

T R A N S C R I P T

LEGISLATIVE COUNCIL ENVIRONMENT AND PLANNING COMMITTEE

Inquiry into Renewable Energy in Victoria

Melbourne—Thursday, 17 March 2022

MEMBERS

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Mr Clifford Hayes—Deputy Chair

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Ms Cathrine Burnett-Wake

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Mrs Beverley McArthur

Mr Tim Quilty

Mr Gordon Rich-Phillips

WITNESSES (*via videoconference*)

Dr Dylan McConnell, Research Fellow, and

Dr Kelvin Say, Research Fellow, Energy Transition Hub, University of Melbourne; and

Mr Greg Foyster, Acting Campaigns Manager, and

Mr Paul Beaton, Senior Energy Policy Analyst, Environment Victoria.

The ACTING CHAIR (Mr Hayes): I declare open the Legislative Council Environment and Planning Committee's public hearing for the Inquiry into Renewable Energy in Victoria. Please ensure that mobile phones have been switched to silent and that background noise is minimised.

I would like to begin this hearing by respectfully acknowledging the Aboriginal peoples, the traditional custodians of the various lands we are gathered on today, and pay my respects to their ancestors, elders and families. I particularly welcome any elders or community members who are here today to impart their knowledge of this issue to the committee or who are watching the broadcast of these proceedings.

I welcome any members of the public who are watching via the live broadcast.

I want to introduce our committee members: Dr Samantha Ratnam, Ms Nina Taylor, Mr Stuart Grimley and Mrs Beverley McArthur. That is it for the moment, but we may have other committee members join us as we proceed.

All evidence taken today is protected by parliamentary privilege as provided by the *Constitution Act 1975* and further subject to the provisions of the Legislative Council standing orders. Therefore the information you provide during the hearing is protected by law. You are protected against any action for what you say during this hearing, but if you go elsewhere and repeat the same thing, these comments may not be protected by this privilege. Any deliberate false evidence or misleading of the committee may be considered a contempt of Parliament.

All evidence is being recorded. You will be provided with a proof version of the transcript following the hearing. Transcripts will be ultimately made public and posted on the committee's website.

For the Hansard record, can you please state your name and any organisation you are appearing on behalf of.

Dr SAY: Kelvin Say, Energy Transition Hub at the University of Melbourne.

Mr FOYSTER: Greg Foyster, Environment Victoria.

Mr BEATON: Paul Beaton, Environment Victoria.

Dr McCONNELL: Dylan McConnell, University of Melbourne.

The ACTING CHAIR: Okay. If you could start your presentation—maybe 5 minutes each or something like that. I do not know what you have got prepared, but we could balance it up so we have 10 minutes for each organisation. Who would like to start?

Mr BEATON: I would be happy to start.

The ACTING CHAIR: Okay, great. Thank you. Thanks, Paul. Take it away.

Mr BEATON: This is Paul Beaton. First, thank you for the opportunity to present to the inquiry. I just want to acknowledge that I am calling you from the lands of the Wurundjeri peoples, the traditional custodians of this land, and recognise all of their elders past, present and emerging. I think it is an important topic for all people, including the First Australians.

We want to speak today on how the transition to 100 per cent renewable electricity grid is technically feasible, economically beneficial and socially desirable, in part because it is going to create thousands of jobs and really

leave Victorian households better off. When it comes to feasibility, the good news is that the technology for a renewable power grid is ready already. It is already in use in Victoria and the rest of Australia and the rest of the world, and fully renewable is feasible. It is feasible now with what we have, courtesy not just of power generation and transmission but also the storage capacity for dispatchable storage, deep storage and so on. Even better news is that people have already been taking it up—households, businesses. Every year tens of thousands of them have been installing new power plants right at their businesses, on their facilities and on their houses. They are doing that with the help of the grid operators like Powercor, CitiPower, AusNet and so on. So they are active participants; the grid market participants are all active in there. And even despite COVID, the past two years have continued to see growth to the highest levels yet—like nearly 80 000 installs in Victoria last year and nearly 75 000 in 2020 before that—and that has just been growing at a quite rapid pace. And even better news is the large installs. The big commercial ones, the big grid-scale ones, so to speak, have also been increasing in both size and pace. This goes back to the fact that the technology has really matured. It is feasible—it is technically feasible right now—to have a fully renewable grid.

