ranges from 2028–29 to 2036–37 and the second cable is either not required, where the pace of renewable energy development slows, or best delivered by 2031–32 to 2035–36. Earlier delivery of both Marinus Link cables enables more renewable energy development and goes some way to mitigating the risk of early coal generator retirement.²⁰⁷ The ISP recommends that early design and

²⁰³ Australian Energy Market Operator, *2020 Integrated System Plan*, p. 15.

²⁰⁴ TasNetworks, *Project Marinus: RIT-T Project Assessment Draft Report*, TasNetworks, 2019, p. 8.

²⁰⁵ TasNetworks, *Project Marinus: Business Case Assessment Report*, TasNetworks, 2019, p. 44.

²⁰⁶ Australian Energy Market Operator, *2020 Integrated System Plan*, pp. 15–16, 62.

²⁰⁷ *Ibid.*, pp. 64–7.

approvals work for this project commence immediately to progress to a 'shovel-ready' state and enable delivery as early as 2028–29 depending on the future pace of renewable energy development.²⁰⁸

New and upgraded transmission and Renewable Energy Zones

Renewable Energy Zones (REZs) are areas in the NEM where there is opportunity for intensive development of large-scale renewable energy resources. Development of REZs could promote economies of scale through the development of high-quality renewable resources using shared transmission assets and deliver better value to electricity users.²⁰⁹ The ISP identified six Renewable Energy Zones in Victoria as shown in Figure 4.3:

- Ovens Murray
- Murray River
- Western Victoria
- South West Victoria
- Gippsland
- Central North Victoria.²¹⁰

Completion of all the upgrades mentioned in this section would unlock additional renewable energy capacity in at least four of these zones. Coordination of investment in the REZs will be critical to ensure their optimal development in terms of meeting the VRET at the best value to Victorians. Understanding the potential demand from the renewable energy sector in different REZs will also be important in the selection of the route of new transmission infrastructure such as VNI West.

REZs are starting to be developed in other jurisdictions. For example, to accelerate the development of new renewable energy projects and appropriate transmission infrastructure, the NSW Government called for registrations of interest in June 2020 for developments in its pilot Central-West NSW Renewable Energy Zone.²¹¹

The Committee considers it important that Victoria gains an understanding of the market's desire to develop REZs in the state, especially where transmission upgrades increase capacity. This information will likely be highly useful for network planning into the future.

²⁰⁸ Ibid., pp. 76–7.

²⁰⁹ Ibid., pp. 45–6.

²¹⁰ Ibid., p. 48.

²¹¹ NSW Energy, *Renewable Energy Zones*, 2020, <<https://energy.nsw.gov.au/renewables/renewable-energy-zones>> accessed 28 May 2020.

RECOMMENDATION 22: That the Department of Environment, Land, Water and Planning conduct a registration of interest process to understand the scale, type and location of potential projects in renewable energy zones with increased capacity due to priority transmission upgrades. This should be done with a view towards a future transparent and market-led allocation of connection capacity in these renewable energy zones.

4.6 Encouraging mid-scale community energy projects

Section 4.3.3 demonstrated the significant interest that exists among community energy groups in developing or investing in mid-scale community energy projects in Victoria. Despite this, relatively few projects of this scale have been completed in Victoria to date, especially compared to the number of behind-the-meter projects that have been completed by community energy groups. This suggests there are still many challenges for mid-scale projects. This section will explore policy options and recommendations to further support mid-scale projects. Microgrids—which are discussed in Section 4.3.2—can have a similar level of complexity and funding need. Measures to support mid-scale projects should consider how they can also support the development of microgrids.

To understand the success of recommendations implemented from this chapter, a more complete understanding of the scope and achievements of the community energy sector is required. While this chapter has demonstrated the large diversity in community energy projects, there is limited data available to understand the size of the community energy sector in Victoria and what it has achieved to date.

In accordance with s 8 of the *Renewable Energy (Jobs and Investment) Act 2017*, the Victorian Government must report to the Parliament on progress towards meeting the Victorian Renewable Energy Target including the amount of new and total renewable energy generation in Victoria. The Victorian Government does not currently publish data on community ownership of renewable energy generation. This includes community ownership or part-ownership of mid-scale or large-scale generators and community ownership of behind-the-meter renewable energy generation. This makes it difficult to assess how close Victoria might be to meeting any future Community Energy Target—an issue which is discussed in Section 4.6.1.

RECOMMENDATION 23: That the Department of Environment, Land, Water and Planning, as part of its annual reporting on the Victorian Renewable Energy Target, publish data on the ownership and business structure of renewable energy generation in Victoria, including small scale generation.

The remainder of this chapter will examine potential policies to support further development of mid-scale community energy projects.

4.6.1 A Community Energy Target

Many submissions called for a Community Energy Target as a way of fostering the development of mid-scale community energy projects.²¹² This would provide a signal to the sector and broader industry of the Government's commitment to community energy projects. Moreover, like the Victorian Renewable Energy Target (VRET), it would enable the government to support the development of the community energy industry through a variety of means and enable projects achieved independently of direct government support to also be counted. By contributing directly to such a target, community energy groups would also feel better connected to the larger scale roll out of renewable energy in Victoria. In the submissions to this Inquiry, those stakeholders that quantified a possible Community Energy Target suggested a figure of 100 MW by 2025.²¹³

The VRET includes any eligible renewable energy generation in the state, including behind-the-meter rooftop solar PV. Since it is likely that all community energy projects contribute to meeting the VRET, it follows that action towards meeting a Community Energy Target would also contribute towards the VRET, without the need for changes to the eligibility for the VRET.

Submissions to the 2017 *Inquiry into community energy projects* called for 5–10% of the VRET to be met by community energy projects.²¹⁴ The minimum amount of renewable energy generation capacity required to meet the VRET 2025 target is 11,354 MW.²¹⁵ As at 30 June 2019, there was 6,098 MW of installed renewable energy generation capacity in Victoria and 2,960 MW under construction or commissioning, a total of 9,058 MW.²¹⁶ Applying the percentages discussed in the 2017 Inquiry to the 2025 target would represent a target for community energy projects of between 568 MW and 1,135 MW. This is substantially higher than the 100 MW target more recently suggested, however, it is important to consider the sizes, types and ownership models of community energy projects that would count towards any target.

Ms Lane emphasised that a Community Energy Target should be focused on projects larger than the behind-the-meter rooftop solar PV projects that community energy groups have typically been involved in to date:

Importantly, this would be a midscale target. We are already seeing many, many small-scale projects on the roofs of community facilities and the like. We are really talking about that 1 to 10 megawatt scale, so the scale where there is a gap between what is happening on rooftops and what is happening in the large-scale auction scheme such as through the VRET.²¹⁷

²¹² Coalition for Community Energy, *Submission 65*, p. 3; Community Power Agency, *Submission 99*, p. 10; Moreland City Council, *Submission 116*, p. 4; Hepburn Shire Council, *Submission 119*, p. 12; Mr Adrian Ford, *Transcript of evidence*, p. 33; Ms Vicki Perrett, *Transcript of evidence*, p. 26.

²¹³ Coalition for Community Energy, *Submission 65*, p. 3; Community Power Agency, *Submission 99*, p. 10; Hepburn Wind, *Submission 64*, p. 3.

²¹⁴ Parliament of Victoria, Economic, Education, Jobs and Skills Committee, *Inquiry into community energy projects*, p. 68.

²¹⁵ Victoria, *Victoria Government Gazette*, No. S 567, 23 December 2019.

²¹⁶ Department of Environment, Land, Water and Planning, *Victorian Renewable Energy Target*, p. 5.

²¹⁷ Ms Taryn Lane, *Transcript of evidence*, p. 18.

Ms Heather Smith agreed that projects of the order of one to ten megawatts would be most appropriate for community-owned renewable energy generators that could be developed in Victoria.²¹⁸ However, the Committee is mindful that placing a qualification limit on the scale of such projects could discourage otherwise highly beneficial projects. Mr Tim Adams, Committee Member of Geelong Sustainability, outlined some of the options for community participation in larger projects:

Size limits are constraints by the investment potential to a large degree. We have in fact spoken to people developing large-scale renewable energy projects, whereby they would consider a portion of their funding coming from community groups, so that is another vehicle there. If a community group is going to do a standalone thing, then there are constraints on the capacity to implement something, but we can get involved as a partner in other larger projects.²¹⁹

Projects that involve a community-developer partnership or community part-ownership of a larger renewable energy development may involve installations much larger than 10 MW. An example of this is the 270 MW Sapphire Wind Farm in the New England region of New South Wales. The developers of this project offered community members the opportunity to invest \$1,250 to \$200,000 in the project.²²⁰ This co-investment model is a common form of community ownership and benefit sharing in Europe but has only had limited implementation in Australia.²²¹ The only example of co-investment that the Committee is aware of in Victoria is the 19.4 MW Coonooer Bridge wind farm. Notably, despite its strong benefit sharing criteria and weighting, none of the successful projects in the Victorian Renewable Energy Auction Scheme appear to have co-investment as one of their benefit sharing measures. Inclusion of community part-ownership of larger renewable energy developments in a Community Energy Target would foster community co-investment models of benefit sharing. However, this would also make it easier to meet any Community Energy Target.

Similarly, consideration could be given to inclusion of various behind-the-meter community energy projects towards a Community Energy Target. Despite the potential merits of including behind-the-meter community energy projects in a Community Energy Target, the Committee considers that the Government's focus should be on supporting further development of mid-scale community energy projects and community part-ownership of large-scale projects.

The size of any Community Energy Target should be commensurate to the eligibility requirements that are determined for such a scheme.

RECOMMENDATION 24: That the Victorian Government establish a dedicated Community Energy Target component within the Victorian Renewable Energy Target.

²¹⁸ Heather Smith, *Transcript of evidence*, pp. 45–6.

²¹⁹ Mr Tim Adams, Committee Member, Geelong Sustainability, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 26.

²²⁰ Community Power Agency, *Submission 99*, p. 5.

²²¹ Parliament of Victoria, Economic, Education, Jobs and Skills Committee, *Inquiry into community energy projects*, pp. 43–5; Taryn Lane and Jarra Hicks, *A Guide to Benefit Sharing Options for Renewable Energy Projects*, Clean Energy Council, Melbourne, 2019.

4.6.2 Ongoing revenue and investment certainty for community energy projects

As new entrants to the electricity market, renewable energy generators are subject to a range of conditions in the electricity market that affect their revenue. This includes the curtailment issues identified in Section 4.5, fluctuations in the wholesale market price, and competition between front-of-the-meter and behind-the-meter solar leading to low and sometimes negative prices during the day. Long-term revenue can also be impacted by policy uncertainty and uncertainty in the closure date of large-scale coal generators. Renewable energy projects, especially smaller community energy projects, have also been subjected to massive fluctuations in the price of Large-scale Generation Certificates which are issued by the Federal Government under its renewable energy target to large-scale generators. These generators are then able to sell these certificates to electricity retailers to meet their renewable energy obligations, or on the secondary market. Over recent years prices have ranged from \$25/MWh to \$80/MWh and are expected to fall to as low as \$14.50/MWh by 2021. These fluctuations have had a significant impact on Hepburn Wind, who at one time were forced to cut staff hours and delay a dividend to their community investors.²²²

As community energy projects tend to be smaller and not part of a company's larger portfolio of renewable energy assets, they are generally not able to access hedges and other financial mechanisms that can protect against market fluctuations. Smaller projects may also face more challenges in securing investment for some of the fixed costs of project development such as planning and environmental approvals. Ms Lane explained the link between these barriers and the limited development of mid-scale community energy projects in Victoria:

If Government wants to see us thrive, and especially if they want to see more midscale projects like Hepburn Wind, there is a reason why there is a gap. There is a reason why there are no other projects like us. And essentially it is because there is no long-term, secure income and early phase funding to get through the high-risk phase for these projects.²²³

As Mr Law explained to the Committee, there are a range of different options for providing financial and revenue support to community energy projects:

I think there [are] a number of models that could be tested and piloted as to how that is best gone about. I know some are advocating for a feed-in tariff perhaps for community energy groups to access to improve the business case, whereas the likes of Renewable Newstead are working on something that is trying to bend the energy market rules a bit—so that is something they are working with more at a federal level with the energy market bodies in testing. There is a whole range of different models that could be piloted and tested across the state to try and see what is the thing that pushes through.²²⁴

²²² Hepburn Wind, *Submission 64*, p. 4.

²²³ Ms Taryn Lane, *Transcript of evidence*, p. 18.

²²⁴ Mr Rob Law, *Transcript of evidence*, p. 29.

A community energy feed-in tariff

The Coalition for Community Energy, in its submission, proposed a special feed-in tariff for community energy projects of 6–7 cents above the wholesale electricity market price guaranteed for 15 years.²²⁵ This would be a sizeable tariff compared to annual average wholesale spot prices which have ranged from 3–12 c/kWh over the past 5 years.²²⁶ Eligibility for the tariff could be determined before project development which would provide more certainty for community and other local investors. An expression of interest process for the tariff could also be designed to enhance collaboration, improve transparency and enable a broad mix of technologies to participate.²²⁷ Other community energy stakeholders support this proposal.²²⁸

This type of incentive would need to be well-designed to ensure it had the intended outcome. Ms Lane explained the importance of giving careful consideration to eligibility criteria in the design of any community energy feed-in tariff:

[I]t would just be really important to set the criteria very carefully, because what has happened in countries like Germany through their auction scheme is that they have had a lot of, I guess, fake community energy projects because the criteria were very flimsy. I think they had a minimum investor level of 20 participants. So a renewable energy developer would just get their family and the farmer who the project was on to sign up to the company and that qualified them to be community and there was a lot of pushback. So you have to set the criteria really carefully as to what we mean by a midscale community energy project.²²⁹

The Coalition for Community Energy recommended the following eligibility criteria:

- the project is community-led or the result of a community-developer partnership with broad local support
- a minimum of 20% community ownership and minimum 50% local ownership
- a project size of 1–10 MW
- project has other strong benefit sharing arrangements including the use of local skills and businesses.²³⁰

The Committee is mindful that a feed-in tariff would very likely be passed onto consumers in full by electricity retailers. Ultimately the impact of a feed-in tariff would depend on a range of different factors, including the eligibility criteria for the feed-in tariff and the size of the Community Energy Target. The Victorian Government could

²²⁵ Coalition for Community Energy, *Submission 65*, p. 3.

²²⁶ Australian Energy Regulator, Annual volume weighted average spot prices - regions, D19/178617, *Wholesale Statistics*, 1 January 2020, <<https://www.aer.gov.au/wholesale-markets/wholesale-statistics/annual-volume-weighted-average-spot-prices-regions>> accessed 17 April 2020.

²²⁷ Coalition for Community Energy, *Submission 65*, pp. 3–4.

²²⁸ Hepburn Wind, *Submission 64*, pp. 3–5; Community Power Agency, *Submission 99*, p. 10; Mr Adrian Ford, *Transcript of evidence*, p. 34.

²²⁹ Ms Taryn Lane, *Transcript of evidence*, p. 24.

²³⁰ Coalition for Community Energy, *Submission 65*, p. 3.

commission appropriate modelling to understand the impact, and potentially assess this against other options to address ongoing revenue certainty for the community energy sector. Other possible options to reduce revenue uncertainty include the development of local energy trading, as discussed in Section 4.3.2, or facilitating the development of and relationships with community electricity retailers, discussed in Section 4.3.4.²³¹ PPAs, such as the City of Sydney PPA supporting Repower Shoalhaven, discussed in Section 4.3.5, may also provide opportunities for fixed revenue streams for community energy projects.

RECOMMENDATION 25: That the Department of Environment, Land, Water and Planning commission research to understand the impact of a community energy feed-in tariff on household retail electricity prices and model this against other policy options for long-term revenue support for community energy projects.

A community energy fund

Several stakeholders proposed a government-initiated community energy fund that would provide a vehicle for institutional investors to buy into community energy projects. A notable feature of such a fund is that it could operate alongside, or instead of, a community energy feed-in tariff. Mr Barfoot explained how such a fund could work alongside the Community Power Hubs:

It would act as an aggregator, which would allow these projects to be assembled into groups which are large enough that we would attract the institutional investor. The community power hubs would remain in terms of the asset management, providing the structure, legal requirements and also the engineering facilities needed to ensure compliance and the delivery of an appropriate and investable project.²³²

The Gippsland Climate Change Network proposed an initial government investment of \$250,000 to establish the fund, which would include the appointment of a fund manager.²³³

Finance to reduce the risk of innovative projects

Many community energy projects in Victoria are innovative ‘first movers’. As such, they can involve increased risks for community and other investors. This can make it difficult to raise the capital for detailed business cases and other feasibility studies required to progress innovative proposals. An example of a first mover project is the City of Greater Bendigo’s pumped hydro proposal discussed in Section 4.3.3. Although the Council and Victorian Government have funded some initial feasibility studies, further work is needed to ‘de-risk’ the project, as explained by Mr O’Sullivan:

²³¹ The Institute for Sustainable Futures, et al., *National Community Energy Strategy*, Coalition for Community Energy, 2015.

²³² Mr Chris Barfoot, *Transcript of evidence*, p. 2.

²³³ *Ibid.*, pp. 2-3.

[Y]ou have got to get it investment ready. There is market failure there because there is uncertainty. So I think there is a great opportunity for local government and State Government to say, 'Well, a small number of our projects need to be a little bit blue-sky; they need to be a bit different because you just never know if one of these is going to come off'. We think this is unique to Bendigo, has a lot of potential, and we would love to keep the conversation going with State Government about: is this something that we could do the broader feasibility work for to say, 'This project—we have sorted through the risks and it is now potentially investment ready'.²³⁴

Mr O'Sullivan did not specify the type of financial assistance required. However, the Committee notes that other projects have benefited from grants and underwriting. It is also important to recognise that even a comprehensive understanding of the costs and benefits of a particular project cannot remove all forms of risk and uncertainty, especially in relation to broader market conditions. A combination of up-front assistance to develop projects and longer term measures to ensure revenue may be required to adequately support mid-scale community energy projects.²³⁵

Financial support for mid-scale renewable energy projects

Although all community energy groups are experiencing similar challenges in terms of bringing mid-scale projects to completion, they each have different needs and have requested a broad range of financial support from the Victorian Government. Rather than settle on a single mode of support to community energy groups, the Victorian Government could provide a range of different financial supports through a community energy finance agency. This concept has been supported by a range of stakeholders.²³⁶

Ms Claire Ferres Miles, Chief Executive Officer, Sustainability Victoria (SV), informed the Committee about SV's work to address this issue:

We recently held a round table. We had a whole range of—we had the big four banks, we had impact investors and we had community banks and community organisations. We brought those players together to actually discuss how we can finance this community transition. There was lots of goodwill in the room and certainly interest in continuing to connect and discuss some of those barriers.²³⁷

When asked about the possible role of a community energy finance agency, Ms Ferres Miles agreed that it had potential but cautioned that the purpose of such an organisation would need to be well defined. Ms Ferres Miles also explained that one of the key barriers for community energy groups is not access to finance per se, but that such groups often speak a different 'language' from investors. She suggested that one way of addressing this situation could be to second staff from the banking industry to

²³⁴ Mr Bernie O'Sullivan, *Transcript of evidence*, p. 10.

²³⁵ Hepburn Wind, *Submission 64*, p. 6.

²³⁶ Mr Chris Corr, *Transcript of evidence*, pp. 20–1; LIVE (Locals Into Victoria's Environment), *Submission 56*, p. 2; Mr Bernie O'Sullivan, *Transcript of evidence*, p. 10; Mr Rob Law, *Transcript of evidence*, p. 29.

²³⁷ Ms Claire Ferres Miles, *Transcript of evidence*, p. 25.

work with community energy groups on the development of business cases for private investment.²³⁸

The Committee considers that in addition to any financial support during the pre-feasibility stage or via underwriting, it is important to facilitate dialogue between community energy groups and investors. With appropriate support, Community Power Hubs may be able to perform this role and ensure that business cases and feasibility studies for mid-scale projects best meet the needs of potential financiers. There is a range of other financial support that could be provided to community energy groups and other proponents of mid-scale renewable energy projects including:

- providing milestone-based grants for pre-feasibility studies
- operating a vehicle for institutional investors to invest in community energy projects
- underwriting business cases, feasibility and other studies for high-risk innovative projects, for example, through concessional finance
- facilitating the participation of community energy projects in power purchase agreements
- the development of innovative financial instruments, such as hedges or parametric insurance, to protect community energy projects from future market fluctuations.

A revolving loan fund, with repaid loans used to finance new projects, may be a further option for financial support.²³⁹

RECOMMENDATION 26: That the Victorian Government develop formal mechanisms to support the development of mid-scale community energy projects—with a capacity of between 1 MW and 10 MW—in Victoria.

4.6.3 Other measures to facilitate mid-scale community energy

Piloting a solar garden

As discussed in Section 2.3, many stakeholders expressed concern that the benefits of solar power are not being fairly shared across the Victorian community, especially among lower income and at-risk Victorians. Solar gardens represent one option for extending the benefits of solar power and renewable energy more broadly. As Mr Ford explained:

A solar garden is a large solar PV array, in this case 1 or 2 megawatts, in which individual panels are owned by electricity consumers. So a 2 megawatt social access solar garden, for example, would accommodate 500 households who would effectively own

²³⁸ Ibid., p. 26.

²³⁹ The Institute for Sustainable Futures, et al., *National Community Energy Strategy*, p. 24.

notionally 4 kilowatts of generating capacity. The electricity generated by the solar panels is credited to the owner's household electricity bill even though the panels are not located on their property.²⁴⁰

Solar gardens could be optimised for social access, i.e., targeted at renters and low-income energy users. Surf Coast Energy Group is developing a proposal to establish a 2 MW solar garden near Geelong.²⁴¹ Mr Ford recommended the Victorian Government's Solar Homes program be revised to support investment by renters and apartment dwellers in solar gardens.²⁴² Solar gardens may be particularly attractive to renters, because they enable solar ownership among people who move house frequently. As Ms Perrett explained:

You have got the solar for renters program, but if that renter leaves that house, the solar panels are still on the house. Is there something that can be more portable that goes with the person? They could then have that feeling that 'I'm using renewable energy. It doesn't matter where I'm living; I'm using renewable energy'.²⁴³

The Committee received evidence from a range of other stakeholders in support of solar gardens.²⁴⁴ Some suggested a pilot project for 1,000 Victorian households which could support the installation of a 4–6 MW solar farm depending on the amount of access by each household within the solar garden.²⁴⁵

Recent research indicates that solar gardens are feasible in Victoria, but that they would require a subsidy in the order of \$2,000 to \$4,000 per household to have a similar payback period compared to rooftop solar. This amount is similar to the combined amount of grants under the Victorian Government's Solar Homes program and the Federal Government's Small-Scale Technology Certificates. Delivery of a pilot project would likely require additional investment due to its first mover status. However, such a pilot could lead to the establishment of a general program to develop solar gardens, which could significantly expand social access to renewable energy in Victoria.²⁴⁶

RECOMMENDATION 27: That the Victorian Government develop one or more pilot social access solar gardens in Victoria.

²⁴⁰ Mr Adrian Ford, *Transcript of evidence*, p. 35.

²⁴¹ *Ibid.*

²⁴² *Ibid.*, p. 34.

²⁴³ Ms Vicki Perrett, *Transcript of evidence*, p. 27.

²⁴⁴ City of Darebin, *Submission 124*, p. 4; Northern Alliance for Greenhouse Action, *Submission 118*, p. 3; Moreland City Council, *Submission 116*, p. 4.

²⁴⁵ Community Power Agency, *Submission 99*, p. 11; Coalition for Community Energy, *Submission 65*, p. 3; Hepburn Wind, *Submission 64*, p. 7.

²⁴⁶ J. Rutovitz, et al., *Social Access Solar Gardens for Australia*, University of Technology Sydney, 2018.

Unlocking the distribution network

Section 4.5.2 discussed some key upgrades to the high voltage transmission network which are required for increased development of large-scale renewable energy projects. Larger scale renewable energy projects need to connect to the high voltage transmission network, which moves electricity across significant distances between large generators of electricity—such as coal-fired power plants or large wind farms—and large consumers of electricity, such as cities or large industrial facilities. Smaller renewable energy projects are able to connect to the distribution network, which moves electricity from substations to homes and businesses. Ms Lane explained to the Committee that there is opportunity for mid-scale community energy projects to connect to the distribution network:

[U]nlocking the distribution network is really key. So we are starting to see a lot of issues with large-scale renewables and connection delays, connection issues, changing the scope of these projects. There is a whole range of distribution network across the State that is not being utilised. There are only two midscale generators connected right now into the distribution network. Hepburn Wind was the first, Chepstowe wind farm was the second. It is existing there. You do not need to perform much upgrades if you keep it within a certain scale, but you really need to bring distributors to the table and help them link with community groups, because these projects are at a scale where community groups can finance them and own them and they are not too onerous to manage. They are a simpler kind of project, especially at that scale and for solar.²⁴⁷

In summary, smaller scale community energy projects are able to connect directly to the electricity distribution network, bypassing the need for expensive and lengthy transmission network upgrades which many large projects require.

Hepburn Shire Council suggested in its submission that there should be a greater focus on the potential for smaller community energy projects to connect to the distribution network:

Unlocking of the distribution network for more small to mid-scale projects has the potential to encourage faster implementation of regionally appropriate projects/grid infrastructure. This could include minor augmentation of the distribution network to facilitate and encourage mid-scale renewables. While smaller scale projects often carry a higher cost per installed MW, it would be prudent to consider the true costs of all project components, including grid augmentation, line upgrades, land access, and many others including non-financial impacts.²⁴⁸

Similarly, Mr Gil Hopkins, Acting Executive Officer, Wimmera Mallee Sustainability Alliance, informed the Committee about his vision for smaller scale projects which could make individual towns net-zero energy:

So I think one of the things that needs to happen is to act locally—instead of trying to do great big structures and great big programs, to do a lot of smaller programs.

²⁴⁷ Ms Taryn Lane, *Transcript of evidence*, p. 18.

²⁴⁸ Hepburn Shire Council, *Submission 119*, p. 11.

With the Bendigo group that was just talking, they are doing a lot of local solar that is used locally, and I think that is the way to go. We supported the Natimuk Community Energy group to do a study to see if they could make Natimuk entirely energy self-sufficient; they have got a program where [they] are going to produce a solar farm—a small one—to try and power Natimuk.²⁴⁹

While the connection of community energy projects directly to the distribution network may present a range of benefits, there can also be substantial challenges for such projects in seeking a grid connection. Ms Lane explained how the costs for grid connection of Hepburn Wind's Leonards Hill Wind Farm substantially increased as they developed their project:

The planning, design and the grid connection cost as well. It is very different from a transmission line, but it is a risk for most communities. For example, we were quoted by Powercor that our grid connection would be \$225 000. At the end point it was \$1.6 million. So there is this big unknown for community groups. We have performed significant upgrades and we can now put a solar farm there, and that is great, but the big unknown for communities around what is the end point for costs, for grid connection, needs support.²⁵⁰

FINDING 15: Large variation between quoted and actual connection costs create substantial uncertainty for mid-scale renewable energy developers and are a major barrier for this type of project.

Variation in connection prices may be linked to understanding the state and condition of the distribution network. There are a range of technical challenges related to connecting power generation into the electricity distribution network, particularly on the scale of a mid-scale community energy project. Many locations in the distribution grid that would otherwise be viable for a community energy project may be subject to size limitations. Mr Chris Gilbert, Senior Economic Advisor, Energy Networks Australia, explained the technical considerations around connecting generators to the distribution network:

[T]here are export limits in place ... and that is for network security. When you have solar flowing back into the grid it raises the voltage of the poles and wires at our end, in the network, and to make sure that they are at a safe level in certain parts of the grid ... limiting the exports back into the grid is a way to maintain system security and reliability. If that energy is not being used and the voltage continues to go up, it poses possible safety risks to appliances in residential homes ...

...

²⁴⁹ Mr Gil Hopkins, Acting Executive Officer, Wimmera Mallee Sustainability Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 22.

²⁵⁰ Ms Taryn Lane, *Transcript of evidence*, p. 19.

There is only so much electricity you can push back into the grid in the wrong direction before you start to create problems. The only way of dealing with that at the moment is to augment the infrastructure so that there are bigger pipes and you can have more electricity, and that way you can keep the voltage and other things like the frequency at a safe level.²⁵¹

Understanding where network constraints, and conversely opportunities, exist would assist community energy groups in selecting possible locations and project sizes. Although recent rule changes and work by AEMO have improved transparency of the connection capacity and congestion in the transmission network, understanding of the capacity of the various parts of the distribution network is much less advanced. Ms Mouchaileh explained to the Committee the current state of play in terms of transparency on the distribution network:

When you go down to the distribution side of things one area I think that we have been working very closely with a number of the networks is to get a lot more visibility in terms of where is the excess capacity, what is the hosting capacity in those areas and how do you get then to the transparency of that to understand where some of the distribution-connected resources might need to go and give third parties—like through virtual power plant—an ability to locate those resources, aggregate them and then offer consumers locally and whole of system benefits.

That is probably its infancy, I would say. The level of transparency or understanding around local capability and constraints is something that a lot of the networks are working on as well—an important piece of work I think.²⁵²

The provision of more information for community energy groups at the scoping stage of a mid-scale project would assist them to select potential sites and commence early discussions with the Distribution Network Service Providers (DNSPs) regarding project connection. If feasible, DNSPs could also provide estimated ranges of connection costs for renewable energy projects of various sizes. While some information has been made available regarding the capacity of the transmission and sub-transmission network, further work and collaboration between the DNSPs, regulatory bodies and DELWP could provide this information for lower voltage parts of the distribution network. Initial focus could be on the 22 kV network which is most compatible with projects in the 1–2 MW range.²⁵³ Such a project would also provide a discussion forum for community energy groups and DNSPs, which could also help to streamline the connection process.

RECOMMENDATION 28: That the Department of Environment, Land, Water and Planning work with stakeholders to develop and regularly publish data on available capacity, estimated connection costs and projected demand for connections for mid-scale renewable energy project connections in the Victorian electricity distribution network, to provide greater guidance and investment certainty for these projects.

²⁵¹ Mr Chris Gilbert, Senior Economic Adviser, Energy Networks Australia, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, pp. 41–2.

²⁵² Ms Violette Mouchaileh, *Transcript of evidence*, pp. 32–3.

²⁵³ Enhar, *Preliminary Concept Design for a 2 MWp Community Solar Farm*, report for Community Power Hub Bendigo, 2019, p. 1.

5 Energy efficiency and buildings

Victorian communities are increasingly active and innovative in the implementation of energy efficiency measures. Like renewable energy, energy efficiency is a fundamental way of driving climate change mitigation. Programs to retrofit housing, assistance to businesses and residents to help them understand the energy efficiency of their existing buildings and the rating of energy efficient buildings are just some of the actions that Victorian communities are currently taking to improve their energy efficiency.

5.1 Best practice examples of sustainable development

While existing buildings can be retrofitted, the planning and building systems present substantial opportunities for additional future emissions reduction. Some Australian developers are among the world leaders for environmental sustainability and are already constructing net-zero homes.¹ A net-zero home has a low enough energy use through appropriate design and other energy efficiency measures that its entire electricity consumption can be offset by rooftop solar. Ms Davina Rooney, CEO, Green Building Council of Australia (GBCA), provided estimates of the additional cost of a new net-zero home:

I am very excited to say the market is doing more work on this than we have actually ever seen them do to date. We are starting to work with builders who want to have net zero houses, and depending on where they are starting on the mark, they are talking of figures from \$15 000 to \$35 000. Some are benchmarking as low as \$15 000, some are benchmarking higher.²

Ms Rooney went on to explain that this would have a payback period of roughly seven to ten years but also emphasised that there are significant improvements in comfort and health associated with net-zero homes in addition to bill savings.³

Many buildings combine environmental sustainability with other social outcomes. For example, Nightingale Housing uses a social ownership and development model that enables exemplary environmentally sustainable design (ESD). The future owners take on the role of the property developer, which enables the developer's typical profit margin of 5–15% of project costs to be reinvested in sustainability and liveability measures. This improves the property's overall affordability.⁴ The 20-apartment 'Nightingale 1' development in Brunswick won the 2017 Built Environment Category at

1 Ms Davina Rooney, CEO, Green Building Council of Australia, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 47.

2 *Ibid.*, p. 50.

3 *Ibid.*

4 Victorian Planning Authority, *Submission 115*, received 30 August 2019, p. 5.

the Premier's Sustainability Awards and has an 8.2 NatHERS rating (see 5.2.1), an 18 kW solar array and rainwater harvesting.⁵

Geelong Sustainability partnered with Deakin HOME in the 'Live Small Live Eco' project to design a cluster of small houses that maximises community and environmental values. The concept is for a development that would physically resemble a retirement village but where the dwellings would be owned as freehold property.⁶ Mr Tim Adams, Committee Member, Geelong Sustainability, explained some of the challenges with this model of development:

[W]e see that there are constraints within the current state planning scheme, which is then operated in Geelong and Surf Coast, that prevent easy access to some of the things that we are considering. So to have a small house cluster is impossible as an as-of-right development option in the planning scheme because of the requirements for vehicle parking, vehicle circulation and private garden spaces as compared with shared garden spaces. So we are trying to set up an example of what a different vision could be, which would then potentially influence changes to the state planning policy.⁷

At a neighbourhood scale, The Cape development at Cape Paterson is planned to feature 230 home sites, each with a minimum NatHERS rating of 7.5 stars, a minimum of 2.5 kW of rooftop solar and 10,000 litres of rainwater storage. Some houses in the development have achieved 9 and 10 stars on the NatHERS scale. The development also features a community garden, electric vehicle charging and landscaped areas.⁸

Warrnambool City Council has partnered with the Victorian Planning Authority (VPA) to propose a low or zero-carbon precinct in a future urban growth area. The VPA provided support and the coordination of engagement with local landowners and industry. This collaborative approach was identified by Warrnambool City Council as an important condition for the success of the precinct.⁹

Fishermans Bend, an urban renewal precinct located within the City of Port Phillip and the City of Melbourne, has adopted the Green Star—Communities rating tool. The tool, which was launched by the GBCA in 2003, is an internationally recognised built environment rating system, which provides ratings across five impact categories. All buildings in the precinct will be required to achieve a minimum 4 Star Green Star Design and As Built rating, with buildings above 5,000 square metres required to achieve a 5 Star Green Star Design and As Built rating.¹⁰

5 Georgia Thomas, *Green Magazine*, 'MINI Profiles: Nightingale 1 by Breathe Architecture', <<https://greenmagazine.com.au/mini-profiles-nightingale-1-by-breathe-architecture>>, accessed 28 October 2020.

6 Ms Vicki Perrett, President, Geelong Sustainability, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 22.

7 Mr Tim Adams, Committee Member, Geelong Sustainability, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 22.

8 Bass Coast Shire Council, *Submission 36*, received 21 August 2019, p. 4; The Cape, *About*, 2019, <<https://www.liveatthecape.com.au/about.html>> accessed 28 October 2020.

9 Cr Tony Herbert, Mayor, Warrnambool City Council, public hearing, Warrnambool, 21 November 2019, *Transcript of evidence*, p. 3.

10 Green Building Council Australia, *Submission 126*, received 2 September 2019, p. 8.

5.1.1 Government building policies

The design and construction of government buildings presents a substantial opportunity for the Victorian Government to demonstrate best practice ESD. Government investment in sustainable buildings could also help drive the development of lower cost sustainable building products by industry.¹¹

The Green Building Council of Australia recommended that the Victorian Government demonstrate leadership in the sector by requiring Government tenancies and Government-owned office buildings to achieve a Green Star rating.¹² While there may be benefits from a third-party certification of government building projects, Green Star certification is costly and some government building agencies stated that this would be a key barrier to adoption.¹³ However, Fire Rescue Victoria does plan to obtain Green Star certification with the Derrimut Fire Station, which is expected to be completed in 2021, and further new Fire Rescue Victoria stations have been targeted to achieve 5 Star Green Star ratings.¹⁴

Submissions and sustainability guidelines from government building agencies reference the targeting or achievement of performance 'equivalent' to a particular standard.¹⁵ The Green Building Council of Australia notes that this type of statement may mean that a project could actually fall short of the stated rating and may be considered to be possible 'greenwashing'.¹⁶ Although requested, no government building agency was able to provide data on the performance or sustainability rating of any recent construction project. The Department of Justice and Community Safety suggested that greater public disclosure of ESD performance, or a register of ESD performance, would help the Victorian Government demonstrate its commitment under the *Climate Change Act 2017*.¹⁷

The Committee considers that benchmarking of Victorian Government buildings is important in promoting the adoption of green buildings by other levels of government and the private sector. This is especially important given planned construction over the coming years. This could occur through the extension of NABERS (see Section 5.2.2 below) to more building types or the development of bespoke benchmarking systems within the Victorian Government. This extension of NABERS has already occurred with hospitals. The Victorian Health and Human Services Building Authority, through the Australian Healthcare Infrastructure Alliance, worked with all other Australian health jurisdictions to develop the NABERS tool for energy and water efficiency in public

11 Ms Julia Cabbage, Chief Executive Officer, Australian Institute of Architects, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 67.

12 Green Building Council Australia, *Submission 126*, p. 7.

13 Robert Fiske, Chief Executive Officer, Victorian Health and Human Services Building Authority, correspondence, 8 May 2020, p. 7; Department of Education and Training, correspondence, 30 June 2020, p. 13; David Martine, Secretary, Department of Treasury and Finance, correspondence, 15 July 2020, p. 2.

14 Ken Brown, Deputy Commissioner, Fire Rescue Victoria, correspondence, 22 July 2020, pp. 4–5.

15 Rebecca Falkingham, Secretary, Department of Justice and Community Safety, correspondence, 10 June 2020, p. 2; Robert Fiske, correspondence, p. 2.

16 Green Building Council of Australia, *Green Star in focus: The business case*, 2020, p. 12.

17 Rebecca Falkingham, correspondence, p. 6.

hospitals.¹⁸ Furthermore, some building elements, such as heating, ventilation and air conditioning systems, do not have recognised sustainability benchmarks.¹⁹

RECOMMENDATION 29: That the Victorian Government collect and publish consistent data on the sustainability performance or rating of all new government construction projects and upgrades with a value over \$2 million.

In addition to greater transparency on sustainability performance, stakeholders also recommended that the Victorian Government invest in low-carbon government buildings, including through the procurement of low-carbon building products.²⁰ The cost of achieving high environmental performance is relatively small compared to the overall construction cost of a large building. For projects receiving Green Star Design and As Built certification, the average proportion of the total budget to achieve the certification for different types of projects is:

- 1.7% for office buildings
- 0.8% for education facilities
- 2.3% for industrial buildings
- 5.2% for residential buildings
- 1.7% for retail buildings
- 4.3% for public buildings.²¹

For public hospital building projects, 2.5% of total construction costs are set aside for sustainability initiatives above business-as-usual requirements.²² This is consistent with the cost for achieving Green Star certification in private sector projects.

The Committee also notes that the Green Building Council of Australia has published a case study on the redevelopment of the Williamstown High School's Bayview Campus, which commenced in 2005 with a commitment of \$11 million. The redevelopment was awarded a 5 Star Green Star—Education Design PILOT rating. The redevelopment cost of \$2,075 per square metre, which included all site works and the fitout, was within a standard school build budget.²³

Green buildings can deliver savings of up to 20% of a building's construction cost from energy bills alone over a building's lifespan. In addition to energy savings, green

¹⁸ Robert Fiske, correspondence, p. 2.

¹⁹ Ken Brown, correspondence, p. 11.

²⁰ For example: Mr Bernie O'Sullivan, Director, Strategy and Growth, City of Greater Bendigo, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, pp. 4–5; Western Alliance for Greenhouse Action, *Submission 143*, received 27 September 2019, p. 23; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, received 19 August 2019, p. 7; Green Building Council Australia, *Submission 126*, p. 6.

²¹ Green Building Council of Australia, *Green Star in focus: The business case*, p. 47.

²² Robert Fiske, correspondence, p. 1.

²³ Green Building Council of Australia, *Williamstown High School, Bayview Campus*, 2012, p. 2.

buildings can also deliver substantial productivity improvements in commercial buildings, faster recovery for patients in hospitals, and improvements in student health and test performance in schools.²⁴ These non-financial benefits should be considered in any benefit-cost analysis for government buildings given this potential for large community benefit.

Ms Julia Cabbage, Chief Executive Officer, Australian Institute of Architects, recommended that government could lead in the development of ESD by increasing its focus on ESD in the procurement and construction of government building projects:

I think that ultimately my fundamental belief is that government needs to be the exemplar and that government needs to actually demonstrate the best possible practice when they are procuring buildings for design and construct[ion], and they need to ensure that what they are actually asking for is what they get delivered. So it means a really strong understanding of end-to-end procurement practice and then things like novation, because we know that environmental standards around design are quite often around how the light comes through the window, how the air flows through the building, how it is actually oriented to the site et cetera. Now, if there is nobody ensuring that that gets delivered rather than a time-and-cost approach to actual delivery, then it becomes problematic.²⁵

Ms Cabbage recommended greater harmonisation of government building guidelines to ensure that projects are delivering the best value sustainability outcomes while reducing costs because industry tenderers will be working to the same set of policies across different projects:

What would be really great is if departments across government actually had the same procurement practice, and ultimately that will take time and cost out of your budgets because you actually are adhering to the same policy platform and procedures.

...

[I]f health is building something and education is building something they are two very different experiences—it is about how you actually bring that together.

...

So it is about: how do we actually start to maybe get that group of bodies working together to actually define what good looks like and then work towards it as well? For me it is about: how do we collaborate across one budget to actually deliver in a way that is fundamentally aligned with your values?²⁶

²⁴ Green Building Council of Australia, *Green Star in focus: The business case*, p. 11.

²⁵ Ms Julia Cabbage, *Transcript of evidence*, p. 64.

²⁶ *Ibid.*, pp. 66-7.

The Victorian Government has a range of different policies and guidelines to encourage sustainable building and procurement for government projects. These include:

- the Office of Projects Victoria's Whole of Victorian Government (WoVG) *Sustainable Investment Guidelines*, which were being updated as at September 2020²⁷
- the Department of Health and Human Services' sustainability guidelines for capital works, which were being finalised as at September 2020²⁸
- the Department of Justice and Community Safety's *ESD Guidelines*, which are used by the Community Safety Building Authority and the Emergency Services Infrastructure Authority²⁹
- the Victorian School Building Authority's (VSBA) *Building Standards and Quality Handbook*.³⁰

While a detailed review of government ESD guidelines is outside of the scope and expertise of this Inquiry, the Committee is concerned that:

- no departmental ESD guideline that the Committee has accessed appears to reference the Office of Projects Victoria's *Sustainable Investment Guidelines*
- correspondence from Victorian Government building agencies (in response to written questions from the Committee) referenced different national and international sustainability and energy efficiency rating schemes with no apparent justification.

Ms Claire Ferres Miles, Chief Executive Officer, Sustainability Victoria, explained that there may be a gap between the sustainability standards of current school building projects and community expectations:

I think the comment when we have engaged with the VSBA is that they do acknowledge that there is probably a gap between what they are building and community expectations in terms of the climate-resilient school buildings of the future. I think there is an acknowledgement that actually schools are now more and more community hubs in terms of the places where—we saw recently with the bushfires about where the community congregates as safe places. Definitely in the Department of Education and the VSBA, they acknowledge that there is a gap, and there is a question about how you address that gap so that the schools are actually our showcases of what climate resilience looks like into the future.³¹

Improving inter-departmental collaboration and the development of strong sustainability guidelines, such as a whole-of-government ESD policy, could help address this gap. In response to questions from the Committee regarding the potential utility of

²⁷ David Martine, correspondence, p. 1.

²⁸ Robert Fiske, correspondence, pp. 1–4.

²⁹ Rebecca Falkingham, correspondence, p. 1.

³⁰ Department of Education and Training, correspondence, pp. 10–12.

³¹ Ms Claire Ferres Miles, Chief Executive Officer, Sustainability Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 28.

a whole-of-government ESD policy, Fire Rescue Victoria supported such a policy and suggested it could include minimum standards across a range of ESD elements. This would provide sound guidance to both line agencies and the building industry in policy implementation.³² The Department of Justice and Community Safety (DJCS) stated in its response that:

A state-wide ESD policy may assist government entities in approaching ESD in a similar manner and reduce confusion between departmental ESD policies. However, government facilities vary in their size and operation and as such any policy would need to allow for flexibility in its approach

The primary driver behind DJCS' development of its own ESD guidelines was to allow for a more seamless application within a correctional setting, which has a number of security requirements that are bespoke to this industry and must be adhered to. These components can be adapted, but do not apply to emergency service facilities.³³

This highlights the need for a consistent approach that considers the most appropriate sustainability measures in different structure types. The Department of Education and Training also supported a state-wide approach that allowed for differentiated implementation across different portfolios, project types and project sizes.³⁴ The Department of Education and Training also suggested that greater industry consultation could improve market clarity and provide sustainable building products that are code compliant and good value:

In a similar way as the National Construction Code (NCC) process, there could be advantages in government publishing technical advice based on expertise and agreed understandings of costs and benefits of particular technical solutions. This could provide clarity to the market, and also ensure products and building processes are safe and do not conflict with requirements under the NCC. Market participants, including the Green Building Council, could also engage in this process.³⁵

While the Committee recognises that a whole-of-government working group is currently reviewing the Whole of Victorian Government (WoVG) *Sustainable Investment Guidelines*, it is concerned about the views of industry groups and other stakeholders outlined above that government sustainability building and procurement practices are either uncoordinated or not delivering buildings with sufficient sustainability outcomes.

The Committee considers that there is clearly scope for much greater collaboration between government building authorities and greater consistency across sustainability policies and guidelines for capital works.

³² Ken Brown, correspondence, p. 15.

³³ Rebecca Falkingham, correspondence, p. 5.

³⁴ Department of Education and Training, correspondence, p. 13.

³⁵ Ibid.

RECOMMENDATION 30: That the Victorian Government establish a Sustainable Government Buildings Community of Practice to collaborate on best practice environmentally sustainable design in Government building projects. This group should include representation from the Department of Treasury and Finance, Victorian Government Architect, Sustainability Victoria, and all Victorian government building and infrastructure authorities.

RECOMMENDATION 31: That the Sustainable Government Buildings Community of Practice, as its first item of business, work to harmonise Victorian Government sustainability guidelines for Government building projects. This should include consultation with industry groups and experts.

5.2 Sustainability and energy efficiency rating systems

Understanding how a building does, or how a building design should, perform on energy efficiency and other aspects of sustainability is key to incentivising better design, retrofitting and meeting building code requirements. Community groups, the private sector and local governments are engaging in both voluntary and mandatory building sustainability rating schemes, by performing or undertaking ratings or setting requirements for new developments. For completeness, this section discusses the built environment energy efficiency and environmental rating systems commonly in use in Victoria. These rating systems are summarised in Table 5.1 at the end of the section.

5.2.1 Nationwide House Energy Rating Scheme

The Nationwide House Energy Rating Scheme (NatHERS) is a rating system that assesses the energy efficiency of a house or apartment from the perspective of heating or cooling. That is, it provides an estimate of how much energy is required to heat or cool a home based on its design and construction. It rates housing on a scale of 0–10 stars, based on design, construction materials and climate zone. The scheme does not measure the energy efficiency of appliances, including air conditioners or heaters.³⁶

Under the National Construction Code, the current minimum standard for new houses and apartments is six stars. However, the Committee heard from many stakeholders that the average value of existing building stock in Victoria is approximately two stars.³⁷

NatHERS does have several limitations as it only addresses the thermal performance of the building shell and minimum standards tend to be adopted as standard practice.

³⁶ Australian Government Department of Industry, Science, Energy and Resources, *Nationwide House Energy Rating Scheme: About*, 2019, <<https://www.nathers.gov.au/about>> accessed 28 April 2020.

³⁷ Ms Vicki Perrett, *Transcript of evidence*, p. 22; Mr Tim Adams, *Transcript of evidence*, p. 28; Victorian Council of Social Service (VCOSS), *Submission 88*, received 26 August 2019, p. 8.

These issues were explained to the Committee by Mr Malcolm McKelvie, Board Member, Gippsland Climate Change Network:

At the moment we are using the NatHERS system for residential buildings, which is just looking at the building shell and not at how much the house will cost to run. What I would love to see—actually, there is a saying in the energy assessment industry at the moment that ‘A six-star NatHERS house is the worst home you are legally allowed to build’.³⁸

The setting of minimum energy efficiency standards in the building code and consideration of incentives for the construction of homes at higher NatHERS ratings is considered in Chapter 6.

Despite a six-star NatHERS rating being the minimum standard for detached housing, the websites and advertising material of some volume home builders imply that six stars is a maximum or superior rating or extends to other sustainability elements beyond thermal performance.³⁹

NatHERS is also an ‘as-designed’ rating system and does not measure the actual performance of the building after it is built. This might be substantially lower due to faults in construction and maintenance. Mr Chris Barfoot, Board Member, Gippsland Climate Change Network, provided an example of this drawback:

[T]he NatHERS system it is a paper-based system; it is not based on audit. So what you have on your paper is not necessarily what you built. There is really a desperate need to seriously consider auditing of new homes to ensure that the customer is getting what they are paying for because we have seen examples, for example, where people come to us and say, ‘Hey, have I got ceiling insulation because my bills are going through the roof?’. You put a thermal camera on—‘Yes, you do have your ceiling insulation. It is all in bags in that corner of your house. It has never been installed’.⁴⁰

Furthermore, as Mount Alexander Shire Council stated in its submission, NatHERS ratings are based on climate zones, so that ‘houses are being designed for winter conditions rather than for the increasing number of heatwave days’ in some locations.⁴¹ The Committee discusses the implementation of NatHERS within the planning and development system in Chapter 6 (which deals with climate change action by Victoria’s local governments).

³⁸ Mr Malcolm McKelvie, Board Member, Gippsland Climate Change Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, pp. 4–5.

³⁹ Georgia Warren-Myers, Erika Bartak and Lucy Craddock, ‘Observing energy rating stars through the Australian Consumer Law lens: How volume home builders’ advertising can fail consumers’, *Energy Policy*, vol. 139, 2020.

⁴⁰ Mr Chris Barfoot, Board Member, Gippsland Climate Change Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 5.

⁴¹ Mount Alexander Shire Council, *Submission 114*, received 29 August 2019, p. 5.

5.2.2 National Australian Built Environment Rating System

The National Australian Built Environment Rating System (NABERS) measures the environmental performance of apartment and commercial buildings, including offices, hospitals, hotels, shopping centres and data centres. It examines performance across energy, waste, water, the indoor environment and carbon neutrality on a scale of one to six stars.⁴² NABERS is based on a building's actual performance, unlike some other rating systems, which enables users of the system to understand the true environmental credentials of the building as it was constructed and as it is operated.⁴³

5.2.3 Built Environment Sustainability Scorecard

The Built Environment Sustainability Scorecard (BESS) was designed to enable builders and developers in Victoria to demonstrate the environmental sustainability of a development proposal at the planning permit application stage.⁴⁴ It assesses projects against benchmarks across nine environmental categories, which in some cases are similar to those assessed by the Green Star program (discussed in Section 5.2.4). Each category and the overall BESS score are rated on a scale of 0–100%, with some categories having minimum pass criteria. Overall BESS scores of at least 50% are defined as 'best practice' and scores of at least 70% are defined as 'excellence'. BESS can incorporate NatHERS scores where appropriate.⁴⁵

BESS has principally been used in Victoria in conjunction with local government ESD planning policies, which are discussed further in Chapter 6. The tool is funded by 24 participating Victorian local governments and is maintained by the Council Alliance for a Sustainable Built Environment (CASBE).⁴⁶ CASBE is an alliance of Victorian councils, which operates with the support of the Municipal Association of Victoria (MAV) and aims to improve the sustainability of the built environment through the Victorian planning process. Ms Natasha Palich, Executive Officer, CASBE, explained the goals of BESS and how it interacts with other rating systems like Green Star:

Our goal as councils is to lift all of the development up to a level of performance. In the green building industry you have organisations like the Green Building Council of Australia and their Green Star tool—that is targeting the top end of the market. What we are about in the councils is enabling all people to get better buildings, more comfortable, more affordable in the long-term with a lower impact on the environment.⁴⁷

⁴² NSW Department of Planning, Industry and Environment, *What is NABERS?*, <<https://www.nabers.gov.au/about/what-nabers>> accessed 28 October 2020.

⁴³ Ms Natasha Palich, Executive Officer, Council Alliance for a Sustainable Built Environment, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 15.

⁴⁴ Council Alliance for a Sustainable Built Environment (CASBE), *Submission 97*, received 26 August 2019, p. 3.

⁴⁵ Municipal Association of Victoria, *Built Environment Sustainability Scorecard: Tool notes*, 2020, <<https://bess.net.au/tool-notes>> accessed 28 April 2020.

⁴⁶ Council Alliance for a Sustainable Built Environment (CASBE), *Submission 97*, p. 3.

⁴⁷ Ms Natasha Palich, *Transcript of evidence*, p. 12.

As BESS is targeted at the planning and development industry it is mostly applied to multi-dwelling and commercial developments. Like NatHERS, it is an as-designed system, so actual performance ‘as-built’ may be lower if there are construction faults or poor maintenance.

5.2.4 Green Star

Green Star is a national, voluntary rating system for sustainable buildings and communities. It produces certified ratings for individual buildings, precincts and neighbourhood developments that cover energy and water efficiency, waste, construction and building management, social inclusion and place-based resilience. Projects are certified by an independent panel and the whole program is operated by the Green Building Council of Australia (GBCA), an industry association that promotes sustainability in the built environment.⁴⁸ Only buildings meeting a ‘best practice’ standard can receive a Green Star rating. Buildings that are certified can achieve one of three different ratings:

- 4 Star—Australian Best Practice
- 5 Star—Australian Excellence
- 6 Star—World Leadership.⁴⁹

Ms Rooney outlined some of the achievements of the Green Star system:

As of June 2019 more than 2350 Green Star certifications had been issued across 2000 assets in Australia, and they come in buildings of all shapes and size—office buildings, hospitals, hotels, broad accommodation in apartments, university campuses, public buildings. So in Victoria there are 645 buildings that have been certified, and we seek to partner with industry to develop and enhance those standards over time. Now, why would someone do that? That is because when we have reviewed what those buildings have achieved, they are designed and built to produce over 55 per cent less greenhouse gases than a typical building, use 66 per cent less electricity and 51 per cent water and recycle 96 per cent of their waste.⁵⁰

While Green Star does incorporate some elements of NABERS, it is a much more comprehensive system, focused on driving industry leadership and excellence.⁵¹

5.2.5 Victorian Residential Efficiency Scorecard

The Victorian Residential Efficiency Scorecard (VRES) has been developed by the Department of Environment, Land, Water and Planning (DELWP) to provide Victorians with a clear, comparable and trustworthy scale to understand the comfort and energy efficiency levels of their homes. Under the scheme, a person may have their house

⁴⁸ Green Building Council Australia, *Submission 126*, pp. 10–11; Ms Davina Rooney, *Transcript of evidence*, pp. 43–4.

⁴⁹ Green Building Council Australia, *Green Star: A Year in Focus: FY 2019 Annual Report*, 2019, p. 14.

⁵⁰ Ms Davina Rooney, *Transcript of evidence*, p. 44.

⁵¹ *Ibid.*, pp. 46–7.

assessed to determine which of its features drive the cost of energy bills, including insulation, the building shell, air leakage and major appliances such as heating, cooling, hot water, and lighting. Assessments also take into account whether any solar PV is installed. The resulting two-page scorecard gives an overall rating of the home on a scale of one to ten and a separate rating for each major appliance group. The scorecard also provides a 'hot weather rating', which measures how easy it is to keep the house cool during hot weather without air conditioning. Unlike other rating schemes, the VRES also provides recommendations for occupants on upgrades or behaviour changes that could reduce energy usage or improve efficiency and comfort.⁵²

The pilot of the VRES was run by the South East Councils Climate Change Alliance (SECCCA), which provided 200 assessments for free.⁵³ It is now also being used in several programs to retrofit Victorian homes, some of which are discussed in Section 5.3.1.

While most councils and community organisations assisting with energy efficiency assessments are using VRES, some are using an alternative bespoke approach. One example is Hepburn Shire Council, which provides tools and instructions on loan for residents to conduct their own home assessments.⁵⁴

The Committee heard from many councils and community organisations that provide the VRES service. Geelong Sustainability have established a social enterprise to undertake the assessments, which has two accredited assessors. In conjunction with the VRES, they also offer an additional thermal camera inspection service which can help identify building defects like missing insulation, air leaks and condensation issues.⁵⁵ Ms Vicki Perrett, President, Geelong Sustainability, outlined the cost of an assessment and how an assessor examines somebody's home:

So \$350 to \$400 is the cost of the scorecard assessment. So the assessor will come into your home and they will ask for all your bills, they will look at all your appliances, they will be in your roof and all of that sort of stuff. Then you will get an assessment, a two-page report, with a star rating and advice about in what order you should tackle the problems that your house may likely have.⁵⁶

Ms Perrett went on to mention that Geelong Sustainability was offering a free scorecard assessment as a prize for people who participate in their surveys:

We are trying to get people to do the survey because we know that they would like the scorecard. In our survey of the people who have taken up solar, 40 per cent said they would really like to get one of these scorecard assessments to understand, 'What should I do next?'.⁵⁷

⁵² Department of Environment, Land, Water and Planning, *Victorian Residential Efficiency Scorecard: Flash report: July 2019*, Government of Victoria, East Melbourne, 2019, pp. 3–14.

⁵³ South East Councils Climate Change Alliance, *Submission 136*, received 12 September 2019, p. 2.

⁵⁴ Hepburn Shire Council, *Submission 119*, received 2 September 2019, p. 5.

⁵⁵ Geelong Sustainability, *Submission 107*, received 27 August 2019, p. 5.

⁵⁶ Ms Vicki Perrett, *Transcript of evidence*, p. 25.

⁵⁷ *Ibid.*, p. 26.

Mr McKelvie, who is also a certified VRES assessor, explained some of the outcomes from Gippsland Climate Change Network's (GCCN) delivery of VRES assessments:

We did about 60 homes, and it has been very well received. People like the output, they get a certificate and they get personalised, prioritised advice about how they can retrofit their homes.⁵⁸

In the first two years of the program to July 2019, 1,870 VRES assessments were conducted and the Victorian Government accredited 40 Victorian assessors. Many assessments are being provided through government programs, such as Victorian Healthy Homes. A Government survey found that 91% of respondents were extremely or very satisfied with the service and nearly half had already made some home upgrades, with a further quarter planning to do so within three months of the assessment. This suggests that assessments may be important for driving the upgrade of relatively energy inefficient Victorian homes. Of homes that had received a VRES assessment up to July 2019, the average score was only three stars. DELWP has estimated that an average package to upgrade a home from three to ten stars would cost about \$12,000 and save an average of \$2,000 per year in energy costs.⁵⁹

Although these early results seem promising, the relatively limited demand for assessments and the small number of assessors represent challenges to the scaling up of the VRES program. A staged approach to drive expansion of the program and the number of assessors would be appropriate. As Mr McKelvie explained:

The trouble with the program is a bit of a chicken and egg thing. There is no market because people do not know about it so people do not want to become accredited to be assessors.⁶⁰

More training may need to be provided to upskill potential assessors. Mr Adams explained some of the benefits of the VRES but also stated that the lack of skilled tradespeople is hampering the delivery of assessments and the retrofitting of houses:

We are identifying, however, that there is a lack of skilled-trade capacity and knowledgeable people on the ground to actually do the work. So that is one of the things that we would like to make you aware of here: all of the goodwill is wonderful and metrics can be made and studied, but I think to progress with climate change adaptation we have got a huge scope for a cohort of people to actually implement the work and have suitable training.⁶¹

Some stakeholders recommended that the VRES assessments should become a mandatory part of the Solar Homes rebate.⁶² Understanding a building's energy use and current energy efficiency can be important when installing solar panels. Energy

⁵⁸ Mr Malcolm McKelvie, *Transcript of evidence*, p. 3.

⁵⁹ Department of Environment, Land, Water and Planning, *Victorian Residential Efficiency Scorecard*, pp. 5–8.

⁶⁰ Mr Malcolm McKelvie, *Transcript of evidence*, p. 6.

⁶¹ Mr Tim Adams, *Transcript of evidence*, p. 24.

⁶² See for example: Mr Malcolm McKelvie, *Transcript of evidence*, p. 6; Baw Baw Sustainability Network (BBSN), *Submission 81*, received 26 August 2019, p. 3.

efficiency upgrades, in addition to being a good investment on their own, can reduce the size and cost of the appropriate solar system. Cr Darren McCubbin, Chair, GCCN, explained how energy efficiency can sometimes represent a better investment than solar panels:

Sometimes people think, 'Oh, look, the easy answer is just to put PV on our roof. Yes, that'll do', whereas actually going in and making your house a bit more comfortable to live in and creating some solutions about where you should be running your appliances could actually be a cheaper way of going.⁶³

Cr McCubbin went on to explain that the VRES assessments can also provide important advice to individuals on how to get the most out of their solar system:

[I]f you get PV on your roof, suddenly you do not run your dishwasher at night, you run your dishwasher during the day. That is not as obvious as what it sounds, and people need a bit of education about using renewable energy in a different way. Malcolm's assessors came into houses. You found people had all sorts of crazy things in their system.⁶⁴

Although the VRES program is now open to both commercial and non-commercial organisations to act as assessors, the program still represents a potential income source for local sustainability groups, such as Geelong Sustainability and their social enterprise. Creating more demand for Scorecards could assist the non-profits providing this service by providing them with an additional income stream. Creating more demand through the Victorian Solar Homes program would also have benefits for recipients by ensuring they receive the most appropriate system and maximise their usage through better energy efficiency in their home.

RECOMMENDATION 32: That the Victorian Government provide Victorian Residential Efficiency Scorecard assessments for any home receiving assistance through the Victorian Solar Homes program.

RECOMMENDATION 33: That the Victorian Government phase in a subsidy available to all homeowners who undertake Victorian Residential Efficiency Scorecard assessments.

The five rating systems discussed in this section and others in use in other jurisdictions—such as the NSW Building Sustainability Index (BASIX) system—are different in a range of ways. These include whether they assess performance or design, whether they are mandatory or voluntary, the rating scale they use, and market segment or types of buildings targeted. While each scheme appears well adapted for its purpose, there is potential for confusion among less knowledgeable consumers. For example, the presence of 10 star systems such as NatHERS and VRES may be confused with

⁶³ Cr Darren McCubbin, Chair, Gippsland Climate Change Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 4.

⁶⁴ Ibid.

star rating systems for appliances, which historically have had 6 star rating systems, potentially leading people to believe a 6 star rated house is high performing.⁶⁵ Ms Rooney referenced the potential for confusion and need for clearer language when questioned about different rating schemes by the Committee:

I think there is a genuine opportunity for how we use language better. It will not surprise you that when we are going into our new tool suite I am moving from language like ‘indoor environment quality’ and repositioning it as ‘healthy’, because that is the language that normal people use. You know, people like me, engineers...we have to reduce the technocratic language and make these things far more accessible.⁶⁶

FINDING 16: Existing sustainability and energy efficiency rating systems for buildings are fit for purpose and each has a distinct purpose. However, the diversity of rating schemes and their use of technical language has the potential to confuse consumers.

The Committee does not consider there to be sufficient evidence for the rationalisation of energy efficient rating schemes into a single system, however, there may be benefits from clearer communication about different rating schemes. In particular, there may be benefit in requiring communications and advertising material on the above rating schemes to include the maximum rating for each scale when mentioning an individual rating, for example, ‘6 out of 10 stars on the NatHERS scale’. Chapter 6 discusses the minimum energy efficiency standards for new dwellings.

Table 5.1 Built environment energy efficiency and environmental rating systems

	NatHERS	NABERS	VRES	BESS	Green Star
Full Title	Nationwide House Energy Rating Scheme	National Australian Built Environment Rating System	Victorian Residential Efficiency Scorecard	Built Environment Sustainability Scorecard	-
Owner	National program managed by the NSW Department of Planning, Industry and Environment	National program managed by the Commonwealth Government	Victorian Government	Council Alliance for a Sustainable Built Environment	Green Building Council of Australia
Scale	0-10 Stars	0-6 Stars	1-10 Stars	0-100%	4-6 Stars
Aim	Predict the amount of heating and cooling your apartment or house will need to stay comfortable all year round.	Measure a building’s energy efficiency, carbon emissions, water consumed, and waste produced and compare it to similar buildings.	Empower householders to improve the energy performance of their home and save money on their energy bills.	Assesses energy and water efficiency, thermal comfort, and overall environmental sustainability performance of your new building or alteration.	Assesses the sustainable design, construction and operation of buildings, fitouts and communities.

⁶⁵ Warren-Myers, Bartak and Craddock, ‘Observing energy rating stars through the Australian Consumer Law lens: How volume home builders’ advertising can fail consumers’.

⁶⁶ Ms Davina Rooney, *Transcript of evidence*, pp. 47-8.

	NatHERS	NABERS	VRES	BESS	Green Star
Scope	Houses (new and existing)	Apartment buildings, offices, shopping centres, data centres, hospitals	Houses (mostly existing)	Any development or addition (at planning permit stage)	Precincts, design and construction, fitouts, operational performance of buildings
Elements	Models expected indoor temperatures based on data specific to that dwelling. This includes information on design and construction, climate and common patterns of household use. The software tools do not take into account electrical appliances in the dwelling, apart from the air flow impacts from ceiling fans.	EnergyWater Waste Indoor Environment Carbon Neutral Certification	Breakdown of energy use and generation. Ratings on thermal performance. Ratings on heating, cooling, passive thermal, lighting and hot water	BESS assesses projects against a benchmark in nine environmental categories: <ul style="list-style-type: none"> • Management (construction and ongoing) • Energy • Indoor Environment Quality • Water • Stormwater • Urban Ecology • Transport • Waste • Innovation Some have minimum pass criteria	New buildings/ Operational Performance/ Interior Fitouts: <ul style="list-style-type: none"> • Management (construction and ongoing) • Indoor Environment Quality • Energy • Transport • Water • Materials • Land use and Ecology • Emissions • Innovation Precincts: <ul style="list-style-type: none"> • Governance • Liveability • Economic Prosperity • Environment • Innovation

Sources: Australian Government Department of Industry, Science, Energy and Resources, *Nationwide House Energy Rating Scheme: About*, 2019, <<https://www.nathers.gov.au/about>> accessed 28 April 2020; NSW Department of Planning, Industry and Environment, *NABERS: Your partner in building performance*, 2019, <<https://www.nabers.gov.au>> accessed 28 April 2020; Municipal Association of Victoria, *Built Environment Sustainability Scorecard: Tool notes*, 2020, <<https://bess.net.au/tool-notes>> accessed 28 April 2020; Green Building Council Australia, *Green Star: A Year in Focus: FY 2019 Annual Report*, 2019; Department of Environment, Land, Water and Planning, *Victorian Residential Efficiency Scorecard: Flash report: July 2019*, Government of Victoria, East Melbourne, 2019.

5.2.6 Disclosure of energy efficiency ratings

Energy efficiency assessments can promote better designed buildings and motivate building owners to undertake upgrades. Increased promotion of such assessments, or a requirement that building owners undertake them, could help to increase both the level of retrofitting and the adoption of better design by building owners. Many stakeholders called for mandatory disclosure of residential energy efficiency at the point of sale or lease, with some suggesting the use of VRES for such disclosure.⁶⁷ Although NABERS

⁶⁷ Hume City Council, *Submission 54*, received 23 August 2019, p. 2; Northern Alliance for Greenhouse Action, *Submission 118*, received 1 September 2019, p. 4; Ms Krista Milne, Director, Climate Change Action, City of Melbourne, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 53; City of Darebin, *Submission 124*, received 2 September 2019, p. 4; Moreland City Council, *Submission 116*, received 30 August 2019, p. 5; Victorian Planning Authority, *Submission 115*, p. 4.

Energy ratings are required to be disclosed for some commercial building types, there is no requirement for disclosure of any energy efficiency rating for residential buildings.

Energy efficient homes cost more to build but are cheaper to run and, under most circumstances, cost less over the long-term.⁶⁸ Ms Cambage discussed the challenge facing home buyers in trading off higher up-front costs against lower long-term costs:

It is the Australian dream, isn't it. Everybody wants to own a home, and if they can own a home and they can own it more cheaply, then that is goal met, and I think that is part of what has driven a lot of development that is simply cost based. We are not going to get away from that, but I think that there are probably some pieces of work that could and should be done around total life cost of that type of building. I think if people understood that they may have paid \$20 000 less than this but the life cycle [costs] of it is more and ultimately will cost you more to heat and cool and all of those sorts of things, then they are not up-front. So people do not understand up-front what is the life cycle of that building and also what is the cost life cycle of it. Is it going to be more expensive than one or another?⁶⁹

None of the energy rating systems reviewed in this section include an estimated operating cost for the home's energy, which makes it more difficult to provide a price signal to potential buyers or renters. Such an estimate could be integrated into an existing tool such as NatHERS or VRES. Any mandatory rating disclosure would need to be carefully phased in, to ensure sufficient supply of qualified or accredited assessors. The differences between new and existing dwellings also present challenges as new dwellings have no actual energy efficiency performance data. Some form of as-built certification may be required under a mandatory disclosure scheme. The Committee considers that a mandatory disclosure scheme requires further study to develop the most appropriate model for implementation.

RECOMMENDATION 34: That the Victorian Government investigate the feasibility, benefits and costs of a mandatory disclosure scheme for residential building energy efficiency to provide prospective buyers and tenants information on the energy efficiency of a dwelling. This investigation should include detailed consultation with industry and consider:

- a. whether disclosure should occur during a sale or lease, or both
- b. at what point in the process disclosure should occur
- c. what rating or information should be included on any certificate of disclosure
- d. the time period of validity of any certificate of disclosure
- e. how disclosure should operate for new homes, including for dwellings purchased off-the-plan.

⁶⁸ J. Morrissey and R.E. Horne, 'Life cycle cost implications of energy efficiency measures in new residential buildings', *Energy and Buildings*, vol. 43, no. 4, 2011.

⁶⁹ Ms Julia Cambage, *Transcript of evidence*, p. 66.

5.3 Retrofitting homes and businesses

Sustainability and energy efficiency rating systems are often used to help drive the retrofitting of homes and businesses to achieve greater energy efficiency. Many community groups, local governments and businesses are involved in retrofitting programs, which are often funded by the Victorian Government. Education and behaviour change programs, such as Pass the Parcel which was discussed in Section 3.1.2, can be a key enabler of retrofitting initiatives.

There is often substantial overlap in the type of programs that aim to install solar PV on building rooftops and those that seek to install energy efficiency upgrades. For example, bulk buy programs, such as those discussed in Chapter 4, are not restricted to the purchase of rooftop solar PV.⁷⁰ Totally Renewable Yackandandah has conducted bulk buy programs for highly efficient solar hot water systems and natural refrigerant (CO₂) heat pumps. Some of these efficiency upgrades have the added benefit of enabling better utilisation of the household's rooftop solar electricity during the middle of the day.⁷¹

5.3.1 Upgrades for low income and vulnerable households

Some organisations, such as the Brotherhood of St Laurence, have specific programs to assist low income households to upgrade their homes for energy efficiency.⁷² Victorian Government programs, such as the Latrobe Valley Home Energy Upgrade Program, are also targeted at low income households. The Latrobe Valley Home Energy Upgrade Program will provide energy efficiency upgrades to 1,000 households in the Latrobe City, Wellington and Baw Baw council areas. Importantly, this program is engaging local businesses to install upgrades which include the replacement of older appliances, building retrofits such as draught proofing, and the installation of solar panels or heat pump water heaters. In 2018–19, 560 households received upgrades.⁷³ Ms Ferres Miles, shared the experience of one of the participants in the Latrobe Valley Home Energy Upgrade Program with the Committee:

'Today was a great day. My heater, cooler, aircon and hot water services were installed, and to top it off the weather was cold but my home was warm for the first time in ages. George, my dog, and I had a dance around our lounge room and I even took off one of his coats. We were so happy. The tradesmen were just so lovely and very efficient. They even cleaned up my floor and garden bed after their work. This scheme will make such a difference in my winter life. I can even invite friends around knowing my home will be warm, which was impossible in the past. My health, social life, finances and outlook will be so improved and even my dear little mate George, who does not have much hair, will soon stop shivering. This is terrific.'⁷⁴

⁷⁰ Hepburn Shire Council, *Submission 119*, p. 5.

⁷¹ Totally Renewable Yackandandah, *Submission 138*, received 16 September 2019, p. 6.

⁷² Brotherhood of St Laurence, *Submission 142*, received 26 September 2019, pp. 1–2.

⁷³ Sustainability Victoria, *Submission 141*, Attachment A, received 26 September 2019, p. 20.

⁷⁴ Ms Claire Ferres Miles, *Transcript of evidence*, p. 25.

Another example is the Hume Heatwave Help program which has to date resulted in the retrofitting of 214 homes in the Hume City Council area for residents receiving home and community care. Evaluation of the program has revealed a 93% satisfaction rate and that 80% of residents felt they would be better able to manage in a heatwave.⁷⁵

Most discussion of energy efficiency retrofitting focuses on the cost savings that people can achieve on their electricity bills. However, retrofits that improve the capacity of a building to maintain a comfortable temperature can also have substantial benefits in terms of comfort, enjoyment and health. Homes that are too hot or too cold can seriously impact the health of residents, especially if they have certain chronic health conditions. The Healthy Homes program is a Victorian Government initiative which, in collaboration with the University of Technology Sydney and a small group of local governments, aims to quantify these benefits. Overall the project is targeting 1,000 homes, with 800 in the municipalities of Brimbank, Hobsons Bay, Maribyrnong, Melton and Wyndham and 200 in Campaspe, Strathbogie, Greater Shepparton and Moira local government areas. Residents with low incomes and complex healthcare needs are recruited through councils' home and community care units and provided with energy efficiency upgrades of up to \$3,500. The project uses a randomised controlled trial, considered the 'gold standard' of experimental evidence, to compare residents who receive the upgrades at different points over the three years of the program's implementation.⁷⁶ Greater Shepparton City Council welcomed the implementation of the program and noted its potential to assist some of its more vulnerable community members.⁷⁷

Mr Geoff Lodge, Chief Executive Officer, Goulburn Valley Community Energy, outlined the benefits of the program:

For a modest amount, in this case it is about \$4000 to \$4500, you can make a significant difference in retrofitting a house and making it a lot more comfortable. It is not hard to do. It is not rocket science. You do not need big budgets. We have been involved in other projects dealing with retrofits—keep the sun off the north-facing windows, seal up the houses, sort out the insulation in the roof. It can make a big difference with a small budget, and this particular program is getting some good science behind it and quantifying it, and in doing so not only monitoring what is happening in the house but what is happening to the people in the house.⁷⁸

According to Sustainability Victoria's submission, participants in the Healthy Homes program have reported high levels of satisfaction with their energy efficiency upgrades. The submission includes the following testimonials from participants:

I feel so lucky. I haven't been sick once this winter and I usually get sick 2–3 times a winter. (Householder and retrofit recipient)

⁷⁵ Hume City Council, *Submission 54*, p. 5.

⁷⁶ Western Alliance for Greenhouse Action, *Submission 143*, p. 10; Sustainability Victoria, *Submission 141*, Attachment A, p. 20.

⁷⁷ Ms Sharon Terry, Team Leader, Sustainability and Environment, Greater Shepparton City Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 10.

⁷⁸ Mr Geoff Lodge, Chief Executive Officer, GV Community Energy, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 31.

We know other people who could really benefit from this amazing program. You don't realize what a difference it makes until it's done. The difference is very significant. I hope it is made more widely available. Thank you very much. (Householder and retrofit recipient)⁷⁹

Sustainability Victoria suggested that this program could be scaled up to assist more households, depending on the research findings.⁸⁰

Several other groups are also providing targeted retrofitting assistance to low income residents with chronic health conditions. In 2019, Geelong Sustainability ran a program (in partnership with the City of Greater Geelong, CSIRO, Uniting Kildonan and ecoMaster) called 'Climate Safe Rooms', for which it received a \$300,000 grant through the Victorian Government's Climate Change Innovation Grants program. The program is aimed at assisting 20 low income households in the Geelong area to upgrade part of their home for greater comfort and energy efficiency. Starting with an assessment using the VRES, Geelong Sustainability worked with selected residents to identify the most appropriate room in their house and to then implement a range of energy efficiency upgrades. Upgrades include insulation, retrofitting of windows, installation of highly efficient reverse cycle air conditioners to provide heating and cooling and rooftop solar to offset the cost of heating and cooling.⁸¹ Mr Adams explained the status of the program as at November 2019 and the evaluation of the initiative, which was conducted in partnership with CSIRO:

We have done the assessments and we are just about ready to embark on the installation process. The CSIRO will then monitor their dwellings for the next 18 months and we will see how people's behaviour changes and make sure that people with health vulnerabilities are kept safe in extreme weather events—either hot or cold.⁸²

Together with the evaluation results from the Healthy Homes program and other similar programs, the results from the Climate Safe Rooms initiative may help to improve the design of retrofitting assistance programs for low income households with chronic health needs. The early results of these programs are promising and some stakeholders have called for further discounted or free VRES assessments to be provided to vulnerable and low income residents and for this to be followed up with assistance to implement retrofitting recommendations.⁸³ Mr Barfoot suggested that collaboration between the operators of energy efficiency programs and electricity retailers could result in improved outcomes for people experiencing bill stress:

We believe that an energy efficiency program, run in conjunction with those companies, at the very least will help those people reduce the amount of credit that they are building up, or potentially put them in a position where they can actually start to repay.

⁷⁹ Sustainability Victoria, *Submission 141*, Attachment A, p. 20.

⁸⁰ Ibid.

⁸¹ Geelong Sustainability, *Submission 107*, p. 5; Mr Tim Adams, *Transcript of evidence*, p. 24.

⁸² Mr Tim Adams, *Transcript of evidence*, p. 24.

⁸³ Frankston City Council, *Submission 89*, received 26 August 2019, p. 3; Victorian Council of Social Service (VCOSS), *Submission 88*, p. 7; Hume City Council, *Submission 54*, p. 2; Gippsland Climate Change Network, *Submission 33*, received 19 August 2019, p. 3.

So we see there is a substantial potential there to work with the energy providers to provide some basic energy efficiency advice.⁸⁴

As the Brotherhood of St Laurence noted in its submission, home energy efficiency upgrades ‘to date have been commendable but do not come close to meeting the level of need’.⁸⁵

FINDING 17: Home energy efficiency upgrade programs have health, comfort and wellbeing benefits in addition to lowering the cost of energy bills and reducing carbon dioxide emissions.

RECOMMENDATION 35: That the Victorian Government significantly increase the scale of programs to upgrade the energy efficiency of the homes of low income Victorians.

5.3.2 Upgrades for business

As noted by a number of stakeholders, many businesses are leading the way in undertaking energy efficiency upgrades of their premises.⁸⁶

The Victorian Government also provides energy efficiency upgrade support to businesses. For example, the Better Commercial Buildings program provides commercial building owners with matched funding to improve the energy efficiency performance of their buildings. The program aims to assist the owners of 50 buildings to undertake energy audits and upgrades with the aim of improving their average NABERS rating by one star. Sustainability Victoria anticipates that the \$1.4 million invested by the Victorian Government will leverage \$13 million of private sector investment. Under the program’s predecessor, the commercial buildings that achieved a one-star NABERS improvement saw a 29% reduction in energy consumption and a payback period on the upgrade of three years.⁸⁷

5.3.3 Minimum standards for rental and public housing

Many stakeholders involved in the current inquiry called for minimum energy efficiency or sustainability standards for rental and public housing.⁸⁸ Ms Fran Macdonald, Executive Officer, Western Alliance for Greenhouse Action (WAGA), stated that

⁸⁴ Mr Chris Barfoot, *Transcript of evidence*, p. 7.

⁸⁵ Brotherhood of St Laurence, *Submission 142*, p. 3.

⁸⁶ City of Darebin, *Submission 124*, p. 2; Mornington Peninsula Council, *Submission 121*, p. 2; Sustainability Victoria, *Submission 141*, pp. 11, 22.

⁸⁷ Sustainability Victoria, *Submission 141*, Attachment A, p. 23.

⁸⁸ For example: Western Alliance for Greenhouse Action, *Submission 143*, p. 23; Brotherhood of St Laurence, *Submission 142*, p. 3; Moreland City Council, *Submission 116*, p. 5; Victorian Council of Social Service (VCOSS), *Submission 88*, p. 7; Eastern Melbourne Climate Alliance Inc, *Submission 61*, received 25 August 2019, p. 3; Women’s Climate Justice Collective (Vic), *Submission 153*, received 30 January 2020, p. 7.

proposed regulations under the *Residential Tenancies Act 1997* to establish minimum standards for rental dwellings did not address energy efficiency:

At the moment draft regulations are out, released in November [2019] under the *Residential Tenancies Act*, and those draft regulations do not address energy efficiency at all. I see that as a missed opportunity, so we would like to see that—that is particularly urgent.⁸⁹

These concerns were echoed by Ms Emma King, Chief Executive Officer, Victorian Council of Social Service (VCOSS):

We have been really heartened to see minimum standards coming in for the first time for the private rental market, but we would love to see some really clear recommendations and some clear outcomes when it comes to energy efficiency, because it genuinely will change people's lives. It seems like a nonsense now when we talk about the minimum standards to think that it was not required before to have a toilet that worked or a door that locked, so we have got some key fundamental things in place. But we have not gone far enough when it comes [to] energy efficiency. So if you are looking at basic things like insulation, if we are looking at fixed heating and cooling and those sorts of things, they make a huge difference.

...

[T]he reality is if an owner can afford to have an investment property they can afford to make it energy efficient. It is pretty straightforward. I think if they are deriving income in that way, there is no excuse for not putting that in place.⁹⁰

Section 52 of the *Residential Tenancies Amendment Act 2018* provided for new rental minimum standards to come into effect by 1 July 2020, which was subsequently delayed to 1 January 2021 by s 50 of the *COVID-19 Omnibus (Emergency Measures) Act 2020*. Draft standards circulated for consultation would require the installation of energy efficient heaters over time but make no provision for other energy efficiency measures—at September 2020 the final regulations including the new standards have not been made available. The Regulatory Impact Statement predicts that many of the energy efficient heaters installed will be reverse cycle air conditioners, thus also providing renters with an energy efficient cooling option.⁹¹ Many stakeholders mentioned that people will opt not to run energy intensive appliances if they believe the cost to be high.⁹² If a house is inefficient at maintaining a comfortable temperature, the health and comfort benefits of having energy efficient heating and cooling available are unlikely to be realised.

⁸⁹ Ms Fran Macdonald, Executive Officer, Western Alliance for Greenhouse Action, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 9.

⁹⁰ Ms Emma King, Chief Executive Officer, Victorian Council of Social Service, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 30.

⁹¹ Regulatory Impact Solutions, *Regulatory Impact Statement: Residential Tenancies Regulations 2020*, 2019, pp. 45–67.

⁹² For example: Ms Emma King, *Transcript of evidence*, p. 30; Ms Joanne Brown, Manager Health and Wellbeing, Southern Grampians Glenelg Primary Care Partnership, public hearing, Warrnambool, 21 November 2019, *Transcript of evidence*, p. 24.

There are two key types of minimum standards, prescriptive standards and performance-based standards, both of which are present in the Building Code of Australia. A prescriptive standard tells owners what measures need to be installed, such as insulation or water saving shower heads. A performance-based standard states how well the building needs to perform, such as meeting a particular NatHERS star rating, but leaves it up to the owner to determine what measures to adopt to achieve that standard. Performance-based standards may be particularly attractive to the owners of existing rental dwellings as the most effective upgrades in terms of cost and energy savings vary for different dwellings. Cr McCubbin explained that the cost-effectiveness of different energy efficiency upgrades or interventions is highly dependent on individual circumstances:

It depends very much on the individual in the house. I mean, you went into some houses and discovered that they were running their appliances at the wrong time and that they thought the air conditioning system—you know, the split-level systems—was inefficient, so they had their gas burner on, but it turned out that the gas burner was costing them more money than the split system. It very much depends on the house.⁹³

Environment Victoria recommended the adoption of minimum prescriptive standards, targeted at the very lowest quality housing, before moving to a performance-based approach phased in over time. Environment Victoria recommended an eventual goal of a minimum five-star equivalent NatHERS standard and suggested that a performance-based standard could be based on the VRES.⁹⁴ However, with the current number of assessors—as discussed in Section 5.2.5—such an approach would need careful phasing to ensure that a sufficient number of qualified assessors could be trained and accredited.

Any minimum standard introduced for private rental dwellings should apply to public and social housing as well. Ms Bridget Tehan, Policy Adviser, VCOSS, provided the Committee with an example of the consequences of energy inefficient public housing:

Yes, so stories of people actually dragging mattresses out to the local park in order to be able to sleep at night but then not actually getting to sleep because of being alert for safety reasons, children not sleeping well and then not going to school and so forth—increased alcohol use, increased family violence and so on. So you get all these flow-on effects of simply having a hot house.⁹⁵

A range of organisations have documented the impacts of heatwaves and hot weather on people who live in public housing in Victoria, including health impacts, reduced sleep, sleeping outdoors, and concerns about family violence and other crime.⁹⁶ Even if

⁹³ Cr Darren McCubbin, *Transcript of evidence*, p. 4.

⁹⁴ Anne Martinelli, *Bringing Rental Homes up to Scratch: Efficiency standards to cut energy bills, reduce pollution and create jobs*, Environment Victoria, Carlton, Victoria, 2017, pp. 11–17.

⁹⁵ Ms Bridget Tehan, Policy Adviser, Victorian Council of Social Service, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 31.

⁹⁶ J. Lander, et al., *Extreme heat driven by the climate emergency: impacts on the health and wellbeing of public housing tenants in Mildura, Victoria*, report for Mallee Family Care, 2019; Henrietta Cook, 'Airconditioning plea for public housing tenants', *The Age*, 9 February 2014, <<https://www.theage.com.au/national/victoria/airconditioning-plea-for-public-housing-tenants-20140208-328ul.html>> accessed 16 July 2020; Victorian Council of Social Service (VCOSS), *Submission 88*, p. 2.

low income households, including those living in public housing, have air conditioning, many are reluctant to use it due to cost.⁹⁷ Researchers have also demonstrated the serious impacts of heatwaves on human health.⁹⁸

RECOMMENDATION 36: That the Victorian Government investigate minimum energy efficiency standards for public and private rental dwellings. This should include consultation with tenancy and property owners' associations and industry. Any new standards should be implemented for public housing well in advance of their introduction to the private market.

A number of stakeholders called for government investment to improve the energy performance and thermal comfort of public housing, to meet and exceed any new standards, and to install rooftop solar PV where appropriate.⁹⁹ Ms Ferres Miles explained that upgrading the energy efficiency of Victoria's public housing portfolio represents a large opportunity to reduce tenants' running costs:

It is somewhat shocking that our most vulnerable members of our community are living in probably some of the poorest quality houses that we have. They are in a cycle of, 'Yes, you can put in an air conditioner and, yes, you can put in a heater', but actually when you live in a glorified tent, there is a huge cost to run those facilities, and they are the least able to afford the running costs. I think that is a big opportunity.¹⁰⁰

Upgrading the energy efficiency of public and social housing prior to the commencement of new standards could bring forward these benefits and help develop the retrofitting industry in Victoria. The connection between standards and the development of industry skills, products and supply chains is discussed in Chapter 6 in the context of new dwellings. Government investment in upgrading public housing would ensure that the retrofitting industry has appropriate skills and capacity before the commencement of new standards for private rental dwellings. Chapter 4 discussed the benefits of installing rooftop solar on social housing. Retrofitting of public and social housing could consider the installation of rooftop solar where appropriate, which may provide cost benefits through integration into the same projects as efficiency upgrades. This is possible even in apartment dwellings with new solar sharing systems, such as the Victorian product SolShare.¹⁰¹

RECOMMENDATION 37: That the Victorian Government strongly consider the installation of rooftop solar PV when retrofitting public housing dwellings.

⁹⁷ Larissa Nicholls, et al., *Heatwaves, Homes & Health: Why household vulnerability to extreme heat is an electricity policy issue*, Centre for Urban Research, RMIT University, 2017.

⁹⁸ Peng Bi, et al., 'The Effects of Extreme Heat on Human Mortality and Morbidity in Australia: Implications for Public Health', *Asia Pacific Journal of Public Health*, vol. 23, no. 2_suppl, 2011; Women's Health East, *Women and Climate Change*, Doncaster East, 2018.

⁹⁹ City of Darebin, *Submission 124*, p. 4; Northern Alliance for Greenhouse Action, *Submission 118*, p. 4; City of Port Phillip, *Submission 93*, received 26 August 2019, p. 4.

¹⁰⁰ Ms Claire Ferres Miles, *Transcript of evidence*, p. 29.

¹⁰¹ Allume Energy Australia, *Solar for apartments is possible*, 2020, <<https://allumeenergy.com.au/apartment>> accessed 6 May 2020.

5.4 Recommendations to support existing dwellings—a summary

This chapter contains substantial discussion and a number of recommendations intended to improve the energy efficiency of existing dwellings in Victoria. These recommendations are intended to work in concert to address the broad range of dwelling tenures across Victoria:

- Public housing—Recommendations 36 and 37 are aimed at uplifting the standards for public housing and require the retrofit of low energy efficiency dwellings and the installation, where appropriate, of rooftop solar PV.
- Private rental housing—Recommendations 34 and 36 are aimed at investigating minimum energy efficiency standards for private rental dwellings and the establishment of an energy efficiency disclosure scheme so tenants understand the energy efficiency of a dwelling prior to agreeing to a lease.
- Owner occupied housing—Recommendations 32 and 33 are aimed at encouraging homeowners to undertake an assessment using the Victorian Residential Efficiency Scorecard. The VRES process results in recommendations for energy efficiency retrofits and many individuals receiving the assessments go on to upgrade their homes. To further motivate upgrades, Recommendation 34 is aimed at providing information on energy efficiency to potential buyers prior to sale. Recommendation 35 is aimed at providing targeted support for low income homeowners to retrofit their dwellings.

6 Local government

Local governments have critical responsibilities in addressing climate change under the *Local Government Act 2020* and a long history of responding to community concerns on climate change (discussed in Chapter 2). This chapter explores a range of areas where local government plays a key role in tackling climate change. These include strategic planning, grant-making to the community, the construction and operation of local infrastructure, land-use planning and development, waste management and transport. Local government contributes to other actions to address climate change alongside community groups, for example, in the installation of rooftop solar or education initiatives, and these contributions are discussed in other chapters.

6.1 Local government strategic planning

As the level of government closest to communities, councils undertake a broad range of strategic planning activities to coordinate their service delivery and work with communities to achieve their goals. Many local governments now include climate change in their strategic planning and have developed, or are developing, specific plans and strategies aimed at climate change mitigation and adaptation. These councils are also including goals related to emissions reduction and climate change adaptation in their Council Plans.¹

Most of the councils that made submissions to the Inquiry now prepare separate emissions reduction and climate change adaptation plans, along with a range of other plans and strategies focused on related activities such as renewable energy, urban forestry, transport and integrated water management.² For example, Ms Michaela Skett, Environmentally Sustainable Development Unit Manager, City of Moreland, explained the council's integrated transport strategy and how it will contribute to a range of objectives, including emissions reduction:

We have got a highly urbanised context and a strongly growing population, and we just cannot maintain city liveability and amenity if that growing population brings with them the current levels of private car ownership into the city. As well as seeking to make the city more cycling and walking friendly, we are changing the way parking is provided and managed in our three key activity centres. Key measures include the introduction of new parking restrictions and the proposed removal, through a planning scheme amendment, of the minimum parking rates required in new developments within the activity centres. This approach is backed by world's best practice about what works to enable transport

1 For example: Manningham City Council, *Submission 39*, received 21 August 2019, p. 1; Ms Allison McCallum, Environmental Project Officer, Conservation, Campaspe Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 6; Cr Tony Herbert, Mayor, Warrnambool City Council, public hearing, Warrnambool, 21 November 2019, *Transcript of evidence*, p. 2.

2 For example: City of Ballarat, *Submission 78*, received 26 August 2019, pp. 1-5; Hume City Council, *Submission 54*, received 23 August 2019, p. 2; City of Kingston, *Submission 20*, received 1 August 2019, pp. 1-2.

mode shift to more sustainable forms of transport, but it is somewhat controversial and challenging to implement with the local community.³

Surf Coast Shire Council is one of a number of local governments that have linked their environmental strategy to a broader international framework:

Since 2016, Council's environmental actions and response to climate change have been framed under the Towards Environmental Leadership (TEL) Program ...

The TEL Program is guided by the internationally recognised One Planet Living (OPL) framework. The OPL framework uses a set of 10 principles, based on ecological and carbon foot printing, to guide living within the limits of the planet. In this way, the OPL framework is aligned with the responses called for by climate emergency advocates, who seek for acknowledgement that urgent action is required to stop living beyond the climate's limit.⁴

The integration of state, national and international goals is challenging for local governments when they lack clear guidance and direction. Many stakeholders called for further clarification of the roles, responsibilities and expectations of local government related to climate change to assist them in defining the strategic direction and scope of their climate change plans and strategies.⁵ The *Local Government Act 2020* established new overarching government principles,⁶ including that:

- b. priority is to be given to achieving the best outcomes for the municipal community, including future generations
- c. the economic, social and environmental sustainability of the municipal district, including mitigation and planning for climate change risks, is to be promoted.⁷

By explicitly mentioning climate change, these new sections may provide better strategic direction for councils in their strategic planning and service delivery.

Councils have also requested the release of the final reports and data from three relevant projects conducted by the Department of Environment, Land, Water and Planning (DELWP) with extensive local government consultation, which should further assist in clarifying the roles and responsibilities of local government. These are: the *Local Government Climate Change Adaptation Roles and Responsibilities*, the *Climate Change Adaptation Governance Assessment of Victorian Local Government*, and a review of the planning and building systems for their management of natural hazards in light of climate change.⁸

³ Ms Michaela Skett, Environmentally Sustainable Development Unit Manager, City of Moreland, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 20.

⁴ Surf Coast Shire Council, *Submission 86*, received 26 August 2019, attachment, p. 5.

⁵ Centre for Urban Research, Climate Change Transformations (CCT) Research Group, *Submission 135*, received 11 September 2019, p. 7; City of Ballarat, *Submission 78*, p. 3; Ms Fran Macdonald, Executive Officer, Western Alliance for Greenhouse Action, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, pp. 8–9.

⁶ The first tranche of reforms in the new Act commenced on 6 April 2020; several other transitional stages will occur during 2020 and up until 1 July 2021.

⁷ *Local Government Act 2020* (Vic). s 9(2).

⁸ Western Alliance for Greenhouse Action, *Submission 143*, received 27 September 2019, p. 20; Goulburn Broken Greenhouse Alliance, *Submission 140*, received 25 September 2019, p. 9.

RECOMMENDATION 38: That the Department of Environment, Land, Water and Planning expedite the release of the findings and data from reviews that address local government roles and responsibilities related to climate change.

6.1.1 Challenges for local government delivery of government grants

Like other organisations—which are discussed in Chapter 10—many local governments access Victorian Government grants to deliver climate mitigation and adaptation projects. However, less well-resourced rural councils can find the delivery of projects funded by grants to be challenging. Issues raised by councils included: the short time frame in which to achieve outcomes; the frequent bar on the use of grant funds to hire staff; community expectations of ongoing program delivery; the need to start projects rapidly after the announcement of a successful grant; and challenges in budgeting co-contributions when announcements are delayed.⁹ Mr Vito Albicini, Director of Assets and Development, Murrindindi Shire Council, suggested

a staged approach where you have got a year where you can actually ask for grants that maybe you want in two years time so you can plan for it properly. Like a two-tier process where your first tier is will you be potentially successful with the grant? Yes, then you can put the effort into planning to make it so it is applicable, or no, you are not.¹⁰

Other local governments have recommended that phased funding should be considered for certain types of hazard mitigation infrastructure, along with a guarantee that later phases of funding will be forthcoming. Mr Robert Gibson, Manager of Environment and Regulatory Services, Moyne Shire Council, proposed a planned state-wide approach to investment in coastal protection infrastructure. Mr Gibson said that knowing who is getting what funding at what time would enable council to better plan the construction of such infrastructure:

We can work with that, because we know we just have to do some maintenance or whatever to hold the fort until the proper solution comes along in due course. That level of certainty and, I suppose, ability to plan it out not just spatially but temporally—space and time—just helps everyone. You are not left wondering, ‘How are we going to deal with this?’ and ‘When’s our number going to come up to get the money, if it ever does?’¹¹

⁹ Ms Amanda Priest, Coordinator, Environmental Sustainability, Murrindindi Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, pp. 20, 5; Mr Vito Albicini, Director, Assets and Development, Murrindindi Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 25; South East Councils Climate Change Alliance, *Submission 136*, received 12 September 2019, p. 5.

¹⁰ Mr Vito Albicini, *Transcript of evidence*, p. 25.

¹¹ Mr Robert Gibson, Manager Environment and Regulatory Services, Moyne Shire Council, public hearing, Warrnambool, 21 November 2019, *Transcript of evidence*, p. 13.

This concept of strategic phased funding was supported by East Gippsland Shire Council, which also has substantial need for upgraded coastal protection infrastructure.¹² Two of the Greenhouse Alliances also supported a planned long-term approach to funding and called for greater attention to be paid towards local and regional priorities in assigning funding and prioritising projects.¹³ The Committee considers that there is a role for the Victorian Government in the funding of significant hazard mitigation infrastructure, for example, coastal protection infrastructure—due to the expense and time required to construct this infrastructure. This funding should be phased to ensure adequate delivery through the life of a construction project. DELWP would likely need to work with local government organisations to identify and prioritise these significant projects and determine the overall amount of funding required.

RECOMMENDATION 39: That the Victorian Government consider the establishment of a long-term infrastructure fund to support local organisations in mitigating the consequences of climate change on public infrastructure, especially infrastructure that mitigates climate change-related hazards.

6.2 Finance by local governments for community climate action

Local governments facilitate the provision of financial support for community climate action to the broader community through two key mechanisms: direct grants to community organisations and Environmental Upgrade Finance.

6.2.1 Grant-making by local governments for community climate action

Some local governments have provided small grants to local community groups for sustainability, emissions reduction and climate adaptation. For example, Greater Shepparton City Council provides grants of up to \$2,000 to community groups to reduce their greenhouse gas emissions and energy bills.¹⁴ East Gippsland Shire Council accepts proposals that focus on sustainability and energy efficiency within its community grants program.¹⁵ Banyule City Council has recently increased funding to a range of initiatives under its Banyule Environmental Grants Program focused on youth, training, workshops, and home and business energy audits.¹⁶ Local government grant-making also extends to providing ongoing funding and support for local organisations, such as the City of Port Phillip providing annual funding to support

¹² East Gippsland Shire Council, *Submission 144*, received 30 September 2019, p. 17.

¹³ Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, received 19 August 2019, p. 4; Central Victorian Greenhouse Alliance, *Submission 113*, received 29 August 2019, p. 8.

¹⁴ Ms Sharon Terry, Team Leader, Sustainability and Environment, Greater Shepparton City Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 9.

¹⁵ East Gippsland Shire Council, *Submission 144*, p. 6.

¹⁶ Banyule City Council, *Submission 109*, received 27 August 2019, p. 1.

the operation of the Port Phillip EcoCentre.¹⁷ Other assistance provided by local governments includes the provision of meeting venues, the auspicing of unincorporated groups for state government grants, and the provision of networking opportunities.¹⁸

6.2.2 Environmental Upgrade Finance

Many local councils facilitate the offer of Environmental Upgrade Finance to businesses in their areas for the installation of solar panels and energy efficiency upgrades.¹⁹ Environmental Upgrade Finance enables a business to take out a loan for the installation of solar panels and energy efficiency upgrades and pay it back through their council rates. As at September 2019, Environmental Upgrade Finance was being offered by 34 councils and 71 projects worth \$30 million had been implemented as a result.²⁰ Mr Jay Smith, Environmental Sustainability Coordinator, Mildura Rural City Council, explained how it works:

Environmental upgrade finance involves a three-way agreement between the property owner, council and lender, called an environmental upgrade agreement. It provides an incentive for building owners to upgrade their infrastructure and improve the value of their property. The key features of environmental upgrade finance that make it different to traditional finance include fixed interest, quarterly repayments made via a local council charge and up to 100 per cent project finance, including hard and soft costs. Loan terms can extend from five to 20 years to maximise business cashflow. Loans are tied to the building, not the business owner, making them easily transferable if the building is sold, and landlords can split repayments with tenants, with both parties benefiting from the upgrade.²¹

The largest project funded through Environmental Upgrade Finance in Victoria to date is a 393 kW solar system with a 150 kW Tesla battery, installed on Booth Transport's depot in Moira Shire. The installation has reduced Booth Transport's energy bills by 40%.²²

Another example of a Victorian local council that has offered Environmental Upgrade Finance is the Mornington Peninsula Shire Council. Seven local businesses have taken out loans using Environmental Upgrade Finance to install 849 kW of solar panels on their facilities since January 2017.²³

Section 363 of the *Local Government Act 2020* extends Environmental Upgrade Finance to all buildings, further enabling local governments to offer this type of finance to residential properties.

¹⁷ City of Port Phillip, *Submission 93*, received 26 August 2019, p. 2.

¹⁸ Goulburn Broken Greenhouse Alliance, *Submission 140*, p. 4.

¹⁹ For example: Central Victorian Greenhouse Alliance, *Submission 113*, p. 5; Western Alliance for Greenhouse Action, *Submission 143*, p. 9; City of Kingston, *Submission 20*, p. 2; Greater Shepparton City Council, *Submission 108*, received 27 August 2019, p. 2.

²⁰ Sustainability Victoria, *Submission 141*, Attachment A, received 26 September 2019, p. 23.

²¹ Mr Jay Smith, Environmental Sustainability Coordinator, Mildura Rural City Council, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 3.

²² Cr Marie Martin, Moira Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 4.

²³ Mornington Peninsula Shire, *Submission 121*, received 2 September 2019, p. 3.

FINDING 18: Environmental Upgrade Finance is a highly effective financing mechanism for energy efficiency upgrades and the installation of rooftop solar PV. Expansion of Environmental Upgrade Finance across all local government areas in Victoria would enable more businesses and homeowners to access this form of capital for enhancing energy efficiency and rooftop solar.

RECOMMENDATION 40: That the Department of Environment, Land, Water and Planning consult with local governments that do not offer Environmental Upgrade Finance to understand the barriers to its broader adoption and introduce reforms to expand it across all local government areas.

6.3 Local government community infrastructure

Local governments construct and operate substantial assets and infrastructure in their communities. There are opportunities for the retrofit of existing assets or development of new assets that are more environmentally sustainable from the perspective of energy and water use. These assets are also vulnerable to climate change impacts, including reduced rainfall and extreme weather events. This section explores activities by local governments to upgrade infrastructure to be more energy and water efficient, and measures to improve the resilience of local infrastructure to extreme weather events and sea level rise.

6.3.1 Energy efficient community infrastructure

Many Victorian local governments are increasingly active and innovative in working to reduce their energy usage, both to save operating costs and to reduce emissions. This action is also resulting in more energy efficient and sustainable infrastructure in local communities. Councils have adopted and utilised a range of policies and programs to help drive their energy efficiency.

Most local governments now routinely audit the energy efficiency of their built infrastructure, including leisure and sporting centres, community halls, and maternal and child health care centres, and implement the findings of these audits. Councils now often upgrade the energy efficiency of their facilities when also installing rooftop solar PV (discussed in Chapter 4).²⁴ For example, the City of Wodonga has an annual energy efficiency program that allocates funds to improving the efficiency of council buildings. The City of Wodonga submission outlines some of the upgrades that have been made and how they have integrated education initiatives into the program:

This program has put PV solar panels on several buildings, installed/replaced to LED lights, installed motion sensors, variable speed drives, provided energy meter readers

²⁴ For example: Northern Alliance for Greenhouse Action, *Submission 118*, received 1 September 2019, p. 2; Cr Darren Howe, Deputy Mayor, Latrobe City Council, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 12; Western Alliance for Greenhouse Action, *Submission 143*, p. 15.

available to the public to measure their home appliances energy use and run energy efficiency workshops for staff and community to assist people with reading energy accounts and discover ways to reduce their energy use.²⁵

Some energy efficiency improvements can be implemented through a council's general program of asset management, leading to incremental improvements as older and less efficient items are replaced. Ms Allison McCallum, Environmental Project Officer, Conservation, Campaspe Shire Council, explained the types of upgrades that have been examined by the council:

We also look at opportunities to improve energy and water efficiency, and a big part of that is just our general maintenance and repairs program. A lot can be achieved by, rather than just replacing one light with the next light, choosing more efficient lights and looking at water pumps, our heating and cooling systems, variable speed pumps and even whitegoods—because across the resources of councils, whether you are looking at offices or childcare centres, there are a lot of whitegoods. Even programs that improve their efficiency, whether it be water and energy, can make a big difference.²⁶

Local governments are also approaching the private sector for assistance in improving their energy efficiency. Cr Josh Fergeus, Executive Committee Chair, Eastern Alliance for Greenhouse Action, outlined the Energy Performance Contracting (or EPC) program that the City of Monash has in place:

[T]o look at a series of buildings, for example, to look at every opportunity for reducing consumption, increasing generation, and if there are generation opportunities, replacing plant and equipment—upgrades, those sorts of things—so you can realise a guaranteed amount of energy saving. ... The City of Monash and the City of Whitehorse are working together looking at how we can do that together to again scale up that capacity, because between us we have more buildings, we have more usage, and so it becomes a more attractive proposition for the private sector.²⁷

Councils are increasingly seeking to construct and develop new facilities as best-practice exemplars of energy efficiency and sustainable design.²⁸ For example, Ms Krista Milne, Director of Climate Change Action, City of Melbourne, described how the organisation is leading the city in the development of Green Star accredited buildings—a rating scheme that is further discussed in Chapter 5:

We have also built Council House 2, which was Australia's first 6-star Green Star building, and that was built as a test lab for innovative technologies and both how you manage buildings with environmental credentials and show that it is commercially viable. That set in train Melbourne being a leader in Green Star buildings.²⁹

²⁵ City of Wodonga, *Submission 83*, received 26 August 2019, p. 2.

²⁶ Ms Allison McCallum, *Transcript of evidence*, p. 6.

²⁷ Cr Josh Fergeus, Executive Committee Chair, Eastern Alliance for Greenhouse Action, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 60.

²⁸ For example: Ms Fran Macdonald, *Transcript of evidence*, pp. 4–5; Mr Bernie O'Sullivan, Director, Strategy and Growth, City of Greater Bendigo, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 3.

²⁹ Ms Krista Milne, Director, Climate Change Action, City of Melbourne, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 50.

To help ensure their newly constructed facilities are best-practice, councils have developed environmentally sustainable design and development policies for their own building projects and facilities.³⁰ One example of the support for this work that is provided by the Greenhouse Alliances is the environmentally sustainable development matrix developed by the South East Councils Climate Change Alliance (SECCCA). Ms Dominique La Fontaine, Executive Officer, SECCA, explained the purpose of the project:

This project helps council project managers to easily include sustainability in design briefs so that buildings and structures can be resilient to climate change and also cheaper to operate. We are also developing an environmentally sustainable development policy template, so that is helping councils that may be using the tool to develop a consistent vision and foundation for environmentally sustainable design buildings and structures within their councils.³¹

Local Government Energy Saver Program

Sustainability Victoria's Local Government Energy Saver Program, which ran from July 2017 to June 2020, provided targeted support to 22 resource-constrained councils across regional Victoria. This three-stage funding enabled councils to map their corporate emissions profile, conduct energy audits on their most energy intensive sites, and complete energy and efficiency upgrades to improve comfort and efficiency. The program has delivered 189 energy audits and contributed funding to the upgrade of 172 council-owned buildings. As a result, these councils were expected to save \$700,000 per year in energy costs, install 1MW of rooftop solar PV and reduce emissions by 3,000 tonnes of CO₂ annually.³²

Ms Larissa Montgomery, Environmental Sustainability Coordinator, Benalla Rural City Council, outlined the achievements of the council as a result of the funding provided under the Local Government Energy Saver Program:

The first stream allowed us to do a greenhouse reduction plan and inventory. The second stream allowed us to move forward with some of the recommendations of that reduction plan, and we had detailed building energy audits undertaken. Stream three provided for one-to-one matched funding of up to \$100 000 to actually implement some of the recommendations of the building energy audits.

So through that program we have undertaken LED lighting upgrades to our art gallery, town hall, senior citizens centre and library. We have done some smaller things, like window film and air conditioning upgrades. We have installed a 27-kilowatt solar system on the senior [citizens], and as we speak there is a 60-kilowatt solar system going in on

³⁰ For example: Ms Melissa Burrage, Manager, Climate Change, Energy and Water, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 20; Western Alliance for Greenhouse Action, *Submission 143*, p. 19; Moreland City Council, *Submission 116*, received 30 August 2019, p. 2; Frankston City Council, *Submission 89*, received 26 August 2019, p. 3; Bass Coast Shire Council, *Submission 36*, received 21 August 2019, p. 3.

³¹ Ms Dominique La Fontaine, Executive Officer, South East Councils Climate Change Alliance, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, pp. 25–6.

³² Sustainability Victoria, *Submission 141*, Attachment A, pp. 17–18.

the library. Overall this is expected to result in annual electricity cost savings of around \$55 000 and a reduction in greenhouse gas emissions of about 250 tonnes.³³

Ms Amanda Priest, Coordinator of Environmental Sustainability, Murrindindi Shire Council, praised the administrative simplicity of the Local Government Energy Saver Program:

[The Local Government Energy Saver Program is] a good example of something that was a relatively simple, easy process to go through, and the reporting requirements are not too resource intensive. So that is a good example of a grant that I think has worked quite well.³⁴

Sustainability Victoria suggested that this program could be scaled up to assist all councils in Victoria with the introduction of concessional finance for capital upgrades replacing matched grant funding.³⁵

RECOMMENDATION 41: That the Victorian Government resume Sustainability Victoria's Local Government Energy Saver Program to provide targeted support to resource-constrained councils across regional Victoria and consider extending the program to a larger number of councils.

6.3.2 Energy efficient street lighting

A large portion of local government electricity expenditure is for street lighting, with metropolitan councils spending approximately \$1–1.5 million on electricity and 40% of that going towards public lighting.³⁶ Many Victorian local governments have upgraded their streetlights from energy inefficient models to LEDs, either independently or as part of a program led by the Greenhouse Alliances.³⁷

One of these programs was Lighting the Regions, led by the Wimmera Mallee Sustainability Alliance and the Central Victorian Greenhouse Alliance.³⁸ The Wimmera Mallee Sustainability Alliance described the program in its submission:

[Lighting the Regions has] resulted in replacing street lights with LED globes across most of the western half of Victoria. This saves those Councils at least \$1M/yr and reduces energy use and greenhouse gas production. This program has since been taken up by Melbourne and other Councils ...³⁹

³³ Ms Larissa Montgomery, Environmental Sustainability Coordinator, Benalla Rural City Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 17.

³⁴ Ms Amanda Priest, *Transcript of evidence*, p. 25.

³⁵ Sustainability Victoria, *Submission 141*, Attachment A, p. 18.

³⁶ Mr Scott McKenry, Executive Officer, Eastern Alliance for Greenhouse Action, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 60.

³⁷ For example: City of Kingston, *Submission 20*, p. 1; Bass Coast Shire Council, *Submission 36*, p. 3; Gannawarra Shire Council, *Submission 45*, received 22 August 2019, p. 2; Swan Hill Rural City Council, *Submission 160*, received 10 March 2020, p. 1; Mr Jay Smith, *Transcript of evidence*, p. 3.

³⁸ Mr Gil Hopkins, Acting Executive Officer, Wimmera Mallee Sustainability Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 22.

³⁹ Wimmera Mallee Sustainability Alliance, *Submission 66*, received 26 August 2019, p. 1.

Between 2012 and 2016 Lighting the Regions replaced over 22,600 old mercury vapour streetlights with efficient LED models, providing energy savings of up to 77% and in some cases brighter lighting. The Central Victorian Greenhouse Alliance estimated that over the project's life it will eliminate emissions of 180,000 tonnes of CO₂ and save the participating councils \$57 million in operating and energy expenditure.⁴⁰

Another lighting upgrade project, Watts Working Better, led by the Goulburn Broken Greenhouse Alliance, upgraded 13,600 residential streetlights in 11 councils in northeast Victoria.⁴¹ Ms Bronwyn Chapman, Executive Officer, Goulburn Broken Greenhouse Alliance, listed the program's outcomes:

The councils reduced their streetlighting power by 33 per cent and saved the equivalent of 51 000 cars off the road—this was referred to yesterday. It had a five to six-year payback on paper, but the councils got a better payback because we had got some funding to reduce that payback period.⁴²

Mr Scott McKenry, Executive Officer, Eastern Alliance for Greenhouse Action, discussed the scale of the lighting replacement programs over the previous ten years:

Victorian councils can claim the second largest public lighting energy efficiency program in the world after New York state, and I think that is testament to councils' ability to work in groups and work collaboratively with problematic partners like distributors et cetera. Nearly every council has completed a residential bulk changeover and about 200 000 lights have already been changed to energy efficiency models.⁴³

Across the state, this changeover is expected to save \$500 million in electricity expenditure and reduce emissions by 2.2 million tonnes over the life of the project.⁴⁴

In addition to the direct impacts of the programs on council electricity bills, some local governments have combined the upgrades with a public education program to leverage their activity into greater energy efficiency measures in the community. Ms McCallum explained the outcomes of Watts Working Better for Campaspe Shire Council:

It had a payback of 2.4 years for Campaspe, so that is an awesome business result. But we also had some really good education with the community, not just about street lights but a shoot-off of that program was about running education sessions with community about how to understand their bill and how they use their energy. So there are a lot of social opportunities we get from rolling out these big programs as well, which often do not get captured.⁴⁵

40 Central Victorian Greenhouse Alliance, *Submission 113*, p. 4.

41 Goulburn Broken Greenhouse Alliance, *Submission 140*, p. 3.

42 Ms Bronwyn Chapman, Executive Officer, Goulburn Broken Greenhouse Alliance, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 4.

43 Mr Scott McKenry, *Transcript of evidence*, p. 57.

44 Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 3.

45 Ms Allison McCallum, *Transcript of evidence*, p. 7.

Many Victorian local governments wish to expand streetlight upgrades to major road lighting, including streetlights where the use of electricity is cost-shared with the Department of Transport. Many local government and Greenhouse Alliance submissions called for the Government to develop an equitable cost-sharing model and to fund the Department of Transport's component of any upgrade.⁴⁶

Ownership of street lighting is complicated. The assets are typically owned by the local electricity distribution company, with funding for the operation and maintenance including electricity costs coming from the local government or shared between the local government and the Department of Transport. Installation of new lighting is paid for by the respective road authority. This means that proposed upgrades may require tripartite agreement to proceed. Regulation of street lighting is also complex, involving both the Victorian Essential Services Commission and the Australian Energy Regulator.⁴⁷ Mount Alexander Shire Council described these shared responsibilities as being a key barrier to past and future upgrades.⁴⁸

Notably, some councils plan to continue their street lighting upgrade programs, while excluding those lights that are covered by cost-sharing arrangements with the Department of Transport.

A recent business case prepared by the Greenhouse Alliances estimated that replacing all the major road lighting in the state would save \$24 million in electricity costs and reduce emissions by 86,500 tonnes annually.⁴⁹ The Greenhouse Alliances have engaged with the Victorian Government to develop a model to implement the upgrade. However, Mr Rob Law, Executive Officer, Central Victorian Greenhouse Alliance, explained their dissatisfaction with the proposed cost-sharing arrangements under the model:

They have sort of come back and suggested coming up with a model whereby council pays for everything up front and then the State pays them back. That is not really something that smaller councils are keen on. Some councils would be happy with that—bigger ones in metro areas perhaps—but not in our region. We have tested the waters. They would like to see that they pay 60 per cent of the cost and that the State pays their share—an equitable cost-share model relative to the amount that you pay for the actual bills. That is just something to flag as a pretty easy win, but it is a pretty big emissions reduction project, and across the state it could be staggered out over a number of years.⁵⁰

⁴⁶ For example: Macedon Ranges Shire Council, *Submission 69*, received 26 August 2019, p. 9; City of Port Phillip, *Submission 93*, p. 4; Central Victorian Greenhouse Alliance, *Submission 113*, p. 10; Western Alliance for Greenhouse Action, *Submission 143*, p. 22; Swan Hill Rural City Council, *Submission 160*, p. 2.

⁴⁷ Essential Services Commission, *Public Lighting Code: Version 2*, Melbourne, Victoria, 2015.

⁴⁸ Mount Alexander Shire Council, *Submission 114*, received 29 August 2019, p. 9.

⁴⁹ Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 5.

⁵⁰ Mr Rob Law, Executive Officer, Central Victorian Greenhouse Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 33.