In terms of what it takes to get there, to an actual 100 per cent one, both the producers and the grid operators have been working very hard to upgrade the grid already to make that happen, and you can see that reflected in the latest planning document from AEMO, the Australian Energy Market Operator. They are planning to document the integrated system plan; it is created under the national electricity rules, commonwealth legislation, that they have to go in. That really demonstrates just how feasible and how close the entire national electricity market—the NEM—that Victoria participates in, including the Victorian component, is to actually being fully renewable at this point. Every scenario that they model in there shows achieving net zero by 2050, so net zero emissions by 2050, and all of the coal stations in Victoria closing by 2032 at the latest.

It is worth commenting that these scenarios that are run are chosen based on market participants. So industry goes in there and votes, like: which ones do we think are the most likely and worth actually running into in-depth modelling and forecasting? So it is not just an isolated group of individuals, it is actually everyone who is involved; it comes from government as well as peak bodies and so on all saying which ones they think are going to be there. I want also to comment that AEMO's mandate, which they take very seriously, is a stable and secure grid: like, the lights stay on—that is their ultimate imperative. And the lights stay on even with 100 per cent renewable power. So the interesting thing there is because we are so conservative, forecasts always lag behind what the market participants are really doing. What the investors, the power producers, the transmission companies are already doing is always a bit ahead, and often very far ahead, of what the market operator thinks will go on. Part of that is because it really pays off. There are economic benefits. The return on investment for upgrading the grid is actually very large, even by AEMO's conservative estimates. If you take what was expected to be the most likely of the scenarios to look like reality, it is about eight times the payback versus if you went on a slower course, and if you go even faster, if you push it even faster, it will be about 20 times versus that slower charted course to 2050. And that does not even account for the unpriced costs of pollution. You put those in and the return will be even better, and of course a lot of that payback comes in terms of lower prices for businesses and households for their power as well as economic engines of creation, so new jobs, new industries and so on.

My colleague Greg is going to speak a little more to how things are happening faster, but I just want to point to one particular thing in terms of generation, because this is a lot about generating capacity but actual power generated is a different matter. In all of these scenarios, even from that conservative stance, they anticipate by 2030 that at least 90 per cent of Victoria's power generated will come from renewables. With that, I am going to turn over to my colleague Greg Foyster to comment a little more.

Mr FOYSTER: Thanks, Paul. It is worth just reiterating the importance of that report, the Australian Energy Market Operator's integrated system plan. It came out after the inquiry submissions were due, but it really should be the starting point for this inquiry, particularly because it shows that Victorian coal power stations would close by 2032 under the central scenario, and that is far, far sooner than the official closure dates. So that is what we should look at as a starting point.

I just want to briefly talk about Victoria's energy transition so far and acknowledge that significant progress has already been made. Back in 2014 renewable energy generation was about 10 per cent in Victoria, and it is now up to nearly 30 per cent, so that is significant. That has happened partly because the Victorian government has pursued policies to support renewable energy at a time when the federal government has been missing in action. So it is important to acknowledge that progress so far and some of the leading work that has been done. I also

want to acknowledge the recent announcement on the offshore wind targets from the Victorian government, which aims for 9 gigawatts of offshore wind by 2040. That is significant, and that is going to be reflected in the new Australian Energy Market Operator forecasts. So there has been significant work done so far.

However, despite all this work the Victorian government still has a renewable energy target of 50 per cent by 2030, and by our calculations and forecasts from the Australian Energy Market Operator we are well on track to overachieve that. So one of our recommendations is to significantly increase that target to close to 100 per cent by 2030 if you are just looking at the electric grid—and much further. If you include clean manufacturing or clean renewable export strategy, you would need an even higher target.

I just want to talk about how popular renewable energy is, because it is really significant across various electorates and the political divide. Renewable energy is extremely popular and has been so for the last decade in all published polls. To give a recent example, the Lowy Institute climate poll published in 2021 shows that 91 per cent of Australians would support government subsidies for the development of renewable energy technology. That is an extraordinary supermajority of people. Even in coal communities there is very high support for governments to take some responsibility for the transition from coal to renewable energy. For example, there was a YouGov poll in December 2021 that covered the Hunter Valley and the Latrobe Valley, and that found that 75 per cent of people agreed governments should do more to assist the transition from burning coal to renewable sources of power. So even in those areas there is high support for the transition to renewables. The support is even higher if the statement includes a plan to look after workers in the community.

So we need to acknowledge that while the transition to renewables should be as fast as possible to deal with the worst impacts of climate change it also needs to be fair to people in affected regions, and those two things go hand in hand. That is why we also make the recommendation that the Victorian government should extend funding for the Latrobe Valley Authority until the last power station closes and give certainty to the community that there will be a government authority that is helping that transition, and also that that transition should be community led. It has to be led by the community as much as possible, and it should focus on regional strengths. A lot of work has been done by the University of Melbourne into this, which I am sure others can speak to, but there is still the lack of a very long term transition plan for the Latrobe Valley region.

Just finally I want to end on another topic, which is gas. Emissions from the gas sector would make up about 16 per cent of Victoria's emissions. We have a lot of gas used in homes in winter for heating. Various studies have shown that it is actually much cheaper for households to use electricity to heat their homes, and so what we should be doing is increasing existing government programs that support households to switch from gas to efficient electrical appliances. There are already some really good programs, like the program to replace 250 000 heaters with efficient electric heaters, but those could be scaled up massively. We should be aiming to cut gas sector emissions in half by 2030 at the very least and doing that through switching households from gas to electricity. That will actually save households money, from all the studies that have been published on it so far.

Finally, I also want to mention that currently new developments in Victoria are forced to connect to gas, and so that is increasing gas demand and expanding the gas network at a time when we should not be doing that. We should be switching households to electric, so we also make a recommendation for all-electric new housing developments, because it will save households money and cut emissions.

The ACTING CHAIR: Thank you very much. Thanks, Greg. If I could throw over to the Energy Transition Hub now. Who would like to kick off there?

Dr McCONNELL: I might kick us off. I would just like to start also by acknowledging that we are on the lands of the Wurundjeri people, who have been custodians here for thousands of years, and I acknowledge and pay respects to their elders past and present.

So I am going to speak first, and I will pass over to my colleague Kelvin afterwards. Just a bit of background: I have been an energy market analyst and researcher at the University of Melbourne for a bit over a decade now, basically studying the unfolding energy transition in the electricity market and researching various policy questions that emerge around that. I did a PhD thesis on energy transitions in liberalised electricity markets, specifically with a focus on the Australian system.

I am going to speak a little bit about similar stuff to what Paul mentioned—around the ISP and some of the insights and findings from that new draft report—and then talk a little bit about gas and then pass over to my colleague Kelvin, who will speak a little bit about new sources of energy demand and the need to link those with generation and find ways to better match demand and generation. If I can, I will just quickly share my screen.

Visual presentation.

Dr McCONNELL: Hopefully you can see that now. So this is from the so-called step change scenario in the report that Paul referred to. The integrated system plan is the main sort of planning document prepared by the Australian Energy Market Operator every two years. And this particular scenario is the one that is considered by industry and stakeholders to be the most likely. I will talk a little bit about what that actually means a bit later on. As you can see, this is only one of the scenarios, and as you can see there is basically a rapid expansion of renewable energy over the next decade and a decline in brown coal, with brown coal ceasing to generate from about 2032.