Mr McKenry explained that a particular barrier to the upgrade of cost-shared street lighting is that the Victorian Government has not provided the capital appropriation to the Department of Transport, leaving only operating budgets available to fund any upgrades.⁵¹ This point was also made by Ms Chapman:

The region is very reluctant to continue until [the Department of Transport] is able to make a contribution to these projects for that reason I talked about. They are sitting there—councils are sitting there saying, ‘Hang on. We’re expected to fork out the money. We’re not actually asking for a grant; we just want them to pay their way’. All the regions have done these studies. They show similar advantages of savings against costs. So [the Department of Transport] has over 20 years some considerable savings to be made if they can make the capital up-front.⁵²

Local governments have demonstrated a clear return on investment in both reduced electricity bills and emissions reduction from road lighting upgrades. The anticipated emissions reduction and cost savings for major road lighting upgrades clearly makes the case for investment by the Victorian Government.

RECOMMENDATION 42: That the Department of Transport fund its equitable share of major road lighting upgrades, where the operating costs of the lighting are shared with local government. This funding should be provided up front, rather than in arrears.

Upgraded lighting also presents opportunities for further energy efficiency. However, most streetlights are unmetered, with costs calculated largely according to the type of luminaire that is used. Mr McKenry explained the success of a local trial and the lack of incentive for local governments to implement these additional efficiency improvements:

With the rollout of new lights comes the opportunity for the introduction of new technologies that can do dimming and trimming and other things that can provide some of those controls that you are talking about. Again, there are barriers for councils going down this route. One of my councils has already done quite a significant trial in this space. That is Glen Eira council. What that trial showed is that you can capture significant additional energy efficiency and energy savings et cetera with some of those other control benefits. At the moment those benefits do not actually flow on to the bill, because it is an unmetered streetlight, so it is not actually recognised in the national electricity market as a metered site.⁵³

Shared responsibilities for road lighting clearly present challenges for their upgrade with more energy efficient light fixtures. The Committee considers that options for reform of these arrangements should be considered to better streamline future upgrade projects. These reforms should also consider the potential cost and benefits of metering street lights. In-depth consultation would be required with Distribution Network Service

⁵¹ Mr Scott McKenry, *Transcript of evidence*, p. 58.

⁵² Ms Bronwyn Chapman, *Transcript of evidence*, p. 4.

⁵³ Mr Scott McKenry, *Transcript of evidence*, p. 59.

Providers (DNSPs), local government, the Department of Transport and the regulators to ensure proposed reforms would deliver the best incentives for energy efficient upgrade projects.

RECOMMENDATION 43: That the Victorian Government consider reforms to the responsibilities for installation, operation and funding of street lighting to better enable future upgrades for energy efficiency. This should include consideration of the installation of metering on street lights.

6.3.3 Water efficient community infrastructure

With the long-term reduction in rainfall due to climate change, many of Victoria's local governments are taking action to maximise the efficiency of their water use on sportsgrounds and open spaces.⁵⁴ For example, Loddon Shire Council have undertaken drought audits, installed water tanks and water saving devices, and changed the type of grass used in parks and gardens to achieve greater water efficiency.⁵⁵ Others, such as Macedon Ranges Shire Council, are using recycled water to irrigate parks and sporting facilities.⁵⁶ Data analytics is a core part of Hepburn Shire Council's Climate Resilient Recreation Facilities project. This project analysed the irrigation system type and usage patterns, species of grass, desired quality of pitch, water storage options and other factors at council sport facilities and developed a data-driven action plan for reducing water use at these sites.⁵⁷

The more efficient use of stormwater is a priority for other local governments who, often working with developers and using Water Sensitive Urban Design principles, are developing projects to treat stormwater and use it on nearby open spaces.⁵⁸ Cr Rose Hodge, Mayor, Surf Coast Shire Council, outlined a stormwater harvesting project developed in a new estate in Winchelsea:

There is a new estate opening up which is a smaller inland area, and all of the new run-off of water is going into the golf course—now that golf course has never been greener; its dams are full—rather than that going down the drain. So we are really looking at innovative ways to use water, especially with all the new growth that we have got. There are more wetlands being put in by the developers and things like that, and a lot of the water will go into that.⁵⁹

⁵⁴ See for example, Surf Coast Shire Council, *Submission 86*, attachment, p. 6; City of Port Phillip, *Submission 93*, p. 3.

⁵⁵ Loddon Shire Council, *Submission 73*, received 26 August 2019, pp. 1–2.

⁵⁶ Macedon Ranges Shire Council, *Submission 69*, p. 5.

⁵⁷ Hepburn Shire Council, *Submission 119*, received 2 September 2019, p. 8.

⁵⁸ For example: Greater Shepparton City Council, *Submission 108*, p. 4; Moreland City Council, *Submission 116*, p. 3; Western Alliance for Greenhouse Action, *Submission 143*, p. 19.

⁵⁹ Cr Rose Hodge, Mayor, Surf Coast Shire Council, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 14.

The City of Ballarat, in partnership with Central Highlands Water, is using a combination of stormwater, recycled water and bore water to maintain the level of Lake Wendouree and provide water to 11 nearby sports fields. Mr Terry Demeo, Director, Infrastructure and Environment, City of Ballarat, explained the system and the importance of maintaining the lake:

The lake was dry, as you well know, for a decade almost, and it had a disastrous—that would not be too strong a word—impact on the psyche of Ballarat. We do not want that to happen again. So the plan that was put in place then was to develop A-class water treatment facilities at the northern water treatment plant, which Central Highlands Water run, and to utilise the bore fields of the Cardigan Aquifer as well as stormwater recovery. So the system is multitiered. We put 600 megalitres a year of water into the lake to maintain it at an adequate level for recreational purposes and for general amenity. And as I said, it is the heart and soul of the city.⁶⁰

In new growth areas, the City of Ballarat is working with Central Highlands Water, Southern Rural Water and Corangamite Catchment Management Authority to expand the use of treated bore water, recycled water and stormwater. This will include the use of such water in a recreational precinct to be developed in Wendouree West. The council is also exploring the future use of stormwater from other new developments to recharge the aquifer.⁶¹

Councils face challenges in using recycled water, especially if it is not of sufficient quality. Mr Mike McIntosh, Director, Development and Infrastructure, Mitchell Shire Council, explained some of the difficulties faced by the rural council in accessing and using recycled water:

For example, our local business contractors do not have water trucks that are capable of storing both potable and grey water; we need fit-for-purpose water for our sporting reserves; and there are high salt loads in treated water that are not suitable for highly sodic soils. We are all eager to utilise recycled water; however, the barrier to entry is high and many regional councils cannot afford to meet this.⁶²

Cr David Atkinson, Vice-Chair, Goulburn Broken Greenhouse Alliance, called for more investment from the Victorian Government in recycled and grey water infrastructure to enable more appropriate use of potable water:

People want to water their gardens, and using potable water is crazy. So if you put in a development, you have got one pipeline of water going through it and it is potable water. So State Government could put in the assets, the infrastructure, so that the pipeline goes past those developments.⁶³

⁶⁰ Mr Terry Demeo, Director, Infrastructure and Environment, City of Ballarat, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 4.

⁶¹ *Ibid.*, pp. 4–5.

⁶² Mr Mike McIntosh, Director, Development and Infrastructure, Mitchell Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 3.

⁶³ Cr David Atkinson, Vice-Chair, Goulburn Broken Greenhouse Alliance, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 14.

There is substantial potential to expand the use of recycled water, including for agriculture as discussed in Chapter 8, to meet future water needs in a drier climate. However, the business cases for recycled water projects often do not pass a traditional cost benefit analysis against the use of potable water. These assessments may not be considering future potable water availability in a drier climate.⁶⁴ The City of Melbourne recommended that the Essential Services Commission consider future water availability and supply needs under climate change when assessing operating and capital expenditure proposals from water corporations.⁶⁵ There are a number of potential models for the implementation of this change, including amendment of the objectives of the *Water Industry Act 1994*, amendment of the Water Industry Regulatory Order, or the addition of the Water Industry Regulatory Order to Schedule 1 of the *Climate Change Act 2017*.

RECOMMENDATION 44: That the Victorian Government instruct the Essential Services Commission to consider the impacts of climate change in its regulation of water corporations, including pricing reviews.

Community initiatives to reduce water usage and enhance water efficiency are discussed in Section 7.1. The agricultural use of recycled water is discussed in Chapter 8.

6.3.4 Resilient local infrastructure

The infrastructure managed by local governments, especially rural councils, is both extensive and increasingly vulnerable to climate change impacts.

As Mr McIntosh of Mitchell Shire Council explained:

Climate change increases the likelihood of damage to assets via extreme weather events and threatens the continuity of service provision, and this results in a rise in maintenance requirements, operational costs and insurance premiums. Our shire is responsible for over 1500 kilometres of roads. Just for perspective, that is longer than a network extending from here to Adelaide and back.⁶⁶

The impacts of climate change on local government infrastructure can be highly varied and extend beyond the impacts of climate change-related disasters. For example, reduced total annual rainfall may have a much more significant effect on water sensitive urban design measures such as rainwater harvesting or urban wetlands, than the effects of increased rainfall intensity on suburban drainage.⁶⁷ At the larger scale of riverine flooding, drier soils, lower flows, increased capacity in reservoirs, sea level rise and

⁶⁴ City of Melbourne, *Submission 120*, received 2 September 2019, p. 26.

⁶⁵ Ibid.

⁶⁶ Mr Mike McIntosh, *Transcript of evidence*, p. 3.

⁶⁷ Michael Mag and Valerie Mag, *Stormy Water Solutions*, correspondence, 18 May 2020.

increased rainfall intensity create a highly complex and uncertain environment for modelling future changes to flooding.⁶⁸ At the time of writing there is no international consensus on how best to account for these changes in engineering design.⁶⁹

Many councils have developed or upgraded infrastructure to protect communities and assets from hazards that are associated with or exacerbated by climate change. Evidence provided to the Committee focused on various infrastructure projects that aim to mitigate coastal hazards.⁷⁰ For example, Bass Coast Shire Council has undertaken wet sand fencing and revegetation at Inverloch surf beach, and sand renourishment at both Inverloch surf beach and Cowes Main beach.⁷¹ Councils have also designed coastal protection infrastructure to account for future climate change projections. Mr Gibson discussed a rock wall that Moyne Shire Council has upgraded on East Beach in Port Fairy:

The rock wall on East Beach is probably the most obvious example of that. So back in 2012 there was some significant erosion on East Beach, and one of the houses towards the northern end of the beach, the dunes were starting to get a bit close to its back fence or front fence, depending on how you want to orientate. There was a section of rock wall that was upgraded at that end of the beach to provide protection to that home or the houses along that section of beach, again to 2100, with projected sea level rises forecast into that.⁷²

The Port Fairy rock wall was part funded by the Victorian Government.⁷³ Coastal protection infrastructure is expensive, and several stakeholders called for significant government investment in additional and upgraded mitigation infrastructure.⁷⁴

Older infrastructure is increasingly proving to be unsuitable for changing conditions. Ms Fiona Weigall, General Manager, Assets and Environment, East Gippsland Shire Council, told the Committee:

We have got seawalls. It has always been happening. We have had seawalls in Lakes Entrance for over 100 years, but the seawalls were built for a certain time and a certain condition and those conditions are changing.⁷⁵

68 Conrad Wasko and Rory Nathan, 'Influence of changes in rainfall and soil moisture on trends in flooding', *Journal of Hydrology*, vol. 575, 2019; Keirnan Fowler, et al., 'Application of Available Climate Science to Assess the Impact of Climate Change on Spillway Adequacy', paper presented at ANCOLD 2010 Conference on Dams, Hobart, 2010; Rory Nathan, Associate Professor Hydrology and Water Resources, University of Melbourne, correspondence, 14 May 2020.

69 Rory Nathan, correspondence; B. François, et al., 'Design considerations for riverine floods in a changing climate – A review', *Journal of Hydrology*, vol. 574, 2019.

70 For example: East Gippsland Shire Council, *Submission 144*, p. 20; Ms Fran Macdonald, *Transcript of evidence*, p. 6; Mr Tim Mordaunt, Senior Sustainability Officer, City of Greater Geelong, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 6; Bass Coast Shire Council, *Submission 36*, p. 4.

71 Bass Coast Shire Council, *Submission 36*, p. 5.

72 Mr Robert Gibson, *Transcript of evidence*, p. 11.

73 Ibid.

74 Moyne Shire Council, *Submission 14*, received 26 July 2019, p. 2; South Gippsland Conservation Society Incorporated, *Submission 27*, received 13 August 2019, p. 1; City of Darebin, *Submission 124*, received 2 September 2019, p. 5; Cr Jenny O'Connor, Mayor, Indigo Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 21; Ms Fiona Weigall, General Manager, Assets and Environment, East Gippsland Shire Council, public hearing, Bairnsdale, 24 October 2019, *Transcript of evidence*, pp. 7–8.

75 Ms Fiona Weigall, *Transcript of evidence*, p. 4.

Contemporary design standards for local government infrastructure are contained within documents such as the *Infrastructure Design Manual, Engineering Design and Construction Manual*, and *Australian Rainfall and Runoff 2019*. While *Australian Rainfall and Runoff 2019* details how climate change should be accounted for in planning for flooding, including the design of flood mitigation infrastructure, the other two design manuals only contain limited reference to climate change. The organisations that publish these manuals have initiated projects to update them to better account for climate change in engineering design.⁷⁶

Some councils discussed the challenges they have experienced in replacing or upgrading infrastructure, including community infrastructure, damaged in extreme weather events. Ms Weigall explained how changes to the Australian Government's Disaster Recovery Funding Arrangements have made it more difficult for the council to replace damaged community infrastructure:

[T]he national disaster recovery funding has been constrained, so it is now really just transport infrastructure: roads, drainage, culverts, bridges. All the community infrastructure that is part of these communities is no longer able to be funded for replacement through those previous relief funding sources. So we have collectively got a very large challenge ahead of us ...⁷⁷

The Committee also received evidence that the Disaster Recovery Funding Arrangements cannot fund upgraded replacement infrastructure. Mr Gibson explained this issue to the Committee:

The national disaster relief fund comes to the fore, and it is fantastic. The question is: is some of that money best spent in prevention rather than in the response phase? ... But further to that, the funding comes with like-for-like requirements. So if your structure that was lost was made of timber and is going to wash away in the next storm, that is what you have to replace it with to get the funding. So there is no futureproofing built into that service provision or that funding provision that allows you to build a structure that might be more suited to a future environment—so higher sea levels, bigger storms, whatever.⁷⁸

The provisions of the Disaster Recovery Funding Arrangements require that eligible assets are only restored to their 'pre-disaster function', for example:

The existing, pre-disaster capacity of the culvert or drainage structure is only eligible for reconstruction — for example, a four-cell 1200mm pipe culvert with an effective area/capacity of 3m² can only be replaced by a culvert with the same 3m² capacity.⁷⁹

⁷⁶ Ralph Kop, Former Executive Officer, Local Government Infrastructure Design Association, correspondence, 15 May 2020.

⁷⁷ Ms Fiona Weigall, *Transcript of evidence*, p. 6.

⁷⁸ Mr Robert Gibson, *Transcript of evidence*, p. 17.

⁷⁹ Emergency Management Victoria, *Victorian Disaster Recovery Funding Arrangements: Guideline 1: Claims and eligibility for essential public assets (Category B)*, Government of Victoria, Melbourne, 2019, p. 10.

The Committee notes that this may not be appropriate given projections for increased extreme rainfall and other projected changes due to climate change. The Disaster Recovery Funding Arrangements do provide some scope for betterment—or the reconstruction of an asset to a more resilient standard—however, this requires exceptional circumstances and further approvals.⁸⁰

Even in normal asset replacement and maintenance cycles, climate change may not be adequately considered. Typically, local government asset renewal policies provide for a like-for-like replacement with functional upgrades only occurring in special circumstances.⁸¹ Upgrade projects can also face competition against other projects in local government budgets.⁸²

Councils are also grappling with understanding the vulnerability of their infrastructure to climate change and how to best manage it over the long term. The governance of local government climate risk is a key emerging issue. Ms La Fontaine explained that from a financial perspective the exposure of local governments to climate impacts on its infrastructure is largely unknown:

Climate risk governance for our councils has been a really key issue for SECCCA. We have hosted climate risk governance expert Sarah Barker, who is head of climate risk governance with MinterEllison, to explain to our members how climate change presents a physical, economic as well as legal risk and how this has serious implications for local government. These forums have led councils to begin to question how a change in climate will impact councils' assets, revenue streams and services—something that really is largely unknown because the climate data as it exists is not accessible to asset managers and finance people in councils. The Australian Accounting Standards Board and the Auditing and Assurance Standards Board note that climate-related risks are no longer just an environmental concern and that entities should now consider material climate-related risk in financial statements. Our feedback from SECCCA members tells us that councils do not have the climate data or the asset management systems needed to enable a deep enough understanding of the risk that climate change poses to council business and communities.⁸³

While new high-resolution climate projections are now available—as discussed in Chapter 1—understanding the implications of those projections on different infrastructure is challenging. Ms La Fontaine explained that this typically requires further detailed engineering assessment:

The data exists out there, but it has not been put into a way in which asset managers can take it, localise it, put it over the assets and then be able to ask questions like that and come up with the answers. It all starts with having the right climate data that can be assessed.⁸⁴

⁸⁰ Ibid., pp. 14–15.

⁸¹ Ralph Kop, Former Executive Officer, Local Government Infrastructure Design Association, correspondence, 15 May 2020.

⁸² Ibid.

⁸³ Ms Dominique La Fontaine, *Transcript of evidence*, p. 26.

⁸⁴ Ibid., p. 27.

Some councils have undertaken a variety of risk and vulnerability assessments, including those with a focus on council assets.⁸⁵ Councils and Greenhouse Alliances have also collaborated to explore how to manage their assets in a changing climate. The Eastern Alliance for Greenhouse Action and the Northern Alliance for Greenhouse Action have collaborated in a Future Assets project to develop a vulnerability assessment framework.⁸⁶ Other risk assessment projects have also been completed collaboratively between councils. Cr Tony Herbert, Mayor, Warrnambool City Council, outlined the Barwon South West Local Coastal Hazard Assessment, which will

build a detailed view of the South Barwon region's existing and future coastal hazards and to prioritise risks for future modelling. This regional project was led by the Warrnambool City Council in partnership with the regional coastal LGAs and other agencies to provide a first phase of a multistage process to implement the Victorian coastal hazard planning process.⁸⁷

As guidance on how to consider climate change in modelling hazards such as flooding changes, even recently conducted risk and vulnerability assessments will go out of date. The City of Ballarat noted this problem and other challenges in implementing the results of flood studies in its submission:

Australian Rainfall and Runoff 2016 (AR&R 2016) [the 2019 version of Australian Rainfall and Runoff, which includes updates to climate change guidelines, has since been released] incorporates Climate Change Considerations (Book 1 Chapter 6) for planning purposes and new infrastructure/mitigation measures. As this is a relatively new amendment, the inclusion of climate change projects was not part of the latest flood studies conducted by Council which are intended to advise on new planning controls and overlays. We also note the provisions for Climate Change as per AR&R 2016 span over a 20-year period and planning controls/overlays are revisited and amended on a much more frequent basis. In addition to this, changes to the catchment (mitigation measures, development, changes in infrastructure etc.) occur on an annual basis. Such changes can drastically change the projected flood extents when Climate Change is included.⁸⁸

Several stakeholders recommended that the Victorian Government invest in assessments of the vulnerability of local government and other infrastructure to climate change impacts and build the climate change risk governance capacity of councils.⁸⁹ This would assist local governments with the identification and prioritisation of infrastructure upgrades. The City of Melbourne recommended that there is a need for assessments to focus on 'the extent of interdependencies and climate-related risks faced by infrastructure systems'.⁹⁰

⁸⁵ See for example: Surf Coast Shire Council, *Submission 86*, attachment, p. 6; City of Port Phillip, *Submission 93*, p. 3; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 4; City of Melbourne, *Submission 120*, p. 25.

⁸⁶ Central Victorian Greenhouse Alliance, *Submission 113*, p. 8.

⁸⁷ Cr Tony Herbert, *Transcript of evidence*, p. 3.

⁸⁸ City of Ballarat, *Submission 78*, p. 4.

⁸⁹ City of Greater Bendigo, *Submission 128*, received 5 September 2019, p. 6; East Gippsland Shire Council, *Submission 144*, pp. 20-1; City of Ballarat, *Submission 78*, p. 4; Mr Mike McIntosh, *Transcript of evidence*, p. 3.

⁹⁰ City of Melbourne, *Submission 120*, p. 25.

Ms Carole Hammond, Coordinator, Climate Change and Environment, Strathbogie Shire Council, suggested that technology may assist rural and regional councils to track and share information on infrastructure vulnerability assessments, and that this information might also assist the Victorian Government to develop a state-wide picture of the condition of local government infrastructure regarding climate change:

I think we are also moving into an era where smart technology is helping councils to understand what is happening underground a lot better, but access to that for many regional councils is not available, for obvious reasons that we have stated. It would be good to have some access to that and access to the knowledge of metropolitan councils that are also using it right now.⁹¹

Ms Kylie White, Deputy Secretary, Environment and Climate Change, DELWP, was asked by the Committee at a public hearing whether a comprehensive database or valuation of infrastructure vulnerable to climate change impacts currently exists:

I am not aware of a comprehensive or collated centralised database of all that infrastructure. I am aware that particular owners or managers of the infrastructure have commenced or are in known stages of developing their understanding of infrastructure that is at risk. I am aware that Parks Victoria, for their coastal properties, have done some of that work. It may not be complete or comprehensive. And some of the entities that have those essential services or other infrastructure that may be impacted would have their own understanding or their own database of those assets that may be at risk. But I am not aware of a central one.⁹²

Ms White went on to agree that any system to improve the visibility of infrastructure and the risks it is exposed to would be useful.⁹³

Section 6.1 discussed and recommended the release of a series of reports and data regarding local government climate change adaptation and climate risk governance. The Committee expects that implementation of the recommendations contained in these reports should address many of the issues raised in this section.

6.4 Planning, development and building

Victoria's planning and building system presents substantial opportunities to lock in future energy efficiency, emissions reduction and other sustainability gains. Local governments play a critical role in the implementation of Victoria's planning and building system, and the use of Environmentally Sustainable Design planning policies to drive improvements in performance is an important tool for local governments. Many stakeholders discussed the development of sustainable communities through changes to planning and building legislation and regulation. This section explores climate change

⁹¹ Ms Carole Hammond, Coordinator, Climate Change and Environment, Strathbogie Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 16.

⁹² Ms Kylie White, Deputy Secretary of Environment and Climate Change, Department of Environment, Land, Water and Planning, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 37.

⁹³ Ibid.

and the *Planning and Environment Act 1987*, Environmentally Sustainable Design (ESD) local planning policies, climate change-related hazards and the planning and building system, and building codes including inspection and verification.

6.4.1 Planning legislation

Many stakeholders mentioned the *Planning and Environment Act 1987* and the need to strengthen how the Victorian planning system addresses climate change impacts and emissions reduction.⁹⁴ The Victorian Local Governance Association highlighted some of the shortcomings of the current Act in its submission:

[It] does not reflect contemporary challenges in tackling climate change risks. Issues such as poor design and ESD (ecologically sustainable development) ratings of buildings and development proposals should be subject to greater scrutiny than they do currently. Similarly, councils' ability to address the long term social and environmental infrastructure needs of communities such as open green space and tree canopy coverage need to be strengthened under the Act. Events associated with climate change such as flooding and [coastal] erosion are occurring more frequently and with greater severity. This requires a thorough examination of relevant development guidelines and regulations and for them to be updated and/or developed as necessary.⁹⁵

Some stakeholders also highlighted the fact that the *Planning and Environment Act 1987* contains no specific mention of climate change.⁹⁶ Ms White noted that while this is the case, a number of subordinate planning documents do consider climate change:

The *Planning and Environment Act*, as you note, has been in existence for a number of years. You could see it as an Act that enables a whole range of considerations under that legislation, and I note that though the legislation does not acknowledge climate change in the document itself, the *Victoria Planning Provisions* that sit and underpin the *Planning and Environment Act* do consider climate change in a number of areas, and also significant planning documents such as *Plan Melbourne* also consider climate change principally and directly.⁹⁷

Many stakeholders called for greater consideration of climate change in the *Planning and Environment Act 1987*, although few proposed a specific model.⁹⁸

⁹⁴ For example: Ms Deirdre Griepsma, Manager, Sustainable Environment, Bass Coast Shire Council, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, pp. 15, 22; Cardinia Shire Council, *Submission 43*, received 22 August 2019, p. 3; Totally Renewable Yackandandah, *Submission 138*, received 16 September 2019, p. 9; South East Councils Climate Change Alliance, *Submission 136*, p. 5; Mr David Blore, Member, Benalla Sustainable Future Group, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 24.

⁹⁵ Victorian Local Governance Association (VLGA), *Submission 117*, received 31 August 2019, p. 4.

⁹⁶ For example: Council Alliance for a Sustainable Built Environment (CASBE), *Submission 97*, received 26 August 2019, p. 2; Mr Rob Law, *Transcript of evidence*, p. 30.

⁹⁷ Ms Kylie White, *Transcript of evidence*, p. 34.

⁹⁸ For example: Council Alliance for a Sustainable Built Environment (CASBE), *Submission 97*, p. 2; Totally Renewable Yackandandah, *Submission 138*, p. 9; Ms Deirdre Griepsma, *Transcript of evidence*, p. 22.

FINDING 19: Despite substantial potential for emissions reduction and climate change adaptation through Victoria's planning system, there is limited connection between the *Planning and Environment Act 1987* and the *Climate Change Act 2017*.

The simplest approach to more explicitly integrating climate change into the *Planning and Environment Act 1987* would be to add climate change mitigation and adaptation to the objectives in s 4, however, this option was not suggested by any of the stakeholders who provided evidence to the Committee. Furthermore, DELWP advised that consideration of climate change is already implicit within the objectives of planning in Victoria.⁹⁹ While amending the objectives to mention climate change may provide symbolic benefits, there is insufficient evidence to recommend this model.

The approach recommended by some stakeholders was to use existing mechanisms in the *Climate Change Act 2017* to require planning authorities to give greater consideration to climate change. They recommended adding the preparation, consideration or approval of certain planning instruments under the *Planning and Environment Act 1987* to sch 1 of the *Climate Change Act 2017*.¹⁰⁰ This would require entities preparing these instruments to consider climate change impacts and the impacts of the instruments on Victoria's greenhouse gas emissions.¹⁰¹ There are a broad range of planning instruments that could be included, such as ministerial directions or guidelines, the Victorian Planning Provisions, or planning schemes. The expansion of government decision making required to consider climate change under the *Climate Change Act 2017* is also supported by Environment Victoria.¹⁰²

The Law Institute of Victoria recommended that the items added to sch 1 of the *Climate Change Act 2017* should include the approval of planning scheme amendments under s 35 of the *Planning and Environment Act 1987* and decisions on planning permits under s 61.¹⁰³ If the *Climate Change Act 2017* was to be amended to include decisions on planning permits in sch 1, detailed ministerial guidelines would need to be prepared (under s 18) to ensure local governments are able to consistently incorporate climate change considerations into these local decisions. Inclusion of some decisions, such as the issuing or amending of planning permits, could cause significant delays in the operation of the planning system.¹⁰⁴ Amendment of the State Planning Policy Framework to include an Environmentally Sustainable Design (ESD) policy that also appropriately considers resilience and adaptation could assist in the implementation of such amendments to the *Climate Change Act 2017*. ESD planning policies are discussed in Section 6.4.2.

⁹⁹ Department of Environment, Land, Water and Planning, Inquiry into tackling climate change in Victorian communities public hearings, response to questions on notice received 20 May 2020.

¹⁰⁰ Western Alliance for Greenhouse Action, *Submission 143*, p. 20; Bass Coast Shire Council, *Submission 36*, p. 7.

¹⁰¹ *Climate Change Act 2017* (Vic), s 17.

¹⁰² Environment Victoria, *Submission 159*, received 6 March 2020, pp. 6–7.

¹⁰³ Law Institute of Victoria, *Submission 134*, received 11 September 2019, pp. 2–3.

¹⁰⁴ Department of Environment, Land, Water and Planning, response to questions on notice.

RECOMMENDATION 45: That the Victorian Government seek to amend the *Planning and Environment Act 1987* and/or the *Climate Change Act 2017* to ensure that consideration of climate change receives stronger emphasis in the Victorian planning system.

6.4.2 Environmentally Sustainable Design local planning policies

Many local governments in Victoria have an Environmentally Sustainable Design (ESD) policy in their Local Planning Policy Framework (although some substitute ‘Development’ for ‘Design’ in the title).¹⁰⁵ These policies typically apply to residential developments of two or more dwellings and commercial developments of more than 100 square metres and require the applicant to demonstrate that the proposal meets environmentally sustainable goals.¹⁰⁶ Applicants are required to prepare a Sustainable Design Assessment or Sustainability Management Plan, depending on the development size, and to assess the proposal using a tool such as Built Environment Sustainability Scorecard (BESS) or Green Star. Ms Natasha Palich, Executive Officer, Council Alliance for a Sustainable Built Environment, explained the history of these policies in Victoria:

In 2009 a number of councils formally applied to DELWP to seek a local policy. I will call it an ESD policy—that now stands for environmentally sustainable development policy. At that time there was a little bit in the state planning scheme referring to environmental outcomes in buildings but not a lot. The local policy sought to provide a greater level of detail on what that might entail. In 2015 six of those policies were gazetted and since that time there have been another 12, so there are 18 identical policies requiring detailed information to be submitted at the planning permit stage. This shows support from State Government for this work. It provides support for councils to ask for that information.¹⁰⁷

Four other local governments have planning policies containing ESD elements that they have developed themselves (the majority have ESD planning policies that are closely based on the one developed by CASBE).¹⁰⁸ Other councils are also seeking to amend their local planning schemes to introduce ESD policies.¹⁰⁹ The City of Greater Bendigo observed that since the council has implemented an ESD policy there have been improvements in design and an increase in ESD literacy in the development industry.¹¹⁰

¹⁰⁵ See for example: Western Alliance for Greenhouse Action, *Submission 143*, p. 14; City of Greater Bendigo, *Submission 128*, p. 4; City of Port Phillip, *Submission 93*, p. 2; City of Kingston, *Submission 20*, p. 2.

¹⁰⁶ Ms Natasha Palich, Executive Officer, Council Alliance for a Sustainable Built Environment, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, pp. 10–11.

¹⁰⁷ *Ibid.*, p. 10.

¹⁰⁸ Council Alliance for a Sustainable Built Environment (CASBE), *State & local planning policy*, 2019, <<https://www.casbe.org.au/what-we-do/state-local-planning-policy>> accessed 30 April 2020.

¹⁰⁹ Mornington Peninsula Shire, *Submission 121*, p. 5; Frankston City Council, *Submission 89*, p. 2.

¹¹⁰ City of Greater Bendigo, *Submission 128*, p. 4.

CASBE and other stakeholders are collaborating to develop a new version of the local ESD policy that will push further strategies for sustainability, including increased energy efficiency, fuel switching from gas to electricity and smart onsite energy generation.¹¹¹

Ms Palich described the direction of this updated version:

[W]ith our members declaring climate emergencies and the ESD policy that currently exists being written a decade ago, there is the view amongst the councils that it now needs to be updated. The language of the existing policy is primarily around mitigation as opposed to a thorough consideration of how buildings and the built environment can adapt to what we are going to be needing in a future scenario.

Also we think there is probably a better consideration of community resilience and human resilience in our buildings, particularly in terms of providing havens in heatwave events. There is a group of councils that are now actively working on a stronger, more forward-looking, more climate-resilient approach to an ESD policy. At the moment we have councils that are still seeking that original policy and we have councils that are presently working on upgrading that, and the State Government is also working on something.¹¹²

A State ESD Policy

Many stakeholders, primarily local governments, have called for the Victorian Government to amend the State Planning Policy Framework to include a State ESD policy.¹¹³ This would build on the work of those councils who have adopted a local policy and extend it across the state, helping Victoria meet its renewable energy and emissions reduction goals.¹¹⁴

An ESD amendment to the State Planning Policy Framework would have the advantage of not requiring local governments to submit their own planning scheme amendment and the substantial work on the council's behalf that such a submission entails.¹¹⁵ This would particularly benefit rural councils with ESD ambitions as they can then devote their limited resources to implementation of the policy, rather than its development and submission.

However, the impact of a state-wide policy on rural councils needs to be considered. At the time of writing, councils with ESD planning policies were exclusively located in Melbourne or larger regional centres. Ms Chapman explained the care required when implementing planning policy for both metropolitan and regional areas:

The thing is you cannot transfer metro planning, especially around development, into the regions because of the difference in the value of the development. So there is a

¹¹¹ Ms Michaela Skett, *Transcript of evidence*, p. 19.

¹¹² Ms Natasha Palich, *Transcript of evidence*, p. 11.

¹¹³ *Ibid.*, p. 10; Mount Alexander Shire Council, *Submission 114*, p. 5; Moreland City Council, *Submission 116*, p. 5; Mornington Peninsula Shire, *Submission 121*, p. 5; Ms Lauren Watt, Coordinator, Environmental Sustainability, Surf Coast Shire Council, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 16; Ms Sandra Qian, Senior Manager, Policy and Government Relations, Green Building Council of Australia, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 45.

¹¹⁴ Council Alliance for a Sustainable Built Environment (CASBE), *Submission 97*, pp. 2-3.

¹¹⁵ Ms Natasha Palich, *Transcript of evidence*, p. 11.

general principle that what you ask in planning needs to be commensurate with the value of the development; it should not be way out of whack, and because development in regional Victoria, particularly housing, does not have the same dollar values as Melbourne, we cannot ask the same as some of the metro councils can; it is not seen as reasonable by the developer, so it is hard to counter that argument, and that is what this project is doing. They have also been, as part of this, looking at the value saving, the value proposition, for increased environmental aspects in subdivisions.¹¹⁶

Ms Chapman went on to call for assistance for rural councils to develop the capabilities to undertake assessments of planning permit applications from an ESD perspective.¹¹⁷ Ms Palich agreed:

[T]he challenge is that the councils that mainly have those policies are the more well-resourced councils, so we have our rural and regional members and network members who might hold the same position in terms of declaring a climate emergency but do not have the resources to go through that planning amendment process.¹¹⁸

Although the number of development applications for rural councils that would require assessment under an ESD policy is small, many lack the required expertise. Clusters of councils are collaborating on shared resource models that could address this expertise gap. These models should be able to ensure that rural councils can appropriately implement a state-wide policy, but some assistance from the Victorian Government may be required during establishment.¹¹⁹

Requiring more environmentally sustainable elements in a development may make it more expensive, which is a significant concern for housing affordability and climate justice (discussed in Chapter 2). However, Mr McIntosh explained how treating ESD and affordability as a trade-off is ultimately a 'false economy':

What we are [currently] delivering to the market is a housing product that in the long term is using more energy and ultimately costing the householder more to run. We then roll out solar and water efficiency programs to retrofit these developments. It simply does not make sense. Governments and the development industry need to aim higher to achieve true ESD within subdivisions and new housing stock. We need to work harder at the front end of the development process, not just retrofit at the back end when the damage is done.¹²⁰

There may be benefits to the planning and development industry from a state-wide approach. Although most ESD local policies are nearly identical, there are several alternative policies in operation. This inconsistency may be challenging for developers, so a single state-wide policy—with appropriate local variation—could assist the industry.¹²¹

¹¹⁶ Ms Bronwyn Chapman, *Transcript of evidence*, p. 5.

¹¹⁷ *Ibid.*, pp. 5–6.

¹¹⁸ Ms Natasha Palich, *Transcript of evidence*, p. 10.

¹¹⁹ *Ibid.*, p. 11; Central Victorian Greenhouse Alliance, *Submission 113*, p. 7.

¹²⁰ Mr Mike McIntosh, *Transcript of evidence*, pp. 2–3.

¹²¹ City of Ballarat, *Submission 78*, p. 5.

FINDING 20: The introduction of a single state-wide Environmentally Sustainable Design policy would improve the energy efficiency of the built environment, deliver greater consistency for industry and enable better resource allocation to policy implementation by local governments.

RECOMMENDATION 46: That the Victorian Government amend the State Planning Policy Framework to include a single Environmentally Sustainable Design policy.

6.4.3 Planning and building for climate change-related hazards

Climate change is projected to increase the intensity and frequency of a range of disaster events, as mentioned in Chapter 1. Many parts of Victoria are exposed to bushfire, floods and sea level rise.¹²² Some councils mentioned hazard-related controls and overlays in their planning schemes.¹²³

Sea level rise has been a particular focus for many councils in coastal Victoria. For example, the Association of Bayside Municipalities—which consists of the ten municipalities that abut Port Phillip Bay—and the Municipal Association of Victoria have partnered in the Port Phillip Bay Coastal Planning Project. This project aims to develop a consistent approach to climate change-related hazards in land use planning among the ten councils and has developed the *Planning Response to Sea Level Rise Plan*, which recommends a group planning scheme amendment for these bayside councils.¹²⁴

Lakes Entrance was one of the first areas in Victoria to have planning controls that consider sea level rise.¹²⁵ Planning controls for flooding need to be sensitive to the nature of flooding in the local area—at Lakes Entrance up to 3 days of warning is provided for flood events.¹²⁶ Ms Weigall recommended there be more local flexibility in how planning schemes address climate change-related hazards, such as sea level rise:

Over time the local policy content in the planning scheme has been reduced and reduced and reduced. I think we need to see the local content in planning schemes go back up so we do not just get this carte blanche ‘This is what is happening’ across the state, so that we do have that nuance around what is required at a local level and so that we have the ability in our local planning schemes to recognise these differences and adapt. Whilst we do need statewide guidance and support, I am not sure that our council believes that statewide controls, set at the same level to mitigate the highest

¹²² See for example: East Gippsland Shire Council, *Submission 144*, pp. 14–16; Warrnambool City Council, *Submission 150*, received 6 December 2019, p. 1; Cr Darren McCubbin, Wellington Shire Council, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 14.

¹²³ For example: Ms Fiona Weigall, *Transcript of evidence*, p. 5; Central Victorian Greenhouse Alliance, *Submission 113*, p. 8; Bass Coast Shire Council, *Submission 36*, p. 5.

¹²⁴ Frankston City Council, *Submission 89*, pp. 1–2.

¹²⁵ Cr Natalie O’Connell, Mayor, East Gippsland Shire Council, public hearing, Bairnsdale, 24 October 2019, *Transcript of evidence*, p. 1.

¹²⁶ Ms Fiona Weigall, *Transcript of evidence*, p. 5.

risk, will work for all our communities. We have seen boat ramps and jetties that have been built to the current standard; now, other than in a flood, people cannot actually get to their boats because they are built too high. So we have got to be practical about this as well.¹²⁷

Understanding and modelling the risk and consequences of sea level rise is crucial to enacting appropriate planning measures. Ms Deirdre Griepsma, Manager, Sustainable Environment, Bass Coast Shire Council, explained that local risk assessments for sea level rise and coastal hazards have enabled appropriate overlays to be put into planning schemes:

[T]here have been a number of local coastal hazard assessments that have been done which talk about predicted sea level rise based on the best available data. There were five of those pilots done back in about 2010, and the Western Port coastline, which is part of Bass Coast, was one of those. Then often what happens is the council can introduce that into their planning scheme for a land subject to inundation overlay, which is what has been done at Bass Coast. But it does not cover the entire Victorian coastline; it does not cover the entire Australian coastline.¹²⁸

Ms Griepsma went on to suggest that closer linkages between the *Planning and Environment Act 1987* and *Climate Change Act 2017*—as discussed in Section 6.4.1—should assist in the development of appropriate and consistent local planning policy.¹²⁹ Other local government representatives called for improved data and guidance on how to approach coastal planning with regard to sea level rise.¹³⁰

Many stakeholders discussed the impact of urban form on the urban heat island effect and heatwaves.¹³¹ While options for urban greening are discussed in Chapter 8, changes to planning schemes could also assist in mitigating the urban heat island effect as detailed in Hume City Council's submission:

[T]he current planning scheme guidelines are resulting in new suburbs with little if any room for mature trees on private land and constrained space for trees in road reserves. These suburbs and their residents will be particularly vulnerable to the urban heat island effect and heat waves that are projected to increase in frequency, duration and intensity with climate change. There is currently significant focus on the benefits and need for urban greening and urban forests in more established areas of the metropolitan area but urgent attention needs to be given to Victorian Planning Scheme amendments to ensure that new suburbs are designed to retain existing canopy trees (native and planted) and include provision for appropriate canopy cover in the public and private realm to mitigate the impacts of increasing average temperatures, the urban heat island and heatwaves and to share in the multiple benefits provided by trees and vegetation.¹³²

¹²⁷ Ibid., p. 6.

¹²⁸ Ms Deirdre Griepsma, *Transcript of evidence*, p. 15.

¹²⁹ Ibid.

¹³⁰ Cr Darren McCubbin, *Transcript of evidence*, pp. 13–14.

¹³¹ For example: Western Alliance for Greenhouse Action, *Submission 143*, p. 19; Mr Terry Demeo, *Transcript of evidence*, pp. 2–3; Melton City Council, *Submission 37*, received 21 August 2019, p. 2; Greater Shepparton City Council, *Submission 108*, p. 2.

¹³² Hume City Council, *Submission 54*, p. 2.

While there are opportunities to address the impact of climate change-related hazards on the built environment through the planning system, they also have implications for local government infrastructure. This is further discussed in Section 6.3.4.

FINDING 21: The planning system presents substantial opportunities for climate change adaptation, particularly to mitigate heatwaves and other extreme weather events.

6.4.4 Building codes

Alongside the planning system, building codes and regulation may present substantial opportunities to mitigate and adapt to climate change. In Victoria, ESD planning policies do not apply to single dwelling construction, such as detached family homes, and planning permits are not required for most single dwellings. Energy efficiency standards in the construction of single dwellings are mostly defined in the National Construction Code. Ms McCallum explained that many examples of poor environmentally sustainable design never needed a planning permit:

I think for a lot of things that is actually into the building area because a lot of people say, 'Oh, how did this come to council?', 'How did this go ahead?' or, 'Did that happen?', 'Why isn't it in the planning scheme?'. But that particular development did not need a planning permit, where if you are building, particularly the residential dwellings, all that type of thing needs a building permit. So I think there are a lot of opportunities in the building but there is this historic reaction of, 'Oh, we'll put it in the planning scheme', and it works in the planning scheme but you need a trigger of a permit for that to apply. So many of the buildings that we are talking about only get building permits, they do not need a planning permit, so there are a lot of opportunities under the Building Act to increase the ESD for sure.¹³³

Similarly, Ms Fran Macdonald, Executive Officer, Western Alliance for Greenhouse Action, provided a summary of feedback received from planners across the western metro area:

You do not need a planning permit for many new buildings, particularly in the growth areas where planning is a particular problem for emissions and where we are not seeing enough planning for renewables, energy efficiency and greening. There is also fairly haphazard application of principles and standards to deal with climate change. We do not have consistent adaptation standards, apart from sea level rise, and relevant overlays have not been updated in most of our councils.¹³⁴

The current building code requires detached housing to achieve a minimum of 6 stars on the NatHERS scale and for apartment buildings to achieve a minimum of 6 stars averaged across all apartments. Despite the fact that these requirements represent minimum standards, the vast majority of new dwellings are built at, not above, these

¹³³ Ms Allison McCallum, *Transcript of evidence*, p. 12.

¹³⁴ Ms Fran Macdonald, *Transcript of evidence*, p. 7.

standards. In Victoria, 86% of dwellings constructed between 2016 and 2018 had a design that only just achieved the minimum 6 star standard or below and only 3% achieved a rating of higher than 7 stars.¹³⁵ Ms Chapman stated that '[b]ecause it is spread across Australia [the building code] tends to be a minimum standard rather than a desired standard, and that is a real issue.'¹³⁶ In the discussion on the NatHERS rating scheme in Chapter 5, Mr Malcolm McKelvie, Board Member, Gippsland Climate Change Network, noted that '[a] six-star NatHERS house is the worst home you are legally allowed to build'.¹³⁷

FINDING 22: Minimum standards for energy efficiency in new residential construction are standard among the residential design and construction industry. Relatively few new dwellings significantly exceed these standards.

There is clearly substantial scope for improvement of the standard of new construction, especially of single dwellings. Ms Davina Rooney, CEO, Green Building Council of Australia, explored the opportunities in the residential components of the building code and how they are working with the volume building industry to improve the sustainability of residential construction:

The role of that residential construction code, which is seeking to do uplifts, is critical in that space. We know that of the buildings that stand in 2050 more than half of them in the residential space will be built between now and then. So actually getting those minimum standards to an appropriate level and actually partnering with industry to deliver them is critical. Something that we are turning our focus to is very much, as you say, 'There is a large amount of [residential] construction; how do you reach that cohort?'. So we are actually putting together a program that we are due to launch for consultation in April, a volume home builders program where we actually discuss, 'How do you take where the code is going and go there in a voluntary capacity?', so we can actually take some of these opportunities and lead them at scale ...¹³⁸

Sustainability Victoria is also working with the volume building industry through the Zero Net Emissions Homes program. Ms Claire Ferres Miles, Chief Executive Officer, Sustainability Victoria, explained that a key component of that program is looking at skills and construction practices within the industry, noting that there is often a big difference between the thermal performance of a building on the plan and what is actually built:

The builders are saying, 'We think this is a pretty great home'. We do the thermal testing, and there are just holes all over it in terms of its thermal comfort. What they have realised is actually the way they construct their homes is in the wrong order. They

¹³⁵ Trivess Moore, Stephen Berry and Michael Ambrose, 'Aiming for mediocrity: The case of Australian housing thermal performance', *Energy Policy*, vol. 132, 2019.

¹³⁶ Ms Bronwyn Chapman, *Transcript of evidence*, p. 6.

¹³⁷ Mr Malcolm McKelvie, Board Member, Gippsland Climate Change Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 5.

¹³⁸ Ms Davina Rooney, CEO, Green Building Council of Australia, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 46.

seal the house, then they cut holes for windows and then they cut holes for piping, and they effectively reduce the airtight—so what is now happening from the program we have had is they are now thinking of a completely different construction method so that they can actually get a fully sealed home.¹³⁹

Ms Ferres Miles went on to discuss Sustainability Victoria's work with the Department of Education and Training and industry to improve the skills of home builders.¹⁴⁰

As noted in the context of the retrofitting of dwellings (Chapter 5), human health and climate change adaptation are also key concerns with regard to building standards. The City of Melbourne's submission referenced the University of Melbourne's Heat Box study, which demonstrated that during a combined heatwave and power outage most apartment buildings will have indoor temperatures that exceed international health standards.¹⁴¹ Other stakeholders have recommended that the building code take more account of climate adaptation and hazard mitigation, including due to heatwaves, storms and flooding.¹⁴²

A number of stakeholders referred to the consultation on options for updates to the National Construction Code (NCC) that are planned for 2022. These could include a minimum 7-star NatHERS rating for residential construction and potentially a net zero annual energy use requirement, requiring the installation of rooftop solar PV.¹⁴³ Adoption of a more stringent requirement, such as 7-star NatHERS and net zero energy, in the National Construction Code was recommended in multiple submissions.¹⁴⁴ In the *Energy efficiency: NCC 2022 and beyond Outcomes report* this more stringent requirement was termed 'Option 1' and received broad support as part of the study's consultation process.¹⁴⁵ Issues with renewable energy connection and integration, especially in new housing estates, were raised in the *Energy efficiency: NCC 2022 and beyond Outcomes report*.¹⁴⁶ Integration of renewable energy into the electricity grid, with measures such as microgrids and appropriate control systems, are discussed in Chapter 4.

Other submissions, such as the South East Councils Climate Change Alliance submission, recommended a more prescriptive approach, with requirements for particular energy efficiency elements and the elimination of gas appliances.¹⁴⁷ While

¹³⁹ Ms Claire Ferres Miles, Chief Executive Officer, Sustainability Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 27.

¹⁴⁰ *Ibid.*, pp. 27–8.

¹⁴¹ City of Melbourne, *Submission 120*, p. 25.

¹⁴² Greater Shepparton City Council, *Submission 108*, p. 5; City of Melbourne, *Submission 120*, pp. 25–6; Victorian National Parks Association, *Submission 50*, received 23 August 2019, p. 8.

¹⁴³ Ms Davina Rooney, *Transcript of evidence*, p. 49; Australian Building Codes Board, *Energy efficiency: NCC 2022 and beyond: Outcomes report*, Commonwealth of Australia and States and Territories of Australia, Canberra, 2019, p. 3.

¹⁴⁴ For example: Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 7; Western Alliance for Greenhouse Action, *Submission 143*, p. 23; City of Greater Bendigo, *Submission 128*, p. 6; City of Darebin, *Submission 124*, p. 4; Ms Lauren Watt, *Transcript of evidence*, p. 16; Victorian Planning Authority, *Submission 115*, received 30 August 2019, p. 4; CERES, *Submission 96*, received 26 August 2019, p. 6.

¹⁴⁵ Australian Building Codes Board, *Energy efficiency: NCC 2022 and beyond*, pp. 13–14.

¹⁴⁶ *Ibid.*, pp. 25–6.

¹⁴⁷ South East Councils Climate Change Alliance, *Submission 136*, p. 6.

such a prescriptive approach may have its own merits, a performance-based approach consistent with Option 1 is supported by more stakeholders and is consistent with current energy efficiency standards in the building code.

However, the Committee is cognisant of the difficulties of introducing changes that might impact construction costs in light of the current economic circumstances, and for that reason does not propose any changes to the NCC in the near term.

Nonetheless, the Committee thinks the market should be incentivised to construct high performing 7, 8, 9 or 10 star dwellings.

The COAG Energy Council developed the *Trajectory for Low Energy Buildings* to outline key national reforms over the next decade to produce zero energy and carbon ready buildings. These are buildings that ‘have an energy efficient thermal shell and appliances, have sufficiently low energy use and have the relevant set-up so they are ‘ready’ to achieve net zero energy (and carbon) usage’ when combined with renewable energy installations.¹⁴⁸ The Trajectory flags an increase in standards in each triennial update to the NCC. The Committee believes market economies function more efficiently where the best information is more readily obtained. The Committee supports better ‘sign-posting’ of anticipated future standards beyond any 2022 updates to the NCC. This would enable industry to bring products and practices to market at a more affordable price and facilitate better long-term business planning.

RECOMMENDATION 47: That, as part of the implementation of the *Trajectory for Low Energy Buildings*, the Victorian Government seek clear advance guidance for construction businesses on target energy performance standards that will form part of any planned updates to the National Construction Code beyond 2022.

Many buildings require both a planning permit and building permit, and thus should comply with sustainability provisions that flow from both sets of regulations. However, this does not always occur. Ms Palich noted that sustainability commitments present in a planning permit sometimes do not make it into the building permit, which means that it is not subsequently verified.¹⁴⁹ Ms Palich went on to explain that

in Victoria there is less alignment between the planning and the building regulation than there is in other states. I certainly think that they could be brought together to work more effectively together. New South Wales has an approach that does that. They use BASIX, and they have a set of sustainability requirements that you consider at planning if you need a planning permit. If you do not need a planning permit, then all of the considerations are considered at building. It is a more streamlined process than what it is in Victoria.¹⁵⁰

¹⁴⁸ COAG Energy Council, *Trajectory for low energy buildings*, Commonwealth of Australia 2018, p. 4.

¹⁴⁹ Ms Natasha Palich, *Transcript of evidence*, pp. 12–13.

¹⁵⁰ *Ibid.*, p. 13.

Many council representatives agreed that improving the interaction between planning and building regulation, with a focus on the implementation of sustainability requirements, would have positive outcomes on the quality of construction.¹⁵¹ While no reform models have been proposed to the Committee, it considers further investigation of options worthwhile.

RECOMMENDATION 48: That the Department of Environment, Land, Water and Planning consult with local government and the building industry on options to improve the alignment of planning and building regulation to better consider climate change impacts and environmentally sustainable design.

Improvements to the building code may also have impacts on the retrofitting of existing dwellings. Ms Rooney stated that a key part of improving the building code is that it will have flow on effects on the availability of sustainable building products and services in the market:

The other piece is supply chain. One of the reasons why regulatory is such a tool in the new space is that if you require a 7-star NatHERS house you increase the requirement on fabric, and suddenly you mean that higher quality products are available at scale in Australia. Then you also train all the key builders and their tradesmen in how to do these products well. This then trickles into the existing market.¹⁵²

Improved availability of sustainable building products is likely to improve the ease and cost for existing homeowners to retrofit their properties.

6.4.5 Building inspection and permitting

Even with more stringent building codes, low compliance with energy efficiency and sustainability requirements could undermine any new standard. The need for increased compliance and enforcement of existing code requirements was raised by several stakeholders.¹⁵³ Ms Macdonald viewed compliance with the mandatory 6-star NatHERS rating as particularly poor.¹⁵⁴

Ms Julia Cabbage, Chief Executive Officer, Australian Institute of Architects, agreed with other representatives that compliance and enforcement need to be increased. She recommended that increased inspections are needed to ensure that buildings are constructed to code and as per the detailed plans:

So it really is about: are we on site? Are people seeing what is being built? Are they actually aware of whether or not that product has been substituted? Who is actually

¹⁵¹ For example: Mr Mike McIntosh, *Transcript of evidence*, p. 13; Ms Elyse Kelly, Environmental Coordinator, Mitchell Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 12; Ms Allison McCallum, *Transcript of evidence*, p. 12.

¹⁵² Ms Davina Rooney, *Transcript of evidence*, p. 50.

¹⁵³ For example: Mr Chris Barfoot, Board Member, Gippsland Climate Change Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 5; City of Port Phillip, *Submission 93*, p. 3; Moreland City Council, *Submission 116*, p. 5; City of Darebin, *Submission 124*, p. 4.

¹⁵⁴ Ms Fran Macdonald, *Transcript of evidence*, p. 7.

being able to manage that? So it becomes problematic, because we do not see enough of that, and there is not enough regulation. If you look at what is happening with the New South Wales inquiry at the moment into building up there, they are clearly stating that building defects are there in most instances because nobody is actually regulating what is going on. So getting somebody back on site to be able to actually check that that is occurring ...¹⁵⁵

Ms Palich recommended a regime with increased inspections, that also address conditions that have been placed on the development during the planning permit process to close the loop between planning and building regulation:

[I]ndustry have been advocating for a new verification regime during the construction process to test some of these things. Because at the moment there are typically four points where the building surveyor will go on site, and they will assess things that relate to the building code. They will assess things relating to sustainability only as it pertains to the building code requirements, not as it pertains to planning permit conditions. So therefore the onus comes back onto council to check during that construction process that the commitments made at planning are being realised on site.¹⁵⁶

The South East Councils Climate Change Alliance recommended that a range of inspection and verification measures should be adopted, including a performance-based assessment, featuring a blower door test, use of the Victorian Residential Efficiency Scorecard and additional building surveyor visits to ensure correct draught sealing and installation of insulation.¹⁵⁷ Additional inspections may reveal that measures such as insulation haven't been installed correctly, but additional tests may also be required to ensure that the building is performing up to standard. Ms Palich explained one of the test types and also outlined her support for a performance-based assessment:

There is talk of doing what is called blower door tests, which is when you will go into a building after it is constructed and see how much air leakage there is, which really only determines the performance of the envelope. ... A shift to buildings having to demonstrate their actual performance would be the regulatory outcome that would see change, but incorporating a checking mechanism at the occupancy permit stage so that the builder can rectify anything before moving off—on things that you can do like looking at the invoices of the products that have been put into the building, doing the blower door test, ensuring that all the elements are on site.¹⁵⁸

If amendments to the building code require zero net annual energy use, performance-based assessments may need to occur post-occupancy. These could examine how a building's inhabitants use energy and whether that is consistent with the building code requirements. Ms Cambage suggested that looking at how a site is

155 Ms Julia Cambage, Chief Executive Officer, Australian Institute of Architects, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, pp. 63–4.

156 Ms Natasha Palich, *Transcript of evidence*, p. 13.

157 South East Councils Climate Change Alliance, *Submission 136*, p. 6.

158 Ms Natasha Palich, *Transcript of evidence*, p. 15.

being inhabited and used after construction could also add substantial value to code implementation:

[A] post-occupancy survey, and we do not do it in Australia—actually talk to the people who are actually using the site every day, whether it is an office, whether it is a home, whatever it is, to have those conversations. Post occupancy, I think, is something we need to start building into our design in Australia because ultimately it will provide us with a different view and that will come to support what you do as well. I have been speaking to registrars around the country and I know that they are actually quite interested in actually being engaged in that piece of work as well. Europeans do it quite regularly.¹⁵⁹

In reviewing options to improve the alignment of planning and building regulation (Recommendation 48), measures to improve compliance with building code and permit requirements should also be reviewed. Such a review could consider a new verification regime including additional tests, measures to increase the skills of building inspectors and surveyors, the conduct of an environmental audit prior to issuing a certificate of occupancy, and the introduction of post-occupancy surveys.

RECOMMENDATION 49: That the Victorian Government explore options for improving compliance with sustainability requirements of planning and building.

6.5 Local government and transport emissions

While local governments may play a relatively small role in the development and implementation of transport policy and its impact on emissions, they do operate substantial vehicle fleets. The Committee received some submissions that discussed the purchase of electric and hybrid vehicles by local governments for their emissions reduction potential and lower total cost of ownership.¹⁶⁰ Of those councils that provided data on the number and type of electric vehicles (EVs) in their fleet, the leading council was Moreland which has a total of 14, followed by Hobson's Bay with five and which is also trialling a hydrogen powered car.¹⁶¹

Mr John Baker, CEO of Mornington Peninsula Shire Council, discussed the council's commitment to introducing electric vehicles into the fleet:

I should also add that the shire is walking the talk when it comes to driving down our own transport emissions. We have invested very heavily in our own electric fleet, indeed my own car and the mayor's car are electric—I parked downstairs today—so we have invested very, very heavily in electric vehicles. But more importantly we are actually progressively transitioning the whole shire fleet to electric.¹⁶²

¹⁵⁹ Ms Julia Cambage, *Transcript of evidence*, p. 65.

¹⁶⁰ For example: Central Victorian Greenhouse Alliance, *Submission 113*, p. 5; Western Alliance for Greenhouse Action, *Submission 143*, pp. 12–13.

¹⁶¹ Western Alliance for Greenhouse Action, *Submission 143*, p. 13; Moreland City Council, *Submission 116*, p. 3.

¹⁶² Mr John Baker, CEO, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 13.