It is worth noting that this scenario is done in the context of a 2-degree emissions budget, and they have done another scenario that is in the context of a 1.5-degree emissions budget. That is the hydrogen superpower scenario. That actually has coal leaving a little bit earlier. The last generation—it is not quite clear from this graph—is actually in 2030, and you have virtually a 100 per cent renewable energy system from then onwards.

I guess, just drawing out some interesting findings in the context of this inquiry from that, what that means in terms of investment is there are some pretty big numbers. There, just looking at wind, solar and storage, we are talking about investment in the state of Victoria in the vicinity of \$10 billion out to 2030 or, in that sort of expanded scenario where we decarbonise faster, close to \$18 billion. I should say this is investment only in wind, solar and storage, including rooftop PV. It does not include things like transmission and other related industries.

Alongside that there is a huge number of jobs that come along with this. Construction jobs are quite significant. This table shows the jobs in 'job years', so you sort of have to spread these out over a period of time, say a decade or eight years or whatever to think about how many construction jobs that might be per year. And there is also a local manufacturing component of that. This table is derived from figures from the Institute for Sustainable Futures, who have done a big survey on the sort of jobs related to renewable energy, and the local manufacturing jobs are based, basically, on what exists and what we currently do. That does not need to remain as it is. With local content provisions those numbers are subject to change, I guess. But as it currently stands there also sort of flow-on local manufacturing jobs that flow from this.

And then there are ongoing operations and maintenance jobs also. This is also based on the ISF study I have referred to. These are permanent ongoing jobs associated with the solar, wind and storage industries, based on the figures from the two ISP scenarios. So I guess this is all quite good or quite positive news, but I guess the other thing to think about is the fact that these are the scenarios that are considered most likely by the industry stakeholders. It does not actually imply that we have the policy or the mechanisms or the processes in place to get there. So there is a bit of a difference to be considered there. In fact just recently AEMO published a document that basically said that these scenarios are driven by carbon budgets; the coal closures are driven by carbon budgets. Now, that is all well and good in the modelling exercises that they undertake, but I guess in the real economy we do not actually apply carbon budgets. So there is a bit of a question mark, at least in my mind, around the mismatch between a scenario where carbon budgets are achieved and what is actually reflected in the electricity market itself.

This slide shows what brown coal generation might look like with these budgets, but we do not actually have policies in place at the moment that would enforce these budgets. As you can see, the coal closure time line is much earlier than you would be led to believe by the various private companies that are participating in the sector. So this is one area where I think there is a bit of a role for state involvement in terms of planning, because this is going to have significant impacts particularly in the Latrobe Valley—I guess most obviously in the Latrobe Valley—and there is a real role for the government to plan for the transition away from brown coal in that area.

Another area where there is a bit of a bottleneck emerging is around transmission. I am sure you have heard quite a bit about transmission in the last few days and the challenges around building that. If you follow the pathways that are laid out in the integrated system plan, there needs to be a substantial investment in transmission. In those least-cost scenarios we are talking in the vicinity of—depending—\$4 billion to \$5 billion to develop the six renewable energy zones in Victoria, and if you are going to develop all of those, that is quite a substantial amount of investment, keeping in mind that the regulator as a base of the entire transmission system in Victoria at the moment is about \$3.5 billion. So we are talking about significant transmission investments in those scenarios.

It should be said that those are not the only scenarios. There are scenarios that do not have as much transmission and also meet those emissions objectives. They do result in more storage or more other local generation in Victoria, but yes, there is a big question around how that transmission will be developed and will roll out, particularly when we have issues like we are seeing in the western Victoria integration project, which you probably have heard about. It is actually quite a small upgrade in the scheme of things. It is I think a \$350 million-odd project, a couple of hundred kilometres, and it has a substantial amount of local objection. It has been in development since about 2018 I think. So if you are thinking about the lead times, costs and social licence issues, there are some real challenges around—

The ACTING CHAIR: Dylan, I might interrupt you there just to say we want to leave time for Kelvin to have a few minutes, and you will probably get some questions about that very topic you are talking about as we—

Dr McCONNELL: No worries.