Regional councils such as Shepparton have also purchased electric vehicles for their fleets, however, others referred to the difficulty of fleet integration due to the greater distance from suppliers who can service the vehicles.¹⁶³ Ms Sharon Terry, Team Leader, Sustainability and Environment, Shepparton City Council, outlined Shepparton's commitment to EVs:

[T]he electrification of our fleet is something we are very passionate about. This current financial year two electric vehicles were procured, and they are in use in the fleet. Next year we will increase that, and that will incrementally increase over time. At the moment we are just focusing on transport, on passenger vehicles, but we are very keen, like most local governments, to expand that into our heavy vehicle use.¹⁶⁴

The vehicles currently owned by Shepparton City Council have a relatively small driving range and range anxiety has been an issue for their staff. Nevertheless, Ms Terry explained that

those vehicles are very much fit for purpose, so for us they are not really to go outside of the municipality—potentially for us to go to Benalla or one of our neighbouring councils for a meeting and then come back. Any further we know we are probably not going to have access to the charging infrastructure, so we cannot take that vehicle on those trips.¹⁶⁵

Access to public fast charging infrastructure is a limitation on electric vehicle travel for council staff and members of the public, as Ms Terry explained:

We get a lot of queries around people asking: 'Can I charge our cars up anywhere around Greater Shepparton?'. Unfortunately there is only really one option at this point for a public charge station, and that is at a winery, and it is a Tesla charger [which are only compatible with Tesla vehicles]. So it really is an issue, the ability for people to move around the state and the country in electric vehicles at a rate at which we are used to.¹⁶⁶

¹⁶³ Greater Shepparton City Council, *Submission 108*, p. 2; East Gippsland Shire Council, *Submission 144*, p. 13.

¹⁶⁴ Ms Sharon Terry, *Transcript of evidence*, p. 9.

¹⁶⁵ *Ibid.*, p. 16.

¹⁶⁶ *Ibid.*

Figure 6.1 Fast charging station in Mildura



Mildura Fast Charger site visit (left to right): Darren Cheeseman MP (Chair), Paul Hamer MP, Will Fowles MP, electric vehicle drivers and Jay Smith, Environmental Sustainability Coordinator, Mildura Rural City Council.

Source: Committee Secretariat.

To address the issue of charging infrastructure, councils are collaborating to develop an electric vehicle charging network across regional and rural Victoria. The Central Victorian Greenhouse Alliance outlined the ‘Charging the Regions’ project in its submission:

The CVGA is leading on a project with 43 rural/regional councils across Victoria to investigate a local government led electric vehicle charging network. This network will encourage the uptake of electric vehicles by addressing the key barrier of range anxiety and ensure that regional towns are not left behind in the transition to electric vehicles. Local governments are well placed to facilitate and support the State Government to develop a comprehensive statewide network. This project provides councils with a stronger understanding of the investment options and their role in provision of public charging infrastructure.¹⁶⁷

The final outcomes report from the Charging the Regions project was released in April 2020. The report envisages a network of DC fast chargers—of the order of 25–50 kW—in 30 priority towns across Victoria that don’t have access to fast chargers and are either tourist destinations or important for regional connectivity. This network could provide both a revenue source for the council or a third party through the

¹⁶⁷ Central Victorian Greenhouse Alliance, *Submission 113*, p. 4.

charging infrastructure and economic development as travellers visit local shops and attractions while they wait for their vehicle to charge. The report envisages that the Victorian Government may be able to provide some funding or finance to establish this network, of which the total initial value would be approximately \$5 million.¹⁶⁸ The role for the Victorian Government could also be to fund the installation of ultra-fast chargers—of the order of 350 kW—as these are substantially more expensive. The Committee considers the development of a robust EV charging network across regional Victoria to be critically important in making the state EV-ready and promoting regional economic development and tourism.

RECOMMENDATION 50: That the Victorian Government provide funding to the development of a regional fast charging network as set out in the *Charging the Regions Outcomes Report*.

Other low emissions vehicle technologies are also being examined by councils. While not as widespread as electric vehicles, hydrogen-powered vehicles are touted by some as ideal for particular use cases, such as more rural shires. Ms Hammond indicated that hydrogen fuelled vehicles could be a better option in their council area:

[I]t is just a real shame that we do not have hydrogen happening in this state and in this country because it has a bigger range, it is very quick to fill up and it would be a great economic resource for Australia as well.¹⁶⁹

Beyond these benefits, the potential for non-fossil fuel transport alternatives to protect rural communities from the effects of fuel supply crises was also discussed. Ms Hammond discussed the results of a study on the council's vehicle fleet:

[I]f we run out of fuel—we truck our water into the regions, we put out our fires with trucks, our main agricultural resources are trucked out of the area, and we will be devastated if we do not have fuel. So we need an alternative fuel resource in our shires, and council will need to step up if any sort of fuel disaster happens. So we want to be electrified or hydrogenised, and it is a really massive unseen risk for Australia and Victoria and our rural economies.¹⁷⁰

While the majority of stakeholder activity on electric and low emissions vehicles has been on the part of local government, other community organisations have promoted the use of electric vehicles and developed charging infrastructure. Bank First—a member-owned bank based in Melbourne—offers discounts on car loans for the purchase of low emissions vehicles. bHive—a platform co-operative in Bendigo—is developing a car sharing system for local businesses.¹⁷¹ Hepburn Wind has installed a community electric vehicle charging station in Daylesford.¹⁷²

¹⁶⁸ Ndevr Environmental, *Charging the Regions: Local Government EV Charging Network Study: Component 5 – Outcomes Report*, report for Central Victorian Greenhouse Alliance, 2020.

¹⁶⁹ Ms Carole Hammond, *Transcript of evidence*, p. 16.

¹⁷⁰ Ibid.

¹⁷¹ Business Council of Co-operatives and Mutuals, *Submission 104*, received 26 August 2019, pp. 8–9.

¹⁷² Hepburn Wind, *Submission 64*, received 26 August 2019, p. 2.

Stakeholders called for policy to support the transition to private and commercial low emissions and electric vehicles in Victoria, and called for financial incentives and more charging infrastructure to aid their uptake.¹⁷³ Many of the policy options to support electric vehicles were examined during the 2018 *Inquiry into Electric Vehicles*, which was conducted by the Economy and Infrastructure Committee of Parliament's Legislative Council. It is expected that some of these will be addressed in the Victorian Government's *Zero Emissions Vehicle Roadmap*, to be released during 2020.¹⁷⁴

The Central Victorian Greenhouse Alliance in its submission called for a state-wide program focused on transitioning council fleets to electric vehicles as a way of stimulating the second-hand electric vehicle market.¹⁷⁵ Others also discussed the role of state and local government fleets and the benefits that they can provide, particularly in terms of the wider adoption of electric vehicles.¹⁷⁶ Focusing on fleets to stimulate the second-hand electric vehicle market would likely have strong benefits for communities and community groups by providing low emissions vehicles with a lower up-front cost than a newly purchased vehicle. This is particularly important given the relatively high cost of currently available electric vehicle models in the Australian market.¹⁷⁷ The buying power of fleets could also bring more models of electric vehicles to the Australian market, increasing competition and further lowering cost.¹⁷⁸

RECOMMENDATION 51: That the Victorian Government support the integration of electric vehicles into local government fleets including through:

- a. provision of technical support to regional councils so they have the capability for fleet integration
- b. exploration of financing options for less well-resourced councils.

RECOMMENDATION 52: That the Department of Treasury and Finance integrate electric vehicles into the Victorian Government fleet.

Broader considerations of vehicle efficiency and the electrification of public transport services are discussed in the context of community concerns and initiatives, and the broader uptake of electric vehicles in Section 7.2.

¹⁷³ For example: Mr Ken Matthews, *Submission 12*, received 25 July 2019, p. 1; CERES, *Submission 96*, p. 6; Hepburn Shire Council, *Submission 119*, p. 14.

¹⁷⁴ Department of Environment, Land, Water and Planning, *Zero emissions vehicles: Part of our transition to a net zero emissions economy*, 2019, <<https://www.energy.vic.gov.au/renewable-energy/zero-emissions-vehicles>> accessed 16 January 2020.

¹⁷⁵ Central Victorian Greenhouse Alliance, *Submission 113*, p. 10.

¹⁷⁶ Ms Lorraine Bull, President, Latrobe Valley Sustainability Group, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 35; East Gippsland Shire Council, *Submission 144*, pp. 13-14; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 6.

¹⁷⁷ Scott Collie, 'Electric cars cheaper to run, but high prices still a problem: Study', *Car Advice*, 23 July 2019, <<https://www.caradvice.com.au/777650/electric-cars-running-costs>> accessed 11 March 2020.

¹⁷⁸ NSW Department of Planning, Industry and Environment, *Net Zero Plan Stage 1: 2020-2030*, State of NSW, Sydney, 2020, p. 18.

6.6 Local government waste management

Local governments are responsible for the collection of household waste and many operate landfills which contribute to Victoria's greenhouse gas emissions. Methane is produced in landfills by decaying organic matter, such as food and garden waste. Methane is a potent greenhouse gas, with a substantially higher impact on global warming than carbon dioxide.¹⁷⁹ Approximately 40% of household waste collected from kerbside bins is organic waste.¹⁸⁰ Councils have sought to reduce this impact by capturing the methane emissions from landfills and burning it to produce carbon dioxide, in some cases also generating electricity.¹⁸¹

Mornington Peninsula Shire Council have sought to reduce waste from council operations and recently voted to eliminate single-use plastics in council operations.¹⁸² Mr John Baker, CEO, explained how Mornington Peninsula Shire Council is working to implement this commitment:

[W]e are reviewing everything that we do from the perspective of being plastic free, and of course it touches everything. We have a two-year plan around how we are going to go about it—methodically going through the organisation.¹⁸³

Many councils are seeking to divert organic waste from landfill through the establishment of Food Organics and/or Garden Organics (FOGO) programs. These separate kerbside or commercial collection arrangements are for food waste and/or garden waste and produce mulch or compost, or use anaerobic digesters to produce biogas and fertiliser. These products may be used on council-owned parks and gardens or sold commercially, and in the case of biogas can be burnt to produce heat and electricity.

As of May 2019, bins for non-food organic waste—typically from gardens—were offered by 56 of the 79 Victorian councils, with a recovery rate of 66%.¹⁸⁴ Full FOGO kerbside bins—collecting both food waste and garden waste—were offered by 19 councils.¹⁸⁵

¹⁷⁹ Paul Balcombe, et al., 'Methane emissions: choosing the right climate metric and time horizon', *Environmental Science: Processes & Impacts*, vol. 20, no. 10, 2018.

¹⁸⁰ Mr Stan Krpan, CEO, Sustainability Victoria, Legislative Council Environment and Planning Committee, public hearing, Melbourne, 10 May 2019, *Transcript of evidence*, p. 12.

¹⁸¹ Mr Terry Demeo, *Transcript of evidence*, p. 7; Western Alliance for Greenhouse Action, *Submission 143*, p. 12; Surf Coast Shire Council, *Submission 86*, attachment, p. 6; Bass Coast Shire Council, *Submission 36*, p. 3.

¹⁸² Mr John Baker, *Transcript of evidence*, p. 19.

¹⁸³ *Ibid.*

¹⁸⁴ Government of Victoria, *Submission 699*, submission to Parliament of Victoria, Legislative Council Environment and Planning Committee, Inquiry into recycling and waste management, 2019, pp. 39,43.

¹⁸⁵ Mr Matt Genever, Director Resource Recovery, Sustainability Victoria, Legislative Council Environment and Planning Committee, public hearing, Melbourne, 10 May 2019, *Transcript of evidence*, p. 13. Submissions to this Inquiry that mentioned council FOGO collections include: Bass Coast Shire Council, *Submission 36*, p. 3; Central Victorian Greenhouse Alliance, *Submission 113*, p. 5; Moreland City Council, *Submission 116*, p. 3; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 4; Mr Jay Smith, *Transcript of evidence*, p. 4.

Mr Bernie O'Sullivan, Director, Strategy and Growth, City of Greater Bendigo, explained that the council's FOGO collection:

has been in place since 2016—[and is] very successful. In 2018–19 it has diverted over 10 000 tonnes of fresh and organic material from landfill, avoiding approximately 17 000 tonnes in greenhouse gas emissions.¹⁸⁶

The council is looking to expand its collection to outlying villages and to commercial premises, such as cafes and restaurants that generate a lot of food waste. Waste from the FOGO collection is used as compost for council-owned gardens.¹⁸⁷ Mr O'Sullivan went on to discuss the importance of appropriate community behaviour to ensure that contamination of the FOGO waste stream is minimised:

The community education awareness campaigns are really crucial and constructed in a positive way to give people a nudge that that is a contribution they can make. You have got to make it easy, so every household was given a little household bin with organic liners, and those organic liners come out each year—so making it easy for people and also communicating the positive effect it is having.¹⁸⁸

Some councils have recently completed trials of the collection of food organics. Cr Hodge, and Mr Rowan Mackenzie, Manager Environment and Community Safety, Surf Coast Shire Council, explained the recent trial of kerbside FOGO collection:

Mr MACKENZIE: We have trialled the food organics collection. Food waste is a big emitter of emissions, and we have just had a really successful trial completed in Anglesea about the food waste collection, and we are going to now roll that out across the whole shire. We are just going through the preparations for that.

Cr HODGE: It lowered by over 22 per cent in just a small trial, so if we can roll that over and educate the community, who are already wanting it, we are hoping to make that percentage a lot higher in the next year.¹⁸⁹

The Committee visited a pilot facility operated by Hepburn Shire Council, which contains an anaerobic digester, where council are seeking to demystify the technology for the public and gain a greater understanding of how it could be implemented at a larger scale to generate electricity. At the time of its submission, the council was experiencing some challenges in securing local commercial suppliers of the waste and with contamination of the waste stream. However, the council is working to address these challenges.¹⁹⁰

¹⁸⁶ Mr Bernie O'Sullivan, *Transcript of evidence*, p. 3.

¹⁸⁷ *Ibid.*, p. 8.

¹⁸⁸ *Ibid.*, pp. 8–9.

¹⁸⁹ Cr Rose Hodge, *Transcript of evidence*, p. 13; Mr Rowan Mackenzie, Manager Environment and Community Safety, Surf Coast Shire Council, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 13.

¹⁹⁰ Hepburn Shire Council, *Submission 119*, p. 6.

Figure 6.2 Hepburn Shire anaerobic digester

Hepburn Shire Anaerobic Digester site visit (left to right): Paul Hamer MP, Darren Cheeseman MP (Chair), David Morris MP (Deputy Chair), Dominic Murphy, Sustainability Officer, Hepburn Shire Council.

Source: Committee Secretariat

Local governments and Greenhouse Alliances called for greater government support for the establishment of kerbside municipal FOGO collection services.¹⁹¹ Suggestions for support included the establishment of organics processing facilities in regional locations and the extension of collection services to small regional centres and rural areas.¹⁹² Others recommended a greater focus on food organics in commercial waste streams, including by the Regional Waste Management Groups.¹⁹³

The evidence received by the Committee on FOGO appears consistent with that discussed in the report of the *Inquiry into recycling and waste management*, which was completed in November 2019 by the Environment and Planning Committee of the Victorian Parliament's Legislative Council. The evidence gathered in the current Inquiry supports Recommendations 12 and 13 of that earlier inquiry.¹⁹⁴ The Committee also notes that the Victorian Government recently announced that it would introduce a four-bin kerbside waste and recycling system across the state, including a dedicated

¹⁹¹ City of Ballarat, *Submission 78*, p. 5; City of Greater Bendigo, *Submission 128*, p. 6; Central Victorian Greenhouse Alliance, *Submission 113*, p. 10; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 6; Western Alliance for Greenhouse Action, *Submission 143*, p. 23.

¹⁹² Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 6; Cr Jennifer Alden, City of Greater Bendigo, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 9.

¹⁹³ City of Ballarat, *Submission 78*, p. 5; Macedon Ranges Shire Council, *Submission 69*, p. 9.

¹⁹⁴ Parliament of Victoria, Legislative Council Environment and Planning Committee, *Inquiry into recycling and waste management*, November 2019, pp. 74–7.

food and garden organics bin.¹⁹⁵ Community initiatives to reduce waste, increase recycling and rescue food are discussed in Chapter 7.

FINDING 23: The Committee anticipates that implementation of the recommendations of the *Inquiry into recycling and waste management* will address the issues related to waste management raised by stakeholders in this report.

¹⁹⁵ Premier of Victoria, *Transforming Recycling In Victoria*, media release, Melbourne, 24 February 2020.

7 Community initiatives on water, transport, waste management and food

Community climate action is broad and diverse, extending well beyond community energy and education activities. This chapter explores a range of community initiatives, trends and suggested support from government relating to water, transport, waste and food. Victorian communities are seeking to adapt to reduced rainfall and growing water demand through water efficiency measures. Victorians are also increasingly purchasing electric vehicles to address transport emissions. Community groups are implementing a broad range of initiatives to reduce waste and increase recycling and the repair and reuse of products. How we grow and eat food is the focus of other community groups who are engaging in ventures including community gardens, food cooperatives, and food rescue and relief.

Action by local governments across these areas is addressed in Chapter 6.

7.1 Water use and efficiency

As discussed in Chapter 1, average rainfall in Victoria is expected to decline due to climate change. Victorian communities are taking a range of actions to adapt to a drier future by using less water and capturing or reusing stormwater, wastewater and recycled water. Local government efforts to reduce water use and increase water efficiency are discussed in Section 6.3.3.

Yackandandah has installed drinking fountains throughout the town to provide public access to drinking water—which is particularly important during heatwaves—and to reduce the demand for the purchase of bottled water. As the Committee observed during its site visit, Yackandandah’s drinking fountains are also public art pieces, designed and built by a local sculptor, and enable the filling of water bottles and provision of water for pets.¹

¹ Totally Renewable Yackandandah, *Submission 138*, received 16 September 2019, p. 7.

Figure 7.1 Sculptural drinking fountain in Yackandandah



Source: Committee Secretariat

The Port Phillip EcoCentre has developed an innovative approach to encouraging environmental volunteering and the installation of rainwater tanks. The Living Water Workbees program enables community groups, schools and individuals to earn rebates for volunteering for environmental activities. Ms Fam Charko, Acting Executive Officer, Port Phillip EcoCentre, explained how the program functions and some of its outcomes:

For every hour of volunteering a community member puts in, they get a \$25 rebate, and they can save up those rebates and then choose to have that spent on installing a rainwater tank either at a school, at a local business or in their own home, making that infrastructure happen. We are in the last six months now, but in the first two years of the project 6600 volunteers participated, contributing over 10 000 hours of labour in environmental projects, 9100 kilograms of litter were removed and over 12 000 trees were planted by the community. And that actually translated into rebates for 234 square metres of rain gardens being installed in schools and in people's homes and nearly 150 000 litres worth of water tanks to divert stormwater and flush the toilets in schools instead of using good drinking water for that. So in total so far, in the first two years, 2 million litres of stormwater has been diverted on a yearly basis, and that is

going to have effects that will flow on because those rain tanks are there now and they will stay there. The incredible enthusiasm of the volunteers to make this happen in the community and in the schools has been really overwhelming. It has been a really fantastic project.²

The Committee received evidence from a number of other stakeholders to suggest that the installation of rainwater tanks to flush toilets and water gardens by households, businesses and institutions has become increasingly common across Victoria.³

FINDING 24: Victorian communities recognise that saving water is an important climate adaptation measure and have taken steps to reduce their water usage and increase water harvesting.

7.2 Transport

With just over 20% of Victoria's emissions in 2017 resulting from transportation, this sector presents substantial opportunities for emissions reduction.⁴ Stakeholders raised a number of transport issues during the Inquiry, including: encouragement for the take-up of electric and other low emissions vehicles; the promotion of public transport; and the provision of infrastructure that enables active transport such as walking and cycling.

7.2.1 Electric and low emissions vehicles

In 2017 and 2018, the Victorian Legislative Council Economy and Infrastructure Committee conducted an *Inquiry into Electric Vehicles*.⁵ Although the Inquiry into Electric Vehicles made no recommendations, it provided a comprehensive overview of the benefits and challenges of the introduction of more electric vehicles (EVs) into Victoria. A key theme of the final report was the need for Victoria to adapt to international market trends in vehicular transport now that Australia has ceased local production of passenger vehicles. Like the community energy sector (discussed in Chapter 4), Australia's EV sector is rapidly evolving with the roll out of rapid charging infrastructure, the availability of new models, and development of new technologies

2 Ms Fam Charko, Acting Executive Officer, Port Phillip EcoCentre, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 3.

3 For example: Port Phillip EcoCentre, *Submission 133*, received 11 September 2019, p. 4; Emerald Community House, *Submission 102*, received 26 August 2019, p. 2; Mr Ken Matthews, *Submission 12*, received 25 July 2019, p. 1; Eastern Melbourne Climate Alliance Inc, *Submission 61*, received 25 August 2019, p. 2.

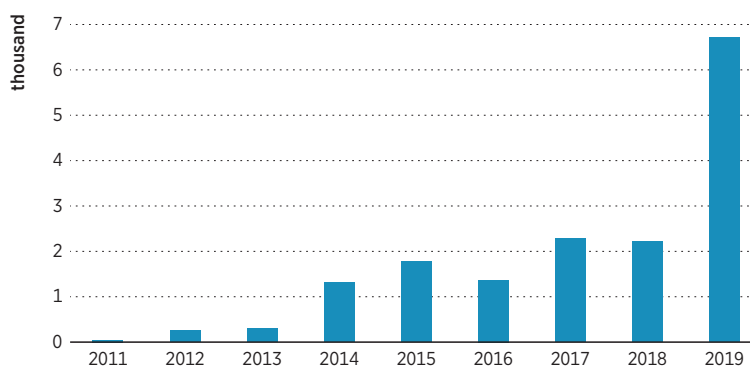
4 Department of Environment, Land, Water and Planning, *Victorian Greenhouse Gas Emissions Report 2019*, State of Victoria, Melbourne, 2019, p. 11.

5 Parliament of Victoria, Legislative Council Economy and Infrastructure Committee *Inquiry into Electric Vehicles*, May 2018.

changing the market.⁶ Internationally, many vehicle manufacturers have plans to switch large portions of new sales to electric and hybrid vehicles over the next 5–10 years.⁷

Victoria had 4,193 sales of EVs between 2010 and 2019, and sales are growing.⁸ Nationally, 2019 saw a substantial increase in the number of new electric vehicles sold, as shown in Figure 7.2. The first months of 2020 continued to see growth in electric vehicle sales, despite an overall contraction in the passenger vehicle market.⁹ Many Victorians are interested in purchasing an electric or hybrid vehicle. Survey data from Sustainability Victoria found that in 2017, 56% of Victorians were interested in purchasing an electric or more fuel-efficient car.¹⁰

Figure 7.2 Number of new electric vehicles sold in Australia



Source: Electric Vehicle Council, *State of Electric Vehicles – August 2020*, 2020, p. 13.

Local governments are also involved in the purchase of electric vehicles for their fleets and the development of charging infrastructure. This is explored further, including the integration of electric vehicles into fleets and the roll out of charging infrastructure, in Section 6.5.

As Australia no longer manufactures passenger vehicles, the adoption of low emissions vehicles is largely dependent on broader conditions in the passenger and light commercial vehicle markets. Several submissions discussed the broader policy environment for low emissions vehicles.¹¹ Some of these submissions argued for the

6 Bridie Schmidt, 'Eight new electric vehicle models set to join Australia market in 2020', *The Driven*, 20 December 2019, <<https://thedriven.io/2019/12/20/eight-new-electric-vehicle-models-set-join-australia-market-in-2020>> accessed 16 January 2020; Australian Renewable Energy Agency, *Ultra fast highway charging network for electric vehicles*, media release, Australian Renewable Energy Agency, Canberra, 26 August 2019; David McCowen, 'How Nissan's next car could make you money', *Drive.com.au*, 9 February 2018, <<https://www.drive.com.au/motor-news/how-nissan-s-next-car-could-make-you-money-117189>> accessed 16 January 2020.

7 Tim Levin, 'All the things carmakers say they will accomplish with their future electric vehicles between now and 2030', *Business Insider Australia*, 29 January 2020, <<https://www.businessinsider.com.au/promises-carmakers-have-made-about-their-future-electric-vehicles-2020-1>> accessed 7 September 2020.

8 National Transport Commission, *Carbon Dioxide Emissions Intensity for New Australian Light Vehicles 2019*, Melbourne, 2020, p. 20.

9 Susannah Guthrie, 'Electric car sales surge in the first five months of this year', *Car Advice*, 4 June 2020, <<https://www.caradvice.com.au/855020/electric-car-sales-australia-2020>> accessed 18 August 2020.

10 Sustainability Victoria, *Victorians' Perceptions of Climate Change: Key Findings - Social Research on Climate Change Attitudes and Behaviours*, Sustainability Victoria, Melbourne, 2017, p. 12.

11 For example: City of Port Phillip, *Submission 93*, received 26 August 2019, p. 5; Women's Climate Justice Collective (Vic), *Submission 153*, received 30 January 2020, p. 6; Mornington Peninsula Shire, *Submission 121*, received 2 September 2019, p. 6.

introduction of fuel efficiency or CO₂ emissions standards for passenger vehicles.¹² The Inquiry into EVs examined national vehicle emission standards, noting that Australia is one of the few industrialised countries without CO₂ emissions standards and that more stringent standards could promote the adoption of low emissions and electric vehicles.¹³ Adoption of more stringent emissions standards would likely have a range of other benefits for human and environmental health and would address concerns that less efficient or more polluting vehicles could be dumped in Australia.¹⁴

Australia's current vehicle emissions standards are based on the European 'Euro 5' standards, which were adopted in Australia in 2013.¹⁵ These standards aim to limit vehicle emissions of nitrogen oxides, carbon monoxide, hydrocarbons and particulate matter. In 2015, Europe adopted the more stringent 'Euro 6' standards. The primary differences between the Euro 5 and Euro 6 standards are the introduction of a new particle number standard (which is a measure of particulate pollution) for direct injection petrol vehicles, and the tightening of nitrogen oxide emissions standards for diesel vehicles.¹⁶

In October 2015, the Australian Government established the Ministerial Forum on Vehicle Emissions to coordinate a whole-of-government approach to addressing emissions from vehicles. Its terms of reference include examining the possible implementation of Euro 6 fuel quality standards and fuel efficiency or CO₂ measures. While the Australian Government has announced new fuel quality standards, it has not announced any further emissions or fuel efficiency standards as at September 2020.¹⁷

Although the Euro 6 standards do not include regulation of CO₂ emissions, the European Union has separately introduced regulations for fleet-wide CO₂ emissions targets.¹⁸

RECOMMENDATION 53: That the Victorian Government advocate to the Australian Government for the adoption of vehicle emissions standards consistent with or better than Euro 6 and for strong consideration of separate CO₂ emissions or fuel efficiency standards for passenger and light commercial vehicles.

12 Bayside Climate Change Action Group (BCCAG), *Submission 62*, received 25 August 2019, p. 3; Bass Coast Shire Council, *Submission 36*, received 21 August 2019, p. 6; Eastern Climate Action Melbourne, *Submission 34*, received 19 August 2019, p. 2.

13 Parliament of Victoria, Legislative Council Economy and Infrastructure Committee *Inquiry into Electric Vehicles*, pp. 58–60.

14 Ibid.; Anna Mortimore, 'Australia's weaker emissions standards allow car makers to 'dump' polluting cars', *The Conversation*, 30 September 2015, <<https://theconversation.com/australias-weaker-emissions-standards-allow-car-makers-to-dump-polluting-cars-48172>> accessed 11 March 2020.

15 Department of Infrastructure, Transport, Regional Development and Communications, *Vehicle Emission Standards*, 2018, <<https://www.infrastructure.gov.au/vehicles/environment/emission/index.aspx>> accessed 11 March 2020.

16 NSW Environment Protection Authority, *TPO1: Trends in Motor Vehicles and their Emissions*, Advisory Committee on Tunnel Air Quality, 2014, pp. 4–5.

17 Department of Infrastructure, Transport, Regional Development and Communications, *Ministerial Forum on Vehicle Emissions*, 2019, <<https://www.infrastructure.gov.au/vehicles/environment/forum/index.aspx>> accessed 11 March 2020.

18 European Commission, *Reducing CO2 emissions from passenger cars - before 2020, 2020*, <https://ec.europa.eu/clima/policies/transport/vehicles/cars_en> accessed 11 March 2020.

7.2.2 Active and public transport

Some local councils and community groups are seeking to reduce car use through the promotion of car sharing or active transport, such as walking and cycling. Initiatives include bicycle user groups, internal car-pooling programs, and the construction of paths and other infrastructure.¹⁹ For example, the Committee visited Ironbark Gully Friends in Bendigo, which has lobbied council to construct a 3km shared user trail through reserves the group has been revegetating. This trail would connect multiple schools and enable greater access for local residents to green space while encouraging active modes of transport.²⁰

A number of submissions called for increased government investment in public transport, especially in regional and rural areas where access and service levels are typically lower than in Melbourne. They also called for the use of electric buses and the purchase of 100% renewable electricity to power Melbourne's train network.²¹

Mr John Baker, CEO, Mornington Peninsula Shire Council, discussed some of the public transport challenges in Mornington Peninsula Shire in the context of the Shire's greenhouse gas emissions and the financial support they would like to see from the Government:

However, a sizable proportion—31 per cent of the total emissions—are from on-road transport. This is pretty high compared to the state average of 19.5 per cent. This is largely due to the high level of private vehicles; that is because of our notoriously poor public transport. In fact we have the second lowest provision of public transport per person in the metropolitan area; 82 per cent of the Mornington Peninsula is not covered by public transport at all so everybody is driving around in cars. By improving our public transport and trialling the use of things like electric buses we believe we can effectively kill two birds with one stone: we can drive down our community greenhouse gas emissions whilst also directly tackling the many social and economic deficits that stem from very poor or inadequate public transport.

So we believe there is incredible potential for the Victorian Government to unlock genuine and lasting environmental and social benefits by working with us to improve our public transport network. For example, we are the perfect location for trialling electric buses because of our mix of urban and rural roads and because of the huge influx of visitors that I just outlined to you.²²

¹⁹ Deakin University, *Submission 158*, received 6 March 2020, p. 2; Port Phillip EcoCentre, *Submission 133*, p. 4; City of Port Phillip, *Submission 93*, p. 2.

²⁰ Anthony Pinda, 'Ironbark Gully Friends look to enhance Bendigo with green corridor which will enhance unused pieces of land', *Bendigo Advertiser*, 29 July 2018, <<https://www.bendigoadvertiser.com.au/story/5553120/vision-for-a-green-corridor-through-bendigo>> accessed 17 January 2020.

²¹ For example: City of Darebin, *Submission 124*, received 2 September 2019, p. 4; City of Melbourne, *Submission 120*, received 2 September 2019, p. 23; COTA Green Sages, *Submission 132*, received 9 September 2019, p. 2.

²² Mr John Baker, CEO, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 12.

Ms Mary Farrow, Manager, Emerald Community House, also discussed the use of electric buses to extend public transport to underserved areas in outer suburban Melbourne and suggested that if the vehicle and infrastructure could be provided, the community would be able to operate the service:

In the Dandenongs we have such limited transportation, and the system is built that way because it was never intended to develop. We held a transport summit at the community house with Yarra Ranges and we had 15 different groups who are involved in transport, including a Yarra Ranges councillor, and what we came up with after talking about how the problem has been going on in the Dandenongs forever—where people cannot get anywhere and the kids suffer from that, they are quite isolated from that and they stop going to school because they cannot get to school—is that we need some kind of shuttle. We need some kind of shuttle that the community can run, and it can just go around to Olinda, Belgrave, Emerald, Monbulk and round and round and round. We said, ‘Let’s get an electric one and let’s provide an electric power point.’²³

Beyond Zero Emissions, in its *Million Jobs Plan* (June 2020), calls for the expansion of public transport services using electric buses and the replacement of 30% of the public bus fleet over the next 5 years with electric buses. There are more than 500,000 electric buses in operation worldwide and some cities have already switched their entire fleets. In addition to the emissions reduction and air pollution benefits, electric buses are cheaper and quieter to run and present substantial potential for job creation in manufacturing.²⁴

The Victorian Government is currently trialling a single electric bus on routes within Melbourne in a partnership with Transdev.²⁵ The Committee considers that there is substantial opportunity to commence a phased replacement of the public bus fleet given the international examples of cities that have switched their bus fleets to electric. This should include the use of electric buses to pilot innovative modes of service expansion, such as demand-responsive transport, to areas that currently have less access to public transport.

RECOMMENDATION 54: That the Victorian Government commence a phased replacement of the public bus fleet with electric buses, utilising learnings from its electric bus trial.

RECOMMENDATION 55: That the Victorian Government use electric buses to pilot innovative and flexible modes, such as demand-responsive transport, for the expansion of public transport services to areas with less access.

²³ Ms Mary Farrow, Manager, Emerald Community House, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 33.

²⁴ Beyond Zero Emissions, *The Million Jobs Plan*, Beyond Zero Emissions Inc., Melbourne, 2020, pp. 56–8.

²⁵ Department of Transport, *First electric bus to hit the road*, 2019, <<https://transport.vic.gov.au/about/transport-news/news-archive/first-electric-bus-to-hit-the-road>> accessed 18 August 2020.

Beyond electric buses, the Committee believes that there is an opportunity to have renewable energy power the metropolitan train network, for example, through the expansion of the Renewable Certificate Purchasing Initiative's Solar Trams Project, which has offset the power consumed by the city's tram fleet.

RECOMMENDATION 56: That the Victorian Government explore options to have the metropolitan train network powered by 100% renewable energy.

Beyond public transport infrastructure, some submissions also called for Government investment in active transport, such as walking paths and cycling infrastructure.²⁶ The Committee anticipates that its upcoming *Inquiry into environmental infrastructure for growing populations* will gather further evidence on the use of open space for active transport.

7.3 Waste reduction and product reuse

In Victoria, waste accounts for 2.4% of greenhouse gas emissions. Emissions from waste have been falling in recent years. Over the period 1990–2017, emissions from solid waste have decreased by 52% and emissions from waste water treatment and discharge have decreased by 51%.²⁷ Alongside emissions from waste itself, there are emissions associated with the production of goods that may later be discarded. Initiatives that are designed to maximise the use, repair, reuse and recycling of goods can avoid emissions associated with the production of new goods.

Many stakeholders called for the Government to address the recycling crisis.²⁸ This was the topic of an inquiry conducted by the Environment and Planning Committee of the Victorian Parliament's Legislative Council over the course of 2019. In November 2019, that Committee tabled its detailed report into recycling and waste management, making 33 findings and 46 recommendations.²⁹ The Victorian Government tabled its response in May 2020, accepting 24 recommendations in full, 20 in principle and two in part.³⁰ Given the extensive detail of this recent report, this section does not seek to explore the topic in detail but instead summarises the relevant evidence received during that Inquiry. The Committee also notes that the Victorian Government recently announced its *Recycling Victoria* policy which includes

26 For example: Bayside Climate Change Action Group (BCCAG), *Submission 62*, p. 3; City of Darebin, *Submission 124*, p. 4; Women's Climate Justice Collective (Vic), *Submission 153*, p. 6.

27 Department of Environment, Land, Water and Planning, *Victorian Greenhouse Gas Emissions Report 2019*, pp. 28–30.

28 For example: City of Greater Bendigo, *Submission 128*, received 5 September 2019, p. 6; Central Victorian Greenhouse Alliance, *Submission 113*, received 29 August 2019, p. 10; LIVE (Locals Into Victoria's Environment), *Submission 56*, received 23 August 2019, p. 3; Mr Gary Paul, *Submission 16*, received 28 July 2019, p. 1; Mr Wo Chong, *Submission 3*, received 17 July 2019, p. 1.

29 Parliament of Victoria, Legislative Council Environment and Planning Committee, *Inquiry into recycling and waste management*, November 2019.

30 Government of Victoria, *Response to the Parliament of Victoria, Legislative Council Environment and Planning Committee, Inquiry into Recycling and Waste Management*, 26 May 2020.

support for community initiatives and a range of other recycling and circular economy interventions.³¹

Many Victorian sustainability groups are engaged in initiatives to reduce waste and increase the reuse of products.³² Some groups have credited the ABC's documentary series 'War on Waste' with increasing public awareness about waste and recycling issues, and a desire to reduce waste and increase reuse and recycling.³³

Plasticwise groups have been established across Victoria to encourage a reduction in single-use plastics through local lobbying, education and provision of alternatives, such as Boomerang Bags.³⁴ Starting in Australia, Boomerang Bags has grown to a global movement of more than 1,000 communities that produce reusable bags from fabric waste. Boomerang Bags estimates that more than 485,000 bags have been made and 169 tonnes of waste have been diverted from landfill.³⁵

The Committee heard from two sustainability groups that are offering mobile dishwashing services for festivals, to reduce waste from single-use food service items. Geelong Sustainability's Wash Against Waste (WAW) service has been used at a number of festivals, including the 2019 National Celtic Festival where the service was integrated into a broader Towards Zero Waste Strategy. This included the rental of 2,400 re-usable meal kits by B-Alternative and the availability of souvenir reusable cups, which avoided the use of 12,000 single-use plastic cups. Volunteers ran the WAW service over the four-day festival, which avoided the use of single-use items for 14,400 servings of food and drink. Implementation of the WAW service, and other strategies, reduced waste by eight tonnes, or 89%. In addition, 58% of that waste was diverted from landfill into recycled waste streams. Despite the success of the program in reducing waste, Geelong Sustainability found its operation on a purely volunteer basis to be highly challenging and that it may be more effectively offered as a social enterprise.³⁶

During a site visit to Yackandandah the Committee learnt of a similar local community project—by Plasticwise Yackandandah—to develop a mobile dishwashing station in a modified horse float. This 'DishPig' was to be used for the first time at the now-cancelled 2020 Yackandandah Folk Festival to help the festival to reduce its waste.³⁷

31 Department of Environment, Land, Water and Planning, *Recycling Victoria: A new economy*, State of Victoria, 2020.

32 For example: Neighbours United for Climate Action (NUCA), *Submission 49*, received 23 August 2019, p. 4; Jesuit Social Services, *Submission 122*, received 2 September 2019, p. 6; Mr David Blore, Member, Benalla Sustainable Future Group, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 23.

33 Geelong Sustainability, *Submission 107*, received 27 August 2019, p. 3; Ms Fam Charko, *Transcript of evidence*, p. 2.

34 For example: Indigo Shire Council, *Submission 131*, received 9 September 2019, p. 2; Benalla Sustainable Future Group, *Submission 152*, received 23 January 2020, p. 4; Mr Colin Lambie, Member, Bendigo Sustainability Group, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 14.

35 Boomerang Bags, *Boomerang Bags*, 2019, <<https://boomerangbags.org>> accessed 24 February 2020; Dr Rowan O'Hagan, *Submission 72*, received 26 August 2019, p. 1; Ballarat Renewable Energy and Zero Emissions Inc. (BREAZE), *Submission 77*, received 26 August 2019, p. 5.

36 Geelong Sustainability, *Submission 107*, p. 4.

37 Mim Poyner, 'Dishpig ready to fly', *Yackity Yak*, Feb/March 2020.

Environmental organisations have called for a ban or phase-out of single-use plastics in Victoria. This could include food-service items such as cutlery, balloons, plastic wrap, and single-use plastic bags.³⁸

Local sustainability groups have encouraged people to continue using products through running repair cafes. These events involve experienced volunteers repairing a variety of household goods free of charge while developing people's repairing skills.³⁹ Ms Lizette Salmon, Co-convenor, Wodonga Albury Towards Climate Health, explained the group's repair cafe to the Committee:

So they get furniture repaired, battery-operated appliances, bikes, clothing and textiles and so on. It was an idea that began in the Netherlands in 2009. In Albury–Wodonga we were the first repair cafe in Victoria in 2015, and there are now 25 repair cafes across Victoria, so it has really had a wonderful ripple effect. We are open once a month, but we have managed to fix 2500 items, so it is a really popular service. And it has wonderful not only environmental benefits but social benefits, because people do not just drop off their items and then leave; they watch, they learn how to repair and it upskills them in the art of repair.⁴⁰

Several submissions called for the government to put greater focus on product stewardship to ensure products are developed with their full life-cycle in mind—including packaging—and improve their efficiency.⁴¹ At a public hearing, Ms Salmon mentioned French planned obsolescence laws.⁴² Under these laws it is a crime to 'deliberately reduce the lifespan of a product to increase the rate of replacement' with penalties of up to two years in prison for executives and fines of up to 300,000 euros and 5% of company turnover.⁴³

Individuals are also seeking to reduce their waste and increase the care with which they recycle.⁴⁴ For example, a Coburg resident informed the Committee of a metal recycling bin they had created for their household.⁴⁵

³⁸ Women's Climate Justice Collective (Vic), *Submission 153*, p. 7; Cardinia Shire Council, *Submission 43*, received 22 August 2019, p. 3; Macedon Ranges Shire Council, *Submission 69*, received 26 August 2019, p. 9.

³⁹ Ms Cathie Steele, Board Member, Bendigo Sustainability Group, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 12; Port Phillip EcoCentre, *Submission 133*, p. 3; Jewish Ecological Coalition, *Submission 130*, received 8 September 2019, p. 1.

⁴⁰ Ms Lizette Salmon, Convenor, Wodonga Albury Towards Climate Health, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 32.

⁴¹ For example: Ballarat Climate Action Network, *Submission 6*, received 18 July 2019, p. 1; City of Wodonga, *Submission 83*, received 26 August 2019, p. 3; CERES, *Submission 96*, received 26 August 2019, p. 6.

⁴² Ms Lizette Salmon, *Transcript of evidence*, p. 33.

⁴³ Rory Mulholland, 'Apple execs could face jail in France after lawsuit over slowing down iPhones', *The Local Fr*, 28 December 2017, <<https://www.thelocal.fr/20171228/french-lawsuit-launched-against-apple-for-alleged-crime-of-slowng-down-iphones>> accessed 17 February 2020.

⁴⁴ For example: Mr Ken Matthews, *Submission 12*, p. 1; Western Alliance for Greenhouse Action, *Submission 143*, received 27 September 2019, p. 14; Ms Fam Charko, *Transcript of evidence*, p. 2.

⁴⁵ Ms Bec Pillari, *Submission 32*, received 19 August 2019, p. 1.

Two submissions called for community-managed schemes to collect, sort and process waste. One idea was neighbourhood-level composting facilities for food and garden waste.⁴⁶ Another suggested a block-by-block collection and sorting regime managed by volunteers.⁴⁷

FINDING 25: Victorian communities are working to minimise waste going to landfill with a focus on reducing the prevalence of single-use items and promotion of the repair of damaged goods.

7.4 Food systems

Many sources of emissions are related to food. These include agricultural emissions associated with food production, electricity and natural gas used in food processing and cooking, emissions associated with food transport, and a substantial proportion of landfill emissions. While initiatives to reduce emissions from these sectors are discussed in this and other chapters of this report, community initiatives to change current patterns of the production and consumption of food have potential to reduce the associated greenhouse gas emissions. For example, some stakeholders discussed changes to their own diet or other initiatives to substitute meat for less emissions intensive foods.⁴⁸ Three key areas of community action are the promotion of home and community gardening, local food cooperatives, and food rescue and relief.

7.4.1 Community gardens and local food

Community gardens provide opportunities for local people to engage in gardening fruit and vegetables, learn and share skills, and access fresh and healthy food. Food grown in community gardens may be used by the gardeners themselves, donated through community organisations or local businesses, or a combination of both. The Committee visited two community gardens, in Daylesford and Newstead, as part of its program of public hearings and site visits.

Community gardens also have social benefits. Ms Genevieve Barlow, spokesperson, Renewable Newstead, explained that in Newstead, 'We have a community garden that is about to celebrate 10 years—very significant because a lot of people come together. It is a social place.'⁴⁹

The Baw Baw Sustainability Network (BBSN) has volunteers which maintain two community gardens in Yarragon to grow fresh and healthy food for local consumption. The food grown in the garden is used by local cafes, shared amongst the volunteers, or

⁴⁶ Women's Climate Justice Collective (Vic), *Submission 153*, p. 7.

⁴⁷ Mr James Rowlands, *Submission 17*, received 30 July 2019, p. 1.

⁴⁸ Ms Cori Nelson, *Submission 58*, received 25 August 2019, p. 1; City of Darebin, *Submission 124*, p. 3; Jewish Ecological Coalition, *Submission 130*, p. 2.

⁴⁹ Ms Genevieve Barlow, spokesperson, Renewable Newstead, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 9.

provided to the public for free at the Yarragon Medical Centre. BBSN's submission also notes the social, skills sharing and community building benefits of community gardens. BBSN also runs an annual open garden weekend called 'Creative Harvest' where locals open their food gardens to share knowledge and skills about local food production.⁵⁰

Some organisations encourage fruit and vegetable growing by people at home, such as Seed Savers Albury Wodonga and My Smart Garden, a program run by Hobsons Bay, Maribyrnong and Moonee Valley councils.⁵¹ Others, such as Jesuit Social Services and Emerald Community House, have established gardens at their facilities to improve access to fresh food and volunteering opportunities for their communities.⁵²

Local food cooperatives provide another means for communities to source locally grown sustainable food. For example, CERES Fair Food is a social enterprise online food delivery service that sources food from local and other Victorian suppliers to improve connections between local producers and customers.⁵³

Friends of the Earth operates a café in addition to their food cooperative. Mr Leigh Ewbank, Coordinator, Act on Climate Victoria, Friends of the Earth Melbourne (FoEM), explained how FoEM sources local food and provides the waste to a local school garden:

Friends of the Earth Food Co-op & Cafe in Collingwood is a case in point. With produce from 150 farmers across the state, the cafe serves organic, seasonal and vegan meals to our community every day. The intentional use of local produce minimises the embodied carbon emissions from excessive transportation, and each year the cafe serves 24 000 plates of food, including to vulnerable people in the neighbourhood. The co-op has also pioneered local organic waste composting to demonstrate ways to reduce methane emissions from food waste going to landfill and to encourage low-carbon food production. All the compostable waste from the cafe is transported to a nearby primary school, which is only a couple of hundred metres away, where it is composted and used by the students to grow vegetables and educate them about the benefits of urban farming.⁵⁴

The Committee also received evidence on food cooperatives outside of metropolitan Melbourne. Mr David Blore, Member, Benalla Sustainable Future Group, outlined the growth of the group's long running food cooperative and the benefit the group sees in minimising emissions associated with long-distance transportation of food:

The first one is our food cooperative started nine years ago. It had a membership then of 12 and it has grown significantly; we just ticked over the 4,000th customer last year. I guess the key benefits that we wanted to achieve, and which we are, are good-quality

50 Baw Baw Sustainability Network (BBSN), *Submission 81*, received 26 August 2019, p. 2.

51 Wodonga Albury Toward Climate Health (WATCH), *Submission 63*, received 26 August 2019, p. 1; Western Alliance for Greenhouse Action, *Submission 143*, p. 14.

52 Jesuit Social Services, *Submission 122*, p. 4; Emerald Community House, *Submission 102*, p. 2.

53 CERES, *Submission 96*, p. 3.

54 Mr Leigh Ewbank, Coordinator, Act on Climate Victoria, Friends of the Earth Melbourne, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 24.

food products sourced locally where possible from local producers and contributing to less food miles and less packaging.⁵⁵

FINDING 26: Victorian communities are deriving a range of social and health benefits, learning about food production, and reducing emissions associated with food miles and food waste by contributing to community gardens.

RECOMMENDATION 57: That the Victorian Government establish a small grants program for neighbourhood houses and community groups to establish, maintain or improve community gardens.

7.4.2 Food rescue and relief

Australia generated an estimated 7.3 million tonnes of food waste in 2016–17. Of that waste, 31% was generated during primary production, 24% during manufacturing, 34% by households, and 11% by other sources. Approximately 44% of this waste is disposed of, 16% is recycled and 40% is recovered. Only 48 thousand tonnes of food were diverted towards food rescue nationwide in 2016–17.⁵⁶ The generation of food waste is highly complex. Drivers include weather and on-farm damage, consumer cosmetic standards, low prices making harvest uneconomical, perishability of different foods, and the discarding of by-products during manufacturing for goods such as dairy products. Not all food waste is edible, such as bones and nut shells. Inedible food waste is typically considered in the total of all food waste. This is to ensure that it is best utilised and not sent to landfill. Reducing waste generally requires consideration of multiple interventions and the assessment of other environmental impacts, such as increased energy and water usage. The Committee notes that the *Recycling Victoria* policy contributes to a national target to reduce Australia’s food waste by 50% by 2030.

Ms Cathie Steele, Board Member, Bendigo Sustainability Group, explained how much of the food that is diverted from waste is used by food relief organisations and the scale of the group’s community owned Foodshare organisation:

We know that food rescue is for food relief, because a lot of that food is suitable for human consumption still ... there are actual food waste in our region that would go to waste if we were not rescuing it. We are a local community group tackling climate change by reducing food wastage, and I will give you some figures. About 120 volunteers work every day—or five days a week, not every day; we are just going to seven days, so I will not get into that yet, it is too hard—to help develop food waste. About 2000 people in the communities around—about 100 kilometres around—we work with.⁵⁷

⁵⁵ Mr David Blore, *Transcript of evidence*, p. 23.

⁵⁶ Arcadis, *National Food Waste Baseline: Final Assessment Report*, Department of Agriculture, Water and the Environment, 2019, p. 4.

⁵⁷ Ms Cathie Steele, *Transcript of evidence*, p. 13.

A number of organisations are engaged in food rescue and relief, including Foodshare, Foodbank, SecondBite, and OzHarvest. Foodshare operates in four regional locations, Albury-Wodonga, Shepparton, Bendigo and Warrnambool, all of which are community owned.⁵⁸ Other stakeholders also mentioned their engagement with food rescue and relief organisations.⁵⁹ Emerald Community House helps distribute food relief and engages in food relief activities of its own through the preparation of meals from food donated by local supermarkets.⁶⁰

Ms Steele went on to discuss the opportunity for a significant increase in the size of the local food rescue and relief program:

So the system is in place here. In just Bendigo alone, we are diverting about 615 000 kilos of food per annum from landfill for zero government cost—state, local, federal: zero—and that could significantly be increased with a little bit of support. It is easily doubled, because we know the food is there. We know it is going to waste. We know we cannot collect it all. We cannot warehouse it and get it out. We know the demand is there. We know that the youth need it, we know the farmers need it and we know the community needs it.⁶¹

Ms Steele estimated that the amount of food rescued by Foodshare could increase to 2.6 million kilograms, resulting in the avoidance of 5.51 million kilograms of CO₂ emissions.⁶² Ms Steele went on to explain that a lack of cooperation between donors of freight capacity and other support leads to duplication of effort and hampers the achievement of food rescue and relief outcomes.⁶³

Given the opportunity for emissions reduction and reports of unprecedented demand for food relief during the COVID-19 pandemic, the Committee considers that there is an urgent need to increase the scope and scale of community food rescue and relief efforts in Victoria. The Victorian Government should collaborate with key existing food relief organisations, suppliers, donors of freight and warehouse space, and other key stakeholders to identify priority areas that could benefit from government assistance as well as opportunities for increased cooperation with the private sector.

RECOMMENDATION 58: That the Victorian Government work urgently with food rescue and relief organisations to identify priority areas for assistance to increase the amount of food diverted from waste and meet higher demand, including through the identification of opportunities to rescue food at all points in the supply chain.

⁵⁸ Ibid., pp. 13, 18.

⁵⁹ Macedon Ranges Shire Council, *Submission 69*, p. 5; City of Wodonga, *Submission 83*, p. 2.

⁶⁰ Emerald Community House, *Submission 102*, p. 2.

⁶¹ Ms Cathie Steele, *Transcript of evidence*, p. 13.

⁶² Ibid.

⁶³ Ibid., p. 18.

8 Agriculture and urban forestry

Agriculture is highly sensitive to climate change and substantial effort will be required over the coming decades to enable the sector to maintain productivity through adaptation. Agriculture also has an increasingly important role to play in mitigating climate change through the reduction of greenhouse gas emissions and carbon sequestration (the locking up of carbon in trees, plants and soil). This chapter discusses the importance of regional projections of climate change impacts and agricultural extension. The chapter also discusses some emerging sustainable agricultural practices that present significant potential in terms of climate change adaptation and mitigation. The use of recycled water for agriculture is also discussed, along with the role of urban forestry and the importance of existing habitat protection.

8.1 Planning for climate change in agriculture

8.1.1 Regional projections of climate change impacts

Information on projected climate change impacts at the scale of individual farms is critical for farmers and farm businesses to plan and prepare for current and future climate change. While high resolution climate projections are increasingly available—such as the Victorian Climate Projections 2019 (VCP19)—this information is not readily interpretable by farmers. Further modelling is required to convert climate projections into practical information, such as expected yields, the frequency of relevant extreme events and water availability for irrigation and stock. Mr Graeme Anderson, Climate Specialist, Agriculture Services Branch, Agriculture Victoria, outlined some of the challenges for farmers in understanding how they should adapt their farm business to climate change:

Farmers are very good at saying that there is successful agriculture happening across all the climate zones in Australia, but there are really different systems as to how they have set that up to deal with that climate, and our challenge for Victoria is the transition of reliable wet seasons to a warming up and having a bit more summer rain occasionally, but it is not reliable. So part of it is: what are those varieties and crops and systems that might translate that we apply here? It is back to the challenge of how people build that into the business—that transition over time.¹

Two examples of projects that seek to present information on climate change impacts in a manner that is actionable by farmers are the *Climate Smart Agricultural Development* project by the Goulburn Broken Greenhouse Alliance (GBGA) and *Embedding Climate Change in Agriculture* by the North East Catchment Management Authority (which is a member of the GBGA, along with the Goulburn Broken Catchment Management

¹ Mr Graeme Anderson, Climate Specialist, Agriculture Services Branch, Agriculture Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 14.

Authority, Department of Environment, Land, Water and Planning (DELWP) Hume, and thirteen municipalities).² Ms Bronwyn Chapman, Executive Officer, GBGA, explained the underlying objective of these projects:

[T]he motivator with this is to protect the region's economic and social base, because agriculture underpins the economies of both regions. That leads to our townships being viable, and all of the rest of it all flows on from there.³

The *Climate Smart Agricultural Development* project was launched in 2015 to assist councils, land managers and the agricultural sector in the Goulburn Broken region adapt to climate change. Cr Marie Martin, Moira Shire Council, outlined the objectives and outcomes of the project:

The project specifically analysed the long-term agricultural viability within the Goulburn Broken region of Victoria. The key focus areas included understanding our current climate and land versatility, understanding our future climate and exploring adaptation actions and new agricultural opportunities in this future climate. The outcome of this project was the development of a spatial mapping tool, which considers topography, climate data, soils and crop requirements for 17 different agricultural commodities.⁴

The *Embedding Climate Adaptation in Agriculture* project examined the impact of projected changes in temperature, rainfall and other weather variables on the yields of various crops in the North East Victoria Catchment Management Authority (CMA) region. The project found that impacts will vary depending on the crop and its location within the region. Ms Chapman summarised some of the projected impacts on agricultural productivity:

So we had a look at that expected yield impact, and this one is showing the change in yield. ... You can see with phalaris [a pasture grass suitable for grazing, hay and silage—see Figure 8.1] the pattern of change is not the same across the catchment, because of the way those temperature and rainfall effects are happening, but it is pointing to definite impacts in that north-west section, but in that central section—white is little change. There are other opportunities across the catchment for looking at this. Then we compared it with rye grass, which was far more affected, as an example. Grapes are showing a decrease in productivity in that section where they are mostly grown, that irrigation section.⁵

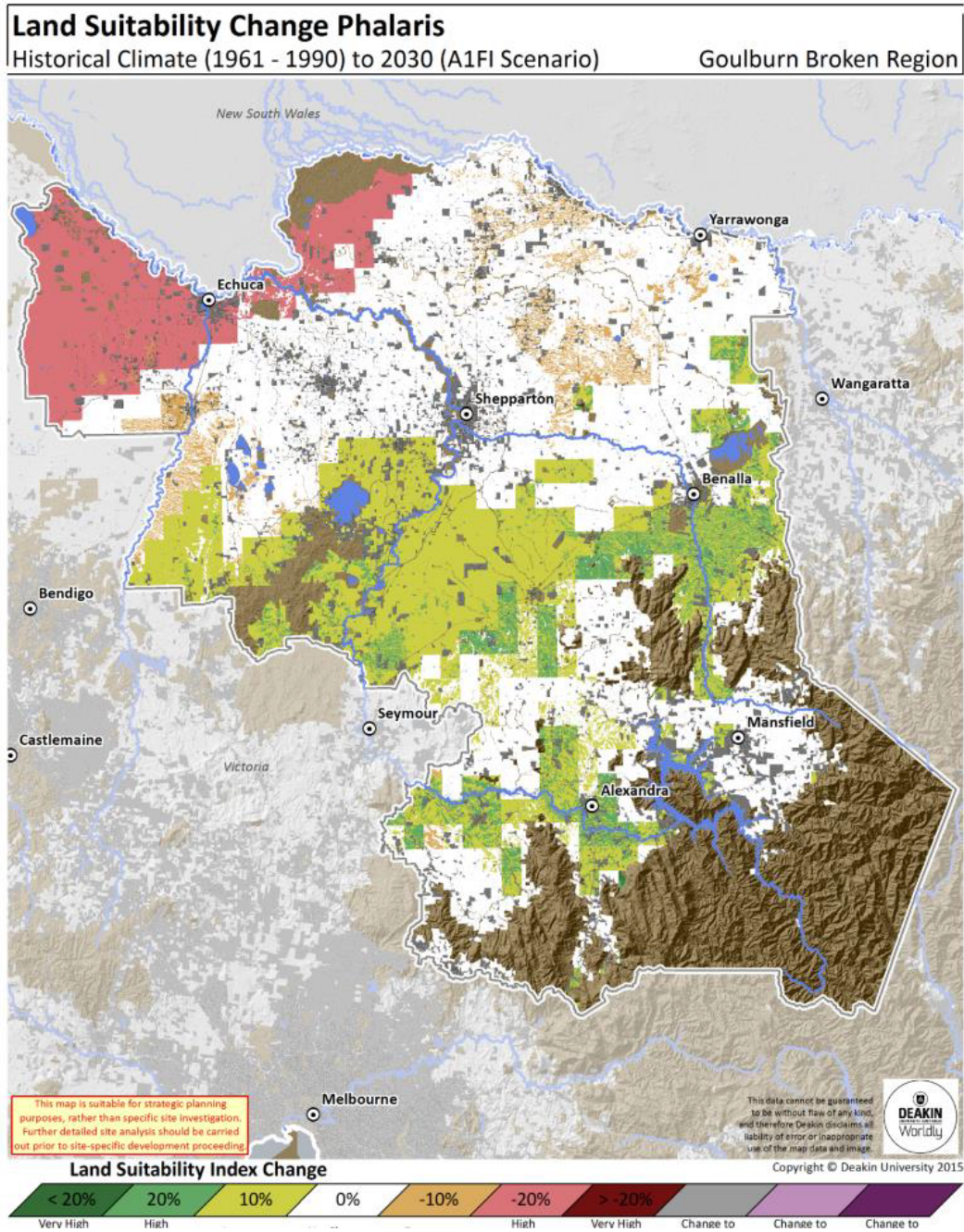
² Ms Bronwyn Chapman, Executive Officer, Goulburn Broken Greenhouse Alliance, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 1; Cr Marie Martin, Moira Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 4.

³ Ms Bronwyn Chapman, *Transcript of evidence*, p. 2.

⁴ Cr Marie Martin, *Transcript of evidence*, p. 4.

⁵ Ms Bronwyn Chapman, *Transcript of evidence*, p. 2.

Figure 8.1 Projected change in land suitability for Phalaris at 2030 in Goulburn Broken region



Phalaris- change at 2030

Source: Ms Bronwyn Chapman, Executive Officer, Goulburn Broken Greenhouse Alliance, *GBGA Presentation to the Inquiry*, supplementary evidence received, 13 February 2020 p. 8.

Developing a better understanding of future changes in the frequency and severity of extreme weather events, such as heatwaves, is also vital, due to the impact that such events can have on animal and human health. Ms Chapman explained the importance

of understanding the impact of climate change on extreme weather events and the importance of recent research by the Bureau of Meteorology (BOM) on this issue:

As I said before, we need more work on understanding these extreme events. That is more difficult work because they are rarer, but the BOM tells us that they are now entering a stage with modelling where they are going to be able to start thinking about that and looking at it. That is really important because it is the extreme events we are seeing that are actually affecting us before those long-term trends; that is our difficulty. So we need to know about them as well.⁶

Ms Chapman agreed with the proposition that the Victorian Government provide financial support for similar modelling to be done by all Catchment Management Authorities, in consultation with industry sectors.⁷ This modelling would need to consult closely with farmers to ensure that results are meeting their needs. Ms Chapman explained the value of working with farmers and expert modellers in the process:

A key feature of it is the way that that information is made available to the user. There is a very particular consultant—every time I show this, anyone who works in the industry says, ‘Oh, did such and such do that work?’. Yes they did, because they are well known for it. So that is the real value of that. That information is out there for other modellers to use, but the way that it is presented, and the fact that we went to growers and said to them, ‘What do you need to know? Why is it important to you?’, means that when we go back to them we can say, ‘Okay, you said “We need this data” because that enables them to assess heat stress, potential soil moisture or that sort of thing’, that makes sense to them.⁸

Victoria’s Commissioner for Environmental Sustainability also called for improved projections for agricultural areas.⁹

The results of climate impact modelling on agriculture need to be communicated to end-users in a manner that enables it to be integrated into on-farm planning. Cr Martin emphasised the importance of extension (see below at Section 8.1.2) in the distribution of results from recent and future modelling projects:

The next steps: financial assistance and resources required to help distribute and champion this vital information to its intended audience. This will enable the modelling and data to reach the land managers and farmers within the Goulburn Broken region, who will be affected by climate change into the future. Extension officer or officers [defined below at Section 8.1.2] sponsored through the Department of Agriculture or Catchment Management Authorities is an appropriate option. We need people to take it to the people.¹⁰

⁶ Ibid., p. 4.

⁷ Ibid., pp. 8–9.

⁸ Ibid., p. 8.

⁹ Victorian Commissioner for Environmental Sustainability, *Submission 141*, Attachment E, received 26 September 2019, p. 12.

¹⁰ Cr Marie Martin, *Transcript of evidence*, p. 4.

Given the critical importance of agriculture to feeding Victorians and its place in the Victorian economy, the Committee considers it of utmost importance that farmers understand the potential impacts of climate change at a farm level and are provided with the tools and support to adapt their farming practices. The provision of actionable information on climate change impacts is a key component in ensuring this understanding.

RECOMMENDATION 59: That the Department of Environment, Land, Water and Planning work with Agriculture Victoria, Greenhouse Alliances, Catchment Management Authorities, the Bureau of Meteorology, CSIRO, farmers and other stakeholders to produce regional projections of climate impacts on agriculture. These projections should be made available through online tools, and support should be provided to farmers to ensure they can integrate them into their businesses. This work should seek to expand on the approach taken by projects such as the North East Catchment Management Authority's *Embedding Climate Adaptation in Agriculture*.

8.1.2 Agricultural extension services

Agricultural extension refers to the process of enabling change, based on scientific and technological advances, to make farming more profitable and sustainable.¹¹ Extension services can be provided by governments, corporations or farmer-driven research groups. Extension services are also increasingly recognised as having a critical role to play in helping farmers to adapt to climate change and mitigate its effects. Agricultural extension officers

are intermediaries between research and farmers. They operate as facilitators and communicators, helping farmers in their decision-making and ensuring that appropriate knowledge is implemented to obtain the best results with regard to sustainable production and general rural development.¹²

Mallee Sustainable Farming represents an example of extension through farmer-driven research. Established in 1997, Mallee Sustainable Farming operates across the Mallee regions of Victoria, New South Wales and South Australia. The organisation works with farmers, research organisations and government agencies to produce practical research for its members. Ms Tanja Morgan, Program Manager, Mallee Sustainable Farming, outlined the organisation's approach:

The research was farmer led and farmer driven, and it still is to this day. The bottom-up approach involving researchers and advisers always gives a better outcome as farmers can better direct the research right from the start, and the researchers and advisers are there to problem solve. Together the results were better adapted and more rapidly adopted, and we saw that time and time again over our 20-year history. The 2000s

11 Enablers of Change, *What is agricultural extension?*, 2019, <<https://www.enablersofchange.com.au/what-is-agricultural-extension>> accessed 30 September 2020.

12 PACE Career Centre, *Agricultural Extension Officer*, 2020, <<https://commonwealth.gostudy.net/occupation/agricultural-extension-officer>> accessed 30 September 2020.

drought helped to provide the catalyst for farmers to adapt much more rapidly—there is no doubt about that—and MSF was there to support them to make sure that they succeeded.¹³

Many Victorian farm businesses are already adapting their operations and diversifying their farming activities in response to climate change.¹⁴ In the case of larger farming enterprises, this is often in response to climate change research that they have initiated. Ms Chapman gave the example of Brown Brothers as a leader in long-term planning for climate change:

I guess the stand-out, and not because of our projects, is Brown Brothers. I do not know if you have heard—you probably know—they have bought land in Tasmania. Brown Brothers is a 100-year-old business, and they intend to be here for the next 100 years. They will not be growing the grapes [where] they are now in Milawa; they know that. They have known pre this work what was happening; they had their own work done. One of the things they found—so they are testing new grape varieties and the like, and this is where that is a real advantage to our region to have Brown Brothers here, because they basically do work that assists all the other growers to understand what the pathway might be. And that leader in the region can be so important.¹⁵

Local government can also play an important role in supporting farmers with climate adaptation. East Gippsland Shire Council established the East Gippsland Drought Reference Group and together with Wellington Shire Council developed the Gippsland Drought Response Proposal. This proposal developed detailed recommendations for governments to assist farmers to recover from recent drought, reduce on and off-farm impacts and adapt to future changes to the climate. East Gippsland Shire Council has stated that implementation of the recommendations would better position the agriculture sector in the region to adapt to a changing climate.¹⁶

Landcare is also an important network for providing farmers the information and support they need to diversify their farming activities.¹⁷ For example, Bass Coast Landcare Network has developed a Climate Change Land Capability and Capacity Project to equip landholders with information on climate change adaptation. The project is developing 12 case studies across southern Gippsland on climate resilience and adaptation in agriculture, as well as a website with resources and decision support tools for farmers.¹⁸ Yarram Yarram Landcare Network has assisted farmers to trial different pasture species that are better able to handle longer periods of hot and dry weather.¹⁹

¹³ Ms Tanja Morgan, Program Manager, Mallee Sustainable Farming, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 17.

¹⁴ See for example: Mr Graeme Anderson, *Transcript of evidence*, pp. 6–8; Friends of the Earth, *Submission 145*, received 12 November 2019, p. 4; Landcare Victoria, *Submission 148*, received 23 December 2019, p. 2; Wodonga Albury Toward Climate Health (WATCH), *Submission 63*, received 26 August 2019, pp. 1–2.

¹⁵ Ms Bronwyn Chapman, *Transcript of evidence*, p. 8.

¹⁶ East Gippsland Shire Council, *Submission 144*, received 30 September 2019, p. 15.

¹⁷ Landcare Victoria, *Submission 148*, pp. 1–2.

¹⁸ Landcare Networks in West Gippsland, *Submission 40*, received 22 August 2019, p. 2.

¹⁹ *Ibid.*

Government research also provides a vital foundation for agricultural extension aimed at climate adaptation and mitigation. Examples include: genetic research to improve the heat tolerance and reduce the methane emissions of dairy cattle; research into feed additives; investigation of the effects of increased CO₂ levels on grain production; and the development of new varieties of pulses for commercialisation.²⁰ Mr Anderson summarised the role of Agriculture Victoria in providing climate related information and research to Victorian farmers:

We do over 140 forums a year, working with agriculture stakeholders or advisers or Landcare groups, where we are invited to come and speak and share information on climate. We have a climate webinar series—there is one tomorrow—which is just trying to make this information more accessible, and people can watch recordings at a time that suits. The Climatedogs animations—I am not sure if you have seen them. We have done them for Victoria, explaining the science of climate and what is behind our big drivers of variability, and they have been taken nationally. There are farm sessions on farm water supply, soil erosion, maintaining ground cover and farm planning. There are dairy and irrigation workshops that are happening at the moment around climate risk. We have livestock network programs like BetterBeef and BestWool/BestLamb and a key element of all of those is setting farms up to deal with greater variability within livestock systems. The Horticulture Industry Network have a number of meetings where they focus on climate. We have dry season support infrastructure grants. It is largely about, as we go through each dry season, learning from that and building back better.²¹

Agriculture Victoria also makes effective use of information technology in the delivery of its extension activities. Professor German Spangenberg, Head, Agriculture Victoria Research, Agriculture Victoria, explained how research on dairy cattle genomics is made available to farmers through an app:

There are also new channels for delivering information. For example, what I have tried to illustrate is how digital technologies assist, and industry is then fully empowered to access relevant information. As an example, all the animal genetic innovation that we do for the dairy industry is basically delivered through an app, that every farmer will have access, to via an industry-owned non-for-profit data company. So in a sense there are now more channels and more technologies that facilitate tailored delivery of information to growers.²²

The extension sector has gone through substantial change over the years, with services previously provided by governments now increasingly provided by the private and non-government sectors.²³ Mr Anderson described this shift:

Perhaps in the 1960s there was a much greater emphasis on departments of agriculture as the key extender of science information. Since that time there has been a really large

²⁰ Professor German Spangenberg, Head, Agriculture Victoria Research, Agriculture Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, pp. 1–5.

²¹ Mr Graeme Anderson, *Transcript of evidence*, p. 7.

²² Professor German Spangenberg, *Transcript of evidence*, p. 10.

²³ Rural Innovation Research Group, *Stimulating private sector extension in Australian agriculture to increase returns from R&D: Research Report C: The advisory and extension system (National and State)* Faculty of Veterinary & Agricultural Sciences, University of Melbourne, 2018.

growth of other providers who deliver services to farmers, so farmers get advice now from the retail sector where they are buying all their plumbing equipment and that sort of thing.²⁴

Government extension often occurs in cooperation with the private sector. Mr Anderson provided an example under the Federal Government's Carbon Farming Initiative to provide farmers with information on how to modify fertiliser use to reduce greenhouse gas emissions:

We teamed up with Fertilizer Australia, and they have a Fertcare accredited training program. We packaged up the science and worked with them on that, and so that was put into all of their training and accreditation programs for fertiliser advisers—who are Fertcare approved—and their fert spreaders on understanding nitrous oxide emissions and soil carbon. So it is an example of that partnership, and all of those farmers who use Fertcare-approved providers are getting that advice with the greenhouse stuff embedded in. So there are ways of doing it, and that is our challenge of 'How do we do it in a partnership?' ...²⁵

Mr Grady Powell, Policy and Advocacy Manager, Victorian Farmers Federation, agreed that much of the extension work previously done by government organisations has moved to the private sector but that this approach can present challenges for farmers in seeking the best advice:

Victoria is not alone in their reduction of extension officers; that has been countrywide. I think agriculture is a very commercial space where you have got people pushing chemicals, fertiliser and the like on you. So they certainly had value, because it was independent advice. I think at that time they had a relationship with the farmer and they were trusted to try and cut through that commercial noise. I think we have moved past that a little bit as an industry now, where we do have reliance on our RDCs [Research and Development Corporations], and we rely on them for that advice. But also I think that, I guess, transition away from those extension officers has also galvanised relationships between farmers and their agronomists as well. So now it is a bit of a patchwork of trying to find the best advice and applying that to your own farming system.²⁶

Ms Morgan also noted the reduction in agricultural extension provided by the State Government and that farmers' groups have moved to address some of these gaps:

The withdrawal of State Government agencies left a hole in the delivery of some basic [research and development] extension. Not only does this leave a gap in delivery that groups like [Mallee Sustainable Farming (MSF)] absolutely must pick up, but it also leaves gaps in capacity in the regions. MSF has taken an unofficial mentoring role for some of these. As an example, we have new recruits coming to the industry, who would often come from the government sector mentored by older experienced agronomists,

²⁴ Mr Graeme Anderson, *Transcript of evidence*, p. 9.

²⁵ *Ibid.*, p. 10.

²⁶ Mr Grady Powell, Policy and Advocacy Manager, Victorian Farmers Federation, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 8.

but there are fewer of these coming through and fewer experienced agronomists also left behind to mentor them. So farming systems groups like MSF are taking on this mentoring role in our regions to make sure that capacity remains.²⁷

Recent collaborative research on agricultural extension in Australia, conducted by the Victorian and New South Wales governments with six Research and Development Corporations (RDCs), found that fewer than half of farmers agreed that they could easily access fee-for-service advice and that such advice would be beneficial. This research identified key risks in the privatisation of agricultural extension that included issues with advice for complex topics and information about the environment.²⁸

Ms Amanda Priest, Coordinator, Environmental Sustainability, Murrindindi Shire Council, explained how an increase in government extension programs, particularly around complex topics, such as regenerative agriculture, would benefit rural areas:

So having roles back in Agriculture Victoria and DELWP in the regions that can sit down and have a cup of tea with farmers and talk to them about these complex areas like regenerative farming—sorry, regenerative agriculture—or sit down and talk to them about how they manage their land and the weeds and pests, because they are going to become more and more profound in the landscape, is a really valuable service that we feel is missing. The lack of those boots on the ground has had a really big impact on the landscape health across the regional areas. I just wanted to reiterate that that is a really important thing that the State used to do and still does in some capacity, but we need to think about how we can all work together better.²⁹

Ms Lisa Gervasoni, Senior Stakeholder Policy and Advocacy Advisor, Land Management and Planning, Victorian Farmers Federation, recommended that agronomists and agricultural accountants should be educated with appropriate climate change mitigation and adaptation knowledge so that they are able to pass it onto farmers:

Yes, and one of the suggestions we have made on other regulatory programs is that sometimes the education probably needs to be rolled out to agronomists as well, or accountants, because sometimes they are the ones that our members are going to, not the extension officer that does not exist anymore. So you actually need to make sure that the people providing advice understand those systems.³⁰

A variety of other stakeholders also called for more extension support including additional funding for Catchment Management Authorities and Landcare to engage with farmers on climate change mitigation and adaptation topics.³¹ The Committee considers that an increase in government extension support on climate change is highly important for supporting this critical industry.

²⁷ Ms Tanja Morgan, *Transcript of evidence*, p. 17.

²⁸ Rural Innovation Research Group, *Stimulating private sector extension in Australian agriculture to increase returns from R&D*, pp. 5–8.

²⁹ Ms Amanda Priest, Coordinator, Environmental Sustainability, Murrindindi Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 20.

³⁰ Ms Lisa Gervasoni, Senior Stakeholder Policy and Advocacy Advisor, Land Management and Planning, Victorian Farmers Federation, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 8.

³¹ Victorian Farmers Federation, *Submission 125*, received 2 September 2019, p. 3; Goulburn Broken Greenhouse Alliance, *Submission 140*, received 25 September 2019, p. 9; Landcare Networks in West Gippsland, *Submission 40*, pp. 2–3.

RECOMMENDATION 60: That the Victorian Government increase extension support to Victorian farmers to better enable them to adapt to and mitigate climate change. This should include increased funding for existing extension activities by organisations such as Catchment Management Authorities and Landcare, the upskilling of agronomists and other advisors in the private sector and the employment of more extension officers by Agriculture Victoria and/or the Department of Environment, Land, Water and Planning.

8.2 Sustainable farming and climate change

8.2.1 Introduction

The Committee received evidence from several stakeholders on the important role of sustainable farming practices in tackling climate change. Many of these practices are already enabling farmers to adapt to climate change and will become increasingly important in the years ahead. Sustainable farming practices can also play a significant role in climate change mitigation, both through the reduction of agricultural carbon emissions and by increasing the amount of carbon that is stored in the landscape.

Sustainable farming practices offer a range of benefits in addition to climate change adaptation and mitigation, including: reduced erosion and soil loss; improved soil structure and fertility; reduced soil salinity; healthier soils, vegetation and animals; increased biodiversity; mitigation of the effects of drought; and greater water efficiency. The Committee received evidence that for many farmers, these benefits can be more immediate and compelling than the arguably more abstract goal of tackling climate change. While many of Victoria's farmers are deeply committed to the challenge of tackling climate change, sustainable farming is often embraced by those who may not share this goal and can therefore provide a powerful tool for encouraging the conversations and innovations within farming communities that will be vital to their success in the years ahead.

The critical role of agriculture in climate change mitigation has been recognised by Carbon Farmers of Australia, which has described climate change mitigation through farming as

farming in a way that reduces Greenhouse Gas emissions or captures and holds carbon in vegetation and soils. It is managing land, water, plants and animals to meet the Triple Challenge of Landscape Restoration, Climate Change and Food Security. It seeks to reduce emissions in its production processes, while increasing production and sequestering carbon in the landscape.³²

³² Carbon Farmers of Australia, *What is Carbon Farming?*, <<https://carbonfarmersofaustralia.com.au/carbon-farming>> accessed 5 October 2020.

It should also be noted that farming in a way that contributes to climate change adaptation or mitigation can involve a single change in land management or an integrated plan that adopts a combination of practices.³³

The Committee is mindful that, in many cases, what may be described as an example of ‘sustainable farming’ is simply good farming practice. Indeed, many Victorian farmers have adopted a wide range of sustainable agricultural practices because they make good business sense and contribute to the long-term viability of their properties. As Landcare stated in its submission, ‘practical strategies to address the changing climate, build carbon in our soils, and improve our resilience just make good business sense’.³⁴

Moreover, some farmers are understandably wary of applying terminology such as ‘carbon farming’ or ‘regenerative agriculture’ to their use of sustainable farming practices, particularly when they have already been applying sustainable approaches for many years.

Apostle Whey Cheese is a dairy farm and boutique cheese factory located in Cooriemungle. During a site visit, the Committee met with owners Julian Benson and Dianne Benson. Mr Benson described the transformation of the property through the adoption of several sustainable farming practices:

- the sub-division of the 367-acre property from the original 15 paddocks into 53 milking paddocks (and 10 smaller paddocks for calf rearing), so that dairy cows can be rotated between paddocks more frequently, enabling pasture to rest and recover more effectively and improvements in sub-surface drainage
- the planting of native trees along every second fence line to provide shelter for the herd of 250 cows, resulting in healthier cows and increased milk production, as well as biodiversity improvements
- the use of solid and liquid effluent from the herd as fertiliser on the property
- the installation of solar panels on the dairy and visitor centre roofs (with a 10-year payback period).³⁵

It is also notable that, like many successful farming enterprises, diversification has proven to be a key factor in the Bensons’ success.

³³ Ibid.

³⁴ Landcare Victoria, *Submission 148*, p. 1.

³⁵ Committee Manager, ‘Notes of Committee site visit to Apostle Whey Cheese, Cooriemungle’, 21 November 2019; Apostle Whey Cheese, *Our Farm*, <<https://apostleweycheese.com.au/our-team>> accessed 6 October 2020.

Mr Allen Sheridan, a farmer who grazes sheep on 6,500 acres across three locations in Gippsland, informed the Committee that he has planted 40,000 trees on his land.³⁶ Mr Sheridan stated:

So we are sort of involved in climate change a bit, not from the point of view of being a climate change believer—and I will explain to you just briefly why I have those reasons—but from the point of view that planting the trees is very beneficial for stock and to break the wind over your pasture.³⁷

The Committee considers that the experience and insights of farmers such as Mr Benson and Mr Sheridan demonstrates how widespread the commitment to more sustainable agricultural practices has become in recent years. It is also notable that many farmers have adopted sustainable agricultural practices both as a way of maintaining the long-term economic viability of their farms and for environmental benefits such as water conservation, the reduced use of fertilizers and pesticides, and the promotion of biodiversity. In short, sustainable farming makes good business sense and is increasingly universal within Victorian farming communities.

FINDING 27: Many of the agricultural practices required for climate change adaptation and mitigation are already being adopted by Victorian farmers through their commitment to sustainable farming and the diversification of their business models.

There are a wide range of sustainable farming practices that are aimed more directly at climate change adaptation and mitigation and it is beyond the scope of the current Inquiry to investigate them all. In the following sections, the Committee discusses the evidence it received in relation to three emerging practices with significant climate change adaptation and mitigation potential: planned grazing; agroforestry; and community forestry (Sections 8.2.2, 8.2.3 and 8.2.4).

8.2.2 Planned grazing

Planned grazing can be defined as

the use of a range of management tools to create a particular landscape that meets the goals of the land manager. For example, a goal might be to maintain ground cover at more than 80% year round.

There are a range of grazing management tools available to use including rest period, graze period, stock density, soil fertility, animal supplements, watering points and access, and fire.

³⁶ Mr Allen Sheridan, public hearing, Bairnsdale, 24 October 2019, *Transcript of evidence*, p. 26.

³⁷ *Ibid.*

Planned grazing relies on the understanding, and more importantly the acceptance, that the condition of the property or paddock is a direct consequence of the management being applied and not simply a reflection of seasonal conditions.³⁸

Planned grazing typically involves the following practices:

- grazing is planned up to 6 months in advance on the basis of required plant conditions and animal management needs are also planned in advance
- graze periods are flexible based on required pasture recovery periods and animal feed demand
- animals graze paddocks for short periods and are moved well before feed runs out
- stock density (i.e., the number of animals per hectare in a paddock at a given time) is high
- drought is routinely planned for
- grazing animals function as a tool for land regeneration.³⁹

The benefits of planned grazing can include increased pasture productivity and increased stocking rates (i.e., the number of animals per hectare across an area of land or property) over time, although stocking rates may be reduced during periods of reduced rainfall or drought.⁴⁰ In other words, planned grazing enables grazing at a higher stock density and shorter duration at some points in time in small, specific areas, while also allowing for grazing at lower stock density and longer durations, based on the recovery period for the plants. In summary, planned grazing focuses on the recovery of plants from grazing and improvements to plant productivity and diversity across the whole farm for the entire grazing season.⁴¹

Ms Jenny Robertson, East Gippsland Landcare Network, explained her experience with planned grazing as follows:

It is looking at things in more of a whole sense and mobbing up and having more paddocks, so you are doing small, sharp grazes and then you are moving on—

...

you have to understand how the grasses recover and put that into your system. If you go in too early, you burn out all your perennials and that is a big issue that we have. We are doing it through cover cropping [the use of plants to cover and protect soil rather than for harvest].⁴²

³⁸ Land & Water Australia, *Planned grazing management: Land, water and wool fact sheet*, 2007, pp. 3, 4.

³⁹ *Ibid.*, p. 4.

⁴⁰ *Ibid.*, p. 5.

⁴¹ Savory Institute, *How high stock density grazing is different from holistic planned grazing*, 2018, <<https://savory.global/high-stock-density-grazing-holistic-planned-grazing>> accessed 6 October 2020.

⁴² Jenny Robertson, East Gippsland Landcare Network, public hearing, Bairnsdale, 24 October 2019, *Transcript of evidence*, pp. 12–13.

The Committee observed the effectiveness of planned grazing during its site visit to a cattle grazing property owned by Rose and Lou Maher in October 2019. The Mahers run approximately 145 cattle on their property, which is located near Perry Bridge, close to the border between Wellington Shire and East Gippsland Shire. During the site visit, Rose Maher, Lou Maher, Jenny Robertson (past East Gippsland Landcare Network President) and Rick Robertson explained that what began as a trial in a small number of paddocks had since been implemented across the whole farm. During the ten years that the Mahers have been practicing planned grazing they have seen a transformation in the coverage and quality of their pasture and in the biodiversity on their property. During this time, the Mahers have implemented a number of planned grazing and related techniques, including:

- reduced stocking rates during times of low rainfall and drought to enable the grass to recover more quickly and maintain its root system, which in turn ensures that there is pasture growth even during periods of very low rainfall
- ‘cover-cropping’ (the use of mixed pasture crops, including brassicas and sunflowers, which suppresses weeds, reduces soil erosion, improves the quality and fertility of soil, increases biodiversity and creates higher value feed)
- increased planting of paddock trees to provide shade for cattle and sequester carbon (which also enables farm diversification, e.g. combining cattle with forestry).⁴³

As the Committee observed during its site visit, what Mr and Mrs Maher started as a trial on a single paddock, despite Mr Maher’s initial scepticism, has since transformed much of the property and enabled their enterprise to remain viable even during periods of prolonged drought.

A major advantage of planned grazing techniques is that improvements to the soil profile can result in significant carbon sequestration to the point that grazing farms can achieve carbon neutrality. Improvements to the soil quality can also increase its capacity to retain water and reduce the need for synthetic fertiliser. While planned grazing and cover cropping originated in the United States, it is increasingly being adopted in the Gippsland and Wimmera regions.⁴⁴

The Committee received evidence on the vital role that Landcare plays in the uptake of sustainable agricultural practices, including planned grazing, through its increasing focus on education and peer learning. As Landcare stated in its submission, the organisation ‘has over thirty years of practical action on the ground that enables difficult conversations in communities around wicked problems’.⁴⁵ It is this practical knowledge that has enabled Landcare to become a trusted and increasingly important source of advice for Victoria’s farming communities dealing with the impacts of climate

⁴³ Committee Manager, ‘Notes of Committee site visit to Rose Maher and Lou Maher’s farm, Perry Bridge’, 24 October 2019.

⁴⁴ Ibid.

⁴⁵ Landcare Victoria, *Submission 148*, p. 1.

change. As Ms Robertson stated at the public hearing, Landcare has traditionally been focused on revegetation but is increasingly involved in innovation within farming landscapes:

I think for a long time all the funding has been focused on revegetation and not across the whole landscape. So now we are seeing within our local area that the biggest benefit we can bring to our farming landscapes is by asking: how do we do that better?⁴⁶

Ms Robertson also noted that much of this innovation comes from within the farming community:

I think a lot of it is coming from farmers themselves. They are investigating and researching themselves, sometimes working with universities. I think the complexity of farming is misunderstood often, and also the risk. ... it is trying to get that in balance and working out how you make really good decisions around your livestock, your pastures and your people. But you have also got to have profit in there. If you have not got profit, well, we do not survive.⁴⁷

Ms Robertson stated that one of the key ways the Government could assist Landcare and farming communities is through programs and funding that enable people to change their farming practices.⁴⁸ As the Committee heard during its site visit, peer influence within grazing communities can work to slow or prevent the trial and adoption of sustainable agricultural techniques such as planned grazing. One suggestion for promoting the uptake of planned grazing would be for the Government to fund a proportion (for example, up to 50%) of the cost of multi-species feed stock to encourage graziers to participate in trials of planned grazing in selected paddocks.⁴⁹

FINDING 28: Planned grazing has significant potential to improve both the long-term viability of grazing enterprises and their contribution to carbon sequestration. While peer learning, particularly as promoted by organisations such as Landcare and the Catchment Management Authorities, has made a significant contribution to the uptake of planned grazing and related practices, there is a need for funding to further promote its uptake.

RECOMMENDATION 61: That Agriculture Victoria investigate the outcomes of planned grazing in Victoria, with a view to the potential for its wider promotion through existing extension activities.

⁴⁶ Jenny Robertson, *Transcript of evidence*, p. 12.

⁴⁷ *Ibid.*

⁴⁸ *Ibid.*

⁴⁹ Committee Manager, 'Notes of Committee site visit to Rose Maher and Lou Maher's farm, Perry Bridge', 24 October 2019.

Figure 8.2 Planned grazing at Perry Bridge.



Rose and Lou Maher's Perry Bridge property site visit (left to right): Jenny Robertson, East Gippsland Landcare Network, Paul Hamer MP, Danielle Green MP, Rick Robertson, East Gippsland Landcare Network, Will Fowles MP, Darren Cheeseman MP (Chair).

Source: Committee secretariat.

8.2.3 Agroforestry

Agroforestry can be defined as

forestry by farmers, either alone or in partnership with other investors. In most areas, this will involve new multipurpose forests planted to support agricultural production, provide conservation outcomes and produce timber and other marketable products and services.⁵⁰

Agriculture Victoria, in its evidence to the Inquiry, outlined the benefits of agroforestry:

There are multiple benefits from trees on farms including shelter for crops and livestock, birdlife and biodiversity habitat, waterway revegetation, income from timber production, as well as carbon sequestration and the potential for this carbon abatement to be monetised.⁵¹

⁵⁰ Otway Agroforestry Network and Australian Agroforestry Foundation, *Submission 146*, received 3 December 2019, p. 2.

⁵¹ Hon. Jaclyn Symes MP, Minister for Agriculture, Inquiry into tackling climate change in Victorian communities public hearings, response to questions on notice received 11 May 2020, p. 1.

The Otway Agroforestry Network (OAN) and the Australian Agroforestry Foundation (AAF), in their joint submission to the Inquiry, highlighted the following benefits and potential of agroforestry in Victoria:

- It is a means of harnessing the willingness and potential of Victorian farmers to produce commercial forest products in a way that satisfies many of the community's environmental and social concerns related to industrial plantation development, public native forest logging, animal welfare and carbon sequestration.
- Up to 20% of the agricultural landscape could be planted to multipurpose trees without a negative impact on agricultural production (e.g. by integrating the trees for shelter and targeting unproductive land and riparian areas).
- It provides an incentive for farmers to commit to the production of long rotation (i.e., the time between establishment and harvest), high quality, native timbers because they are most suited to capturing the non-timber values of trees on farms (shelter, natural pest control, soil erosion control, biodiversity, aesthetics etc.). This enables farmers to both supplement the production of commodity logs and produce a wider diversity of species and log types, including specialty timbers.
- Involving the farming community can add significant value to the industry, build community support for the forestry sector and provide a wide range of environmental and social benefits for people living in the agricultural landscape.⁵²

The submission from OAN and AAF also acknowledged the role of the industrial plantation industry in producing the bulk of the wood required by the domestic and export timber industry and stated that there may also be a place for public native forest logging.⁵³ In other words, agroforestry should be seen as a means of complementing rather than replacing existing forestry practices.

Bambra Agroforestry Farm is a sheep and timber farm located approximately 30 minutes west of Geelong, which was established in 1987 as an 'outdoor classroom' for practical field days and workshops on agroforestry. Owner and operator Mr Rowan Reid, farmer/tree grower, founding member of the Otway Agroforestry Network and Managing Director of the Australian Agroforestry Foundation, describes the aim of the farm as

not to 'demonstrate' how farmers should grow trees but to provide a place where they can explore the opportunities that agroforestry might provide them on their farm and practical knowledge on how they might achieve their own goals.⁵⁴

The farm displays over 50 commercial tree species, a variety of planting arrangements and practical management options. It also runs tours, field days and workshops for farmer groups, government agencies, international visitors and schools.⁵⁵

⁵² Otway Agroforestry Network and Australian Agroforestry Foundation, *Submission 146*, p. 2.

⁵³ Ibid.

⁵⁴ Rowan Reid, *Bambra Agroforestry Farm*, <<http://www.agroforestry.net.au/main.asp>> accessed 6 October 2020.

⁵⁵ Ibid.

Mr Reid hosted members of the Committee during a site visit to the farm, where the Committee also met with Mr Andrew Stewart, farmer and founding member of the Otway Agroforestry Network, who owns and operates a nearby sheep farm. Mr Reid and Mr Stewart accompanied Committee members on a tour of the farm, which includes a small timber mill and solar kiln for the production of high-quality timber for use in furniture making.

Mr Reid explained that planting trees on farms for the sole purpose of carbon sequestration can reduce the value of a property, whereas the strategic planting of multi-use tree species can generate income from the future sale of high-value timber and enable the production of biochar, both of which also serve to sequester carbon. The capital value of the land can also be increased for future generations, for example, by planting high value timbers such as American Black Walnut.⁵⁶

By contrast, Mr Reid noted that he had found the auditing costs associated with verifying the carbon sink status of farm trees on his property to be very high, such that earning Australian Carbon Credit Units (ACCUs) under the Commonwealth Government's Emissions Reduction Fund was less financially attractive than planting trees with commercial value.⁵⁷ As Mr Reid has written on his website:

Not surprisingly, given the emphasis on reducing CO₂, almost all talk surrounding the value of planting trees for climate change has been driven by notions of carbon sequestration and trading. Unfortunately, this approach overlooks the immediate value of trees on farms and the role they might play in helping farmers remain viable. ... that the climate has already changed so much already suggests that, for most landholders, mitigation of the world's climate probably comes well behind their immediate concerns about adapting to more difficult and uncertain local weather conditions.⁵⁸

Notably, the Committee received similar evidence regarding the prohibitive cost associated with ACCUs from Ms Robertson, who stated at a public hearing:

We are in a project for a carbon farming project, but it is going to cost us about \$7000 to do all the baseline testing, so that is a cost at the moment we probably cannot do and then we have got to be able to prove that we can build our soils in a time of drought. That is really, really difficult.⁵⁹

Mr Reid has also found that planting different tree species in different areas can solve farming problems that are specific to those areas, such as the prevention of erosion in gullies and creek lines that may also be dangerous to stock, and the productive use of areas that may previously have been 'written off'.⁶⁰

56 Committee Manager, 'Notes of site visit to Bamba agroforestry farm, Bamba', 21 November 2020.

57 Ibid.

58 Rowan Reid, *Agroforestry and climate change - what is the role of trees on farms?*, <<http://www.agroforestry.net.au/main.asp>> accessed 6 October 2020.

59 Jenny Robertson, *Transcript of evidence*, p. 12.

60 Committee Manager, 'Notes of site visit to Bamba agroforestry farm, Bamba', 21 November 2020.

Figure 8.3 Bambra Agroforestry Farm before and after tree-plantings, showing the same landscape from different elevations



Bambra Agroforestry Farm in 1987.



Bambra Agroforestry Farm in 2001.

Source: Rowan Reid, *Bambra Agroforestry Farm*, <<http://www.agroforestry.net.au/main.asp>>, accessed 23 September 2020.

Mr Stewart noted that the agroforestry model established by Mr Reid had been adopted by a number of surrounding farms, including on his own 580-acre sheep farm, which had now achieved approximately 20% tree coverage, primarily along creek lines and recharge zones. Mr Stewart identified the immediate benefit of this model of agroforestry as improved land management—including the establishment of wildlife corridors—and the longer-term benefit as the creation of capital value in farming land in a way that is analogous to superannuation.⁶¹

Mr Reid has also pointed out that while farmers are the key to increasing forest cover in Australia, they are more likely to respond to incentives that encourage revegetation as a means of addressing challenges such as climate change adaptation and income diversification than carbon sequestration:

If we, as a community, can support strategic revegetation of farms in ways that help farming businesses survive and adapt to climate change - without forests displacing valuable farmland, increasing the fire hazard, or using up valuable water resources—then the carbon the trees lock-up would be a bonus.

... in order to control land degradation and protect productive farming systems it is imperative that farmers are seen as the key to increasing forest cover in Australia. Every tree planted for shade, shelter, timber, food, biodiversity, erosion control and aesthetics locks up carbon. If governments and community groups want trees planted on cleared land for carbon sequestration the best starting point in any discussion with farmers may not be carbon at all but the many other values that make owning these trees worthwhile. The need for climate amelioration and income diversification will drive revegetation on farms—sequestration is what the community gains by helping landholders achieve these goals.⁶²

⁶¹ Committee Manager, 'Notes of site visit to Bambra agroforestry farm, Bambra', 21 November 2020.

⁶² Rowan Reid, *Agroforestry and climate change - what is the role of trees on farms?*

The joint submission from OAN and AAF also recommended the development of a Victorian farm forestry industry through the roll out of a state-wide extension initiative. This would build on the work of the Otway and Gippsland Agroforestry Networks, the Australian Master TreeGrower program and the Peer Group Mentoring initiative to form a joint management committee for the delivery of an extension program across Victoria. The extension initiative would include support (for example, in the form of an annual grant) for existing regional landholder networks, regional stakeholder workshops, the delivery of Master TreeGrower courses and Peer Group Mentoring programs, and a conference on multipurpose farm trees.⁶³

Mr Adam Bester, CEO, Glenelg Hopkins Catchment Management Authority, also acknowledged the significant potential of agroforestry, when implemented in a way that maintains biodiversity outcomes, as a way of incentivising farmers to plant more trees:

We have got in a lot of partnerships, with a lot of farmers, with Landcare, to do a lot of revegetation, which has been quite successful, but you are always going to have some of those farmers out there where there is still going to be a bit of a barrier, or the amount of land that they have—for example, they might have actually already done a lot of revegetation on their property and do not really want to give away too much more of their land, whereas they might be more amenable to putting some of that land aside for agroforestry if they can find that they can actually get an income from it in the future.⁶⁴

Mr Reid and Mr Stewart informed the Committee that despite the clear environmental benefits of agroforestry, the restrictive nature of Landcare grants, which do not allow the harvesting of any trees, remains a key barrier to its adoption across the state.⁶⁵ The Committee notes that local government regulations may also restrict or prevent the harvesting of agroforestry crops, given the role of local government in regulating the removal of native vegetation and as the responsible authority for managing timber harvesting on private land (including the requirement that all operations comply with the *Code of Practice for Timber Production*).⁶⁶ In view of these barriers to agroforestry, the Committee considers that there is a clear need to provide greater recognition of the rights of farmers to harvest their agroforestry crops.

FINDING 29: Agroforestry in the form of multipurpose forests on farms has unique potential to contribute to the production of forest products, improve long-term farm viability and help tackle climate change through sequestration of carbon across much of Victoria.

⁶³ Otway Agroforestry Network and Australian Agroforestry Foundation, *Submission 146*, p. 5.

⁶⁴ Mr Adam Bester, CEO, Glenelg Hopkins Catchment Management Authority, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 20.

⁶⁵ Committee Manager, 'Notes of site visit to Bamba agroforestry farm, Bamba', 21 November 2020.

⁶⁶ Colac Otway Shire, *Trees & Vegetation*, 2020, <<https://www.colacotway.vic.gov.au/Environment-Sustainability/Trees-and-vegetation>> accessed 6 October 2020.

RECOMMENDATION 62: That the Victorian Government:

- a. introduce measures to ensure that public investment in land conservation and biodiversity within agricultural land, including through Landcare, allows for a degree of carefully planned agroforestry
- b. ensure that any codes of practice for forestry on farms are outcome oriented rather than prescriptive and recognise the right of farmers to harvest their agroforestry crops, while also allowing for innovation in harvesting practices
- c. invest in a state-wide landholder and community education extension program on the benefits of agroforestry, including support for farmer networks, industry engagement, the Master TreeGrower Program and Peer Group Mentoring
- d. support agroforestry harvesting, milling and drying trials with industry, including brokers, harvesting contractors, transport companies, timber processors, builders and furniture makers, to boost the take-up of agroforestry practices and the marketing of its products.

Figure 8.4 Bambra Agroforestry Farm

Bambra Agroforestry Farm site visit (left to right): Andrew Stewart, farmer and founding member of the Otway Agroforestry Network, Darren Cheeseman MP (Chair), David Morris MP (Deputy Chair), Paul Hamer MP and Rowan Reid, Managing Director of the Australian Agroforestry Foundation.

Source: Committee secretariat.

8.2.4 Community forestry

Community forestry can be broadly defined in the Australian context as ‘community involvement in local forestry for community benefit’.⁶⁷ While community forestry has a long history in many developing countries, its adoption in Australia has been more limited. However, in those developed countries where community forestry has been implemented, ‘it appears to be achieving remarkable success in its aims of sustainable forest management and securing socio-economic benefits for local communities’.⁶⁸ Moreover, where community forestry is used as a means of revegetating public land, as in the case of Violet Town Community Forest, it can play a significant role in carbon sequestration.

Violet Town Community Forest, located in Shadforth Reserve, Violet Town, was established in 2006 inside a disused trotting racetrack. The area now comprises 8.3 hectares of mixed species forest, including fast growing and local eucalypt species, which will be used for firewood, construction timber and as a forage resource for beekeepers. The forest is managed by the Shadforth Reserve Committee of Management to ensure that it can be selectively harvested indefinitely rather than clearfelled, thereby also providing wildlife habitat and amenity values. The forest was established with financial support of approximately \$12,000 from DELWP and preparation and planting by community volunteers.⁶⁹

During a site visit to Violet Town, Committee members met with Mr David Arnold, Chair, Shadforth Reserve Committee, who hosted a tour of the forest and explained its contribution to carbon sequestration, while supplying a constant yield of firewood and wood products for local use. Mr Arnold noted that while the carbon uptake by the forest will be highest during its establishment phase, the mature forest will achieve a closed ‘carbon loop’ in the form of stable but ongoing carbon sequestration. In the meantime, the thinning of lower quality trees for firewood will promote the growth of higher quality trees and assist the town to become self-sufficient in the supply of firewood, reducing dependence on and emissions from coal-powered electricity. Mr Arnold also noted that the forest could be combined with grazing in future years, thereby achieving a form of community agroforestry.⁷⁰

⁶⁷ Eryl H Roberts and Madan K Gautam, *Community forestry lessons for Australia: a review of international case studies: Research Report presented to: Faculties Research Grant Scheme 2002-2003, The Australian National University, School of Resources, Environment and Society, The Australian National University, Canberra, 2003, p. 2.*

⁶⁸ *Ibid.*, p. 1.

⁶⁹ Violet Town Action Group, *Violet Town Community Forest*, 2020, <<https://www.violettown.org.au/environment/community-forest>> accessed 5 October 2020; Committee Manager, ‘Notes of Committee site visit to Violet Town Community Forest’, 12 February 2019.

⁷⁰ Committee Manager, ‘Notes of Committee site visit to Violet Town Community Forest’, 12 February 2019.

Figure 8.5 Violet Town Community Forest

Violet Town Community Forest site visit (left to right): David Arnold, Chair, Shadforth Reserve Committee of Management, Will Fowles MP, Danielle Green MP, Darren Cheeseman MP (Chair), Paul Hamer MP and David Morris MP (Deputy Chair).

Source: Committee secretariat.

According to Mr Arnold, this model of a managed community forest could be used elsewhere in Victoria to manage the risk and impact of bushfire on the rural/urban fringe (the CFA has assessed the ground fuel load within the forest as too low to pose a fire risk).⁷¹ According to the Shadforth Reserve Committee of Management, the site previously represented an extreme fire risk due to a very heavy build-up of dry grass. As the Committee observed during its site visit, the amount and density of dry grass is now significantly reduced due to competition from the trees. In addition, rows of casuarina, which are much less flammable than eucalypts, will help to reduce the intensity of a fire and slow its movement through the forest. Dead wood larger than 75 mm diameter will also generally be removed for firewood, while harvesting—in the form of thinning—will only be allowed in patches of the forest in any given year to prevent harvest litter increasing the fire risk. As a thinned and managed forest, the Violet Town Community Forest will be also less dense and produce fewer dry sticks than a heavily stocked eucalypt plantation due to the more active growth of its trees.⁷²

FINDING 30: Community forestry may offer benefits for some rural communities, for example, as a way of utilising previously degraded Crown land.

⁷¹ Committee Manager, 'Notes of Committee site visit to Violet Town Community Forest', 12 February 2019.

⁷² Violet Town Action Group, *Violet Town Community Forest*, 2020, <<https://www.violettown.org.au/environment/community-forest>> accessed 5 October 2020.

8.3 Water for agriculture

8.3.1 Introduction

Water security and reliability are growing challenges for Victorian farmers as a result of climate change. As Mr Anderson of Agriculture Victoria stated:

Certainly farmers are noticing water security and reliability has been affected in both our dryland catchments and also our irrigation areas, and that has been played out with a lot of discussion on water reliability. That is not just in the drier areas but often in some of our higher rainfall areas, which traditionally have quite reliable run-off. Farmers are noticing a bit more variability in that, so there is a lot of effort to go to how we improve our water security.⁷³

Despite these challenges, the Committee received evidence of adaptation through innovation across the agricultural sector. For example, Professor Spangenberg outlined recent research and innovation by Agriculture Victoria into improving the water use efficiency of forage systems as a way of adapting to climate change:

In Victoria, the profitability of pasture-based livestock systems is intimately linked to the amount of home-grown feed converted into animal product. Our research, in this particular case, was focused on northern Victoria and has centred on two main themes relating to, on the one side, changes in water availability and how to improve water productivity—it means the amount of forage production per unit of water—and also how to develop more flexible forage systems. In doing so we have been able to identify forage systems with 40 per cent higher water productivity, and that has benefited farmers in making decisions on changes to the forages grown on farm.

Further, studies using information from commercial dairy farms have allowed us to identify grazing management options resulting in a 35 per cent increase in the amount of pasture utilised by grazing when compared to the current industry “best practice”.⁷⁴

Mr Anderson provided an example of a climate risk technology that is enabling farmers to adapt to the decline in the reliability of rainfall due to climate change:

Deep soil moisture probes are an example of new technologies which are buried under paddocks that keep farmers up to date on how much rain is stored in the top 1 metre of the profile, and that can be really important for farmers as part of trying to make the most of it when we have seasons when the soil profile is full; and then when there is actually limited stored soil moisture, that is a warning sign for managing risks better. So there have been a lot of great decisions based on that, and there is a lot more development of that as an example of a [climate risk] technology.⁷⁵

⁷³ Mr Graeme Anderson, *Transcript of evidence*, p. 6.

⁷⁴ Professor German Spangenberg, *Transcript of evidence*, p. 3.

⁷⁵ Mr Graeme Anderson, *Transcript of evidence*, p. 7.

Murray Dairy (one of eight regional development programs across Australia, which represents one of the largest dairying regions across northern Victoria and southern New South Wales) outlined the challenge that reduced water availability poses for the industry and some of the steps that it is taking to adapt:

Since 2000, the volume of water use in the GMID [Goulburn Murray Irrigation District] has declined and the industry is now using about 40% less in an average season than it did pre-2006 ... Water scarcity, of which climate change is a key driver, is a significant challenge for irrigated dairying in northern Victoria.⁷⁶

This decline in water use has coincided with a 40% decline in the total Murray Dairy region herd and a 30% decline in milk production over the same period.⁷⁷ Murray Dairy has identified water trend drivers since 2000 as including

the Millennium drought, unbundling water rights from land, removing restrictions to allow water trade across the southern Murray-Darling Basin, the introduction of carryover and drought reserves in Victoria, and increased competition for both water entitlements and allocation from new and expanding agricultural industries downstream, particularly almonds and other fixed horticultural plantings.

Water recovery from irrigators to increase environmental flows in rivers is the most significant driver.⁷⁸

Murray Dairy summarised the implications of these challenges as follows:

[F]arm businesses must fundamentally transform their farming system to 'get more for less', in other words move away from traditional low input pasture production, towards being able to capitalise on higher yielding forages ...⁷⁹

The Committee also notes that the Victorian CMAs have developed close working relationships with local communities during the past 20 years and are regarded as a trusted source of support and information on natural resource management and climate change. Vic Catchments outlined the framework under which it operates as follows:

Regional Catchment Strategies (RCS) are the primary framework for integrated catchment management at the regional level where CMAs have a core function under the *Catchment and Land Protection Act 1994* (CaLP Act) to coordinate their development and implementation. RCSs are developed through robust consultation with local communities and approved by Government on a six-year timeframe. RCSs reflect community values and priorities and provide strategic directions for natural resource management. They are a key tool to respond to challenges and opportunities with regional communities, where it relates to catchment management and catchment health.

⁷⁶ Murray Dairy, *Submission 161*, received 12 March 2020, p. 2.

⁷⁷ Murray Dairy, Dairy Australia and Committee for Greater Shepparton, *Future focus: dairy industry strategy: Murray region 2019*, Melbourne, 2019, p. 12.

⁷⁸ *Ibid.*, p. 29.

⁷⁹ Murray Dairy, *Submission 161*, pp. 3-4.

In 2015 the ten Victorian CMAs, developed regional natural resource management climate change strategies and plans, which augment the RCSs. These plans have determined what the future climatic impacts may be on our natural assets, how they may adapt to climate change and the management actions that need to be implemented. The plans also identify priority landscapes for carbon sequestration and strategies to build landscape resilience to climate change. These plans were developed in consultation with regional communities, stakeholders and agencies.⁸⁰

The Committee also notes that while agriculture (along with waterway health, biodiversity and ecology) is out of scope of the Pilot Water Sector Climate Change Adaptation Action Plan (AAP), agricultural water use will be addressed in the primary production AAP, which is required to be prepared by 2021.⁸¹

The Committee received relatively little evidence to support recommendations or findings on the issue of agricultural water use. However, the use of recycled water for agriculture was an exception, with two proposed projects being of particular note.

8.3.2 Anglesea Eden Project

The Anglesea Eden Project is a proposal by UK-based charity Eden Project International to transform the disused Anglesea coal mine into an eco-tourism attraction. Cr Rose Hodge, Mayor, Surf Coast Shire Council, outlined the connection between the Eden Project and the potential use of recycled water for agriculture in the region:

[The Eden Project] is the rehabilitation of the old Alcoa mine. It is from the Eden Project in England, and they have got eight projects around the world. If we can get this over the line with water, with the help of Barwon Water and the Government, this will fill up the old mine hole with water. If it was left to its natural things, it would be 40 or 50 years of an acidy-type hole. But if we can get this water through for the Eden Project, it will not only be an international tourist event; it will also rejuvenate the land right around there. ...

We are in talks now with Eden, Alcoa and the State Government about getting a pipeline—I think it is up to about \$58 million. If we can get that—instead of putting all the megalitres out into the ocean, put it through valleys and then to Eden Project—it will be absolutely fabulous.

...

It will be recycled. It actually will come through Thompson Valley, hopefully, near Torquay.⁸²

⁸⁰ Vic Catchments, *Submission 141*, Attachment C, received 26 September 2019, p. 1.

⁸¹ Department of Environment, Land, Water and Planning, *Pilot Water Sector Climate Change Adaptation Action Plan*, 2018, pp. 4, 8.

⁸² Cr Rose Hodge, Mayor, Surf Coast Shire Council, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 14.

Cr Hodge stated that to date, it had only been possible to obtain Class C recycled water, which is too salty for agriculture, but noted that if the water could be recycled to a higher standard, it could enable the establishment of a food bowl around Torquay:

[W]e could have vines growing, wineries and hydroponic things, so there would be an actual food bowl around Torquay in the farmland that would make it much more useful than the sheep and things that are on it now. So we are really looking for that water—as one of our natural resources—to be used a lot better.⁸³

The Committee also notes that the submission from Surf Coast Shire identified ‘a decline in water availability for agricultural operations’ as representing an ‘extreme’ risk over the next 5 to 60 years.⁸⁴ The establishment of a substantial source of recycled water for agriculture in the Shire may significantly reduce this risk.

The Committee notes that the proponents of the Eden Project initially suggested that water from a nearby aquifer could be used to fill the former mine but have since indicated that they are open to the suggestion from DELWP and Barwon Water to consider the use of recycled water from the Breamlea Treatment Plant as an alternative option.⁸⁵

As at August 2020, DELWP was continuing to examine the feasibility of the project, with a particular focus on the development of a water strategy that would protect local waterways, the environment and the rights of other water users.⁸⁶

8.3.3 The Mornington Peninsula Hinterland Environmental Water Scheme

The Hinterland Environmental Water Scheme (HEWS) is a proposal to connect the Mornington Peninsula’s hinterland region to a permanent supply of high-quality recycled water. The water would be provided by Melbourne Water’s Eastern Treatment Plant at Bangholme, which discharges approximately 350 megalitres per day of Class A recycled water into Bass Strait via the South Eastern Outfall pipeline, which traverses the length of the Mornington Peninsula. The scheme aims to provide hinterland landowners with access to this recycled water source to increase the resilience of the hinterland to climate change, boost food production and improve local resilience to bushfires.⁸⁷

⁸³ Ibid.

⁸⁴ Surf Coast Shire Council, *Submission 86*, received 26 August 2019, attachment, p. 9.

⁸⁵ Sally Chandler-Ford, *Eden Project Anglesea, Community Engagement Minutes*, 24 February 2020, <<https://www.alcoa.com/australia/en/pdf/Eden-Project-Anglesea-minutes-240220.pdf>> accessed 5 October 2020.

⁸⁶ Natalee Kerr, ‘Eden project still moving along despite COVID-19’, *Geelong Advertiser*, 29 August 2020, <<https://www.geelongadvertiser.com.au/news/geelong/eden-project-still-moving-along-despite-covid19/news-story/1f62a605c0583878d9aa8641f83f1aba5>> accessed 5 October 2020.

⁸⁷ South East Water, *Feasibility study for hinterland environmental water scheme kicks off*, media release, 7 July 2020.

The Committee received evidence on the HEWS during a public hearing in Mornington from Mr John Baker, CEO, Mornington Peninsula Shire; Ms Melissa Burrage, Manager, Climate Change, Energy and Water, Mornington Peninsula Shire; and Ms Stephanie Delaney, Agribusiness and Food Industry Officer, Mornington Peninsula Shire Council.

Ms Burrage highlighted the importance of water security for the Peninsula given the predicted effects of climate change on rainfall reliability:

[L]ast summer Victoria's potable water storage was the lowest we have seen since the millennium drought, and it is likely to continue to happen. Melbourne's rainfall will continue to be variable, but overall the predictions are saying that we are going to see a decline in our rainfall and particularly during the spring. Also, as Melbourne's population increases, the volumes of this water are only set to increase as well as we need to treat more and more sewerage going forward.⁸⁸

Similarly, Mr Baker stated:

And just to paint that picture for you, as far as the potable water is concerned, we have got instances on the Mornington Peninsula of people using drinking water, buying drinking water in truckloads, and using that to water some of their facilities at the moment because you cannot get the recycled water around the Mornington Peninsula. It has got that bad.⁸⁹

The Committee conducted a site visit to The Briars at Mount Martha in November 2019 to learn more about the HEWS. The Briars is a conservation site which contains a wildlife sanctuary, heritage homestead, nursery, eco-living display centre, eco-camp, eateries and astronomy centre.⁹⁰

During the site visit, Ms Delaney explained council's proposal for The Briars to access recycled water from the Mount Martha treatment plant so that it could become a demonstration site for the wider potential of the HEWS across the peninsula. Ms Delaney explained that Stage 1 of The Briars recycled water project would involve the use of recycled water to grow high-value agricultural crops and showcase the potential for carbon sequestration and reforestation at The Briars.⁹¹ Stage 2 of the project would extend the pipeline to the beach side of Nepean Highway to irrigate a number of neighbouring sporting ovals and the Shire Cemetery.⁹² The Committee notes the announcement by the Victorian Government in July 2020 of \$1 million in funding to enable The Briars (Stage 1) to proceed.⁹³

⁸⁸ Ms Melissa Burrage, Manager, Climate Change, Energy and Water, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 14.

⁸⁹ Mr John Baker, CEO, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 14.

⁹⁰ Mornington Peninsula Shire, *About the Briars*, 2020, <<https://www.mornpen.vic.gov.au/Activities/The-Briars/About-The-Briars>> accessed 30 September 2020.

⁹¹ Committee Manager, 'Notes of Committee site visit to The Briars, Mornington Peninsula', 7 November 2019; Ms Stephanie Delaney, Agribusiness and Food Industry Officer, Mornington Peninsula Shire Council, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 16.

⁹² Imogen Hartmann, 'Funding for Mt Martha recycled water supply', *Pump Industry*, 29 July 2020, <<https://www.pumpindustry.com.au/funding-for-mt-martha-recycled-water-supply>> accessed 5 October 2020.

⁹³ Ibid.

Ms Delaney noted that implementation of the HEWS would enable the region to sequester a significant volume of carbon, but that the cost of delivering the HEWS in full had been estimated at approximately \$180 million due to the high cost of pumping water and the requirement that water companies recover their costs. Despite this, the additional water under the HEWS would allow the region to double its current agricultural output, from approximately \$1.3 billion to \$2.6 billion. Ms Delaney also noted that local farmers were increasingly interested in sustainable farming practices and that many in the community recognised such practices as being vital to the challenge of addressing climate change.⁹⁴

Ms Burrage encapsulated the importance of The Briars recycled water scheme, the HEWS and the related Tyabb-Somerville recycled water scheme (a proposal to provide 1,500 megalitres of recycled water for agriculture, which like the HEWS is currently at the feasibility study stage) as follows:

All of these schemes are essentially climate change adaptation projects. They are critical to droughtproof the peninsula, reduce our reliance on potable water supply, protect us from fire and develop economic growth in agriculture for the region, and also it is about protecting and enhancing our environment.⁹⁵

Mr Baker also explained the current lack of incentive for local water companies to sell the volume of recycled water from the South Eastern Outfall pipeline that would be required to make the HEWS a reality:

The demand is there, as I have said. These organisations—everyone from the winegrowers right the way through to the farmers—need this water. The price at the moment for that water is so high that it is actually not worthwhile, because what you are finding is that there is a full cost recovery for the treatment from the water companies, and therefore the price that they actually want to charge makes it not worthwhile. They would rather pour it into the sea than actually sell it.⁹⁶

Mr Baker and Ms Burrage explained that this situation could be addressed through assistance with the capital cost of installing ‘trunk’ pipelines to transport the recycled water from the main pipeline to where it is needed. While it has proven feasible for a school and Mornington Golf Club to access this recycled water because of their proximity to the main pipeline, the costs are prohibitive for many agricultural producers who are located much further away.⁹⁷

The Committee also notes the regional significance of the HEWS project, as demonstrated by the support offered by seven other southeast Melbourne municipalities.⁹⁸

⁹⁴ Committee Manager, ‘Notes of Committee site visit to The Briars, Mornington Peninsula’, 7 November 2019.

⁹⁵ Ms Melissa Burrage, *Transcript of evidence*, p. 17.

⁹⁶ Mr John Baker, *Transcript of evidence*, p. 14.

⁹⁷ *Ibid.*, pp. 14–15; Ms Melissa Burrage, *Transcript of evidence*, pp. 14–15.