The ACTING CHAIR: Thank you.

Dr McCONNELL: All right. I was going to make some comments on gas, but I might leave those for Kelvin. Thanks, Chair.

The ACTING CHAIR: Thank you.

Dr SAY: Thank you. Okay, once again I would like to thank you for the opportunity to present to this inquiry. It is a vital topic given the limited time frame we have within the global carbon budget to keep warming at 1.5 degrees Celsius. I am a researcher at the University of Melbourne with Dylan, and we are evaluating policy questions around the economics of household PV battery systems, their wider adoption and their subsequent impact on electricity markets. The premise which I would like to start off with is that a 100 per cent renewable energy system cannot be solved only at the grid. It requires a commitment both at the generation—those large-scale installations, the storage that you put behind the grid—and everything that is happening behind the meter at the customer side. This ability to actually moderate customer demand along with generation will be necessary to act as an alternate strategy to things like additional transmission infrastructure and additional storage capacity, because these assets are already sitting within the households and in the premises of many of our electricity customers. So Victorians are continuing to adopt rooftop PV and beginning to adopt battery systems, and currently more than half of the solar PV capacity in Victoria resides within rooftop households.

Now, with rooftop PV the situation that you get from an electricity customer perspective is that you can reduce your overall electricity demand by about 30 or 40 per cent. The moment that you add a battery system into that you create a cost-effective regime where you are actually able to reduce your electricity demand upwards of 70 to 80 per cent. So these have significant repercussions for future system planning, future generation planning and actually the economic case for, for example, additional solar PV in Victoria. These changes are likely to occur in line with battery adoption, and once these changes start moving they become much more difficult to prevent. So currently there needs to be a greater role and a greater strategy to actually plan for behind-the-meter battery adoption and rooftop PV and what role that actually plays in the 100 per cent renewable energy scenario. It cannot be left as an assumption of that passive user; they actually need these active connections and market mechanisms to be established. Currently there are very limited mechanisms in which to do this in such a way that customer and household demand can actually interface with generation. By doing so it can actually also increase your renewable energy penetration by actually shifting demand to periods of time when lots of

renewable energy generation is available on the market, and given that the price of electricity during that point in time is also lower, there is a cost benefit to these customers.

Given that there is a potential for that current electricity demand to move off the market, with households installing their own rooftop PV and battery systems, then in order to find new sources of demand there really remains gas electrification in the heating system and transport electrification. If these things are actually occurring behind the meter, they provide an opportunity for these new sources of energy to also be feathered in with how the market operates, and the system operator can actually use these as a way to further increase renewable energy penetration in Victoria. In order to do this additional technical standards need to be developed along with the market connections, of which we currently do not have very much of. Victoria is in a quite privileged position with its smart meter rollout to have the advantage of having smart meters in all Victorian households, which is an advantage not only in Australia but also worldwide. It provides the ability to actually prototype and develop these mechanisms.

So the recommendation that I have is to (1) develop a timely policy. A strategy needs to occur in order to develop some form of additional demand coordination mechanisms beyond what are currently there in order to actually develop an idea of what the role is of this small-scale generation in storage in 100 per cent renewable energy and how that can actually complement large-scale renewable energy generation.

The ACTING CHAIR: All right. Thanks very much, Kelvin. I might throw over to our committee to ask questions. I ask committee members to keep it to two questions each—if you would like to nominate who you are directing the question to or if you just throw it out there. I will leave it to witnesses to pick up the question if you do not nominate someone. So I might start off with Dr Ratnam. Sam, would you like to ask a question?

Dr RATNAM: Certainly. Thank you, everyone, for your really compelling evidence and written submissions as well. There was a lot that we covered, but just focusing on a couple of things to start off. In the Environment Victoria submission, and thank you very much for that, you talk about commitments to renewable energy projects. You say, on your second page, the trajectory of our move to 100 per cent renewables ‘is in peril’; you talk about how financial commitments to new renewable energy projects in Victoria ‘fell to zero’ in 2021—I am not sure that has been updated since then; and policies play a key role. You said the federal renewable energy target expired but that our renewable energy generating capacity is not legislated and lacks a specific deadline. Can you talk a little more about what you think we need to see in this regulatory and policy environment in Victoria to really codify those targets? What you were saying is industry is moving quite quickly now and yes, we have made some great strides in Victoria, but I would like you to unpack if you can what you think we should be doing next in Victoria to really match the pace of industry and the ambition that we need to have to codify in the regulatory and policy environment the ambition that we need to have.

Mr FOYSTER: I might kick off on that one and then pass to Paul as we go. That sentence in our report was a reference to some data from the Clean Energy Council which showed that financial close had slowed down in Victoria in the previous year. I am not sure what the new data says, but that was an important point to make.

Dr RATNAM: Sorry, can I ask, Greg: is that government money, is that government investment that you are talking about specifically and referencing, or is it overall private industry investment as well?

Mr FOYSTER: There was a gap between projects that were proposed and those that had reached financial close in the financial year. In previous years there were a large number of projects that reached financial close. In that financial year, according to the Clean Energy Council’s data that we have seen, there were not projects that had reached financial close to the same extent.

Dr RATNAM: Okay. Thank you.

Mr FOYSTER: You are probably better off talking to them about that data, but that is what we were referring to. In terms of what you said around setting policies to support renewable energy, what could boost an increase in renewable energy would be long-term certainty around a target for 100 per cent renewable energy, for example. We note that in New South Wales there has been a really large increase in renewable energy projects proposed, and that is through the New South Wales government’s approach of a longer term investment road map. Victoria could copy that and have a more ambitious 2030 target, which would set the policy trajectory. We also, as mentioned, acknowledge that the offshore wind policy does do that—that is the 2040 target for 9 gigawatts. And looking at the effect of long-term targets, what they can do is encourage

renewable energy companies to invest in local component manufacturing or a local industry, because they can see that they will have a return on investment over a longer period of time. I will let others speak to that, but that is what we would say: set long-term trajectories and long-term targets by increasing the Victorian renewable energy target to at least 100 per cent by 2030.

Dr RATNAM: Great. Thank you. Paul, do you want to say something?

Mr BEATON: Thank you. I mean, maybe just to add a little bit of a big-picture view to what Greg has just said and to play on what Kelvin I think laid out, the thing about markets is that they are also a technology, and one of the key drivers of markets as a technology is what is government policy. The intersection that Greg just so nicely laid out is that what most businesses spend a lot of their time and effort doing is trying to manage uncertainty and risk. So the more that policy can support industry with certainty, the faster they will move, the more efficient the market will be, the greater the returns on investment and the greater the ability to address climate change. That is the big picture.

Dr RATNAM: Fantastic. Thank you. I will come back around, Clifford, if there is time, but I am happy for you to go to somebody else.

The ACTING CHAIR: Thanks. It is appreciated. Mrs McArthur, would you like to ask a question?

Mrs McARTHUR: Thank you, Acting Chair, and thank you, witnesses. I would like to go to Greg from Environment Victoria. Greg, I am just wondering if you have done the costing to the environment on overhead transmission lines crisscrossing Victoria as they destroy biolinks, prime agricultural land and amenity in many areas of housing and agriculture.

Mr FOYSTER: Yes, this is a really important issue to address, and I know there are people in western Victoria that are concerned about this. We have not done the costing to the environment on that, and I think the best way to move forward with that is the environment effects statement process, which should come out in June. I assume you are talking about the Western Victoria Transmission Network Project there?