⁹⁸ Mr John Baker, *Transcript of evidence*, pp. 17–18.

The Committee notes that the Essential Services Commission (ESC) has established pricing principles that apply to water businesses when establishing or negotiating a price for recycled water services. These include recovery of the full cost of providing the service (with the exception of services related to specified obligations or maintaining balance of supply and demand). Where a water business does not propose to fully recover the costs associated with recycled water, it is required to demonstrate to the ESC that:

- it has assessed the costs and benefits of pursuing the recycled water project
- it has clearly identified the basis on which any revenue shortfall is to be recovered, and
- if the revenue shortfall is to be recovered from non-recycled water customers, either the project is required under the Statement of Obligations which applies to the water business or pursuant to other Government policies that apply to the water business, or there has been consultation with the affected customers about their willingness to pay for the benefits of increased recycling.⁹⁹

The Committee also notes that the cost of recycled water has been identified by the Victorian Auditor General's Office (VAGO) as one of the main barriers to successfully implementing non-potable recycled water projects and is likely to be examined by VAGO as part of its upcoming performance audit 'Supplying and using alternative water sources'. The audit is scheduled for the 2020–21 financial year—as at October 2020 it had yet to commence.¹⁰⁰

FINDING 31: The Mornington Peninsula represents a food bowl of both regional and state-wide significance. The development of the Hinterland Environmental Water Scheme and the Tyabb-Somerville scheme would have major economic, carbon sequestration and bushfire suppression benefits, while enabling agricultural producers in the region to significantly expand their output.

RECOMMENDATION 63: That the Government investigate business models, including pricing and economic incentives, that would underpin and promote the take-up of recycled water by agricultural enterprises.

8.4 Urban forestry and tree planting

Urban forestry refers to the coordinated planting and maintenance of trees in urban areas, particularly in contiguous patterns and areas to provide a network of tree coverage. In one sense, urban forestry is a misnomer as the trees planted in urban areas are not used for timber production. However, like agroforestry, urban forestry provides a range of benefits, including improved amenity, animal habitat, human health and

⁹⁹ Essential Services Commission, *Water Pricing Framework and Approach: Implementing PREMO from 2018*, 2016, pp. 37–8.

¹⁰⁰ Victorian Auditor-General's Office, *Annual Plan 2020–21*, 2020, pp. 29–30.

air quality. Increasing the coverage of street trees in urban areas can provide climate adaptation benefits by providing shade and countering the urban heat island effect, reducing the impact of heatwaves. It can also make an important contribution to climate change mitigation through biosequestration.

Strategies are a key means for local councils and other government organisations to articulate their priorities and programs for increased tree coverage. One notable example of a strategy to develop an urban forest is *Living Melbourne: Our Metropolitan Urban Forest* strategy, which aims to increase tree coverage across the metropolitan area. Ms Maree Grenfell, Deputy Chief Resilience Officer, Resilient Melbourne, outlined the host of benefits Melbourne could expect to receive by extending, connecting and improving green space across the metropolitan area:

[T]his year we released *Living Melbourne: Our Metropolitan Urban Forest* strategy, which is a strategy that 41 organisations who have policy influence across the metropolitan area have endorsed, including the Victorian Government. This strategy aims to extend, improve and connect existing greening efforts across the city. Our mapping associated with the project indicates that areas of Melbourne with the least vegetation cover are the hottest areas of the city, and these areas also house the communities that are most vulnerable to heat, usually experiencing the highest degrees of energy poverty. We recommend investment in a metropolitan approach to our urban forest and implementation of the *Living Melbourne* strategy to reduce heat; to provide equal access to green spaces for health and wellbeing across the city; to make sure that we have the appropriate ecosystem services that we require for our population, which is set to double by 2050; and also to improve biodiversity, which in itself can strengthen our ability to survive disasters.¹⁰¹

In addition to *Living Melbourne*, a collective of local governments and state agencies in Melbourne's west have developed the Greening the West Project. This project has the ambitious goals of a 25% increase in green space by 2030, doubling tree canopy cover by 2050 and planting one million trees. A major component of Greening the West is Greening the Pipeline, which aims to revegetate and revitalise the entire length of the 27 km Main Outfall Sewer Reserve between Brooklyn and Werribee.¹⁰² Other metropolitan and peri-urban councils have adopted individual strategies and targets that may contribute to the overall goals of *Living Melbourne*.¹⁰³

Councils outside of the metropolitan area have also developed strategies and targets to increase urban trees and greenery. Ms Sharon Terry, Team Leader, Sustainability and Environment, Greater Shepparton City Council, outlined council's strategy for a 40% canopy target for urbanised areas and some of the achievements to date:

We also have an overarching objective called Greening Shepparton, which incorporates our urban forest strategy. That strategy has a target to increase our urban forest to

¹⁰¹ Ms Maree Grenfell, Deputy Chief Resilience Officer, Resilient Melbourne, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 52.

¹⁰² Western Alliance for Greenhouse Action, *Submission 143*, received 27 September 2019, p. 11.

¹⁰³ City of Port Phillip, *Submission 93*, received 26 August 2019, p. 2; Bass Coast Shire Council, *Submission 36*, received 21 August 2019, p. 6; Commissioner for Environmental Sustainability, *Submission 141*, Attachment E, p. 2.

40 per cent canopy cover for not only Shepparton but all of our regional towns. We have the One Tree Per Child project, which has been running for four years—this is the fourth year now. This is a program where we plant a tree for every child in the shire. In 2016, when it first started, there were 16 664 young people under the age of 18. That figure incrementally increases every year by 10 per cent, so this year we are planting 23 500 native plants and shrubs. So that is a big investment and an exciting project. We also have a program to green the entrances to our towns.¹⁰⁴

The City of Ballarat has also adopted a 40% tree canopy cover target. Mr Terry Demeo, Director, Infrastructure and Environment, City of Ballarat, outlined council's target for tree coverage and its focus on areas which currently have less tree cover:

We have a target of the public realm to have a 40 per cent tree canopy. At the moment we are in the order of about 17.5 per cent cover across our streets, and Ballarat, as you well know, is a very treed city. There are some areas that do not have that distinctive character, and they are the more socio-economically challenged communities. So Wendouree West and Delacombe are the areas which are least treed—the old chicken and egg scenario. They are areas that are not treed and therefore suffer the most in terms of that heat island effect and the like. Council has committed \$5 million, so \$500 000 for a decade, to put an urban forest in place. That comes with a myriad of responsibilities in terms of maintaining that and workforce changes and the like. So it is a big commitment in and of itself, but it is really just the start of a process to deliver on a changed landscape.¹⁰⁵

Changes to future climate may impact the viability of certain tree species in particular parts of the state, which means that urban forestry programs need to consider the current and future climate. Ms Allison McCallum, Environmental Project Officer, Conservation, Campaspe Shire Council, explained how council's *Urban Tree Strategy* will help the Shire adapt to climate change and consider which species are the most appropriate for the future:

We have also worked across the organisation on different programs that are helping to adapt to climate change. One of our big programs at the moment is the development of the *Urban Tree Strategy*. That is not just cataloguing what we have got now but updating planting lists for street trees to include species which are better suited to the dry climate that we are experiencing and also increasing urban canopy cover, because obviously shade is a big issue and makes it much more pleasant because we do have hotter summers.¹⁰⁶

Increasing the number of trees in more densely populated urban areas can be challenging. Ms Michaela Skett, Environmentally Sustainable Development Unit Manager, City of Moreland, outlined some of the challenges and potential solutions faced by council in meeting its target of planting 5,000 street and park trees every year:

¹⁰⁴ Ms Sharon Terry, Team Leader, Sustainability and Environment, Greater Shepparton City Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 10.

¹⁰⁵ Mr Terry Demeo, Director, Infrastructure and Environment, City of Ballarat, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 2.

¹⁰⁶ Ms Allison McCallum, Environmental Project Officer, Conservation, Campaspe Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 6.

[S]o it is definitely an ongoing challenge for our open space and parks teams to be finding suitable locations for the trees. Certainly as well in those more constrained spaces sometimes the cost of doing a decent tree planting, even if you can squeeze it in, can be more because you have to do work to get it so that it will thrive into the future. So there is a lot of work around species selection and that sort of thing. So definitely in those smaller streets at the southern end where it is more constrained, it is more difficult. In some cases you are hoping that there is more potential for canopy on private land as well because there is less opportunity in the street.¹⁰⁷

Many stakeholders called for funding from the Victorian Government to help implement urban forestry strategies and programs.¹⁰⁸

While local governments are leading a number of urban forestry efforts, community groups are also contributing to tree planting efforts.¹⁰⁹ There are many urban Landcare groups that contribute to tree planting efforts, such as the Wodonga Urban Landcare Network, which plants thousands of trees each year.¹¹⁰ The Committee visited Ironbark Gully in Bendigo where Ironbark Gully Friends has planted numerous trees and aims to plant more.¹¹¹ Other 'friends of' groups are also involved in habitat protection, restoration and tree planting efforts across urbanised areas and regional towns.¹¹²

Outside of urbanised areas, the objectives of tree planting efforts often include climate mitigation, in the form of carbon sequestration by trees in timber and soils. For example, Greening Australia has identified 200,000 hectares of public land that could be planted with biodiverse species with the objective of carbon sequestration.¹¹³

Landcare is one of the key organisations involved in afforestation, especially in regional and rural Victoria. Cr Rebecca Bowles, Murrindindi Shire Council, discussed the country origins of the Landcare program and the evolving goals of Landcare groups in the Goulburn Valley:

I would also just like to remind people that Landcare was actually started in the bush. It was not actually started in the city, so it actually needs a lot more funding because Landcare are actually doing a lot of the on-ground work. In the Upper Goulburn

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- ¹⁰⁷ Ms Michaela Skett, Environmentally Sustainable Development Unit Manager, City of Moreland, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 23.
- ¹⁰⁸ City of Darebin, *Submission 124*, received 2 September 2019, p. 4; Northern Alliance for Greenhouse Action, *Submission 118*, received 1 September 2019, p. 4; Central Victorian Greenhouse Alliance, *Submission 113*, received 29 August 2019, p. 9; City of Ballarat, *Submission 78*, received 26 August 2019, p. 2; Moyne Shire Council, *Submission 14*, received 26 July 2019, p. 3; Eastern Melbourne Climate Alliance Inc, *Submission 61*, received 25 August 2019, p. 5.
- ¹⁰⁹ Northern Alliance for Greenhouse Action, *Submission 118*, p. 3; Eastern Melbourne Climate Alliance Inc, *Submission 61*, p. 2; Greater Shepparton City Council, *Submission 108*, received 27 August 2019, p. 2; CERES, *Submission 96*, received 26 August 2019, p. 5.
- ¹¹⁰ Wodonga Albury Toward Climate Health (WATCH), *Submission 63*, p. 1; Mr Gil Hopkins, Acting Executive Officer, Wimmera Mallee Sustainability Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 23; Dr Rowan O'Hagan, Member, North East Regional Sustainability Alliance, public hearing, Moorooopna, 12 February 2020, *Transcript of evidence*, p. 20.
- ¹¹¹ Anthony Pinda, 'Ironbark Gully Friends look to enhance Bendigo with green corridor which will enhance unused pieces of land', *Bendigo Advertiser*, 29 July 2018, <<https://www.bendigoadvertiser.com.au/story/5553120/vision-for-a-green-corridor-through-bendigo>> accessed 17 January 2020.
- ¹¹² Greater Shepparton City Council, *Submission 108*, p. 2; Banyule City Council, *Submission 109*, received 27 August 2019, p. 2.
- ¹¹³ Greening Australia, *Submission 80*, received 26 August 2019, p. 1.

Landcare Network, which I am on the committee of, we have 12 Landcare groups in our area. We are tending to get away from a lot of the things like planting trees and planting wattles and all of that kind of stuff because we have got a lot of that. We are actually looking at doing a lot of understorey planting to create a habitat, which are along most of our roadways in the agricultural areas.¹¹⁴

In Victoria, there are around 600 Landcare groups and over 60,000 Landcare volunteers. Landcare is engaged in a broad range of activities beyond tree planting, including agroforestry, outreach and education, improvement of soil and water health, control of pest plants and animals, and biodiversity monitoring. All of these activities contribute to climate change mitigation, adaptation and a better understanding of climate change impacts.¹¹⁵

Mr Dave Bateman, Executive General Manager, Bass Coast Landcare Network, summarised the achievements of Landcare volunteers in Gippsland:

In the Gippsland region in the last financial year we planted 355 hectares of new revegetation, which equates to about 700 000 individual plants going in the ground. We are very much punching above our weight in the Gippsland region compared to the rest of the country, and the reason why we are doing so well down here is because we have got a really strong community that are interested in getting trees back into the landscape. That is one of the things we do—we are planting all the trees—and we do that all with community volunteer labour.¹¹⁶

Landcare groups also work with corporate volunteers. Mr Bateman explained how quickly one group of corporate volunteers was able to plant trees:

We are a very innovative group and we get corporates involved. One Monday I had a local surveying organisation, Beveridge Williams—they decided to sponsor Bass Coast Landcare. They paid us some funds towards a sponsorship, and I got their team out and we had a big team-building day. We planted 3000 plants. We had 11 of them out and I worked them really bloody hard and we got 3000 plants in. So we have a multitude of sources of volunteers.¹¹⁷

Other stakeholders called for major tree planting programs to substantially increase the number of trees in urban, regional and rural settings across Victoria, including the provision of incentives or seedlings for individuals to plant trees on their private land.¹¹⁸ There is substantial capacity to increase tree planting efforts. For example, the Bass Coast Landcare Network alone has stated that it could plant up to 250,000 trees over a 12 month period if provided with increased funding.¹¹⁹

¹¹⁴ Cr Rebecca Bowles, Murrindindi Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 19.

¹¹⁵ Landcare Victoria, *Submission 148*, p. 1.

¹¹⁶ Mr Dave Bateman, Executive General Manager, Bass Coast Landcare Network, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 26.

¹¹⁷ *Ibid.*, p. 29.

¹¹⁸ Women's Climate Justice Collective (Vic), *Submission 153*, received 30 January 2020, p. 7; Jewish Ecological Coalition, *Submission 130*, received 8 September 2019, p. 2; Ms Suzanne Stojanovic, *Submission 1*, received 16 July 2019, p. 1; LIVE (Locals Into Victoria's Environment), *Submission 56*, received 23 August 2019, p. 4; Ms Margaret Joubert, *Submission 31*, received 16 August 2019, p. 1; Mr Sebastian Golotta, *Submission 29*, received 16 August 2019, p. 1.

¹¹⁹ Mr Dave Bateman, *Transcript of evidence*, p. 28.

Some stakeholders recommended strengthening existing, or establishing new, investment or incentive mechanisms to appropriately value land and water carbon sequestration.¹²⁰ The Mornington Peninsula Shire Council recommended the establishment of a Blue Carbon Emissions Reduction Fund to promote sequestration in aquatic ecosystems and measures to make the acquisition of Australian Carbon Credit Units simpler.¹²¹ Greening Australia recommended the establishment of a platform mechanism to enable private investment in large-scale land regeneration and protection projects that could deliver multiple values including biodiversity protection, improved water quality and carbon sequestration.¹²²

FINDING 32: Many local governments, along with Landcare and other community groups, are engaged in the planting of trees in urban areas to improve streetscapes, reduce the urban heat island effect, and achieve other social and environmental benefits.

8.5 Protecting habitat and existing vegetation

Many stakeholders called for the Victorian Government to expand the area of protected forests and other ecosystems and enhance the management of existing protected areas to better enable species to adapt to climate change and maximise the ability of these ecosystems to sequester carbon.¹²³

Increasing the protection of land-based ecosystems was not the only focus of stakeholders. For example, the Victorian National Parks Association called for an expansion of Marine Protected Areas.¹²⁴ Ms Fam Charko, Acting Executive Officer, Port Phillip EcoCentre, noted the substantial amount of carbon sequestered in aquatic ecosystems, for example, in Port Phillip Bay, and called for investment in the protection of those ecosystems to ensure they remain active as carbon sinks:

We also support the protection of our blue carbon, specifically in Port Phillip Bay. For example, seagrass beds are exceptionally good at binding carbon. First of all, Port Phillip Bay is quite important because all of the nitrogen that we put in there that comes in from the Yarra but also that we put in through the Werribee treatment plant, for example, to be recycled and be used and be put in the atmosphere in a safe way, that is an ecosystem service that is worth \$11 billion per year. That whole ecosystem, including the seagrasses, is a massive, massive carbon sink. I think even the seagrasses—I would have to take this on notice and look at the reference—but I think it is something like

¹²⁰ Cardinia Shire Council, *Submission 43*, received 22 August 2019, p. 2; City of Wodonga, *Submission 83*, received 26 August 2019, p. 3; Ms Robyn Nicholas, Sustainability Coordinator, Wodonga City Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 13.

¹²¹ Mornington Peninsula Shire, *Submission 121*, received 2 September 2019, p. 7.

¹²² Greening Australia, *Submission 80*, p. 3.

¹²³ Ms Fam Charko, Acting Executive Officer, Port Phillip EcoCentre, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, p. 4; Greater Shepparton City Council, *Submission 108*, p. 5; Victorian National Parks Association, *Submission 50*, received 23 August 2019, pp. 6–8; City of Wodonga, *Submission 83*, p. 3; Women's Climate Justice Collective (Vic), *Submission 153*, p. 7; LIVE (Locals Into Victoria's Environment), *Submission 56*, p. 2; Eastern Climate Action Melbourne, *Submission 34*, received 19 August 2019, p. 3.

¹²⁴ Victorian National Parks Association, *Submission 50*, p. 9.

95 per cent of the carbon that disappears into Port Phillip Bay and Western Port Bay is bound there by the seagrasses. So this is an extremely important ecosystem that really, really needs to be protected by water quality, by looking at what we are doing to the sediments, including dredging, and whirling up legacy pollution that might be in the sediments, and Port Phillip Bay as a full system in itself.¹²⁵

Land and marine areas have traditionally been protected for environmental, biodiversity and amenity values. There is clearly substantial scope for the actual or potential carbon sequestration of an area to be valued when considering new or expanded protected areas in Victoria.¹²⁶ For example, Victoria's wetlands alone sequester an estimated 3 million tonnes of CO₂ equivalent annually.¹²⁷

There are still knowledge gaps in the understanding of the current levels of, and potential for, sequestration in Victoria's land and marine environments, however, protection and revegetation could play a substantial role in reducing Victoria's emissions.¹²⁸ A key area for further policy development is the linking of carbon sequestration with other environmental values when considering protection and revegetation. This was detailed in a report on the opportunities for land-based carbon sequestration by the Melbourne Sustainable Society Institute:

Linking land-based [carbon dioxide removal] CDR to other policy objectives such as water quantity and quality management, and biodiversity management, will be critical for effective outcomes and is often overlooked in government policies and management strategies. Scientific research is unambiguous in its statement of the importance of biodiversity for the resilience and longevity of terrestrial carbon stocks. Yet current policy frameworks do not directly address enhancing the protection and management of forests and plantings on private land with attributes important to both ecological conservation and carbon storage. Increasing synergies between biodiversity and carbon goals will be critical to the objective of achieving increased CDR in Victoria.¹²⁹

Increasingly, habitat protection initiatives are identifying critical locations for prioritised and intensive effort. Dr Mark Norman, Chief Conservation Scientist, Executive Director of Environment and Science, Parks Victoria, outlined the need to identify climate refuges for key species and ecosystems and engage with the Victorian community in protection and restoration efforts for these key locations:

We have started talking about, 'We need to put Churchill in the bunkers'; we have got to put multiple Churchills in multiple bunkers. So we write off five wetlands but two of them are the ones that we work collaboratively to not put fire retardants in the aerial bombing so that that is the last stand of the giant burrowing frog, but the public can join in that last stand of the giant burrowing frog. So there is a volunteer call to arms or call

¹²⁵ Ms Fam Charko, *Transcript of evidence*, p. 4.

¹²⁶ Department of Environment, Land, Water and Planning, *Fact sheet 8: Valuing forest carbon: Assessing the current and future value of forests in storing carbon*, 2019; K. Dooley, P. Christoff and R. Burdon, *Land-Based Carbon Dioxide Removal Options for Victoria: Review Paper*, Melbourne Sustainable Society Institute, The University of Melbourne, 2020.

¹²⁷ P. Carnell, et al., *Carbon sequestration by Victorian inland wetlands*, Blue Carbon Lab, Deakin University, Melbourne, Victoria, Australia, 2016.

¹²⁸ K. Dooley, p. Christoff and R. Burdon, *Land-Based Carbon Dioxide Removal Options for Victoria*.

¹²⁹ *Ibid.*, p. 13.

to action where there is a local pride in ‘This is our Australian native flora and fauna’ in places, and this is where we would all rally around.

I think there is something in that space, particularly around youth. We will not have problems getting volunteers if we say, ‘We’re all going to collectively de-weed and de-pest this environment to maximise the survival. We’ve done the heat overlays, the risk overlays, all the aerial bombing sites know this is a core habitat for this reason or this group’, and we collectively work on it.¹³⁰

Landcare and other community groups are involved in the protection and restoration of remnant vegetation.¹³¹ This work protects biodiversity, mitigates the impact of climate change on native species and also maintains the ability of remnant vegetation to sequester carbon.¹³² Mr Bateman explained the importance of this protection work in Gippsland and how Landcare works with its members to protect extant vegetation before planting new trees:

Planting trees is not the only thing we do. We do a lot of remnant vegetation protection. You guys are hopefully across protecting the remnant vegetation, and what we have got left is just as important or more important than planting new trees because we have done such a good job of clearing Gippsland that there is only roughly 15 per cent of remnant vegetation left. So what is left that is out there—it is really important that we stick a fence around it and stop cattle from clearing it, basically. So if trees are left in paddocks in the Gippsland area without a fence around them, with stock access to them, they basically get rubbed on and then they eventually end up being a cleared paddock. It is the legal way of clearing your land. So we strongly encourage our members to be involved in fencing their remnant vegetation first before they start planting trees.¹³³

Preservation of vegetation embedded in agricultural landscapes was also viewed as a priority by Greater Shepparton City Council. Ms Terry explained how the council has collaborated with other organisations to work with landowners and provide information on the value of paddock trees:

2019, was the Goulburn Broken Year of the Paddock Tree. We are an agricultural landscape. Greater Shepparton has around 2.5 per cent of native vegetation remaining from prior to European settlement, so we are in dire straits. Our scattered trees are very, very important, so along with the Goulburn Broken Catchment Management Authority and the Department of Environment, Land, Water and Planning, the regional team, we undertook a number of activities. One of them was to hold a forum for landowners and irrigation designers around what does ‘avoid and minimise’ require under the planning scheme and under the native vegetation regulations? We also undertook a scattered tree research forum, where we were lucky to be able to attract a number of eminent scientists around paddock trees and their value on a number of different scales to our region so that our community can have access to that information.¹³⁴

¹³⁰ Dr Mark Norman, Chief Conservation Scientist, Executive Director of Environment and Science, Parks Victoria, public hearing, Melbourne, 28 October 2019, *Transcript of evidence*, p. 30.

¹³¹ Macedon Ranges Shire Council, *Submission 69*, received 26 August 2019, p. 4; Landcare Victoria, *Submission 148*, p. 1; Victorian National Parks Association, *Submission 50*, p. 5.

¹³² Landcare Networks in West Gippsland, *Submission 40*, p. 1.

¹³³ Mr Dave Bateman, *Transcript of evidence*, p. 26.

¹³⁴ Ms Sharon Terry, *Transcript of evidence*, p. 10.

Protecting land-based vegetation is not the only activity that Landcare groups are engaged in. For example, Yarram Yarram Landcare Network's seagrass project aims to protect seagrass to enhance biodiversity and provide co-benefits to the local fishing industry. It will also have climate mitigation benefits, as seagrass is one of the most effective plants at sequestering carbon.¹³⁵ Professor John Donald, Interim Head, School of Life and Environmental Sciences, Deakin University, explained the importance of carbon sequestration in the marine environment:

Carbon sequestration in the marine environment to start off with is something I think that is very important in terms of future climate change management. It has a number of benefits. Firstly, to have a healthy niche or ecosystem for carbon sequestering is really important, but that actually has flow-on benefits in environmental conservation and also it is really critical in providing habitat for juvenile fisheries, so there are a number of flow-on effects. It is really important to have policies in and around near-shore ecosystem management because of that importance of carbon.¹³⁶

Landcare groups engage with many other organisations, including local farmers, many of whom are Landcare members. Dr Rowan O'Hagan, Member, North East Regional Sustainability Alliance, explained how farmers and Landcare collaborate on revegetation and habitat restoration in Wangaratta:

[A] concrete example in Wangaratta is the work we are doing on the waterways, along the Ovens River in particular, and also with farm dams, so there are lots of landholders and farmers along the river and also in the surrounding district who all have contributed to carp removal, for example, and the reintroduction of native fish and revegetation. So there is a lot of crossover between the sustainability groups with what farmers are doing locally as well.¹³⁷

Landcare operates on a paid facilitator model which can help ensure funding is directed to the areas of most need. Mr Gil Hopkins, Acting Executive Officer, Wimmera Mallee Sustainability Alliance, explained that this model can enable a bottom-up approach to the protection and increase of native vegetation:

The Landcare group, having a facilitator, can help set things up, can organise main events, can help people with all the structures and the grant applications and the management of doing things and get them going on stuff like that. What really impresses me about those facilitators is they find the need in the community, like the Landcare group. In our Landcare group, with the funding we get, we do what is needed. We only ask for the funds that we know are needed for that year for weeds, rabbits and revegetation. Just about all our creeks in our area in the Laharum-Wartook area, on the edge of the Grampians, are treed and revegetated.

¹³⁵ Landcare Victoria, *Submission 148*, p. 2.

¹³⁶ Professor John Donald, Interim Head, School of Life and Environmental Sciences, Deakin University, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 54.

¹³⁷ Dr Rowan O'Hagan, *Transcript of evidence*, p. 20.

We have got a lot of Indigenous revegetation that is protected. We have got a lot of the landholders involved in Landcare. It is that bottom-up approach that I think is really important for the whole community for sustainability.¹³⁸

The use of paid facilitators to support other community climate action work is discussed in Chapter 10.

Councils in northeast Victoria are also investing in the protection of remnant vegetation on public land, including along roadside corridors, and are collaborating with Landcare and landholders on programs, such as the identification and control of weeds and pests. The Goulburn Broken Greenhouse Alliance views remnant vegetation as integral to the character of local communities.¹³⁹

Catchment Management Authorities (CMAs) commonly work with Landcare to protect and restore existing vegetation. Ms Paula Camenzuli, Statewide Climate Change Coordinator, Vic Catchments, outlined how CMAs are working with community groups to manage the potential impacts of climate change:

Some of the actions that we undertake in conjunction with community members are planting native vegetation to create biolinks, and that provides corridors of habitat that allow animals and also pollen of plant species to move through the landscape and that then helps to make our landscapes resilient. We do a lot of fencing off, as Adam alluded to—he gave some figures earlier—so fencing off of remnant vegetation, and we do that both inland and along waterways. We do that to protect waterways from stock access because they tend to pollute the waterways. Then what happens as a result of that is that we then have blue-green algae events, which then degrades the water quality and has impacts on farmers and landholders who are reliant on that water.¹⁴⁰

Protection and restoration of vegetation can be done in a strategic manner to link existing habitat areas which enhances climate adaptation by providing wildlife corridors. Cr Darren Howe, Deputy Mayor, Latrobe City Council, explained how council's biolinks project is important for the koala population in the Strzelecki Ranges:

Latest actions include the biolinks project that aims to strengthen wildlife corridors or biolinks to securing and connecting important habitat of the genetically unique Strzelecki koala population. Considering the impacts from climate change, it is likely that there will be an increasing need for connectivity to allow plants and animals to find new habitats as their old habitats become less habitable.¹⁴¹

The Committee considers biolinks to be a critical component of community-led efforts for the protection and restoration of native vegetation. There may be opportunity for Crown land that is currently underutilised to be integrated into existing or new biolink projects. This may provide additional opportunities for Landcare and other community

¹³⁸ Mr Gil Hopkins, *Transcript of evidence*, p. 23.

¹³⁹ Goulburn Broken Greenhouse Alliance, *Submission 140*, p. 4.

¹⁴⁰ Ms Paula Camenzuli, Statewide Climate Change Coordinator, Vic Catchments, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 14.

¹⁴¹ Cr Darren Howe, Deputy Mayor, Latrobe City Council, public hearing, Traralgon, 23 October 2019, *Transcript of evidence*, p. 12.

groups to engage in additional tree planting and vegetation protection activities that link existing rehabilitated areas.

RECOMMENDATION 64: That the Victorian Government investigate opportunities for the integration of underutilised Crown land into biolink projects with revegetation and protection activities to be led by local Landcare and other community groups.

9 Disaster resilience

As the Parliament of Victoria has recognised, natural disasters are increasing in frequency and severity as a result of the changing climate.¹ This chapter examines programs that place Victoria's communities at the centre of emergency planning and risk assessment, and which foster individual and community preparedness. It then examines the impact of emergency events on the community sector's ability to deliver crucial services, before focusing on how renewable energy systems could enhance community resilience. Resilient local government infrastructure, hazard sensitive land use planning, building codes and retrofitting are also demonstrated disaster mitigation tools. These issues are addressed in Chapter 6, which also discusses how these tools can be used to reduce emissions and adapt to other climate impacts.

The Committee is very mindful of the devastating impact of the 2019–20 Australian bushfires, which occurred during the course of the Inquiry. While the Committee did not receive evidence regarding the role that climate change played in these bushfires, it notes the historical increase in high fire danger days and projections for future increases in the bushfire risk due to climate change (see also Chapter 1). The Committee also notes that the final report of the New South Wales inquiry into the 2019–20 bushfires found that climate change 'clearly played a role in the conditions that led up to the fires and in the unrelenting conditions that supported the fires to spread'.²

The Committee received some evidence regarding the impact of the 2019–20 bushfires on communities in northeast Victoria during public hearings in the region, which was significant even in communities that were not directly impacted by fire.³ However, given the scope and timing of this Inquiry, the Committee did not receive sufficient evidence to make any findings or recommendations in relation to the 2019–20 bushfires. A number of other inquiry processes are examining the causes and consequences of the 2019–20 bushfires in Victoria and nationally and the Committee awaits the outcomes of those inquiries with interest.

The Committee also acknowledges the impact of the COVID-19 pandemic, which was ongoing at the time of writing, particularly on the recovery of bushfire affected communities. These disasters underline the need for Victoria's emergency management system to be community centred, consider all hazards, and emphasise mitigation and preparedness.

1 *Climate Change Act 2017*, preamble.

2 Dave Owens and Mary O'Kane, *Final Report of the NSW Bushfire Inquiry*, NSW Government, Sydney, 2020, p. iv.

3 See: Cr Kat Bennett, Wodonga City Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, pp. 13,23; Mr Scott Draper, Natural Resource Manager and Sustainability Coordinator, Rural City of Wangaratta, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, pp. 11–12; Cr Jenny O'Connor, Mayor, Indigo Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, pp. 14–16.

9.1 Community-based emergency management

Community-based emergency management places community at the centre of the emergency planning process. Mr Andrew Crisp, Emergency Management Commissioner, explained the importance of community-based emergency management in Emergency Management Victoria's approach:

Community-based emergency management is at the core of what we do, and there have been examples around how we have done that. In Harrietville there was the development of a community-based emergency management plan and active engagement with the community itself in developing a plan that best suited their needs. You only have to look in more recent times: last weekend with the evacuation exercise that was conducted in Powelltown again the community was at the very centre of the planning in relation to that particular evacuation exercise.⁴

There are several government and non-government organisations in Victoria that have facilitated community-based emergency management projects across the State.

Emergency Management Victoria (EMV) facilitated a pilot Community Emergency Management Plan in the Alpine town of Harrietville. The pilot brought together representatives of the community, emergency services and land management agencies to build stronger relationships. The pilot took a community development approach to emphasise local knowledge and local values. While the impetus for the project was the 2013 bushfires, the plan covered multiple hazards and focused on the consequences of emergencies for sectors such as the tourism industry.⁵ EMV has since sought to extend this pilot to other Victorian communities. In partnership with Federation University, EMV has developed a portal to collate community-based emergency management projects that it has facilitated, together with other examples, and locally targeted information for several communities throughout Victoria.⁶

Some community-based emergency management programs focus on single hazards, such as bushfires. For example, Safer Together is a joint program led by the Department of Environment, Land, Water and Planning (DELWP) and the Country Fire Authority (CFA) to work with communities and manage bushfire risk across land tenures. One of the key components of Safer Together is Community-Based Bushfire Management (CBBM) planning, which aims to build the capacity of agencies to work with communities and improve collective understanding of bushfire risk. Mr Lee Mieziš, then Deputy Secretary, Forest Fire and Regions Group, DELWP, explained Safer Together's approach to Community-Based Bushfire Management planning:

So our approach uses much more of a community development approach to working with communities—ongoing conversations in local communities, working with

4 Mr Andrew Crisp, Emergency Management Commissioner, Emergency Management Victoria, public hearing, Melbourne, 28 October 2019, *Transcript of evidence*, p. 2.

5 Emergency Management Victoria, *Harrietville Community Emergency Management Plan*, 2014, <<https://www.emv.vic.gov.au/publications/harrietville-community-emergency-management-plan>> accessed 22 April 2020.

6 Mr Andrew Crisp, *Transcript of evidence*, p. 13; Emergency Management Victoria, *Community Based Emergency Management Portal*, 2018, <<http://emv.cerdi.edu.au>> accessed 22 April 2020.

community, bringing our expertise as fire agencies and that local knowledge that exists within communities together to really work toward the best local solutions to managing bushfire risk. We have currently got 22 communities involved in community bushfire management planning right across Victoria, each dealing with their own set of complex risks and complex issues.⁷

These communities have both an extreme or very high bushfire risk and a willingness to participate in the CBBM planning process, which can be quite demanding on participants. Each community is supported by a project officer from DELWP or the CFA to help facilitate conversations between community members and the agencies. The CFA, in its submission, explained that these discussions involve

bushfire risk, and actions Government is taking, and actions communities and individuals need to take. The actions are no different under a future warming climate, however discussions would often note the greater frequency, and potential higher risk in coming decades, which may bring a greater urgency to better preparedness in the future.⁸

Preparedness programs need to be well evaluated to ensure that they achieve intended outcomes.⁹ Mr Miezis told the Committee about some of the evaluation results and project outcomes from CBBM:

What we have seen, though, through independent evaluation is that Community-Based Bushfire Management planning is a very effective approach to building community resilience in the communities' capacity to connect and build networks themselves and improving their capability to withstand disaster, their awareness of risk and ultimately their relationships with agency staff too. So we are looking now and working with the team at EMV about how we might extend that community development approach to bushfire management across a broader range of emergencies.¹⁰

Notably, the CBBM program (which, as noted above, is one of the key components of Safer Together) enables different communities to achieve tailored outcomes. Mr Alen Slijepcevic, Executive Director, Bushfire Management, Country Fire Authority, told the Committee about the achievements of several communities under the CBBM program:

Fryerstown recently organised for Professor Stephen Pyne, who is a fire historian from the United States, to come and speak to local communities at the Bendigo Writers Festival, specifically with climate change and its impact on fire behaviour as the topic of the talk. The coastal CBBM communities of Lorne and Wye River worked extensively with Justin Leonard, who is a scientist with the CSIRO, to understand a number of fire-related topics, including climate change and its impact on fire behaviour, house construction and survivability, and landscaping.

⁷ Mr Lee Miezis, Deputy Secretary, Forest, Fire and Regions Group, Department of Environment, Land, Water and Planning, public hearing, Melbourne, 28 October 2019, *Transcript of evidence*, p. 7.

⁸ Country Fire Authority, *Submission 55*, received 23 August 2019, p. 2.

⁹ Centre for Urban Research, Climate Change Transformations (CCT) Research Group, *Submission 135*, received 11 September 2019, p. 13.

¹⁰ Mr Lee Miezis, *Transcript of evidence*, p. 8.

Tolmie is currently looking for a climate change expert or meteorologist to come and speak to the community specifically about climate change. This is a community initiative, not an agency initiative. Briagolong is a Gippsland CBBM community which is currently supporting the local primary school as they put on a production around climate change, the aim of which is to support young people to better understand climate change and the environmental impacts.¹¹

As at September 2020, there were 21 communities across Victoria engaged in the CBBM program, facilitated by 8 staff in DELWP and the CFA. The program has recently recruited its first facilitator, who will work out of local councils to support communities in the Latrobe Valley, and is actively reporting program case studies and outcomes in publications such as the CFA's *Brigade* magazine and the *Australian Journal of Emergency Management*.¹²

Outside of government, key partners such as the Australian Red Cross have also developed community-based emergency management programs. In 2015, the Australian Red Cross piloted a program called RediPlan for Communities. The program aimed to 'build a community-led, community-based approach to community resilience'.¹³ Also known as RediCommunities, this project was piloted in Pomonal, Moyston, Elmhurst, Dadswell's Bridge and Great Western in the Grampians Region. These communities have formed groups to discuss, develop and implement community resilience actions. Achievements have included community emergency plans, community dinners, provision of information to new residents, and distribution of small preparedness kits. The Victorian branch of the Australian Red Cross has prepared a guide for communities to run their own community-based emergency management initiatives.¹⁴ The guide outlines the success of the pilot program:

The successful pilot led to significant benefits including increased community connectedness, emergency preparedness planning and increased capacity to anticipate and cope with the impacts of emergencies. The pilot was extended in 2018/2019, working with additional communities across Victoria.¹⁵

In Victoria, the Australian Red Cross has discussed its desire to more strongly integrate climate change into community resilience programs. The organisation has looked to South Australia, which has developed a number of climate change focused programs. Ms Sue Cunningham, Director, Victoria, Australian Red Cross, explained:

[W]e have this program called Climate-ready Communities, which is very much a community-based, action-based toolkit where we can sit with communities and get them to identify their local risks, their local strengths.¹⁶

11 Mr Alen Slijepcevic, Executive Director of Bushfire Management, Country Fire Authority, public hearing, Melbourne, 28 October 2019, *Transcript of evidence*, p. 24.

12 Fiona Macken, Community Based Bushfire Management (CBBM) Coordinator, Country Fire Authority, personal communication, 8 September 2020.

13 Ms Sue Cunningham, Director, Victoria, Australian Red Cross, public hearing, Melbourne, 28 October 2019, *Transcript of evidence*, p. 22.

14 Australian Red Cross, *RediCommunities: Community-Led Resilience for Emergencies: A guide & toolkit for communities*, Australian Red Cross, Melbourne, 2019.

15 *Ibid.*, p. 3.

16 Ms Sue Cunningham, *Transcript of evidence*, p. 22.

In addition to Government agencies and the Australian Red Cross, a number of other organisations have also undertaken community-based emergency management activities. East Gippsland Shire Council is working to address the challenges posed by the size and diversity of the shire by working with communities to develop local incident management plans. Cr Natalie O’Connell, Mayor, East Gippsland Shire Council, explained the drivers behind this initiative:

The number and diversity of places across the shire means that council has a significant task in working with those communities to understand and to increase their capacity to plan for the future and to recognise the actions that they can take themselves. We have got over 40 communities across our shire and the distances can spread up to 4 hours from one end of the shire to the other. Most recently this has seen council piloting an approach to the development of place and community plans across several quite different communities to understand how best to develop this place-based approach.¹⁷

Other community-based emergency management projects such as Ramp Up Resilience have been led by non-government organisations. This project is a partnership between communities and Coliban Water, Bendigo Sustainability Group, the Central Victorian Greenhouse Alliance, the North Central Catchment Management Authority, Loddon Shire, Campaspe Shire and the City of Greater Bendigo and is delivered by Make a Change Australia, a not-for-profit community engagement organisation. Ramp Up Resilience also takes a more explicit climate change focus, with the aims of understanding local impacts of climate change and the development of local solutions to address these challenges. This program was piloted in three communities during 2019.¹⁸ Ms Karen Corr, Executive Director, Make a Change Australia, detailed the early outcomes from these engagements:

What we have heard, learned and activated through this pilot is—we have been going out to talk to local communities in the whole region about climate change and what they think about that and what they want to do or are doing about it. So through strategically designed communications and creative engagement we have been able to connect with people who would not normally engage with climate change, simply by starting with the question, ‘Do you notice the weather?’

...

The thing that we have been able to achieve through the work that we have done is the generation of a lot of interest. We have been able to build trust very quickly and build relationships with local people who want to and are doing something about it in their communities. The face-to-face conversations we have had across the region and the events and training we have delivered, including in Rochester, Inglewood and Raywood, have demonstrated that there is a lot of commitment, passion and goodwill in this community to take on the challenges and develop and implement local solutions.¹⁹

¹⁷ Cr Natalie O’Connell, Mayor, East Gippsland Shire Council, public hearing, Bairnsdale, 24 October 2019, *Transcript of evidence*, p. 2.

¹⁸ Make a Change Australia, *Submission 103*, received 26 August 2019, p. 1.

¹⁹ Ms Karen Corr, Executive Director, Make a Change Australia, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, pp. 34–5.

Ms Corr went on to explain plans to scale up the program to ten communities in the region of Central Victoria, if the organisation is able to secure support from the Victorian Government. She also mentioned the need to fund further development and implementation of the ideas proposed through the community engagement.²⁰ The role of grants and other support for community organisations is further addressed in Chapter 10.

Individual communities have also developed their own emergency management and resilience plans. Tarnagulla, in the Central Goldfields, was isolated by flooding in 2011 and has also seen the membership of its CFA brigade fall from 45 to 10 over recent years. This motivated the Tarnagulla Alternative Energy Group to partner with RMIT University and develop a community resilience plan.²¹ Taking a strengths-based community development approach, the community will work with agencies to develop actions to build their resilience at an individual, household and community level. They plan to review their plan after five years.²²

A number of councils mentioned that their emergency management plans now take greater account of climate change.²³ Many of these plans are required by the *Emergency Management Act 2013*, which has recently been amended by the *Emergency Management Legislation Amendment Act 2018* to make emergency management planning more community-focused. As Mr Crisp explained:

The community-focused planning reforms—the emergency management planning legislation was passed last year so we are in a process now where we are developing a new state emergency response plan ... Again, there will still be municipal plans, but there is a greater focus on community involvement in the development of those plans.²⁴

These examples demonstrate a clear desire within organisations and communities for increased levels of community involvement and leadership in emergency management planning and preparedness. However, the Committee did not hear any evidence on how these groups and organisations are coordinating their efforts to achieve the best outcomes. This apparently limited coordination may impact the sustainability of these initiatives as facilitators and any supporting funding move to other locations. On the one hand, attempts to streamline or combine these programs would work against the philosophy and values of community-based emergency management. On the other hand, the Government could facilitate the sharing of lessons between different community-based emergency management programs, for example, through conferences or online portals such as the Disaster Resilience Compendium from the Monash University Disaster Resilience Initiative.²⁵ It is also unclear at this stage

²⁰ Ibid., p. 35.

²¹ Friends of the Earth, *Submission 145*, received 12 November 2019, p. 3; Centre for Urban Research, *Submission 135*, p. 12.

²² RMIT Centre for Urban Research, *Tarnagulla Community Resilience Action Plan*, 2020, <<https://cur.org.au/project/tarnagulla-community-resilience-action-plan>> accessed 22 April 2020.

²³ For example: Mornington Peninsula Shire, *Submission 121*, received 2 September 2019, p. 4; Mount Alexander Shire Council, *Submission 114*, received 29 August 2019, p. 11.

²⁴ Mr Andrew Crisp, *Transcript of evidence*, p. 3.

²⁵ Monash University Disaster Resilience Initiative, *Compendium*, 2020, <<https://www.monash.edu/muarc/research/research-areas/home-and-community/disaster-resilience/case-studies>> accessed 22 April 2020.

how these community initiatives will be considered in the development of Municipal Emergency Management Plans in the context of the legislative amendments noted above. In conclusion, there is a strong preference within communities for government to facilitate the sharing of emergency management information. Such an approach ensures that community-based emergency management operates as more than an administrative structure and remains a truly community driven process.

FINDING 33: Community-based emergency management can deliver a range of benefits including improved disaster resilience. It works best when approaches are bottom-up and community focused. There are opportunities for learnings to be shared among engaged communities and facilitating organisations.

Mr Jamie Devenish, then Manager of Emergency Management Planning, Victoria State Emergency Service (VICSES), supported the increase in community-based emergency management approaches, or other approaches to increasing community involvement:

I think if you can put [communities] at the forefront of it ... anything that can be that ground up planning where the agencies are kind of supporting them in their goals and solutions is probably best.²⁶

Both EMV and the CFA suggested that a higher level of knowledge in communities, more community champions and additional funding would be needed to increase the scale and scope of community-based emergency management.²⁷ Investment in trained facilitators, both within and outside the emergency services, is also needed to help bring communities on their own individual journeys. Mr Devenish discussed some of the achievements of VICSES in training their volunteers to engage with communities:

Over 140 SES volunteers have now undertaken community engagement facilitator training, and through those better engagement practices, a stronger focus on community connectivity and building the capacity and capability of our local people to have the skills and tools in place we will better meet our resilience goals and the future need.²⁸

The Safer Together program is also focusing on upskilling people in community engagement. Mr Slijepcevic outlined how the Safer Together program has improved this capability across multiple agencies:

I think through *Safer Together* we had a big emphasis on creating the capability and capacity of our people to engage in and facilitate discussions with the communities, and that has been a great success. We had more than 1000 individuals going to those programs from DELWP or Parks or CFA or SES as well, so it is a program that is working really well.²⁹

²⁶ Mr Jamie Devenish, Manager, Emergency Management Planning, Victoria State Emergency Service, public hearing, Melbourne, 28 October 2019, *Transcript of evidence*, p. 12.

²⁷ Mr Andrew Crisp, *Transcript of evidence*, pp. 12–13; Mr Alen Slijepcevic, *Transcript of evidence*, p. 12.

²⁸ Mr Jamie Devenish, *Transcript of evidence*, p. 15.

²⁹ Mr Alen Slijepcevic, *Transcript of evidence*, p. 24.

Ms Cunningham explained that funding would be most helpful to scale up existing pilot projects to cover the entire State:

So however we achieve it, it is systemically being able to sustain it and to be able to make it accessible to those communities that need it rather than it being a little bit piecemeal. Because we do hear, 'We've done this on the Surf Coast' or, 'We've done this in the Grampians region', but I think it is the systemic ability to work across the whole state that is possibly something that is worth investigating.³⁰

The adoption of a systematic and coordinated approach to existing community-based emergency management programs would be required to scale up the number of communities involved. The Committee considers that bringing the above programs together to share successes and lessons would develop an improved understanding of what is needed to facilitate a sustainable community-based emergency management program and get more communities involved. This could be achieved by involving experienced representatives from the projects and communities discussed in this section, as well as other examples of community-based emergency management in Victoria. These efforts should inform the development or review of guidelines for Municipal Emergency Management Plans on how to best integrate community-based emergency management programs into their arrangements.

FINDING 34: The adoption of a systematic and coordinated approach to existing community-based emergency management programs would be required to scale up the number of communities involved.

RECOMMENDATION 65: That Emergency Management Victoria assume a leadership role in ensuring that the lessons from different community-based emergency management approaches are shared in an ongoing way and work to scale these up to more communities across Victoria.

9.2 Planned burning and cultural burning

Measures to reduce risk are often a component of community-based emergency management projects. Climate change will also impact the range of options available for the reduction of various climate-related and other disaster risks. Planned burning, or the deliberate introduction of fire into the landscape to reduce future fire risk, is one such risk reduction technique that is impacted by climate change. Although there is still substantial uncertainty and regional variation, recent research indicates that opportunities for planned burning could increase in some parts of Victoria.³¹ Some

³⁰ Ms Sue Cunningham, *Transcript of evidence*, pp. 22–3.

³¹ Giovanni Di Virgilio, et al., 'Climate change significantly alters future wildfire mitigation opportunities in southeastern Australia', *Geophysical Research Letters*, vol. 47, no. 15, 2020.

of this increase may occur during winter, although this is likely to present substantial public health challenges, with increased smoke impact more likely during this period.³² Although opportunities may increase in the longer term, Mr Miezis explained the recent impact that climate change has had on the available opportunities for planned burning by reducing the period when weather conditions are both safe and conducive:

[I]t is an ongoing and continual challenge to keep a lid on growing bushfire risk whilst you have got shrinking windows for safe and effective planned burning. It is important, I think—and as we look at it, planned burning is not a panacea, but it is part of a suite of tools that fire services have and communities have to reduce the risk and impact of fires. While we have had a shrinking window for planned burning, we have seen an increase in mechanical treatments—slashing, mowing and those types of activities—which are not as weather-dependent but are much more temporal in nature. So while a planned burn could have an effect in reducing fuel loads for anywhere up to eight to 10 years, mowing and slashing tends to have a much shorter impact period of one to two years, so you are going back more frequently to do those activities.³³

One development in fire management in Victoria is the expansion of cultural burning by Aboriginal people since 2017.³⁴ In 2019, DELWP launched Australia's first *Traditional Owner Cultural Fire Strategy*, which aims to provide a framework for the reintroduction of traditional fire practices.³⁵ Mr Miezis explained some of the work of DELWP with Traditional Owner groups around cultural burning:

We had seen a lot of traditional owner groups working independently, and the framework really helps us work and support them and equally learn from them in terms of how we use cool mosaic burning year-round to manage fire risk. We have had a number of burns done with and led by traditional owners now. In fact on the current 2019 to 2020–21 joint fuel management program plan, which is a joint CFA-DELWP plan, there are 41 burns across the state which were identified as Traditional Owner burns. We also as a department supported 30 Victorian traditional owner representatives to participate in the national Indigenous fire conference ...³⁶

This framework centres self-determination and the recognition of the legal rights of access to Country and intellectual property and moral rights in Indigenous land management practices.³⁷ Integration of cultural burns into the joint fuel management program plan helps mitigate the risks associated with planned burning, which could otherwise attach to Traditional Owner groups. As at June 2020, there were approximately 100 cultural burns nominated by Traditional Owner groups in Victoria.³⁸

³² Giovanni Di Virgilio, et al., 'Under climate change, winter will be the best time for bush burn-offs – and that could be bad news for public health', *The Conversation*, 30 July 2020, <<https://theconversation.com/under-climate-change-winter-will-be-the-best-time-for-bush-burn-offs-and-that-could-be-bad-news-for-public-health-143546>> accessed 30 July 2020.

³³ Mr Lee Miezis, *Transcript of evidence*, p. 7.

³⁴ Mr Scott Falconer, Deputy Chief Fire Officer, Department of Environment, Land, Water and Planning, Royal Commission into National Natural Disaster Arrangements, public hearing, Canberra, 18 June 2020, *Transcript of evidence*, p. 824.

³⁵ *Ibid.*, p. 826.

³⁶ Mr Lee Miezis, *Transcript of evidence*, p. 9.

³⁷ Mr Scott Falconer, *Transcript of evidence*, pp. 823–5.

³⁸ *Ibid.*, p. 824.

Mr Scott Falconer, Deputy Chief Fire Officer, DELWP, explained to the Royal Commission into National Natural Disaster Arrangements how he expects this number to grow in coming years:

[There is an] incredible desire for Traditional Owners to get back on Country to be part of that management process. And I have no doubt that [cultural burning] will be—play a much larger role in the future of fire management in Victoria.³⁹

While only playing a small role in the management of bushfire risk at present, the Committee considers that greater involvement of Aboriginal people in Indigenous land management, including cultural burning, could help address some of the impacts of climate change on Aboriginal people discussed in Chapter 2.

9.3 Community and individual disaster preparedness

In addition to the community-led approaches to emergency management discussed above, Victorian Government agencies, local government and community organisations play a critical role in developing programs and projects to improve the preparedness of individuals and households.

Dr Richard Thornton, CEO, Bushfire and Natural Hazards Cooperative Research Centre, explained the importance of disaster preparedness education and engagement:

Our research following major fires in all states in recent years consistently tells us that community members understand that they live in bushfire-prone areas but that they do not consider themselves personally at risk. The issue of community education, particularly relating to risk perception and understanding of warnings, has been a continual message from inquiries following events. Our research is helping to address some of these issues, but there is still a lot to do. The issues relating to community understanding of risk ultimately underpin many of the issues relating to preparedness and the inability to consider mitigation fully.⁴⁰

Dr Thornton explained that community preparedness programs need to be carefully designed to ensure that they are effective:

I think it is making sure that we understand how to put that message across. It is always complex to get people to understand risk. We have done it quite well in the areas of road safety where people now buckle up and actually pay attention to some of these things. We still have a way to go to take that link from ‘I understand I live in a risky area’ to ‘I know it’s a risk for me’. So even that conversation about how you plan for a bushfire and when is the right time to start planning with your family about where you go is being pushed really strongly by the agencies all around the country. The same applies to storm seasons and to flood seasons, but it is hard to actually get people to do that because it is not front of mind, particularly in winter when it is wet and cold and such.⁴¹

³⁹ Ibid.

⁴⁰ Dr Richard Thornton, Chief Executive Officer, Bushfire and Natural Hazards Cooperative Research Centre, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 16.

⁴¹ Ibid., p. 18.

Community preparedness campaigns are also focused on enhancing social cohesion beyond the traditional preparedness actions of emergency kits and plans. Mr Devenish explained the benefits of knowing one's neighbours and the importance of the Neighbour Day campaign:

[K]nowing those that live around you, where if it was to be a single tree down on a house and our crews were to turn up, if the neighbours were even able to tell you what bedroom they sleep in, those seconds can make a real difference. It is the same in a house fire and the same, I guess, in a large-scale community event. So that story out of Japan in 2011 when the earthquake went off and most coastal communities had around half an hour before the tsunami was going to hit, that is a pretty modern country; it had good alerting systems and good warning systems in place, and essentially anyone along that coastline that was immobile or vulnerable or slow to move—aged—unless a neighbour threw them in the car as they were heading up the hill, they essentially perished. So even something like the benefits of knowing your neighbours and promoting things like Neighbour Day and things like that I think can have a real difference where they are not traditional preparedness actions, but they still make a difference in terms of the outcome.⁴²

Emergency services lead many programs in communities across the state to prepare individuals, households and communities. One example is the Survive and Thrive program, a partnership between Parks Victoria, the CFA and schools in Anglesea and Strathewen to integrate bushfire into education for grade 5 and 6 students. Mr Crisp explained the program:

Anglesea—that is a community that works very, very well with Parks and the CFA and other organisations where they have actually developed their own plans around this. So, the primary school there, I remember I went down there not long after moving into this role. We had to go through a day where I had to learn a bit about a fire so I could put on some gear and go onto a fireground, so we were going to be taught about fire danger ratings and the fire danger index. It was grade 5 kids from the local primary school that came in and taught us. This is a program that has been running down there for a few years. It is probably one of the best models I have seen, and when we talk about community resilience and where we should be focusing our efforts and our energy, you do not give up on any section of the community. And they have got a partnership with Strathewen at the same time ... which works really, really well.⁴³

Although resource intensive, this program has proved successful, with the students increasing their knowledge of fire and reducing their fear. The students' households also increased their bushfire planning and preparedness. The Survive and Thrive evaluation report recommended

replicating the program in a number of small communities and engaging in learning for effectiveness, efficiency, and expansion, the Survive and Thrive model could be

⁴² Mr Jamie Devenish, *Transcript of evidence*, p. 16.

⁴³ Mr Andrew Crisp, *Transcript of evidence*, pp. 11–12.

progressively scaled-up without compromising the valuable outcomes that have been observed in the communities of Anglesea and Strathewen.⁴⁴

Mr Slijepcevic also observed the benefits of programs that are targeted at schools:

[I]t is much easier to engage communities when they are already educated. So if we can put more programs into the schools, the better the outcomes will be later on. So it is the best investment.⁴⁵

Programs developed by the emergency services play a key role in engagement with the community to promote preparedness and resilience. Many local governments and community organisations have also developed projects in their communities to meet local needs.⁴⁶

Heatwaves, which have been demonstrated to have substantial impacts on human health and wellbeing in Australia, are one of the hazards that are most likely to worsen due to climate change.⁴⁷ Indeed, heatwaves are Australia's deadliest natural hazard.⁴⁸ More than 432 people died in the heatwave that coincided with the 2009 Victorian bushfires.⁴⁹ Since then, there have been improvements to the Government's preparedness for heatwaves. Mr Crisp outlined Victoria's current approach to responding to heatwave emergencies:

Now when we see the forecast I will appoint a state controller for heat. We make sure that DHHS, ambos, hospitals are all linked up in relation to heat and our messaging with local government, and we are looking at the homeless. So there is a lot of good work. We were well and truly on track for that over the last summer, and yes, there was some increased work for ambulances and for hospitals but it was nothing like we have been previously. Again, that is not to say that with the trajectory that we are seeing that we do not need to maintain a focus in relation to heat.⁵⁰

Local governments are delivering projects to address heatwave risks, including newsletters and calls to vulnerable people delivered by the City of Ballarat, and heatwave kits distributed to people experiencing homelessness by the City of Port Phillip.⁵¹ Other measures to reduce the risks of extreme heat through retrofitting and building design are discussed in Chapter 5 and Chapter 6.

44 Briony Towers, Sophie Perillo and Kevin Ronan, *Evaluation of Survive and Thrive: Final Report to the Victorian Country Fire Authority, Bushfire & Natural Hazards CRC*, Bushfire and Natural Hazards Cooperative Research Centre, East Melbourne, 2018, p. 82.

45 Mr Alen Slijepcevic, *Transcript of evidence*, p. 12.

46 For example: Cardinia Shire Council, *Submission 43*, received 22 August 2019, p. 2; Surf Coast Shire Council, *Submission 86*, received 26 August 2019, attachment, p. 6; Renewable Newstead, *Submission 95*, received 26 August 2019, p. 2; Centre for Urban Research, *Submission 135*, pp. 12-16.

47 Peng Bi, et al., 'The Effects of Extreme Heat on Human Mortality and Morbidity in Australia: Implications for Public Health', *Asia Pacific Journal of Public Health*, vol. 23, no. 2_suppl, 2011.

48 Andrew Gissing and Lucinda Coates, 'Australia's 'deadliest natural hazard': what's your heatwave plan?', *The Conversation*, 18 January 2018, <<https://theconversation.com/australias-deadliest-natural-hazard-whats-your-heatwave-plan-90165>> accessed 24 July 2020.

49 Ibid.

50 Mr Andrew Crisp, *Transcript of evidence*, p. 23.

51 City of Ballarat, *Submission 78*, received 26 August 2019, p. 3; City of Port Phillip, *Submission 93*, received 26 August 2019, p. 2.