Mrs McARTHUR: Well, there are 30 such projects planned, so the whole of Victoria will be affected by this spider web of steel above ground if we proceed with ancient technology.

Mr FOYSTER: Yes. I think the way to approach this is it is not a dichotomy between renewable energy installations and the environment, because the biggest threat to our environment is actually climate change, and if that is allowed to proceed, the impacts to Victoria will be enormous, including to species. Many species will go extinct if we do not deal with climate change. The biggest source of emissions in Victoria is burning coal, so the greatest contribution we can make to global efforts is actually to reduce our emissions from coal. It is a complex issue.

Mrs McARTHUR: Greg, can I just interrupt? Can't we do both?

Mr FOYSTER: Exactly. We can do both.

Mrs McARTHUR: Can't we green the energy supply and green the transmission infrastructure? I do not think any of the opponents, or hardly any, of the transmission line are anti renewables; they are not. They are just anti browning the environment.

Mr FOYSTER: Absolutely. I think the way to approach this, as I was getting to, is to see a way where we can do renewables right. We need these upgrades to the grid and we need to roll out renewables as fast as possible to reduce the impacts of climate change, and that has to happen across the world. But we need to do it in a way that obviously minimises local environmental impacts and makes the best use of agricultural land. It is a balancing act that needs to be performed here, and it is a relatively new thing for us to all work out. But I just want to stress that it can be done right and there is more research that need to be done there. I would just say that the overarching imperative to act on climate change is an important factor here.

The ACTING CHAIR: All right. Thanks very much, Greg. I will go to Ms Taylor. Would you like to ask a couple of questions?

Ms TAYLOR: Yes. Thanks for your presentation; it was really, really interesting. I think the previous session—which is not relevant to this, but I was just factoring it in, and it is not in any way resiling from the paramount need to reduce emissions et cetera—mentioned the legacy of coal. And there has been discussion earlier today about a very simplistic comparator between, say, South Australia and Victoria—‘Oh, well, we should just become South Australia’—without factoring in the legacy and also the differing energy demands of the different states. It is not to resile from a need to invest, but if we are looking at the actual build and jobs and actual renewable energy generation, I guess I am just looking at what is most helpful and constructive in terms of Victoria truly getting to where it needs to go, noting that we jumped by 3.8 terawatt hours—the largest increase in renewable energy generation of any state ever—in 2021. It is not to say that there is nothing more to do; obviously this is a constant and we have to keep driving forward. It has not happened in this session, but there was a discussion about, ‘Oh, well, just become South Australia’, and I just wonder how helpful that is. Maybe it is better to be more constructive and look at the overall demands of the state as well. I am just putting it out there.

The CHAIR: Who would you like to ask that of, Nina?

Ms TAYLOR: Dylan. There we go. I will pick on you. But other people are welcome to contribute.

Dr McCONNELL: I am not sure how to address that, sorry, but I would say that Victoria is—

Ms TAYLOR: It was a convoluted question—my fault.

Dr McCONNELL: I would just say that South Australia, yes, is a very different state to Victoria in terms of the characteristics of its supply. It has had a gas-heavy grid historically. It shut its last coal plant in 2016, the Northern Power Station. It is able to import a lot of power from Victoria actually and soon will from New South Wales. Its grid is about 3½ times smaller than Victoria’s in terms of the reach of its demand. So yes, we are talking about starting from a different starting point, let us say. Obviously there are limits. It is not a cookie-cutter. Every state has its own flavours and own challenges. One of the things that I think certainly benefited South Australia, not for any particular reason other than the good fortune of having good wind resources, is that it was one of the first places that the national federal renewable energy target ended up supporting a lot of wind farms. The degree to which the South Australian government had a hand in it is perhaps contested if you ask them, but financially the big dollars actually came from the federal scheme, which was paid for by essentially the rest of the country. So that has to be also considered in the context of trying to replicate that in Victoria. They had the first-mover advantage, they had the best wind resources and they got the lowest cost wind, so that was developed first. So that is a different context to keep in mind as well.