Projects like Balmoral Fire Connect have demonstrated the value of informal conversations to facilitate preparedness education. Rather than the distribution of formal bushfire safety information or preparedness programs, Balmoral Fire Connect involved staff from the Balmoral Bush Nursing Centre having conversations in the community. Ms Joanne Brown, Manager Health and Wellbeing, Southern Grampians Glenelg Primary Care Partnership, explained how the project works:

[W]hen [bush nursing centre staff] were out talking to people in the community ... they would talk about safety and welfare and weather. So if they were out yesterday in the community—if the district nurse was out in the community yesterday—it is likely that she was saying, ‘Hey, you know, it’s going to be hot tomorrow. What are you doing to protect yourself? What about your kids? It’s going to be a really bad fire day. Have you got a plan?’. They would be using those prompts, which are just as valuable as taking the formal information.⁵²

The project also partnered with researchers to understand how information moved around the community of Balmoral. Ms Brown outlined how the results demonstrated the effectiveness of this less formal mode of community engagement:

Essentially if you tell somebody something in a rural community, it is likely that message travels. We might have called that the grapevine or gossip years ago, but there are times when that is really effective.⁵³

The project went on to win a number of awards and was made into a short film titled ‘ALLready: There’s No Such Thing As Small Talk’.⁵⁴

Emerald Community House has developed a Centre of Resilience philosophy, a community development model designed to elicit resilience building ideas and initiatives, strengthen communities and contribute to ‘community continuity’.⁵⁵ Ms Mary Farrow, Manager, Emerald Community House, explained the basis for the Centre of Resilience:

As community development practitioners we facilitate and generate community actions and implement solutions to common problems like preparing to live in high-risk fire areas, supporting sustainable practices, community advocacy, flexible employment and support for women, and running community enterprises.⁵⁶

Emerald Community House has also developed the Weathersmarts program to help the community understand the impacts of climate extremes. This program presents face-to-face sessions that involve emergency services, councils, telecommunications providers, the Bureau of Meteorology, insurers and childcare providers. It is designed to help people reflect on their own expectations and promote action to improve

⁵² Ms Joanne Brown, Manager Health and Wellbeing, Southern Grampians Glenelg Primary Care Partnership, public hearing, Warrnambool, 21 November 2019, *Transcript of evidence*, p. 25.

⁵³ Ibid.

⁵⁴ Ibid.

⁵⁵ Emerald Community House, *Submission 102*, received 26 August 2019, p. 2.

⁵⁶ Ms Mary Farrow, Manager, Emerald Community House, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, p. 29.

their resilience to climate extremes. Emerald Community House has run four of these programs over two years.⁵⁷ Ms Farrow explained how Emerald Community House supports its community to prepare for high winds and subsequent power outages when storms are forecast:

When the storm warnings come out in the hills for high winds and damaging winds we put out a message on our Facebook. We do not say, 'Okay, look at the website. Look at what's happening'. We just say, 'Charge your rechargeables'. Everybody knows what that means. Nobody wants to get stuck in a house with a child with a screen that does not work, so they make sure they act.⁵⁸

East Gippsland Shire Council has developed a Building Resilience Guide to consider climate change and climate extremes for houses in East Gippsland.⁵⁹ The guide explains how climate change has impacted East Gippsland, the effects of extreme weather on buildings and the benefits of building or renovating a home to be more resilient. It provides a series of measures for homeowners or homebuilders to consider across the hazards of extreme heat, flooding, storms and bushfire.⁶⁰ The Committee considers this guide to be a clear and practical means to encourage more resilient homes and that it could form the basis for a broader engagement program to motivate people to build and retrofit their homes appropriately.

Submissions to the Inquiry referred to other local initiatives and the need for further support for community organisations to develop and implement emergency preparedness projects similar to those discussed in this section.⁶¹ Chapter 10 addresses grants and other support for community organisations. Community and individual disaster preparedness should be considered holistically with other risk reduction measures, such as building and planning controls (discussed in Section 6.4.3) and hazard-resistant infrastructure (discussed in Section 6.3.4). This is especially important to account for hazards such as sea level rise, storms and flooding.

FINDING 35: Climate-change related hazards, including heatwaves and bushfires, can have serious and substantial impacts on human health. Victorian local governments and community groups are developing and delivering programs to increase the preparedness of the Victorian community for these disaster events.

The Committee considers heatwaves to be an issue of particular relevance. While this section has explored a range of local initiatives designed to prepare for and respond to heatwaves, there is substantial opportunity to ensure that all local governments and emergency services have adequate focus on heatwave hazards. The two key local documents that address heatwave hazards are Municipal Emergency Management

⁵⁷ Emerald Community House, *Submission 102*, p. 2.

⁵⁸ Ms Mary Farrow, *Transcript of evidence*, p. 32.

⁵⁹ East Gippsland Shire Council, *Submission 144*, received 30 September 2019, p. 6.

⁶⁰ Bright Futures, *Building Resilience: A guide to consider climate change for East Gippsland houses*, East Gippsland Shire Council, Bairnsdale, 2020.

⁶¹ For example: Cardinia Shire Council, *Submission 43*, p. 2; Surf Coast Shire Council, *Submission 86*, attachment, p. 6; City of Port Phillip, *Submission 93*, p. 3.

Plans prepared under the *Emergency Management Act 2013* and Municipal Public Health and Wellbeing Plans prepared under the *Public Health and Wellbeing Act 2008*. The Committee recommends that heatwaves be given a strong focus when these documents are reviewed to ensure that there are adequate planning arrangements in place, and that appropriate consideration is given to the impacts on people who are especially vulnerable to heatwaves.

RECOMMENDATION 66: That Emergency Management Victoria and the Department of Health and Human Services ensure that when Municipal Emergency Management Plans and Municipal Public Health and Wellbeing Plans are reviewed, they adequately plan for heatwaves with a focus on heat impacts on people who are especially vulnerable, including people who are registered on the Victorian Vulnerable Persons Register. All local councils should also be required, under their government disaster plans, to advertise the locations where vulnerable persons can seek refuge during heatwaves and other emergencies.

9.4 The community sector and business continuity

Most community organisations are highly vulnerable to the impacts of extreme weather events. Research commissioned by the Victorian Council of Social Service (VCOSS) found that 50% of community organisations would expect to remain closed one week after an extreme weather event seriously damaged their premises and 25% would likely close permanently. Community organisations are also regularly affected by extreme weather events and disasters, with 44% impacted in a one year period. Impacts included interruptions to staff transport, access for their clients, increased demand on their services, staff absences, and impacts on staff health.⁶² Ms Emma King, CEO of the Victorian Council of Social Service, explained how the resource limitations of community organisations make it difficult for them to turn their attention towards matters of business continuity and disaster preparedness:

While some community organisations are doing inspiring work to ensure their organisations, their staff, their clients and their communities are supported, many others are struggling. These organisations are at their limits just trying to meet critical demand. Most do not have the time or the financial resources to be able to build their resilience, and we know that community organisations are society's grassroots safety net.⁶³

Some community organisations are recognising the need to prepare for extreme weather events so that they are able to continue providing their regular services as well as respond to an emergency. Ms Farrow explained the many demands on the services provided by Emerald Community House and its increased need to adapt to climate change:

[W]e have a lot of demands on us to support child care; disability; hungry and unemployed people; family violence issues; homeless women who need help; ageing,

⁶² Victorian Council of Social Service (VCOSS), *Submission 88*, received 26 August 2019, p. 4.

⁶³ Ms Emma King, Chief Executive Officer, Victorian Council of Social Service, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, p. 28.

isolated people and other priority groups, yet we are having to set strategies now for climate adaptation and strategies for our own organisation and our own business to make sure that we can survive and keep running.

...

Keeping [the staff of Emerald Community House] working, earning and contributing to their super is an important responsibility, and I do not think enough talk is happening about the impact of climate change on jobs and income when businesses have to close because of extreme events. Because there is a domino effect, you know? If I close the community house, then all these parents and their child care is not going to happen; all my people are going to go home, they are not going to get paid; and the whole system starts to fall apart.⁶⁴

Several stakeholders called for investment by the Victorian Government to improve the resilience of the community sector and help it to develop climate adaptation strategies.⁶⁵ VCOSS called on the Victorian Government to develop a framework for the community sector to improve its business continuity and resilience to climate change, so that it can continue to deliver services during emergencies. VCOSS suggested that such a framework should identify various roles and responsibilities and the skills and capabilities that community organisations need to develop and maintain. VCOSS also noted that such a framework would need to be well resourced to be effective.⁶⁶

Industry sectors are also increasingly undertaking resilience planning in response to climate change. For example, Mr Crisp explained how the topics of concern for the Sector Resilience Networks formed under the *Critical Infrastructure Resilience Strategy* have changed over time:

I remember when these networks were first established and people were talking about critical infrastructure protection. The reason they were actually developed, and the significant risk at that stage, was terrorism. Since I have come into the role and attended a number of forums in relation to this particular sector it is climate change that they are talking about in terms of one of their most significant risks.⁶⁷

Sector Resilience Networks exist for banking and finance, communications, energy, food supply, government, health, transport and water—but not for the community sector. Bringing the community sector into the critical infrastructure resilience governance arrangements could provide one avenue for assisting the sector to develop its resilience to climate change, however, this would require close consultation with the sector prior to proceeding.

⁶⁴ Ms Mary Farrow, *Transcript of evidence*, pp. 30–1.

⁶⁵ Centre for Urban Research, *Submission 135*, p. 16; Jesuit Social Services, *Submission 122*, received 2 September 2019, pp. 7–8; Women's Climate Justice Collective (Vic), *Submission 153*, received 30 January 2020, pp. 8–9.

⁶⁶ Victorian Council of Social Service (VCOSS), *Submission 88*, pp. 3–4.

⁶⁷ Mr Andrew Crisp, *Transcript of evidence*, p. 3.

RECOMMENDATION 67: That Emergency Management Victoria work with the community sector to develop a framework to improve the sector’s resilience and business continuity.

9.5 Off-grid emergency facilities

Several stakeholders called for a variety of emergency and community facilities to install solar PV and batteries, perhaps with generator backup, to enable continued operation during a power failure or other emergency.⁶⁸ The Committee is aware of only a few examples of these types of systems in Victoria, such as the Diamond Creek Sporting Stadium.⁶⁹ The Committee also visited the Yackandandah CFA Brigade, which has installed 6 kW of solar and 13 kWh of batteries.⁷⁰ Malmsbury CFA Brigade has also installed an off-grid system comprising 10.48 kW of solar panels and a 13.5 kWh battery.⁷¹ One other example was provided by Ms Allison McCallum, Environmental Project Officer – Conservation, Campaspe Shire Council:

One of the new projects that is currently going on as we speak is the installation of 60 kW of solar with 30 kW of battery storage at Echuca Stadium. What makes this project different and one of the first for regional Victoria is that it is also an emergency relief centre. So this emergency relief centre will now be powered off the grid without the use of generators, by that battery storage.⁷²

Mr Slijepcevic explained that the backup power systems that the CFA have invested in are primarily diesel or petrol generators:

We obviously as the agency invested a lot in generators so we can secure power supply to our facilities. But also there are some fire refuges that we utilise in CFA facilities or in some schools as well that have backup power. But I think that is a good idea to increase the number of backup power supplies.⁷³

New VICSES units under construction by the Emergency Services Infrastructure Authority (ESIA) also include backup diesel or petrol generators. Newly built units are also now built with ‘solar ready’ electrical infrastructure to enable the installation of solar panels at a later date.⁷⁴ In a response to questions from the Committee

⁶⁸ For example: Port Phillip EcoCentre, *Submission 133*, received 11 September 2019, p. 5; Ms Mary Farrow, *Transcript of evidence*, p. 32; Ms Carole Hammond, Coordinator, Climate Change and Environment, Strathbogie Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 5; Mr Scott Draper, *Transcript of evidence*, p. 11; Mr Vito Albicini, Director, Assets and Development, Murrindindi Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 27.

⁶⁹ Nillumbik Shire Council, *Diamond Creek Sporting Stadium becomes Centre for Relief*, media release, Nillumbik Shire Council, 23 October 2018.

⁷⁰ Totally Renewable Yackandandah, *Submission 138*, received 16 September 2019, p. 4.

⁷¹ CFA News & Media, *Malmsbury Station becomes Tesla-powered*, media release, Country Fire Authority, 30 July 2020.

⁷² Ms Allison McCallum, Environmental Project Officer, Conservation, Campaspe Shire Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 6.

⁷³ Mr Alen Slijepcevic, *Transcript of evidence*, p. 25.

⁷⁴ Rebecca Falkingham, Secretary, Department of Justice and Community Safety, correspondence, 10 June 2020, p. 3.

regarding the use of sustainable back-up power options, the Department of Justice and Community Safety stated that:

While ESD requirements are a robust consideration in the design, emergency response requirements remain the paramount consideration and reliable and temporary off-grid power is the current option utilised by VICSES facilities.

...

ESIA does not consider solar panels to be a cost-efficient option at this time, with the majority of solar energy generated ultimately being returned to the grid. However, all facilities are being developed as 'solar ready' with switchboards capable of accommodating solar energy systems into the future.⁷⁵

While many emergency facilities contain backup diesel or petrol generators, these options are noisy, cause pollution and need to be refuelled. Fuel can often be difficult to access during an emergency, especially in rural areas, as explained by Ms Carole Hammond, Coordinator, Climate Change and Environment, Strathbogie Shire Council:

We have blackouts regularly because we are at the end of the grid in where we are, and it is very distressing for the community to suddenly be without any power, and generators do not cut it when the service stations do not have any power to give you diesel. So we need solar, we need batteries.⁷⁶

The Committee acknowledges that the limited use of some volunteer-based facilities may not on its own justify the use of solar power, while a generator may be similarly considered the optimal solution for temporary power outages. The Committee considers that the sustainability and resilience benefits of renewable back-up power systems need to be considered in combination rather than separately.

The Committee acknowledges that even with solar and batteries installed, other backup alternatives may still be required, should solar generation be impacted by cloud or smoke, and to meet the needs of energy-intensive appliances such as air conditioning. Consideration could also be given to oversizing storage or the development of other innovative storage or backup options, as this may prove more economical or reliable than use of a generator. Microgrids, as discussed in Chapter 4, could also be considered in the longer term as a means of ensuring continued electricity supply in emergencies. Solar and storage systems installed at emergency facilities should be 'microgrid-ready', to ensure that they can participate in any future microgrid in that area.

A variety of emergency facilities could benefit from the establishment of off-grid capable power systems including:

- Community Fire Refuges, of which there are five in Victoria
- Relief Centres, which are often based in other community facilities

⁷⁵ Ibid., pp. 2-3.

⁷⁶ Ms Carole Hammond, *Transcript of evidence*, p. 5.

- Incident Control Centres, which are typically housed in government buildings
- CFA Brigades and VICSES Units, with priority given to those that are Divisional Command Points.

The Committee does not support the provision of off-grid systems for bushfire situations at Bushfire Places of Last Resort, recognising that these locations are only intended to be used in circumstances where all other options of an individual or household plan have failed. Provision of off-grid systems at Bushfire Places of Last Resort may encourage households to inappropriately utilise them as a ‘first choice’ during a bushfire emergency. However, consideration could be given to off-grid systems at Bushfire Places of Last Resort if that location functions as a Relief Centre in other emergencies such as floods.

In addition to the back-up power benefits in an emergency where grid power is lost, the installation of renewable generation at these facilities will also deliver savings on electricity bills to the facility occupants. These will include emergency services volunteers, schools and community groups, enabling them to direct those savings to core activities. Facilities could be prioritised based on their location in the electricity grid and likelihood of loss of power, emergency risk, and the other uses of the facility.

RECOMMENDATION 68: That the Victorian Government establish a program to install renewable off-grid generation and storage systems at emergency facilities to ensure continued operations during an emergency.

10 Financing community climate action

Many of the initiatives discussed in this report have benefited from grants from the Victorian Government. This chapter outlines the grant-making by the Victorian Government for community climate change action and recommendations from organisations on financial and other models for further support. The Committee recognises that mid-scale community energy projects require specialised investment—financial support for these projects is discussed in Chapter 4.

While the Victorian Government is the major source of finance for community climate action, other organisations also provide grants to communities.

One innovative example of grant-making to community organisations is the Hepburn Z-NET Climate Resilience Fund, which was established early in 2019. The Fund was established with contributions from Hepburn Shire Council, Hepburn Wind, Creswick and District Community Bank and Powershop and is open to other contributions from external organisations. The Fund is focused on providing grants to projects that do not have a clear economic return-on-investment, such as feasibility studies and behaviour change campaigns.¹

As part of benefit sharing arrangements with their host communities, renewable energy developers—such as ACCIONA, the operator of the Waubra Wind Farm—also provide grants to local community groups.² Hepburn Wind, a community-owned wind farm discussed in Chapter 4, has funded over 62 local projects worth \$130,000 since it started its community grants program.³

Local government grant-making to support community climate change action is discussed in Chapter 6.

10.1 Recent community climate change grants programs

The Victorian Government has funded a number of climate change action programs for which local government and community organisations are eligible. This section discusses the achievements of three recent programs that were referred to by many stakeholders.

1 Hepburn Shire Council, *Submission 119*, received 2 September 2019, p. 4.

2 Mr Rob Law, Executive Officer, Central Victorian Greenhouse Alliance, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 31; Taryn Lane and Jarra Hicks, *A Guide to Benefit Sharing Options for Renewable Energy Projects*, Clean Energy Council, Melbourne, 2019.

3 Ms Taryn Lane, General Manager, Hepburn Wind, public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, pp. 17–18.

10.1.1 Community Climate Change Adaptation (3CA) Grants Program

The 3CA Grants program was announced in February 2019 and provided \$1 million of funding to support local climate change adaptation. The focus of the program was community benefit, fostering partnerships, and sharing learnings on best practice approaches to climate change adaptation. The Department of Environment, Land, Water and Planning (DELWP) specifically focused the eligibility criteria for the program to favour community groups and local government over universities.⁴ The program funded 17 projects worth between \$30,000 and \$75,000.⁵

Many stakeholders noted that the program was extremely popular, with many organisations making applications.⁶ Mr Geoff Lodge, CEO, GV Community Energy, outlined the successful and unsuccessful submissions in the Hume region and noted that the program was not as community focused as they had hoped:

In this region alone there were 33 bids totalling \$11 million, and there was \$1 million available [across the entire state]. When you look at the two companies or two organisations that received funding under [the 3CA] program, with both of them all of their partners were either industry or statutory authorities or government agencies. In terms of the targeting of the funding, it was marketed as 'community', and the definition of 'community' was used in the broader sense.⁷

Other stakeholders noted that the delay in the announcement of successful recipients also created challenges for small not-for-profits looking for funding.⁸ Mr Chris Corr, Member, Bendigo Sustainability Group, explained the group's frustration with the delay in the announcement:

[T]he outcome was out this last week, but I guess there was a three, four, five-month delay in the advice. That is I guess frustrating for communities. We need that to be streamlined. There were over \$140 million worth of projects, as we understand it, put in to [the 3CA Grants and Renewable Communities Program] for \$3 million in government funding ... We are not getting those because there is just simply not enough money in these programs.⁹

⁴ Department of Environment, Land, Water and Planning, *Submission 141*, received 26 September 2019, p. 19.

⁵ Department of Environment, Land, Water and Planning, *Community Climate Change Adaptation (3CA) Grants Program, 2020*, <<https://www.climatechange.vic.gov.au/adapting-to-climate-change-impacts/community-climate-change-adaptation-3ca-grants-program>> accessed 6 May 2020.

⁶ Mr Rob Law, *Transcript of evidence*, p. 29; Macedon Ranges Shire Council, *Submission 69*, received 26 August 2019, p. 8; Goulburn Broken Greenhouse Alliance, *Submission 140*, received 25 September 2019, p. 8; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, received 19 September 2019, p. 5.

⁷ Mr Geoff Lodge, Chief Executive Officer, GV Community Energy, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 29.

⁸ Mr Rob Law, *Transcript of evidence*, p. 29; Macedon Ranges Shire Council, *Submission 69*, p. 8.

⁹ Mr Chris Corr, Member, Bendigo Sustainability Group, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 16.

10.1.2 New Energy Jobs Fund

The New Energy Jobs Fund (NEJF) is a \$20 million component of the \$200 million Future Industries fund.¹⁰ Ms Kylie White, Deputy Secretary, Environment and Climate Change, DELWP, explained that the NEJF

is intended to support Victorian-based projects that will create long-term sustainable jobs, increase the uptake of renewable generation, reduce greenhouse gas emissions and drive innovation in new energy technologies.¹¹

The NEJF has delivered four rounds of grant funding, including the Renewable Communities Program, with 59 industry and community projects sharing in \$13.5 million in funding. These included the development of Regional Renewable Energy Roadmaps, which are discussed further in Section 2.2.1. A fifth funding round was announced in May 2020 with a further \$1 million in grants available. Successful applicants were announced in September 2020.¹²

While community projects were eligible in the first three funding rounds provided under the NEJF, the fourth (i.e. the Renewable Communities Program) and fifth rounds have focused more on community energy groups. The Renewable Communities Program was intended to fund ready-to-implement community led renewable energy projects and round five of the New Energy Jobs Fund is intended for community-owned renewable energy projects, including community energy retailing.¹³ Mr Corr explained the benefits of the Renewable Communities Program being more community focused and providing capital for projects:

[A]ctually it was a good one—it actually went to capital projects, which is quite unique—but there was a total of \$1 million available across the whole state, and applicants could apply for up to \$1 million.¹⁴

RECOMMENDATION 69: That the Department of Environment, Land, Water and Planning review the New Energy Jobs Fund, particularly the benefits and outcomes delivered by its rounds of grant funding to date, with a view to providing further rounds of grant funding in the future.

¹⁰ Department of Jobs, Precincts and Regions, *New Energy Technologies: Working with the industry to drive maximum value from Victoria's energy resources*, 2019, <<https://www.business.vic.gov.au/support-for-your-business/grants-and-assistance/future-industries/new-energy-technologies>> accessed 6 May 2020.

¹¹ Ms Kylie White, Deputy Secretary of Environment and Climate Change, Department of Environment, Land, Water and Planning, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 34.

¹² Department of Environment, Land, Water and Planning, *New Energy Technologies*, 2020, <<https://www.energy.vic.gov.au/new-energy-technologies>> accessed 7 October 2020.

¹³ Ibid.; Department of Environment, Land, Water and Planning, *Submission 141*, p. 15.

¹⁴ Mr Chris Corr, *Transcript of evidence*, p. 16.

10.1.3 Victorian Climate Change Innovation Partnerships

This 2017 program provided start-up funding to community groups, local governments and businesses for innovative climate action projects. Over 240 applications were received, with 24 successful applicants sharing in \$4.3 million in funding.¹⁵ Several stakeholders referenced the popularity of this program.¹⁶

FINDING 36: The amount of community interest in climate change action funding from the Victorian Government is far higher than the amount of funding available. This can result in frustration given the substantial amount of time and effort that is invested by community volunteers in preparing grant applications.

RECOMMENDATION 70: That, given the substantial time and effort invested by community groups in preparing grant applications for climate change action projects, the Victorian Government introduce a two-stage process with an initial expression of interest stage for the purpose of shortlisting applicants.

10.2 Funding options for climate change action projects and strategy implementation

Organisations that have received government grants for community climate action have typically been highly appreciative of the receipt of funding and support. However, many have been frustrated with aspects of the grant-making process and have made recommendations for options to reform funding programs.

While most stakeholders discussed government grants, some recommended models to facilitate private funding for community groups. For example, renewable energy developers participating in the Victorian Renewable Energy Auction Scheme are required to include some form of community engagement and benefit sharing as part of their project. Renewable energy developers engage in a range of benefit sharing programs, for example, hiring local contractors, commissioning local Indigenous artists to create artworks on wind turbines, and subsidising the installation of microgrids and rooftop solar in local communities.¹⁷ Innovative mechanisms such as public-private co-investment or climate bonds were seen by the Victorian Marine and Coastal Council as possible options for climate change adaptation.¹⁸

¹⁵ Mr Leigh Ewbank, Coordinator, Act on Climate Victoria, Friends of the Earth Melbourne, public hearing, Melbourne, 26 February 2020, *Transcript of evidence*, p. 25.

¹⁶ Goulburn Broken Greenhouse Alliance, *Submission 140*, p. 8; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 5; Port Phillip EcoCentre, *Submission 133*, received 11 September 2019, p. 6; Central Victorian Greenhouse Alliance, *Submission 113*, received 29 August 2019, p. 9; CERES, *Submission 96*, received 26 August 2019, p. 5; Dr Blanche Verlie, et al., ENV11212 Course Coordinator, School of Global, Urban and Social Studies, RMIT University, *Submission 59*, Attachment B, received 25 August 2019, p. 1.

¹⁷ Lane and Hicks, *A Guide to Benefit Sharing Options for Renewable Energy Projects*.

¹⁸ Victorian Marine and Coastal Council, *Submission 100*, received 26 August 2019, p. 3.

10.2.1 An increase in community climate action funding

Organisations have called for a dramatic increase in the amount of funding for community climate change action.¹⁹ Many of the programs mentioned in Section 10.1 have been significantly oversubscribed. This can be demoralising for community groups, as explained by Ms Bronwyn Chapman, Executive Officer, Goulburn Broken Greenhouse Alliance:

I think our rural committees have really stepped up in their understanding, maturity and their capacity to handle these projects, so the plan to make more funding available to build on that community expertise would be really helpful.²⁰

Friends of the Earth called for a \$100 million investment in a ‘Victorian Climate Change Action Fund’ which was supported by several other submissions.²¹ Noting the scale of the Victorian Government’s Solar Homes program, the Bendigo Sustainability Group recommended an initial investment of \$100 million just to meet community demand for climate change action projects, and then an ongoing \$10 million per annum.²² The Australian Local Government Association has proposed a \$10 billion fund for councils and communities nationwide, which would equate to approximately \$1.5 billion for Victoria over 10 years, though some believe this to be a low estimate for the funding actually required.²³ While the amount of funding called for varies, all these amounts are far larger than current grants targeted at communities. Variation in these amounts is also to be expected as different organisations have proposed different types of projects and organisations that should be targeted by increased funding.

10.2.2 Many possible investment options

There was a broad diversity of views on the appropriate focus of any increased investment in community climate change action. Dr Nicholas Aberle, Campaigns Manager, Environment Victoria, recommended that funding programs should have a very tight focus in order to meet gaps in existing climate change action:

I think the smart way of doing that would not just be to say, ‘Here’s a giant pile of money. Tell us what you reckon’, but to say, ‘Right, here’s a pile of money. We are interested in projects that fill this gap, that fill this gap, that provide this solution, that address this concern’, so actually you are creating really clear categories that help, I guess, focus in the types of applications that people can put together; because it is not just about giving money to community groups, it is about increasing our adaptive capacity ...²⁴

¹⁹ Ms Fam Charko, Acting Executive Officer, Port Phillip EcoCentre, public hearing, Mornington, 7 November 2019, *Transcript of evidence*, pp. 3–4; Dr Nicholas Aberle, Campaigns Manager, Environment Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 15.

²⁰ Ms Bronwyn Chapman, Executive Officer, Goulburn Broken Greenhouse Alliance, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 6.

²¹ Friends of the Earth, *Submission 145*, received 12 November 2019, p. 6; Dr Blanche Verlie, et al., ENV11212 Course Coordinator, School of Global, Urban and Social Studies, RMIT University, *Submission 59*, Attachment D, received 25 August 2019, p. 1; Ms Sarah Lucy, *Submission 44*, received 22 August 2019, p. 2.

²² Mr Chris Corr, *Transcript of evidence*, p. 17.

²³ Goulburn Broken Greenhouse Alliance, *Submission 140*, p. 8; Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 5; Central Victorian Greenhouse Alliance, *Submission 113*, p. 9.

²⁴ Dr Nicholas Aberle, *Transcript of evidence*, pp. 18–19.

Some stakeholders suggested that government grants should be focused on innovation. Mr Leigh Ewbank, Coordinator, Act on Climate Victoria, Friends of the Earth Melbourne, suggested that the organisation's proposed \$100 million Victorian Climate Change Action Fund

should be viewed as like a startup fund, so it is about driving innovation and supporting new offerings from community in terms of mitigation and adaptation, and that is kind of very different to what has been on offer previously.²⁵

On a similar innovation theme, Jesuit Social Services called for financial support for early adopters and first movers on projects, including in the area of climate justice. Their submission notes the additional challenges and costs for pilot projects:

Early adopter organisations who wish to implement ecological justice programs may require extra financial support, however climate change adaptation, mitigation and transformation are not always identified as a sector priority and often do not attract dedicated funding. Further funding sources for these early adopters would enable more organisations, and the community services sector itself, to be better prepared for climate change impacts.

The process of institutional transformation requires access to resources, such as research and examples of evidence-based practice in order to learn about, understand and implement the most appropriate organisational changes.²⁶

Innovation was also the focus of the Women's Climate Justice Collective, which suggested that grants should focus on providing funds to local governments and cooperatives for the development of zero emissions industries.²⁷ East Gippsland Shire Council had a similar view, recommending funding for business development to provide sustainable construction materials for local government infrastructure projects.²⁸ Other submissions also called for business funding to help them reduce their emissions or transition to a circular economy.²⁹

Several organisations called for funding to assist those most vulnerable to the impacts of climate change.³⁰ Funding to develop and support programs to assist people experiencing homelessness, the elderly, children, international students, people with disabilities and low income households was seen as a key priority by the City of Melbourne.³¹ Jesuit Social Services called for support to develop training materials and workshops to share the learnings from different programs and case studies.³²

²⁵ Mr Leigh Ewbank, *Transcript of evidence*, p. 27.

²⁶ Jesuit Social Services, *Submission 122*, received 2 September 2019, p. 6.

²⁷ Women's Climate Justice Collective (Vic), *Submission 153*, received 30 January 2020, p. 6.

²⁸ East Gippsland Shire Council, *Submission 144*, received 30 September 2019, p. 22.

²⁹ Eastern Alliance for Greenhouse Action (EAGA), *Submission 139*, p. 7; Centre for Urban Research, Climate Change Transformations (CCT) Research Group, *Submission 135*, received 11 September 2019, p. 19.

³⁰ For example: City of Darebin, *Submission 124*, received 2 September 2019, p. 5; Jesuit Social Services, *Submission 122*, p. 7; City of Melbourne, *Submission 120*, received 2 September 2019, p. 27; COTA Green Sages, *Submission 132*, received 9 September 2019, pp. 1–2; Women's Climate Justice Collective (Vic), *Submission 153*, p. 8.

³¹ City of Melbourne, *Submission 120*, p. 27.

³² Jesuit Social Services, *Submission 122*, p. 6.

Other stakeholders suggested that funds should be provided to groups that already have strategies and projects underway to help them achieve existing goals, including through a partnership approach.³³ Ms Mary Farrow, Manager, Emerald Community House, recommended that the Government

[f]und or match funds of community groups that have a strategy to support their community and are using renewables. Look for that. Look for groups that are already doing something. Often with grants it says, 'Okay, this grant is for new things, not for if you're already doing it', and we all go, 'Tsk'. There are a lot of groups that are doing stuff and that started it on their own—put it together and scraped their money together. But now they have started it, they are eliminated right at the get-go—pipped at the post.³⁴

The Victorian Government's access to capital was seen as an opportunity for the provision of capital investment for community organisations, especially by those with facilities that need capital-intensive upgrades.³⁵

While this section is not intended to provide a comprehensive gap analysis, it does provide a number of options for consideration in future Victorian Government climate change action programs. The identification of local and regional priorities through the development of community transition plans—discussed in Section 10.2.5—may also provide a better indication of the unmet needs in Victorian communities.

10.2.3 Streamlining application and administrative procedures

The onerous nature of some grant application and administration processes, especially for smaller not-for-profits and those located in lower socioeconomic status areas, was noted by many stakeholders.³⁶ Smaller organisations are often competing against larger groups that either have extensive grant-writing experience or are able to employ their own grant writers. This can make applications for larger programs with broad eligibility criteria particularly challenging for smaller organisations. Ms Larissa Montgomery, Environmental Sustainability Coordinator, Benalla Rural City Council, explained the challenges that smaller groups face and how the introduction of non-competitive funding may assist:

We have seen that the recent funding for community groups is really highly competitive, usually being oversubscribed. It means that smaller groups who have limited resources often even struggle to get an application in, let alone a quality application, and therefore they normally lose out in that competitive process. It is kind of just a continuing cycle. So more non-competitive funding, with longer term implementation phases or

³³ Mr David Meiklejohn, Executive Officer, Northern Alliance for Greenhouse Action, public hearing, Melbourne, 4 December 2019, *Transcript of evidence*, pp. 21–2; Ms Karen Corr, Executive Director, Make a Change Australia, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 35.

³⁴ Ms Mary Farrow, Manager, Emerald Community House, public hearing, Melbourne, 5 December 2019, *Transcript of evidence*, pp. 33–4.

³⁵ Ms Fam Charko, *Transcript of evidence*, p. 8.

³⁶ Mr Leigh Ewbank, *Transcript of evidence*, p. 27; Mr David Blore, Member, Benalla Sustainable Future Group, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, pp. 24–6; Ms Sharon Terry, Team Leader, Sustainability and Environment, Greater Shepparton City Council, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 11.

successive rounds of a funding program would be really well received both by councils and community groups. This is far more likely to mobilise local communities and provide more meaningful strategic and longer term outputs, therefore obviously getting better value for the funding dollar.³⁷

Other stakeholders suggested the establishment of a separate non-competitive stream for smaller organisations with limited capacity or the tailoring of grants programs for low-resource organisations.³⁸ Mr Lodge supported a non-competitive approach and explained the need to separate different types of organisations and regions for a fairer application process:

I appeal that there is a distinction made between the NGO—the non-government organisation—sector, the not-for-profit, as opposed to the industry, government and statutory authorities so we are competing for the same pool of community funds. It is very inefficient in terms of this whole tendering process.

...

[T]here is a whole network of community organisations across the state and to be competing across the whole state means that bigger organisations essentially will step in, and it will be at the expense of the smaller networks. It is the smaller organisations that are connected with the local communities, and they are being adversely affected under these measures.³⁹

Rolling programs, where groups can apply for funding at any time, were also suggested by the Benalla Sustainable Future Group as a means of addressing the challenges small community groups face in competing for funding.⁴⁰

The resources that small rural governments need to devote to grant-writing can be high and diverts their attention from service delivery.⁴¹ Mr Vito Albicini, Director, Assets and Development, Murrindindi Shire Council, noted that the detail requested in applications for different programs can be repetitive, lengthy and seemingly not relevant to the program requirements.⁴²

FINDING 37: Complex and lengthy grant application processes can disadvantage organisations that are smaller or have less grant writing experience.

³⁷ Ms Larissa Montgomery, Environmental Sustainability Coordinator, Benalla Rural City Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 17.

³⁸ Mr David Blore, *Transcript of evidence*, pp. 25–6; East Gippsland Shire Council, *Submission 144*, p. 13.

³⁹ Mr Geoff Lodge, *Transcript of evidence*, p. 29.

⁴⁰ Benalla Sustainable Future Group, *Submission 152*, received 23 January 2020, p. 7.

⁴¹ Cr Jenny O'Connor, Mayor, Indigo Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 22; Goulburn Broken Greenhouse Alliance, *Submission 140*, p. 10.

⁴² Mr Vito Albicini, Director, Assets and Development, Murrindindi Shire Council, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, pp. 24–5.

10.2.4 Ongoing program implementation

The piecemeal nature of many government grants was highlighted as a challenge for organisations implementing long-term programs in their communities.⁴³ Many grants have funded pilots, but once these are demonstrated to be effective, it is difficult to secure funding to scale up or continue the initiative. Ms Sue Cunningham, Director, Victoria, Australian Red Cross, explained what would be needed to expand some of the organisation's volunteer-led pilot programs to more communities:

I hate to sort of go back to funding, because we would look to have these as volunteer-led programs, but ultimately I think across the state and regardless of who the beneficiaries are it is actually about having that sustained and ongoing program in place to sort of support that. At the end of the day the work we have done with communities and RediPlan is driven by the grants we have had from the national disaster resilience grants process and I think CFA and others. So however we achieve it, it is systemically being able to sustain it and to be able to make it accessible to those communities that need it rather than it being a little bit piecemeal.⁴⁴

Mr Rob Law, Executive Officer, Central Victorian Greenhouse Alliance, agreed that piecemeal funding does not meet community demands for a more programmatic approach to community climate change action and highlighted:

the need to move away from this sort of ad hoc small pulse funding that comes out every now and then ... [towards] longer term funding that looks at full project life cycles and funding implementation as well, not just getting to the feasibility business case stage and then sort of falling off a cliff with no pathway to implement them.

So obviously in an Inquiry like this you will hear lots of people asking for money and things like that, but I think it is a bit more nuanced than that. It is about how you create something that is consistent and long term that people can tap into and feel empowered that they can act on climate change, because I think that is the key there.⁴⁵

Constantly changing programs can leave some organisations with funding gaps. Ms Tanja Morgan, Program Manager, Mallee Sustainable Farming, which focuses on practical on-farm research and extension, explained the challenges faced by the group with continuity of Federal Government funding:

I think continuity of funding is also key; probably that would be the one thing that would be a good directive back to Government. There is quite often a lapse in funding. [Mallee Sustainable Farming] came to a cliff face when [the Grains Research Development Corporation] was facing a restructure. We ran out of funding, and it was at the same time that the National Landcare Program was rolling over, and just because of the lag time in those organisations it really put an organisation like ours under a lot of pressure,

⁴³ Macedon Ranges Shire Council, *Submission 69*, p. 2; Mr Bernie O'Sullivan, Director, Strategy and Growth, City of Greater Bendigo, public hearing, Bendigo, 19 September 2019, *Transcript of evidence*, p. 7; Central Victorian Greenhouse Alliance, *Submission 113*, p. 8.

⁴⁴ Ms Sue Cunningham, Director, Victoria, Australian Red Cross, public hearing, Melbourne, 28 October 2019, *Transcript of evidence*, p. 22.

⁴⁵ Mr Rob Law, *Transcript of evidence*, p. 29.

so continuity of funding is absolutely key. You can see a program coming to an end: what is the next thing? We need to start thinking about it before that one program comes to an end, so that we can roll with the punches with everybody else.⁴⁶

Hepburn Shire Council has also called for more funding to implement, roll out and embed pilot programs.⁴⁷ Increased funding for ongoing implementation would stand counter to the many organisations recommending that funding should focus on innovation in Section 10.2.2. However, programs that focus on ‘first-mover’ ideas could incorporate more funding and requirements to develop ongoing delivery and revenue models.

FINDING 38: Securing ongoing funding can be a barrier for the implementation of successful pilot projects.

10.2.5 Strategy development and implementation

Many stakeholders called for government support for the development of local, community-led plans, such as those discussed in Chapter 2.⁴⁸ Funding the development and implementation of community strategies and plans offers one option for reducing the level of competition in funding, ensuring that projects are relevant to and supported by communities, and phasing the delivery of funds through milestones. It might also strike the most appropriate balance between innovation and ongoing delivery, as discussed in Section 10.2.4.

Ms Karen Corr, Executive Director, Make a Change Australia, explained that government investment would assist in the development of community strategies and plans, but would also be needed to implement those strategies:

There are two areas where I think funding would make a big difference. So one is to continue that kind of initiative that supports in the capacity-building side and the bringing of the different towns together, because just through our work we have seen how valuable that has been in terms of them coming up with new thinking that they have not thought of before, or together they can work on their solutions more effectively. But then the other funding is, yes, in the implementation of their actual solutions on the ground.⁴⁹

Hepburn Z-NET, which was highlighted in Chapter 2, is one of the best available examples of community transition planning in Victoria. As discussed in Chapter 2, the Community Transition Plan aims to achieve zero net emissions by 2029 for the entire community of Hepburn Shire while ensuring fair distribution of the benefits of

⁴⁶ Ms Tanja Morgan, Program Manager, Mallee Sustainable Farming, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 19.

⁴⁷ Hepburn Shire Council, *Submission 119*, p. 12.

⁴⁸ For example: Macedon Ranges Shire Council, *Submission 69*, p. 7; Coalition for Community Energy, *Submission 65*, received 26 August 2019, p. 3; Northern Alliance for Greenhouse Action, *Submission 118*, received 1 September 2019, p. 4.

⁴⁹ Ms Karen Corr, *Transcript of evidence*, p. 36.

transitioning to net zero emissions and mitigating the potential burdens on vulnerable community members. Ms Taryn Lane, General Manager, Hepburn Wind, and one of the leaders of the Z-NET project, outlined the scope, detail and level of community engagement involved in preparing the Hepburn Z-NET Community Transition Plan:

Our big plan is about 130 pages so I will not bombard you with that one, but we have got some summary ones for you, and look it is something that we are really proud of because it presents in a very friendly manner but it is deeply rigorous what's behind it. We have very sophisticated modelling that has gone into it, and we have been able to make it work to reach zero net emissions within the next critical decade whilst still empowering our community to have localised datasets that they need to work out what their big-ticket items. We were able to ... pull in 90 projects from the community, and they were reflected into the implementation plan as well.⁵⁰

Ms Lane went on to explain how the Community Transition Plan was developed through financial and in-kind support from a range of government and academic institutions, noting that these networks may not be present in all communities wishing to develop a similar plan.⁵¹ Ms Lane recommended the scaling up of transition planning to more communities and the provision of implementation funding:

We want to see in the next budget at least five other lighthouse communities getting a go like this, not just being supported to do a master plan but being supported to have implementation funding. So it has to be a four-year program—it cannot just be to do the master plan—and help the communities that have a very strong track record to really get there as fast as possible.⁵²

Hepburn Z-NET and their partners estimate that the Victorian Government should fund the development and implementation of these transition plans to the tune of \$1 million per community over four years.⁵³

Sustainability Victoria also recommended that existing community transition planning pilots, such as Hepburn Z-NET, be scaled up to cover the whole state. Funding for a program of this scale would need to support networking, capacity building, volunteer management, the development of business cases and project implementation. Its submission suggested that such a program would unlock extensive knowledge in communities across Victoria and see their desire to act on climate change realised.⁵⁴ Supporting the implementation of community action plans also has the potential for substantial economic development, especially in regional Victoria. Beyond Zero Emissions, in its *Million Jobs Plan*, estimates that community-based climate change initiatives have the potential to create more than 100,000 jobs across Australia.⁵⁵ On a per capita basis, this represents at least 26,000 jobs in Victoria.

⁵⁰ Ms Taryn Lane, *Transcript of evidence*, p. 20.

⁵¹ *Ibid.*

⁵² *Ibid.*

⁵³ Community Power Agency, *Submission 99*, received 26 August 2019, p. 11; Coalition for Community Energy, *Submission 65*, p. 3; Hepburn Wind, *Submission 64*, received 26 August 2019, p. 7; Hepburn Z-NET, *Submission 41*, received 22 August 2019, p. 2.

⁵⁴ Sustainability Victoria, *Submission 141*, Attachment A, received 26 September 2019, p. 27.

⁵⁵ Beyond Zero Emissions, *The Million Jobs Plan*, Beyond Zero Emissions Inc., Melbourne, 2020, p. 91.

Supporting community transition planning and implementation would address many of the concerns raised regarding grant funding in this chapter.

Beyond Zero Emissions provides basic support to many community groups across Australia to develop plans through its Zero Carbon Communities program. There are 14 communities in Victoria participating in the program.⁵⁶ The Committee considers that there is likely sufficient demand in Victoria for at least 20 communities to receive funding to develop and implement community transition plans. Alternatively, the Victorian Government, through Sustainability Victoria, could run an expression of interest process to ascertain the number of Victorian communities that could feasibly commit to the development and implementation of community transition plans.

To ensure financial probity, the Committee considers that implementation funding would need to be made contingent on proper management of the planning process and other implementation projects. This would need to consider, for example, successful delivery of the community transition plan and appropriate engagement with multiple stakeholders, the meeting of milestones and ongoing acquittal of implementation funding.

RECOMMENDATION 71: That the Victorian Government commit at least \$20 million to fund the development and implementation of community transition plans in at least 20 communities across the State.

10.3 Models to support community sustainability groups

Community groups face difficulty with volunteer burnout and the effort required to undertake basic administrative tasks. Ms Vicki Perrett, President, Geelong Sustainability, raised the issue of volunteer burnout in the organisation, particularly when substantial effort is invested in training and mentoring volunteers:

We are in that demographic where we have dedicated our retirement—we were professional people in the education sector; we are virtually dedicating our retirement to the climate emergency. However, it is perhaps unsustainable to be working full-time as a volunteer, which is what we are largely doing at the moment. Also, when it comes to volunteers, it takes a long time to develop their skills and to mentor them and to support them.⁵⁷

While many volunteers with community climate action groups are retired, others have jobs and young families, and the time devoted to volunteering may come from what would otherwise be devoted to paid work. Ms Emma Walmsley, Founder of 350 Mallee Climate Action Group, explained her challenges in coordinating the group's activities:

⁵⁶ Beyond Zero Emissions, *Submission 75*, received 26 August 2019, p. 1.

⁵⁷ Ms Vicki Perrett, President, Geelong Sustainability, public hearing, Geelong, 20 November 2019, *Transcript of evidence*, p. 27.

All of the work I did last year was at the expense of my own business, and it involved about 200 hours of volunteering. No-one is keen to take on the lead coordinator role from me, and I understand why. No-one has the time to continue that. Most of us have young kids and all of us work in other positions, so this climate work is on top of all of our other commitments. Most of us are also not trained managers, including me. My skills are in writing and organising, which has helped with this group, but I am not great at delegating tasks, keeping momentum going or managing a team.⁵⁸

Ms Perrett discussed the challenge in recruiting volunteers with the right skills, for example, in volunteer management, event coordination, communications, online content creation and public relations.⁵⁹

Several community climate action groups recommended that the government provide funding to help with their basic operating costs.⁶⁰ The Bendigo Sustainability Group called for grants of \$100,000 per annum to 100 community environment groups across Victoria to cover operating and administrative costs and enable donations and volunteer time to be devoted to program delivery. Mr Corr explained the achievements that community groups could leverage with recurrent funding:

As has been said these sorts of groups, environment groups and sustainability groups, just need recurrent base funding. Just ongoing funding given to community groups that have demonstrated their value and what they can deliver, not something we have to compete for all the time. We will absolutely go and deliver reduced impacts on global warming, and also the return on government's investment will be huge. Again, the simple models have been talked about.⁶¹

The Gippsland Climate Change Network noted in its submission that volunteers are under a high administrative burden, even when their organisation has been the recipient of a government grant. They called for grants to come with a 10% 'administrative inclusion' above the funding required for the project. They also called for grants to cover operating and administrative expenses including grant writing, travel to meetings and venue hire.⁶²

In the place of direct funding, other stakeholders have called for government staff, for example, hosted within Sustainability Victoria or DELWP, to be located across Victoria to provide administrative and technical support to community sustainability groups.⁶³ This support could extend to the provision of training to these groups to

⁵⁸ Ms Emma Walmsley, Writer and Founder, 350 Mallee Climate Action Group, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 23.

⁵⁹ Ms Vicki Perrett, *Transcript of evidence*, p. 27.

⁶⁰ For example: Neighbours United for Climate Action (NUCA), *Submission 49*, received 23 August 2019, p. 5; Beyond Zero Emissions, *Submission 75*, p. 1; Lighter Footprints, *Submission 82*, received 26 August 2019, pp. 7–8; Baw Baw Sustainability Network (BBSN), *Submission 81*, received 26 August 2019, p. 3.

⁶¹ Mr Chris Corr, *Transcript of evidence*, p. 17.

⁶² Gippsland Climate Change Network, *Submission 33*, received 19 August 2019, p. 6.

⁶³ For example: Mr Anthony Smith OAM, *Submission 19*, received 31 July 2019, p. 1; Macedon Ranges Shire Council, *Submission 69*, p. 6; SECAN (South East Climate Action Network), *Submission 87*, received 26 August 2019, p. 1; Ms Sophie Appleby, Writer and Researcher, 350 Mallee Climate Action Group, public hearing, Mildura, 12 March 2020, *Transcript of evidence*, p. 25.

help them improve their effectiveness.⁶⁴ Government staff could also help identify the best projects for government funding, addressing some of the issues raised in Section 10.2.3.⁶⁵

Permanent support staff could help smaller community groups process the abundance of information on community climate change actions and provide assistance with applications for other government support, including grants. Ms Montgomery explained that this type of support would be beneficial for a community group in Benalla that is currently struggling:

[O]ur Benalla group in particular, they are really struggling to get traction. Often they are overwhelmed by the wealth of information that is available and potential actions that they can take. Even just keeping up with the information coming in, the grants that are available, can be difficult ... Also, as Bronwyn touched on earlier, some sort of Landcare facilitator role, or a program similar to that, in the climate change space would really help these smaller groups get traction within the community.⁶⁶

Community groups have also highlighted the example of the Landcare program and its facilitators as a model that could be replicated for community energy and sustainability groups. Mr David Blore, Member, Benalla Sustainable Future Group, called for resource officers based on the Landcare model:

Another issue that we see an option for the State to assist greatly in helping us is to set aside funding for, if you like, a resource officer for community groups such as ourselves. We draw attention to the very successful Landcare program that has been running for many years and which had such support, at least in the early days.⁶⁷

Dr Rowan O'Hagan, Member, North East Regional Sustainability Alliance, agreed that the Landcare model has proven effective and would also help with volunteer burnout in community sustainability organisations:

I guess the dilemma with the amount of volunteer contribution is that people do get burnt out and they have other roles and responsibilities. But I think the Landcare model is a good one, where you might have a coordinator for a network of Landcare groups, so a lot of the work in terms of organisation and grant applications and bringing in expertise—all those sorts of things that the Landcare coordinators do—and that sort of resource for the community sustainability groups and the renewable energy groups would be useful. Grant funding, those small grants, are important amounts of money to be leveraged on those groups. We know that the Landcare model works and works quite well when it is well supported and that it has also got very broad appeal for the community.⁶⁸

⁶⁴ City of Darebin, *Submission 124*, p. 5.

⁶⁵ Ms Taegen Edwards, Senior Campaigner, Environment Victoria, public hearing, Melbourne, 10 March 2020, *Transcript of evidence*, p. 18.

⁶⁶ Ms Larissa Montgomery, *Transcript of evidence*, p. 17.

⁶⁷ Mr David Blore, *Transcript of evidence*, p. 25.

⁶⁸ Dr Rowan O'Hagan, Member, North East Regional Sustainability Alliance, public hearing, Mooroopna, 12 February 2020, *Transcript of evidence*, p. 20.

Geelong Sustainability observed in its submission how the quality of its work improved once it was able to employ a part-time project officer. Being able to employ experienced project or program managers who can access the appropriate technical, legal and financial specialists improves the success rate for complex projects. They also cited the Landcare model and recommended paid facilitators to assist with administration, volunteer coordination, website development and communications.⁶⁹

Sustainability Victoria currently has five Strategic Coordinators located around Victoria who provide information on programs and services, and develop networks in their regions.⁷⁰ Dr Mary Debrett, Vice President, Ballarat Renewable Energy and Zero Emissions (BREAZE), indicated that this number needs to be doubled or trebled 'to assist in coordinating local initiatives to reduce emissions, to help in changing the culture and to keep abreast of community interest'.⁷¹ Others have suggested that even larger numbers of staff would be required. Ms Lizette Salmon, Convener of Wodonga Albury Towards Climate Health, after listening to calls from local government representatives for increased funding at a public hearing, called for staff to be located in each major town across Victoria:

I know we have just listened to this panel saying, 'Can we have more money?', but if there could be a Sustainability Victoria representative, a person, for each major township rather than one person for the whole of the Hume region, that person could help coordinate initiatives like the Repair Cafe rather than relying entirely on volunteers.⁷²

While the Committee acknowledges the significant work of Sustainability Victoria's Strategic Coordinators, the evidence suggests that they are too few in number to provide sufficient support to the many community groups throughout Victoria who are taking action on climate change.

The Committee believes that the Victorian Government should fund roles located in regional Victoria to support community groups taking action on climate change. These roles should focus on building networks across these groups, promotion of government funding sources, and supporting community groups to access grants and other financial support. These positions should function similarly to Landcare coordinators and facilitators and could even work alongside Landcare roles in Catchment Management Authorities. Alternatively, the Victorian Government could expand the number of Sustainability Victoria Strategic Coordinators and locate them throughout regional Victoria. The Committee is mindful that many local governments already engage in local environmental programming and care should be taken not to supplant this work. Given the long experience of the Landcare program in working with community groups on highly localised environmental programs, connections between community climate

⁶⁹ Geelong Sustainability, *Submission 107*, received 27 August 2019, p. 7.

⁷⁰ Sustainability Victoria, *Contact us*, 2020, <<https://www.sustainability.vic.gov.au/contact-us>> accessed 4 May 2020.

⁷¹ Dr Mary Debrett, Vice President, Ballarat Renewable Energy and Zero Emissions (BREAZE), public hearing, Golden Point, 18 September 2019, *Transcript of evidence*, p. 27.

⁷² Ms Lizette Salmon, Convener, Wodonga Albury Towards Climate Health, public hearing, Wangaratta, 13 February 2020, *Transcript of evidence*, p. 33.

action groups and Landcare could be enhanced, especially among facilitators and coordinators. These positions should also have close links with the expanded Community Power Hub program discussed and recommended in Chapter 4.

RECOMMENDATION 72: That the Victorian Government fund staff across Victoria to support community climate change action groups.

This report was adopted by the Legislative Assembly Environment and Planning Committee

**Parliament of Victoria, East Melbourne
26 October 2020**

Appendix 1

About the inquiry

A1.1 Submissions

1	Ms Suzanne Stojanovic
2	Mr Graham Woods
3	Mr Wo Chong
4	Mr Ken Gellert
5	Links Community Garden Lalor
6	Ballarat Climate Action Network
7	Mr Shane Markey
8	Mr Stewart Day
9	Mr Simon Hunt
10	Mr Peter Donnelly
11	Mr Alan Barron
12	Mr Ken Matthews
13	Not available (withdrawn)
14	Moyne Shire Council
15	Mordialloc Beaumaris Conservation League Inc
16	Mr Gary Paul
17	Mr James Rowlands
18	Ms Toni Phillips
19	Mr Anthony Smith OAM
20	City of Kingston
21	Mr Rudi Horvat
22	Mr Michael Wasley
23	Mr John Boom
24	Mr Peter Clapinski
25	Mr Yicheng Liu
26	Golden Plains Shire Council
27	South Gippsland Conservation Society Incorporated
28	Mr Darcy Vermont
29	Mr Sebastian Golotta
30	Mr Phil Day
31	Ms Margaret Joubert
32	Ms Bec Pillari
33	Gippsland Climate Change Network
34	Eastern Climate Action Melbourne
35	Queensland Department of Environment and Science
36	Bass Coast Shire Council
37	Melton City Council
38	Confidential
39	Manningham City Council
40	Landcare Networks in West Gippsland
41	Hepburn Z-NET
42	Southern Grampians Glenelg Primary Care Partnership
43	Cardinia Shire Council
44	Ms Sarah Lucy
45	Gannawarra Shire Council
46	Baw Baw Shire Council
47	Energy Australia
48	Ms Elaine V Brogan OAM
49	Neighbours United for Climate Action (NUCA)
50	Victorian National Parks Association
51	Not available (withdrawn)
52	Emergency Management Victoria
53	Mr Robert Evans
54	Hume City Council
55	CFA
56	LIVE (Locals Into Victoria's Environment)
57	Mr Paul Schreurs

58	Ms Cori Nelson	87	SECAN (South East Climate Action Network)
59	RMIT University Students	88	Victorian Council of Social Service (VCOSS)
59A	Group 1	89	Frankston City Council
59B	Group 2	90	Not available (withdrawn)
59C	Group 3	91	Centre for New Energy Technologies (C4NET)
59D	Group 4	92	Newlands and East Coburg Community Hubs Inc (NECCHI)
60	Mr Daryl Scherger	93	City of Port Phillip
61	Eastern Melbourne Climate Alliance Inc	94	Nursery and Garden Industry Victoria
62	Bayside Climate Change Action Group (BCCAG)	95	Renewable Newstead
63	Wodonga Albury Toward Climate Health (WATCH)	96	CERES
64	Hepburn Wind	97	Council Alliance for a Sustainable Built Environment (CASBE)
65	Coalition for Community Energy	98	Save Our Strathbogie Forest
66	Wimmera Mallee Sustainability Alliance	99	Community Power Agency
67	Confidential	100	Victorian Marine and Coastal Council
68	BRACE (Barwon Region Alliance for Community Energy)	101	Latrobe Valley Sustainability Group
69	Macedon Ranges Shire Council	102	Emerald Community House
70	Ms Nicola McKay	103	Make a Change Australia
71	Ms Lisa McKenna	104	Business Council of Co-operatives and Mutuals
72	Dr Rowan O'Hagan	105	Dr Colin Hocking
73	Loddon Shire Council	106	Bendigo Sustainability Group
74	Centre for Climate Safety	107	Geelong Sustainability
75	Beyond Zero Emissions	108	Greater Shepparton City Council
76	WarrandyteCAN	109	Banyule City Council
77	BREAZE	110	Mr Russell Northe MLA, Member for Morwell
78	City of Ballarat	111	Croydon Conservation Society
79	Bass Coast Climate Action Network (BCCAN)	112	Energy Networks Australia
80	Greening Australia	112A	Energy Networks Australia - supplementary submission
81	Baw Baw Sustainability Network (BBSN)	113	Central Victorian Greenhouse Alliance
82	Lighter Footprints	114	Mount Alexander Shire Council
83	City of Wodonga	115	Victorian Planning Authority
84	Not available (withdrawn)	116	Moreland City Council
85	Not available (withdrawn)	117	Victorian Local Governance Association (VLGA)
86	Surf Coast Shire Council		

118	Northern Alliance for Greenhouse Action	141B	Victorian Environmental Water Holder
119	Hepburn Shire Council	141C	Vic Catchments
120	City of Melbourne	141D	VicWater
121	Mornington Peninsula Shire	141E	Commissioner for Environmental Sustainability
122	Jesuit Social Services	142	Brotherhood of St Laurence
123	Mr Rob Catchlove	143	Western Alliance for Greenhouse Action
124	City of Darebin	144	East Gippsland Shire Council
125	Victorian Farmers Federation	145	Friends of the Earth
126	Green Building Council Australia	146	Otway Agroforestry Network and Australian Agroforestry Foundation
127	CSIRO	147	RVS Industries
128	City of Greater Bendigo	148	Landcare Victoria Inc
129	Australian Government Department of the Environment and Energy	149	Ms Jane Hildebrandt
130	Jewish Ecological Coalition	150	Warrnambool City Council
131	Indigo Shire Council	151	Docklands Science Park
132	COTA Green Sages	152	Benalla Sustainable Future Group
133	Port Phillip EcoCentre	153	Women's Climate Justice Collective (Vic)
134	Law Institute of Victoria	154	Ms Julianne Langshaw
135	Centre for Urban Research—Climate Change Transformations (CCT) Research Group	155	Mr Mark Dossetor
136	South East Councils Climate Change Alliance	156	Mr Michael Reid
137	Psychology for a Safe Climate	157	Knights of the Southern Cross Northern 8 District
138	Totally Renewable Yackandandah	158	Deakin University
139	Eastern Alliance for Greenhouse Action (EAGA)	159	Environment Victoria
140	Goulburn Broken Greenhouse Alliance	160	Swan Hill Rural City Council
141	Department of Environment, Water, Land and Planning (DELWP)	161	Murray Dairy
141A	Sustainability Victoria	162	Village Well

A1.3 Public hearings

The Committee held the following public hearings:

18 September 2019	Ballarat	4 December 2019	Melbourne
19 September 2019	Bendigo	5 December 2019	Melbourne
23 October 2019	Traralgon	12 February 2020	Mooroopna
24 October 2019	Bairnsdale	13 February 2020	Wangaratta
28 October 2019	Melbourne	26 February 2020	Melbourne
7 November 2019	Mornington	10 March 2020	Melbourne
20 November 2019	Geelong	12 March 2020	Mildura
21 November 2019	Warrnambool		

18 September 2019, Ballarat

Organisation	Name	Position
City of Ballarat	Terry Demeo	Director Infrastructure and Environment
Renewable Newstead	Genevieve Barlow	Spokesperson
Hepburn Shire Council	Taryn Lane	General Manager, Hepburn Wind
Hepburn Wind Hepburn Z-NET	Dominic Murphy	Sustainability Officer, Hepburn Shire Council
Ballarat Renewable Energy and Zero Emissions (BREAZE)	Mary Debrett	Vice President

19 September 2019, Bendigo

Organisation	Name	Position
City of Greater Bendigo	Cr Dr Jennifer Alden	
	Bernie O'Sullivan	Director, Strategy and Growth
Bendigo Sustainability Group (BSG)	Chris Corr	Member, BSG, and Project Manager, Community Power Hub Bendigo
	Colin Lambie	Member
	Cathie Steele	Board Member
Wimmera Mallee Sustainability Alliance	Gil Hopkins	Acting Executive Officer
Central Victorian Greenhouse Alliance	Rob Law	Executive Officer
Make a Change Australia	Karen Corr	Executive Director

23 October 2019, Traralgon

Organisation	Name	Position
Gippsland Climate Change Network (GCCN)	Cr Darren McCubbin	Chair
	Chris Barfoot	Board Member
	Malcolm McKelvie	Board Member
	Esther Lloyd	Communications Officer
Bass Coast Shire Council	Deirdre Griepsma	Manager, Sustainable Environment
Baw Baw Shire Council	Cr Michael Leaney	
Latrobe City Council	Cr Sharon Gibson	
	Cr Darrell White	
	Cr Darren Howe	
Wellington Shire Council	Cr Darren McCubbin	
	Cr Carolyn Crossley	
Bass Coast Landcare Network	Dave Bateman	Executive General Manager
Latrobe Valley Sustainability Group	Lorraine Bull	President
	Ian Onley	Member

24 October 2019, Bairnsdale

Organisation	Name	Position
East Gippsland Shire Council	Cr Natalie O'Connell	Mayor
	Fiona Weigall	General Manager, Assets and Environment
	Stuart McConnell	General Manager, Place and Community
East Gippsland Landcare Network	Jenny Robertson	
East Gippsland Climate Action Network	Peter Gardner	
	Rosemary Gooch	
	Nick Blandford	
	Allen Sheridan	

28 October 2019, Melbourne

Organisation	Name	Position
Emergency Management Victoria (EMV)	Andrew Crisp	Emergency Management Commissioner
Department of Environment, Land, Water and Planning (DELWP)	Lee Miezis	Deputy Secretary, Forest, Fire and Regions Group
Country Fire Authority (CFA)	Alen Slijepcevic	Executive Director of Bushfire Management
Parks Victoria (PV)	Dr Mark Norman	Chief Conservation Scientist, Executive Director of Environment and Science
Australian Red Cross	Sue Cunningham	Director, Victoria
Victoria State Emergency Service (VICSES)	Jamie Devenish	Manager, Emergency Management Planning

7 November 2019, Mornington

Organisation	Name	Position
Port Phillip Eco Centre	Fam Charko	Acting Executive Officer
Bayside Climate Action Group	David Williams	Vice-President
Mornington Peninsula Shire Council	John Baker	CEO
	Melissa Burrage	Manager, Climate Change, Energy and Water
	Stephanie Delaney	Agribusiness and Food Industry Officer
South East Councils Climate Change Alliance	Dominique La Fontaine	Executive Officer
	Emily Boucher	President

20 November 2019, Geelong

Organisation	Name	Position
Western Alliance for Greenhouse Action	Fran Macdonald	Executive Officer
	Tim Mordaunt	Senior Sustainability Officer, City of Greater Geelong
Surf Coast Shire Council	Cr Rose Hodge	Mayor
	Rowan Mackenzie	Manager, Environment and Community Safety
	Lauren Watt	Coordinator, Environmental Sustainability
Geelong Sustainability	Vicki Perrett	President
	Vivienne Burke	Secretary and Public Officer
	Tim Adams	Committee Member
BRACE (Barwon Region Alliance for Community Energy)	Adrian Ford	Co-convenor

21 November 2019, Warrnambool

Organisation	Name	Position
Warrnambool City Council	Cr Tony Herbert	Mayor
	Jodie McNamara	Manager, City Strategy and Development
Moyne Shire Council	Robert Gibson	Manager, Environment and Regulatory Services
Southern Grampians Glenelg Primary Care Partnership	Joanne Brown	Manager, Health and Wellbeing

4 December 2019, Melbourne

Organisation	Name	Position
Victorian Farmers Federation (VFF)	Lisa Gervasoni	Senior Stakeholder Policy and Advocacy Advisor, Land Management and Planning
	Grady Powell	Policy and Advocacy Manager
Council Alliance for a Sustainable Built Environment (CASBE)	Natasha Palich	Executive Officer
Northern Alliance for Greenhouse Action	David Meiklejohn	Executive Officer
	Michaela Skett	Environmentally Sustainable Development Unit Manager, City of Moreland
Victorian Council of Social Service	Emma King	Chief Executive Officer
	Bridget Tehan	Policy Adviser
Energy Networks Australia	Tamatha Smith	General Manager, Corporate Affairs
	Chris Gilbert	Senior Economic Adviser

5 December 2019, Melbourne

Organisation	Name	Position
Psychology for a Safe Climate	Dr Charles Le Feuvre	Vice-President
Vic Catchments	Paula Camenzuli	Statewide Climate Change Coordinator
	Adam Bester	CEO, Glenelg Hopkins Catchment Management Authority
Emerald Community House	Mary Farrow	Manager
CERES	Rod Duncan	Board Member
	John Burne	Infrastructure Manager and Board Member
Coalition for Community Energy (C4CE)	Heather Smith	Chair
City of Melbourne	Krista Milne	Director, Climate Change Action
	Kim Le Cerf	Team Leader, Climate Change Mitigation
Resilient Melbourne	Maree Grenfell	Deputy Chief Resilience Officer
Eastern Alliance for Greenhouse Action	Cr Josh Fergeus	Executive Committee Chair
	Scott McKenry	Executive Officer

12 February 2020, Mooroopna

Organisation	Name	Position
Shepparton City Council	Sharon Terry	Team Leader, Sustainability and Environment
Moira Shire Council	Cr Marie Martin	
Campaspe Shire Council	Allison McCallum,	Environmental Project Officer, Conservation
Mitchell Shire Council	Cr David Atkinson	Deputy Mayor, and Vice-Chair, Goulburn Broken Greenhouse Alliance
	Elyse Kelly	Environmental Coordinator
	Mike McIntosh	Director, Development and Infrastructure
Strathbogie Shire Council	Carole Hammond	Coordinator, Climate Change and Environment
North East Region Sustainability Alliance (NERSA)	Dr Rowan O'Hagan	Member
Benalla Sustainable Future Group	David Blore	Member
	Kay Blore	Member
GV Community Energy	Geoff Lodge	Chief Executive Officer

13 February 2020, Wangaratta

Organisation	Name	Position
Goulburn Broken Greenhouse Alliance	Bronwyn Chapman	Executive Officer
Benalla Rural City Council	Larissa Montgomery	Environmental Sustainability Coordinator
Indigo Shire Council	Cr Jenny O'Connor	Mayor
	Cr Sophie Price	Deputy Mayor
Murrindindi Shire Council	Amanda Priest	Coordinator, Environmental Sustainability
	Vito Albicini	Director, Assets and Development
	Cr Rebecca Bowles	
Rural City of Wangaratta	Scott Draper	Natural Resource Manager and Sustainability Coordinator
Wodonga City Council	Cr Kat Bennett	
	Robyn Nicholas	Sustainability Coordinator
Wodonga Albury Toward Climate Health (WATCH)	Lizette Salmon	Convenor, WATCH, and Coordinator, Repair Cafe Albury-Wodonga

26 February 2020, Melbourne

Organisation	Name	Position
CSIRO	Professor David Karoly	Leader, Earth Systems and Climate Change Hub (ESCC Hub)
Bushfire and Natural Hazards CRC	Dr Richard Thornton	Chief Executive Officer
Friends of the Earth Melbourne	Leigh Ewbank	Coordinator, Act on Climate Victoria
Australian Energy Market Operator (AEMO)	Violette Mouchaileh	Executive General Manager, Emerging Markets and Services
	Nicola Falcon	Group Manager, Forecasting
	Monica Morona	Senior Energy Policy Analyst
Green Building Council of Australia	Davina Rooney	CEO
	Sandra Qian	Senior Manager, Policy and Government Relations
Insurance Council of Australia	Karl Sullivan	Head of Risk and Operations
Australian Institute of Architects	Julia Cambage	CEO

10 March 2020, Melbourne

Organisation	Name	Position
Agriculture Victoria	Professor German Spangenberg	Head, Agriculture Victoria Research
	Graeme Anderson	Climate Specialist, Agriculture Services Branch
Environment Victoria	Dr Nicholas Aberle	Campaigns Manager
	Taegan Edwards	Senior Campaigner
Sustainability Victoria	Claire Ferres Miles	Chief Executive Officer
	Stephanie Ziersch	Director of Communities and Climate Change
Department of Environment, Land, Water and Planning	Kylie White	Deputy Secretary of Environment & Climate Change
	Sharn Enzinger	Executive Director, Energy Group
CSIRO	Jane Coram	Director Land and Water
	Dr Deborah O'Connell	Principal Research Scientist, Adaptation Pathways and Societal Transition, Land and Water
	John Clarke	Team leader, Regional Projections Team, Climate Science Centre
	Dr Martin Cope	Principal Research Scientist, Aerosol and Chemistry Modelling, Oceans and Atmosphere
Deakin University	Professor John Donald	Interim Head, School, Life and Environmental Sciences
	Dr David Halliwell	Director Research Partnerships, Science, Engineering and Built Environment and Research Industry Professor

12 March 2020, Mildura

Organisation	Name	Position
Mildura Rural City Council	Jay Smith	Environmental Sustainability Coordinator
	Cr Jason Modica	
	Cr Simon Clemence	Mayor
	Cr Glenn Milne	
	Cr Helen Healy	
	Cr Mark Eckel	
Mallee Sustainable Farming	Tanja Morgan	Program Manager
Mallee Climate Action Group	Emma Walmsley	Writer and Founder of 350 Mallee Climate Action Group
	Carl Young	Vegetable grower
	Sophie Appleby	Writer and researcher
Mallee Regional Innovation Centre	Rebecca Wells	Chief Executive

A1.2 Briefings and site visits

Briefings

Date	Organisation	Name
12 August 2019	Department of Environment, Land, Water and Planning (DELWP)	Ms Kylie White, Deputy Secretary, Environment and Climate Change
		Mr Mark Rodrigues, Executive Director (acting), Climate Change Division, Environment and Climate Change
		Ms Clare Penrose, Director, Climate Change Division, Environment and Climate Change
		Ms Lana Kovac, Director, Climate Change Division, Environment and Climate Change
26 August 2019	Sustainability Victoria	Mr Carl Muller, Interim CEO
		Ms Stephanie Ziersch, Director Communities and Climate Change
9 September 2019	Department of Health and Human Services	Dr Angie Bone, Deputy Chief Health Officer
		Ms Vanora Mulvenna, Manager Climate and Health

Site visits

Date	Site	Host
18 September 2019	Hepburn Shire Bioenergy Pilot Project	Hepburn Shire Council
	Hepburn Community Wind Farm	Hepburn Wind
	VICSES Hepburn Shire Unit—Community solar PV project	Hepburn Wind and VICSES Hepburn Shire Unit
	Daylesford Free Electric Vehicle Charging Station	Hepburn Wind
	Daylesford Community Food Garden	Hepburn Wind
19 September 2019	Eaglehawk Badminton and Table Tennis Stadium—Community Solar PV project	Bendigo Community Power Hub
	Ironbark Gully	Ironbark Gully Friends
	Newstead Community Garden	Renewable Newstead
	Newstead Eco shop and EV charging station	Renewable Newstead
	Revegetation project - Campaspe River, Kyneton	Campaspe River and Land Management Group (CRLMG)
23 October 2019	Macalister Demonstration Farm	Macalister Demonstration Farm
	Sale Common Wetland	West Gippsland Catchment Management Authority
24 October 2019	Boat tour around Paynesville to examine shoreline development and erosion	East Gippsland Shire Council
	Grazing property in Perry Bridge	Property Owners
7 November 2019	The Eco Living Display Centre, The Briars	Mornington Peninsula Shire Council
20 November 2019	Bambra Agroforestry Farm	Otway Agroforestry Network

Date	Site	Host
21 November 2019	Apostle Whey Cheese	Apostle Whey Cheese
12 February 2020	Violet Town Community Complex	Goulburn Broken Catchment Management Authority Save Our Strathbogie Forest Shadforth Reserve sub-committee
	Violet Town Community Forest	Shadforth Reserve sub-committee
13 February 2020	Yackandandah Public Hall—Community solar PV and battery project	Totally Renewable Yackandandah
	Yackandandah main street and CFA Brigade—Community solar PV and battery projects	Totally Renewable Yackandandah
12 March 2020	NRMA Electric Vehicle fast charging station	Mildura Rural City Council
	Mildura Eco Village	Mildura Rural City Council

Bibliography

Solar Insiders, 'Longi's launch, and AEMO's big solar switch', podcast, Renew Economy, 8 May 2020, Soundcloud app, <Solar Insiders Podcast: Longi's launch, and AEMO's big solar switch> accessed 8 May 2020.

2009 Victorian Bushfires Royal Commission, *2009 Victorian Bushfires Royal Commission: Final Report: Volume II: Fire Preparation, Response and Recovery*, Parliament of Victoria, Melbourne, 2010.

Acil Allen Consulting, *Energy Consumption Benchmarks: Electricity and Gas for Residential Customers*, report for Australian Energy Regulator, 2017.

Allume Energy Australia, *Solar for apartments is possible*, 2020, <<https://allumeenergy.com.au/apartment>> accessed 6 May 2020.

Andor, Mark A. and Katja M. Fels, 'Behavioral Economics and Energy Conservation – A Systematic Review of Non-price Interventions and Their Causal Effects', *Ecological Economics*, vol. 148, 2018, pp. 178–210.

Apostle Whey Cheese, *Our Farm*, <<https://apostlewheycheese.com.au/our-team>> accessed 6 October 2020.

Arcadis, *National Food Waste Baseline: Final Assessment Report*, Department of Agriculture, Water and the Environment, 2019.

ARRCC, *Australian Religious Response to Climate Change: A Multi-Faith Network Committed to Action on Climate Change*, 2020, <<https://www.arrcc.org.au>> accessed 2 March 2020.

Atholia, Timoth de, Gordon Flannigan and Sharon Lai, 'Renewable Energy Investment in Australia', *RBA Bulletin*, vol. March 2020, 2020, pp. 36–46.

Attwooll, Jolyon, 'Councils' clean energy deal delayed a year', *The Ballarat Courier*, 3 May 2020, <<https://www.thecourier.com.au/story/6743046/councils-clean-energy-deal-delayed-a-year>> accessed 19 May 2020.

Australian Building Codes Board, *Energy efficiency: NCC 2022 and beyond: Outcomes report*, Commonwealth of Australia and States and Territories of Australia, Canberra, 2019.

Australian Council of Social Service, *Energy Efficiency and low income households: policy to improve affordability and extreme weather adaptation*, Sydney, 2013.

Australian Energy Market Operator, *AusNet Services Group Awarded Contract to Deliver Western Victoria Transmission Network Project*, media release, Australian Energy Market Operator, 17 December 2019.

Australian Energy Market Operator, *The National Electricity Market*, Fact Sheet, Australian Energy Market Operator, 2018.

Australian Energy Market Operator, *Western Victoria Renewable Integration Project Assessment Conclusions Report*, Australian Energy Market Operator, 2019.

Australian Energy Market Operator, *2020 Integrated System Plan: For the National Electricity Market*, Australian Energy Market Operator, 2020.

Australian Energy Market Operator, *Renewable Integration Study: Stage 1 report: Enabling secure operation of the NEM with very high penetrations of renewable energy*, Australian Energy Market Operator, 2020.

Australian Energy Market Operator and Transgrid, *Victoria to New South Wales Interconnector West (VNI West): Regulatory Investment Test for Transmission Project Specification Consultation Report (PSCR)*, Australian Energy Market Operator, 2019.

Australian Energy Regulator, Annual volume weighted average spot prices - regions, D19/178617, *Wholesale Statistics*, 1 January 2020, <<https://www.aer.gov.au/wholesale-markets/wholesale-statistics/annual-volume-weighted-average-spot-prices-regions>> accessed 17 April 2020.

Australian Energy Regulator, *Seasonal peak demand - regions, 2020*, 2020, <<https://www.aer.gov.au/wholesale-markets/wholesale-statistics/seasonal-peak-demand-regions>> accessed 25 May 2020.

Australian Government Department of Industry, Science, Energy and Resources, *Nationwide House Energy Rating Scheme: About*, 2019, <<https://www.nathers.gov.au/about>> accessed 28 April 2020.

Australian PV Institute (APVI), *Solar Map: funded by the Australian Renewable Energy Agency*, 2019, <<https://pv-map.apvi.org.au>> accessed 13 May 2020.

Australian PV Institute (APVI), *Large-Scale PV Systems*, 2020, <<https://pv-map.apvi.org.au/power-stations>> accessed 28 October 2020.

Australian Red Cross, *RediCommunities: Community-Led Resilience for Emergencies: A guide & toolkit for communities*, Australian Red Cross, Melbourne, 2019.

Australian Renewable Energy Agency, *Ultra fast highway charging network for electric vehicles*, media release, Australian Renewable Energy Agency, Canberra, 26 August 2019.

Balcombe, Paul, Jamie F. Speirs, Nigel P. Brandon and Adam D. Hawkes, 'Methane emissions: choosing the right climate metric and time horizon', *Environmental Science: Processes & Impacts*, vol. 20, no. 10, 2018, pp. 1323–39.

Barnett, Jon, Petra Tschakert, Lesley Head and W Neil Adger, 'A science of loss', *Nature Climate Change*, vol. 6, no. 11, 2016, pp. 976–8.

Beck, Eliza, 'On Country renewable energy partnership gets green light', *ABC News Online*, 9 July 2019, <<https://www.abc.net.au/news/2019-07-09/on-country-renewable-energy-gets-green-light/11292928>> accessed 25 May 2020.

Bell, Liz, 'Ramahyuck Aboriginal corporation hopes to build a solar farm at Longford', *Gippsland Times*, 12 September 2019, <<https://www.gippslandtimes.com.au/story/6381898/ramahyuck-solar-farm>> accessed 7 April 2020.

Bendigo Bank, *Warburton community turns on \$1.2 million hydro power plant*, media release, Bendigo Bank, 29 October 2018.

Bendigo Sustainability Group, *Community Solar Farm*, 2019, <<https://www.bsg.org.au/community-energy/community-solar-farm>> accessed 7 April 2020.

Beyond Zero Emissions, *The Million Jobs Plan*, Beyond Zero Emissions Inc., Melbourne, 2020.

Beyond Zero Emissions, ICLEI - Local Governments for Sustainability (ICLEI Oceania) and Ironbark Sustainability, *Australian Local Government Climate Review*, Beyond Zero Emissions, Melbourne, 2018.

Bi, Peng, Susan Williams, Margaret Loughnan, Glenis Lloyd, Alana Hansen, Tord Kjellstrom, Keith Dear and Arthur Saniotis, 'The Effects of Extreme Heat on Human Mortality and Morbidity in Australia: Implications for Public Health', *Asia Pacific Journal of Public Health*, vol. 23, no. 2_suppl, 2011, pp. 27S-36S.

Boomerang Bags, *Boomerang Bags*, 2019, <<https://boomerangbags.org>> accessed 24 February 2020.

Bright Futures, *Building Resilience: A guide to consider climate change for East Gippsland houses*, East Gippsland Shire Council, Bairnsdale, 2017.

Bunjil Energy, *Bunjil Energy*, 2020, <<https://www.bunjilenergy.com.au>> accessed 25 May 2020.

Bureau of Meteorology and CSIRO, *State of the Climate 2018*, Commonwealth of Australia, 2018.

Business Renewables Centre-Australia, *Corporate Renewable Power Purchase Agreements in Australia: State of the Market 2019*, 2019.

Business Victoria, *Sustainability Resource Directory - Case Studies*, 2020, <<https://www.business.vic.gov.au/marketing-and-sales/sustainable-business/environmental-sustainability-hub/case-studies>> accessed 7 February 2020.

C40 Cities Climate Leadership Group, *about c40*, 2020, <<https://www.c40.org/about>> accessed 11 June 2020.

Carbon Farmers of Australia, *What is Carbon Farming?*, <<https://carbonfarmersofaustralia.com.au/carbon-farming>> accessed 5 October 2020.

Carnell, P., S. Windecker, M. Brenker, B. Yukate, K. Johnson and P. Macreadie, *Carbon sequestration by Victorian inland wetlands*, Blue Carbon Lab, Deakin University, Melbourne, Victoria, Australia, 2016.

cedamia, *cedamia: Climate Emergency Declaration and Mobilisation in Action*, 2020, <<https://www.cedamia.org/global>> accessed 11 June 2020.

CFA News & Media, *Malmsbury Station becomes Tesla-powered*, media release, Country Fire Authority, 30 July 2020.

Chandler-Ford, Sally, *Eden Project Anglesea, Community Engagement Minutes*, 24 February 2020, <<https://www.alcoa.com/australia/en/pdf/Eden-Project-Anglesea-minutes-240220.pdf>> accessed 5 October 2020.

- City of Melbourne, *Melbourne Renewable Energy Project: A new generation of energy*, 2020, <<https://www.melbourne.vic.gov.au/business/sustainable-business/mrep/Pages/melbourne-renewable-energy-project.aspx>> accessed 1 July 2020.
- Clarke, JM, M Grose, M Thatcher, V Hernaman, C Heady, V Round, T Rafter, C Trenham and L Wilson, *Victorian Climate Projections 2019: Technical report*, CSIRO, Melbourne, 2019.
- Clayton, Susan, Christie Manning, Kirra Krygsman and Meighen Speiser, 'Impacts on Individuals', in *Mental Health and Our Changing Climate: Impacts, Implications and Guidance*, American Psychological Association, and ecoAmerica, Washington D.C., 2017, pp. 22–28.
- Clean Energy Regulator, Historical postcode data for small-scale installations, 18 March 2020, <<http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations/historical-postcode-data-for-small-scale-installations>> accessed 13 May 2020.
- Clean Energy Regulator, Postcode data for small-scale installations, 20 April 2020, <<http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations>> accessed 13 May 2020.
- COAG Energy Council, *Trajectory for low energy buildings*, Commonwealth of Australia 2018.
- Colac Otway Shire, *Trees & Vegetation*, 2020, <<https://www.colacotway.vic.gov.au/Environment-Sustainability/Trees-and-vegetation>> accessed 6 October 2020.
- Collie, Scott, 'Electric cars cheaper to run, but high prices still a problem: Study', *Car Advice*, 23 July 2019, <<https://www.caradvice.com.au/777650/electric-cars-running-costs>> accessed 11 March 2020.
- Cook, Henrietta, 'Airconditioning plea for public housing tenants', *The Age*, 9 February 2014, <<https://www.theage.com.au/national/victoria/airconditioning-plea-for-public-housing-tenants-20140208-328ul.html>> accessed 16 July 2020.
- Council Alliance for a Sustainable Built Environment (CASBE), *State & local planning policy*, 2019, <<https://www.casbe.org.au/what-we-do/state-local-planning-policy>> accessed 30 April 2020.
- Cunsolo, Ashlee and Neville R. Ellis, 'Ecological grief as a mental health response to climate change-related loss', *Nature Climate Change*, vol. 8, no. 4, 2018, pp. 275–81.
- de Vries, Gardien, 'Public Communication as a Tool to Implement Environmental Policies', *Social Issues and Policy Review*, vol. 14, no. 1, 2020, pp. 244–72.
- Department of Environment, Land, Water and Planning, *Carbon sequestration a first*, 2016, <<https://www.climatechange.vic.gov.au/media-releases/carbon-sequestration-a-first>> accessed 23 December 2019.
- Department of Environment, Land, Water and Planning, *Fact sheet 8: Valuing forest carbon: Assessing the current and future value of forests in storing carbon*, 2019.
- Department of Environment, Land, Water and Planning, *Victoria's Climate Science Report 2019*, State of Victoria, Melbourne, 2019.

Department of Environment, Land, Water and Planning, *Victorian Climate Projections 2019: Victorian Climate Projections 2019 delivers local-scale projections of Victoria's future climate*, 2019, <<https://www.climatechange.vic.gov.au/adapting-to-climate-change-impacts/victorian-climate-projections-2019>> accessed 18 December 2019.

Department of Environment, Land, Water and Planning, *Victorian Greenhouse Gas Emissions Report 2019*, State of Victoria, Melbourne, 2019.

Department of Environment, Land, Water and Planning, *Victorian Renewable Energy Target: 2018-19 Progress Report*, State of Victoria, Melbourne, 2019.

Department of Environment, Land, Water and Planning, *Victorian Residential Efficiency Scorecard: Flash report: July 2019*, Government of Victoria, East Melbourne, 2019.

Department of Environment, Land, Water and Planning, *Zero emissions vehicles: Part of our transition to a net zero emissions economy*, 2019, <<https://www.energy.vic.gov.au/renewable-energy/zero-emissions-vehicles>> accessed 16 January 2020.

Department of Environment, Land, Water and Planning, *Community Climate Change Adaptation (3CA) Grants Program*, 2020, <<https://www.climatechange.vic.gov.au/adapting-to-climate-change-impacts/community-climate-change-adaptation-3ca-grants-program>> accessed 6 May 2020.

Department of Environment, Land, Water and Planning, *New Energy Technologies*, 2020, <<https://www.energy.vic.gov.au/new-energy-technologies>> accessed 7 October 2020.

Department of Environment, Land, Water and Planning, *Recycling Victoria: A new economy*, State of Victoria, Melbourne, 2020.

Department of Environment, Land, Water and Planning, *Pilot Water Sector Climate Change Adaptation Action Plan*, 2018.

Department of Infrastructure, Transport, Regional Development and Communications, *Vehicle Emission Standards*, 2018, <<https://www.infrastructure.gov.au/vehicles/environment/emission/index.aspx>> accessed 11 March 2020.

Department of Infrastructure, Transport, Regional Development and Communications, *Ministerial Forum on Vehicle Emissions*, 2019, <<https://www.infrastructure.gov.au/vehicles/environment/forum/index.aspx>> accessed 11 March 2020.

Department of Jobs, Precincts and Regions, *New Energy Technologies: Working with the industry to drive maximum value from Victoria's energy resources*, 2019, <<https://www.business.vic.gov.au/support-for-your-business/grants-and-assistance/future-industries/new-energy-technologies>> accessed 6 May 2020.

Department of Transport, *First electric bus to hit the road*, 2019, <<https://transport.vic.gov.au/about/transport-news/news-archive/first-electric-bus-to-hit-the-road>> accessed 18 August 2020.

Di Virgilio, Giovanni, Jason P. Evans, Hamish Clarke, Jason Sharples, Annette L. Hirsch and Melissa Anne Hart, 'Climate change significantly alters future wildfire mitigation opportunities in southeastern Australia', *Geophysical Research Letters*, vol. 47, no. 15, 2020, p. e2020GL088893.

Di Virgilio, Giovanni, Annette Hirsch, Hamish Clarke, Jason Evans, Jason Sharples and Melissa Hart, 'Under climate change, winter will be the best time for bush burn-offs – and that could be bad news for public health', *The Conversation*, 30 July 2020, <<https://theconversation.com/under-climate-change-winter-will-be-the-best-time-for-bush-burn-offs-and-that-could-be-bad-news-for-public-health-143546>> accessed 30 July 2020.

Dooley, K., P. Christoff and R. Burdon, *Land-Based Carbon Dioxide Removal Options for Victoria: Review Paper*, Melbourne Sustainable Society Institute, The University of Melbourne, 2020.

Earthworker Energy Manufacturing Cooperative, *Earthworker Energy Manufacturing Cooperative: We make great solar hot water systems. We make a difference.*, 2018, <<https://earthworkerenergy.coop>> accessed 6 February 2020.

ElectraNet, *SA Energy Transformation RIT-T: Project Assessment Conclusions Report*, ElectraNet, 2019.

ElectraNet and TransGrid, *Project EnergyConnect*, 2020, <<https://www.projectenergyconnect.com.au/index.html>> accessed 15 April 2020.

Electric Vehicle Database, *Tesla Model 3 Standard Range Price and Specifications*, 2020, <<https://ev-database.org/car/1060/Tesla-Model-3-Standard-Range>> accessed 25 May 2020.

Emergency Management Victoria, *Harrietteville Community Emergency Management Plan*, 2014, <<https://www.emv.vic.gov.au/publications/harrietteville-community-emergency-management-plan>> accessed 22 April 2020.

Emergency Management Victoria, *Community Based Emergency Management Portal*, 2018, <<http://emv.cerdi.edu.au>> accessed 22 April 2020.

Emergency Management Victoria, *Victorian Disaster Recovery Funding Arrangements: Guideline 1: Claims and eligibility for essential public assets (Category B)*, Government of Victoria, Melbourne, 2019.

Enablers of Change, *What is agricultural extension?*, 2019, <<https://www.enablersofchange.com.au/what-is-agricultural-extension>> accessed 30 September 2020.

Energetics, *Corporate renewable energy PPA deal tracker*, 2020, <<https://www.energetics.com.au/insights/knowledge-centres/corporate-renewable-ppa-deal-tracker>> accessed 8 April 2020.

Energy Australia, *Ballarat Battery Storage*, 2020, <<https://www.energyaustralia.com.au/about-us/energy-generation/ballarat-battery-storage>> accessed 25 May 2020.

Enhar, *Preliminary Concept Design for a 2 MWp Community Solar Farm*, report for Community Power Hub Bendigo, 2019.

Essential Services Commission, *Public Lighting Code: Version 2*, Melbourne, Victoria, 2015.

Essential Services Commission, *Water Pricing Framework and Approach: Implementing PREMO from 2018*, 2016.

European Commission, *Reducing CO2 emissions from passenger cars - before 2020*, 2020, <https://ec.europa.eu/clima/policies/transport/vehicles/cars_en> accessed 11 March 2020.

Fernandez, Ana, John Black, Mairwen Jones, Leigh Wilson, Luis Salvador-Carulla, Thomas Astell-Burt and Deborah Black, 'Flooding and Mental Health: A Systematic Mapping Review', *PLOS ONE*, vol. 10, no. 4, 2015, p. e0119929.

Fiddes, Sonya Louise, Alexandre Bernardes Pezza and Vaughan Barras, 'A new perspective on Australian snow', *Atmospheric Science Letters*, vol. 16, no. 3, 2015, pp. 246–52.

Filatoff, Natalie, 'Jolted: AEMO radically curtails output of five large solar farms', *PV Magazine Australia*, 16 September 2019, <<https://www.pv-magazine-australia.com/2019/09/16/jolted-aemo-radically-curtails-output-of-five-large-solar-farms>> accessed 3 June 2020.

Fowler, Keirnan, Peter Hill, Phillip Jordan, Rory Nathan and Kristen Sih, 'Application of Available Climate Science to Assess the Impact of Climate Change on Spillway Adequacy', paper presented at ANCOLD 2010 Conference on Dams, Hobart, 2010.

François, B., K.E. Schlef, S. Wi and C.M. Brown, 'Design considerations for riverine floods in a changing climate – A review', *Journal of Hydrology*, vol. 574, 2019, pp. 557–73.

Frontier Economics, *Valuing the impact of local generation on electricity networks*, report for Energy Networks Association, Melbourne, 2015.

Geiger, Nathaniel and Janet K. Swim, 'Climate of silence: Pluralistic ignorance as a barrier to climate change discussion', *Journal of Environmental Psychology*, vol. 47, 2016, pp. 79–90.

Gibbs, Lisa, R Bryant, L Harms, D Forbes, K Block, HC Gallagher, G Ireton, J Richardson, P Pattison, C MacDougall, D Lusher, E Baker, C Kellelt, A Pirrone, R Molyneaux, L Kosta, K Brady, M Lok, G Van Kessel and E Waters, *Beyond Bushfires: Community Resilience and Recovery Final Report*, University of Melbourne, Melbourne, 2016.

Gippsland Climate Change Network, *Participating organisations—GCCN*, 2020, <<http://gccn.org.au/part-organisations>> accessed 22 June 2020.

Gissing, Andrew and Lucinda Coates, 'Australia's 'deadliest natural hazard': what's your heatwave plan?', *The Conversation*, 18 January 2018, <<https://theconversation.com/australias-deadliest-natural-hazard-whats-your-heatwave-plan-90165>> accessed 24 July 2020.

Global Covenant of Mayors for Climate and Energy, *About Us - Global Covenant of Mayors for Climate & Energy*, 2020, <<https://www.globalcovenantofmayors.org/about>> accessed 11 June 2020.

Global Covenant of Mayors for Climate and Energy Oceania, *Signatories to the Global Covenant of Mayors in Oceania*, 2020, <<https://www.gcom-oceania.org/members>> accessed 25 September 2020.

Goldberg, Matthew H., Sander van der Linden, Edward Maibach and Anthony Leiserowitz, 'Discussing global warming leads to greater acceptance of climate science', *Proceedings of the National Academy of Sciences*, vol. 116, no. 30, 2019, pp. 14804–5.

Goulburn Broken Catchment Management Authority, *Taking Action on Climate Change in the Strathbogie Ranges: Bogies and Beyond*, Goulburn Broken Catchment Management Authority, Shepparton, 2017.

Goulburn Broken Catchment Management Authority, *3Bs - Bores of the Bogies & Beyond*, 2019, <<https://www.gbcma.vic.gov.au/projects/current-projects/bogies-and-beyond/3bs-bores-of-the-bogies-beyond>> accessed 28 February 2020.

Goulburn Broken Catchment Management Authority, *Tree Storey citizen science project*, 2020, <<https://www.gbcma.vic.gov.au/projects/current-projects/bogies-and-beyond/tree-storey-citizen-science-project>> accessed 28 February 2020.

Grampians New Energy Taskforce, *Grampians Regional Roadmap to Net Zero Emissions*, Department of Environment, Land, Water and Planning, 2020.

Green Building Council of Australia, *Williamstown High School, Bayview Campus*, 2012.

Green Building Council of Australia, *Green Star: A Year in Focus: FY 2019 Annual Report*, 2019.

Green Building Council of Australia, *Green Star in focus: The business case*, 2020.

Green, David, *Australia's first Virtual Transmission Line: Victoria – South Australia*, 2019, <<https://www.lyonasia.com.au/blog/australias-first-virtual-transmission-line-victoria-south-australia>> accessed 8 April 2020.

Grose, M. R., S. Narsey, F. P. Delage, A. J. Dowdy, M. Bador, G. Boschat, C. Chung, J. B. Kajtar, S. Rauniyar, M. B. Freund, K. Lyu, H. Rashid, X. Zhang, S. Wales, C. Trenham, N. J. Holbrook, T. Cowan, L. Alexander, J. M. Arblaster and S. Power, 'Insights From CMIP6 for Australia's Future Climate', *Earth's Future*, vol. 8, no. 5, 2020, p. e2019EF001469.

Guthrie, Susannah, 'Electric car sales surge in the first five months of this year', *Car Advice*, 4 June 2020, <<https://www.caradvice.com.au/855020/electric-car-sales-australia-2020>> accessed 18 August 2020.

GVCE Mooroopna Solar Farm Pty Ltd, *GVCE Mooroopna Solar Farm*, 2020, <<https://www.gvcemooropnasolar.com>> accessed 30 September 2020.

Harris, Rob, 'Pubs clinch state-wide renewable energy deal to cut electricity bills', *Sydney Morning Herald*, 4 October 2019, <<https://www.smh.com.au/politics/federal/pubs-clinch-state-wide-renewable-energy-deal-to-cut-electricity-bills-20191003-p52xxt.html>> accessed 8 April 2020.

Hartmann, Imogen, 'Funding for Mt Martha recycled water supply', *Pump Industry*, 29 July 2020, <<https://www.pumpindustry.com.au/funding-for-mt-martha-recycled-water-supply>> accessed 5 October 2020.

Henriques-Gomes, Luke, Helen Davidson, Lisa Cox, Ben Smee and Naaman Zhou, 'Hundreds of thousands attend school climate strike rallies across Australia', *The Guardian Australia*, 20 September 2019, <<https://www.theguardian.com/environment/2019/sep/20/hundreds-of-thousands-attend-school-climate-strike-rallies-across-australia>> accessed 16 March 2020.

Hepburn Wind, *Generating Results: Hepburn Wind Annual Report 2019*, Hepburn Wind, 2020.

Hepburn Z-NET, *Community Transition Plan*, 2019.

Hicks, Jarra and Taryn Lane, *Community Power Hubs pilot program: Final evaluation*, report for Sustainability Victoria, Sustainability Victoria, 2019.

Hyde, Malcolm, *2013 Tasmanian Bushfires Inquiry: Volume One*, Department of Premier and Cabinet, Hobart, 2013.

ICLEI – Local Governments for Sustainability (ICLEI Oceania), *ICLEI Oceania Members*, 2020, <<https://www.icleioceania.org/iclei-members>> accessed 25 September 2020.

ICLEI – Local Governments for Sustainability, *ICLEI: About us*, 2019, <https://www.iclei.org/en/About_ICLEI_2.html> accessed 11 June 2020.

Impact Investment Fund, 'How corporate Australia is embracing Sustainable Development Goals', <<https://www.impactinvestmentfund.com.au/newsroom/2017/12/3/how-corporate-australia-is-embracing-sustainable-development-goals>> accessed 30 January 2020.

Independent Expert Panel on Interim Emissions Reduction Targets for Victoria, *Interim Emissions Reduction Targets for Victoria (2021-2030)*, 2019.

Kerbone, Elspeth, 'Solar project launched at Eaglehawk Badminton and Table Tennis Stadium', *Bendigo Advertiser*, 28 March 2019, <<https://www.bendigoadvertiser.com.au/story/5979911/gift-that-keeps-on-giving-solar-panels-save-for-club>> accessed 3 March 2020.

Kerr, Natalee, 'Eden project still moving along despite COVID-19', *Geelong Advertiser*, 29 August 2020, <<https://www.geelongadvertiser.com.au/news/geelong/eden-project-still-moving-along-despite-covid19/news-story/1f62a605c0583878d9aa8641f83f1aba5>> accessed 5 October 2020.

Land & Water Australia, *Planned grazing management: Land, water and wool fact sheet*, 2007.

Lander, J., M. Breth-Petersen, R. Moait, C. Forbes, L. Stephens and M. Dickson, *Extreme heat driven by the climate emergency: impacts on the health and wellbeing of public housing tenants in Mildura, Victoria*, report for Mallee Family Care, 2019.

Lane, Taryn and Jarra Hicks, *Community Engagement and Benefit Sharing in Renewable Energy Development: A Guide for Renewable Energy Developers*, Department of Environment, Land, Water and Planning, Victorian Government, Melbourne, 2017.

Lane, Taryn and Jarra Hicks, *A Guide to Benefit Sharing Options for Renewable Energy Projects*, Clean Energy Council, Melbourne, 2019.

Law, Rob, Scott McKenry, Fran Macdonald, David Meiklejohn, Dominique La Fontaine, Bronwyn Chapman and Ian Southall, *Regional Victorian Greenhouse Alliances: Local Governments Working Together On Climate change*, Central Victorian Greenhouse Alliance, 2018.

Lawson, Damien, 'Stop wasting time and save the planet, Mr Rudd', *The Age*, 14 June 2009, <<https://www.theage.com.au/politics/federal/stop-wasting-time-and-save-the-planet-mr-rudd-20090613-c600.html>> accessed 20 January 2020.

Levin, Tim, 'All the things carmakers say they will accomplish with their future electric vehicles between now and 2030', *Business Insider Australia*, 29 January 2020, <<https://www.businessinsider.com.au/promises-carmakers-have-made-about-their-future-electric-vehicles-2020-1>> accessed 7 September 2020.

- Lucas, Rachael, 'Solar-powered Licola Wilderness Village becomes prototype for off-grid communities', *ABC News Online*, 2 December 2019, <<https://www.abc.net.au/news/2019-12-02/licola-goes-off-grid-with-solar/11739220>> accessed 7 April 2020.
- Macedon Ranges Sustainability Group, *Macedon Ranges Community Energy Park*, 2019, <<https://mrsg.org.au/macedon-ranges-community-energy-park>> accessed 7 April 2020.
- Maibach, Edward W., Connie Roser-Renouf and Anthony Leiserowitz, 'Communication and Marketing As Climate Change–Intervention Assets: A Public Health Perspective', *American Journal of Preventive Medicine*, vol. 35, no. 5, 2008, pp. 488–500.
- Marshall, N.A., L. Thiault, A. Beeden, R. Beeden, C. Benham, M.I. Curnock, A. Diedrich, G.G. Gurney, L. Jones, P.A. Marshall, N. Nakamura and P. Pert, 'Our Environmental Value Orientations Influence How We Respond to Climate Change', *Frontiers in Psychology*, vol. 10, no. 938, 2019.
- Martinelli, Anne, *Bringing Rental Homes up to Scratch: Efficiency standards to cut energy bills, reduce pollution and create jobs*, Environment Victoria, Carlton, Victoria, 2017.
- Mazengarb, Michael, 'City of Sydney inks \$60 million deal to go 100 per cent renewables', *One Step Off The Grid*, 22 October 2019, <<https://onestepoffthegrid.com.au/city-of-sydney-inks-60-million-deal-to-go-100-per-cent-renewables>> accessed 8 April 2020.
- McConnell, Dylan, Simon Holmes à Court and Steven Tan, *OpenNEM: An Open Platform for National Electricity Market Data*, 2020, <<https://opennem.org.au/facilities/vic1>> accessed 25 May 2020.
- McConnell, Dylan, Simon Holmes à Court and Steven Tan, *OpenNEM: South Australia*, 2020, <<https://opennem.org.au/energy/sa1>> accessed 30 September 2020.
- McCowen, David, 'How Nissan's next car could make you money', *Drive.com.au*, 9 February 2018, <<https://www.drive.com.au/motor-news/how-nissan-s-next-car-could-make-you-money-117189>> accessed 16 January 2020.
- Melbourne Water, *Delivering on the Sustainable Development Goals*, (n.d.), <<https://www.melbournewater.com.au/media/7451/download>> accessed 30 January 2020.
- Minister for Energy, Environment and Climate Change, *More Renewables To Help Drive Victoria's Economic Recovery*, media release, Victorian Government, 2 September 2020.
- Minister for Energy, Environment and Climate Change, *Victoria Acts To Secure A More Reliable Energy System*, media release, Victorian Government, Melbourne, 18 February 2020.
- Moloney, Susie and Hartmut Fünfgeld, 'Emergent processes of adaptive capacity building: Local government climate change alliances and networks in Melbourne', *Urban Climate*, vol. 14, 2015, pp. 30–40.
- Monash University Disaster Resilience Initiative, *Compendium*, 2020, <<https://www.monash.edu/muarc/research/research-areas/home-and-community/disaster-resilience/case-studies>> accessed 22 April 2020.
- Mondo, *Third Microgrid to launch in Yackandandah: A new micro grid, Yackandandah's third, represents another significant step in the town's journey to reach 100% renewable energy by 2020*, media release, Mondo, 16 September 2019.

Moore, Trivess, Stephen Berry and Michael Ambrose, 'Aiming for mediocrity: The case of Australian housing thermal performance', *Energy Policy*, vol. 132, 2019, pp. 602–10.

Moreland Energy Foundation, Alternative Technology Association and Akin Consulting, *Wodonga Community Solar Business Case*, report for City of Wodonga and Renewable Albury Wodonga, 2017.

Mornington Peninsula Shire, *About the Briars*, 2020, <<https://www.mornpen.vic.gov.au/Activities/The-Briars/About-The-Briars>> accessed

Morrissey, J. and R.E. Horne, 'Life cycle cost implications of energy efficiency measures in new residential buildings', *Energy and Buildings*, vol. 43, no. 4, 2011, pp. 915–24.

Mortimore, Anna, 'Australia's weaker emissions standards allow car makers to 'dump' polluting cars', *The Conversation*, 30 September 2015, <<https://theconversation.com/australias-weaker-emissions-standards-allow-car-makers-to-dump-polluting-cars-48172>> accessed 11 March 2020.

Mulholland, Rory, 'Apple execs could face jail in France after lawsuit over slowing down iPhones', *The Local Fr*, 28 December 2017, <<https://www.thelocal.fr/20171228/french-lawsuit-launched-against-apple-for-alleged-crime-of-slown-down-iphones>> accessed 17 February 2020.

Municipal Association of Victoria, *Built Environment Sustainability Scorecard: Tool notes*, 2020, <<https://bess.net.au/tool-notes>> accessed 28 April 2020.

Murray Dairy, Dairy Australia and Committee for Greater Shepparton, *Future focus: dairy industry strategy: Murray region 2019*, Melbourne, 2019.

National Transport Commission, *Carbon Dioxide Emissions Intensity for New Australian Light Vehicles 2019*, Melbourne, 2020.

Ndevr Environmental, *Charging the Regions: Local Government EV Charging Network Study: Component 5 – Outcomes Report*, report for Central Victorian Greenhouse Alliance, 2020.

Neon, *Numurkah Solar Farm*, 2020, <<https://numurkhsolarfarm.com.au>> accessed 25 May 2020.

Neria, Y., A. Nandi and S. Galea, 'Post-traumatic stress disorder following disasters: a systematic review', *Psychological medicine*, vol. 38, no. 4, 2008, pp. 467–80.

Nicholls, Larissa, Halley McCann, Yolande Strengers and Karyn Bosomworth, *Heatwaves, Homes & Health: Why household vulnerability to extreme heat is an electricity policy issue*, Centre for Urban Research, RMIT University, 2017.

Nillumbik Shire Council, *Diamond Creek Sporting Stadium becomes Centre for Relief*, media release, Nillumbik Shire Council, 23 October 2018.

NSW Department of Planning, Industry and Environment, *NABERS: Your partner in building performance*, 2019, <<https://www.nabers.gov.au>> accessed 28 April 2020.

NSW Department of Planning, Industry and Environment, *What is NABERS?*, 2019, <<https://www.nabers.gov.au/about/what-nabers>> accessed 28 October 2020.

NSW Department of Planning, Industry and Environment, *Net Zero Plan Stage 1: 2020–2030*, State of NSW, Sydney, 2020.

NSW Department of Planning and Environment, *GreenPower for Businesses: Guide*, State of NSW, 2018.

NSW Energy, *Renewable Energy Zones*, 2020, <<https://energy.nsw.gov.au/renewables/renewable-energy-zones>> accessed 28 May 2020.

NSW Environment Protection Authority, *TP01: Trends in Motor Vehicles and their Emissions*, Advisory Committee on Tunnel Air Quality, 2014.

Owens, Dave and Mary O'Kane, *Final Report of the NSW Bushfire Inquiry*, NSW Government, Sydney, 2020.

PACE Career Centre, *Agricultural Extension Officer*, 2020, <<https://commonwealth.gostudy.net/occupation/agricultural-extension-officer>> accessed 30 September 2020.

Parkinson, Giles, 'AEMO to resume new connections after solar constraints lifted in West Murray', *Renew Economy*, 27 April 2020, <<https://reneweconomy.com.au/aemo-to-resume-new-connections-after-solar-constraints-lifted-in-west-murray-41664>> accessed 28 April 2020.

Parkinson, Giles, 'Big batteries get ready to play main role in next stage of clean energy transition', *Renew Economy*, 1 April 2020, <<https://reneweconomy.com.au/big-batteries-get-ready-to-play-main-role-in-next-stage-of-clean-energy-transition-58327>> accessed 8 April 2020.

Parkinson, Giles, 'Coonooer Bridge claims highest output of Australian wind farms', *Renew Economy*, 26 July 2016, <<https://reneweconomy.com.au/coonooer-bridge-claims-highest-output-australian-wind-farms-74518>> accessed 7 April 2020.

Parkinson, Giles, 'Grid "balanced on a knife edge": AEMO flags more solar delays in Victoria', *Renew Economy*, 20 December 2019, <<https://reneweconomy.com.au/grid-balanced-on-a-knife-edge-aemo-flags-more-solar-delays-in-victoria-23807>> accessed 15 April 2020.

Parkinson, Giles, 'Vic wind farm breakthrough, with pioneering share structure', *Renew Economy*, 12 June 2013, <<https://reneweconomy.com.au/vic-wind-farm-breakthrough-with-pioneering-share-structure-75914>> accessed 7 April 2020.

Pinda, Anthony, 'Ironbark Gully Friends look to enhance Bendigo with green corridor which will enhance unused pieces of land', *Bendigo Advertiser*, 29 July 2018, <<https://www.bendigoadvertiser.com.au/story/5553120/vision-for-a-green-corridor-through-bendigo>> accessed 17 January 2020.

Powercor Australia, *Powercor 2018 Pricing Proposal*, Melbourne, 2017.

Poyner, Mim, 'Dishpig ready to fly', *Yackity Yak*, Feb/March 2020, p. 8.

Premier of Victoria, *Transforming Recycling In Victoria*, media release, Melbourne, 24 February 2020.

Regulatory Impact Solutions, *Regulatory Impact Statement: Residential Tenancies Regulations 2020*, 2019.

Reid, Rowan, *Agroforestry and climate change - what is the role of trees on farms?*, <[http://www.agroforestry.net.au/main.asp?_ =Climate%20Change](http://www.agroforestry.net.au/main.asp?_=Climate%20Change)> accessed 6 October 2020.

- Reid, Rowan, *Bambra Agroforestry Farm*, <http://www.agroforestry.net.au/main.asp?_Bambra%20Agroforestry%20Farm> accessed 6 October 2020.
- Renewable Newstead, *Small town big switch: Newstead's journey to renewable energy*, 2018.
- RMIT Centre for Urban Research, *Tarnagulla Community Resilience Action Plan*, 2020, <<https://cur.org.au/project/tarnagulla-community-resilience-action-plan>> accessed 22 April 2020.
- Roberts, David and Alvin Chang, 'Meet the microgrid, the technology poised to transform electricity', *Vox*, 24 May 2018, <<https://www.vox.com/energy-and-environment/2017/12/15/16714146/greener-more-reliable-more-resilient-grid-microgrids>> accessed 7 April 2020.
- Roberts, Eryl H and Madan K Gautam, *Community forestry lessons for Australia: a review of international case studies: Research Report presented to: Faculties Research Grant Scheme 2002-2003, The Australian National University, School of Resources, Environment and Society, The Australian National University, Canberra, 2003.*
- Roberts, Mike, Kriti Nagrath, Chris Briggs, Jessie Copper, Anna Bruce and John Mckibben, *How much rooftop solar can be installed in Australia?*, report for Clean Energy Finance Corporation and the Property Council of Australia, Sydney, 2019.
- Rockefeller Philanthropy Advisors, *Global Resilient Cities Network*, 2020, <<https://www.rockpa.org/project/global-resilient-cities-network>> accessed 11 June 2020.
- Rural Innovation Research Group, *Stimulating private sector extension in Australian agriculture to increase returns from R&D: Research Report C: The advisory and extension system (National and State)* Faculty of Veterinary & Agricultural Sciences, University of Melbourne, 2018.
- Rutovitz, J., L. McIntosh, N. Ison, E. Noble, J. Hicks and F. Mey, *Social Access Solar Gardens for Australia*, University of Technology Sydney, 2018.
- Sachs, Jeffrey D., 'Goal-based development and the SDGs: implications for development finance', *Oxford Review Of Economic Policy*, vol. 31, no. 3-4, 2015, pp. 268-78.
- Savory Institute, *How high stock density grazing is different from holistic planned grazing*, 2018, <<https://savory.global/high-stock-density-grazing-holistic-planned-grazing>> accessed 6 October 2020.
- Schmidt, Bridie, 'Eight new electric vehicle models set to join Australia market in 2020', *The Driven*, 20 December 2019, <<https://thedriven.io/2019/12/20/eight-new-electric-vehicle-models-set-join-australia-market-in-2020>> accessed 16 January 2020.
- Snapshot, *Snapshot — community climate tool*, 2020, <<https://snapshotclimate.com.au/about>> accessed 15 May 2020.
- Solarquotes, *5 kW Solar System—Solar Power Quotes and Information*, 2020, <<https://www.solarquotes.com.au/systems/5kw>> accessed 25 May 2020.
- South East Water, *Feasibility study for hinterland environmental water scheme kicks off*, media release, 7 July 2020.

- Spratt, David and Philip Sutton, *Climate'code Red': The Case for a Sustainability Emergency*, Friends of the Earth, 2008.
- Staddon, Sam C., Chandrika Cyclic, Murray Goulden, Caroline Leygue and Alexa Spence, 'Intervening to change behaviour and save energy in the workplace: A systematic review of available evidence', *Energy Research & Social Science*, vol. 17, 2016, pp. 30–51.
- State Emergency Management Committee, *State Emergency Management Plan: Part 2 - Arrangements V1.2*, Government of South Australia, Adelaide, 2018.
- Stockyard Hill Wind Farm, *Stockyard Hill Wind Farm*, 2020, <<https://www.stockyardhillwindfarm.com.au>> accessed 25 May 2020.
- Supply Chain Sustainability School, *About the VIC Councils Sustainable Supply Initiative*, 2020, <<https://www.supplychainschool.org.au/learn/partner-landing-pages/vcss>> accessed 3 March 2020.
- Sustainability Victoria, *Victorians' Perceptions of Climate Change: Key Findings - Social Research on Climate Change Attitudes and Behaviours*, Sustainability Victoria, Melbourne, 2017.
- Sustainability Victoria, *Contact us*, 2020, <<https://www.sustainability.vic.gov.au/contact-us>> accessed 4 May 2020.
- Szatow, Tosh, 'How a small town solved five key barriers to a 100 per cent renewable energy supply', *One Step Off The Grid*, 21 August 2020, <<https://onestepoffthegrid.com.au/how-a-small-town-solved-five-key-barriers-to-a-100-per-cent-renewable-energy-supply>> accessed 24 August 2020.
- TasNetworks, *Project Marinus: RIT-T Project Assessment Draft Report*, TasNetworks, 2019.
- TasNetworks, *Project Marinus: Business Case Assessment Report*, TasNetworks, 2019.
- The Cape, *The Cape: Welcome to the Cape*, 2019, <<https://www.liveatthecape.com.au>> accessed 30 April 2020.
- The Institute for Sustainable Futures, Community Power Agency, Alternative Technology Association, Starfish Initiatives, Embark and Total Environment Centre, *National Community Energy Strategy*, Coalition for Community Energy, 2015.
- Thomas, Georgia, 'MINI Profiles: Nightingale 1 by Breathe Architecture', *Green Magazine*, <<https://greenmagazine.com.au/mini-profiles-nightingale-1-by-breathe-architecture>> accessed 28 October 2020.
- Timbal, Bertrand, Marie Ekström, Sonya Fiddes, Michael Grose, Dewi GC Kirono, Eun-Pa Lim, Chris Lucas and Louise Wilson, *Climate change science and Victoria*, Bureau of Meteorology, 2016.
- Timlett, R. E. and I. D. Williams, 'Public participation and recycling performance in England: A comparison of tools for behaviour change', *Resources, Conservation and Recycling*, vol. 52, no. 4, 2008, pp. 622–34.
- Towers, Briony and Kevin Ronan, *Evaluation of Survive and Thrive: Final Report to the Victorian Country Fire Authority, Bushfire & Natural Hazards CRC*, Bushfire and Natural Hazards Cooperative Research Centre, East Melbourne, 2018.

University of Technology Sydney, *Networks Renewed*, 2019, <<https://www.uts.edu.au/research-and-teaching/our-research/institute-sustainable-futures/our-research/energy-futures/networks-renewed>> accessed 12 May 2020.

Victorian Auditor-General's Office, *Annual Plan 2020–21*, 2020.

Victorian Public Sector Commission, *The Victorian Public Sector*, 2020, <<https://vpsc.vic.gov.au/about-public-sector/the-victorian-public-sector>> accessed 22 October 2020.

Violet Town Action Group, *Violet Town Community Forest*, 2020, <<https://www.violettown.org.au/environment/community-forest>> accessed 5 October 2020.

Vorrath, Sophie, 'City of Melbourne leads second "bulk-buy" renewables auction', *Renew Economy*, 22 November 2019, <<https://reneweconomy.com.au/city-of-melbourne-leads-second-bulk-buy-renewables-auction-64091>> accessed 8 April 2020.

Vorrath, Sophie, 'Victoria delays setting interim emissions targets, again, as Covid digs in', *Renew Economy*, 31 July 2020, <<https://reneweconomy.com.au/victoria-delays-setting-interim-emissions-targets-again-as-covid-digs-in-53222>> accessed 21 September 2020.

Warren-Myers, Georgia, Erika Bartak and Lucy Craddock, 'Observing energy rating stars through the Australian Consumer Law lens: How volume home builders' advertising can fail consumers', *Energy Policy*, vol. 139, 2020, p. 111370.

Wasko, Conrad and Rory Nathan, 'Influence of changes in rainfall and soil moisture on trends in flooding', *Journal of Hydrology*, vol. 575, 2019, pp. 432–41.

Western Victoria Transmission Network Project, *Project Information*, 2020, <<https://www.westvictnp.com.au/project-information>> accessed 4 May 2020.

Women's Health East, *Women and Climate Change*, Doncaster East, 2018.