Ms TAYLOR: Thank you. It was a long question, so I do not mind if you want to go and perhaps come back to me after. It was convoluted.

The ACTING CHAIR: Yes, I might come back to you, Nina, if you have got something else. Mr Grimley, would you like to ask a couple of questions?

Mr GRIMLEY: Thanks, Acting Chair. My question is for probably Dylan, I suppose. It is in relation to the transmission infrastructure that you spoke about briefly. I note that the Energy Transition Hub is a venture supported by DFAT and the German federal ministry. I am just curious to know in relation to what has been brought up already in terms of the western Vic transmission network project in particular or indeed other projects with community pushback issues: are there any experiences that you can advise the committee about as to the German experiences, I suppose, with any community pushback in relation to such transmission infrastructure?

Dr McCONNELL: Yes, sure. Just a quick clarification: I would say that it was supported by DFAT. DFAT actually pulled our funding about 2020.

Mr GRIMLEY: Okay. I have to defer to the research I have been provided. So that can take care of that.

Dr McCONNELL: That is fine. More broadly, this is a challenge that is not unique to Australia, that is for sure. It is a challenge in the United States, and it is a challenge in Germany. They have very strong wind resources in the north of the country and the industrial demand centre is in the south, and they are trying to basically build transmission links through the country from north to south and having exactly the same issues

around this. I guess there are quite a few differences in their system compared to ours. They have a greater degree of community ownership in the renewable energy industry itself. I cannot remember the specifics, but local communities and landholders and farmers actually are significant shareholders in renewable energy projects in Germany, and that actually changes the dynamics somewhat around who benefits and who stands to basically financially or materially gain from some of these projects. That does change the dynamics. That said, there are still a lot of challenges and delays and costs. I know of one project in particular that they are basically moving to underground to avoid some of the social licensing and community pushback. But yes, there is no easy way to do this. We have not seen an easy way to do this anywhere in the world, and it is being solved simultaneously in multiple jurisdictions.

Mr GRIMLEY: Thanks, Dylan. What project is that one that they are moving to underground, just out of curiosity?

Dr McCONNELL: I will take that on notice and get back to you on that one.

The ACTING CHAIR: Take that on notice. Thanks, Dylan.

Mr GRIMLEY: Thanks, Acting Chair.

The ACTING CHAIR: Thanks, Mr Grimley. Ms Terpstra, I see you have joined us. Is there a question you would like to ask now that you are here?

The CHAIR: No. Look, I have missed most of the presentation, so I do not have any questions for these witnesses. Thank you.

The ACTING CHAIR: Thanks, Sonja. I will go back to Dr Ratnam in that case, who said she had something else to ask.

Dr RATNAM: Sure. Just following up from some of the evidence we have been hearing over the last couple of days. We heard some claims yesterday. Particularly we had someone from the fossil fuel industries speaking to us about the role of gas, which I know you will have touched on, and basically claiming that if we electrify or when we electrify too quickly, in their words, we are going to push the demand onto fossil fuels because the renewable energy generation is just not going to keep up. I am sure you have heard these claims made before as arguments to somehow still prop up fossil fuel use. I just want to know what your response to that is, because that is often a critique and a claim that is made for the continued reliance on oil and gas and coal. Anybody who wants to take that is fine.

Dr McCONNELL: Look, I would not mind starting on that, because I serendipitously happened to listen into the APPEA thing yesterday and, yes, it was an interesting presentation. I suspect there may have been some alternative facts floating around. That was actually something I wanted to address in my presentation. I might actually just quickly share my screen right now.

Visual presentation.

Dr McCONNELL: This idea that gas is a necessary part of or a corollary to renewable energy is just not really borne out in the experience in the national energy market. The blue line here shows the growth of renewable energy. The orange line here shows what has happened to gas generation in the market. That is the whole market. More specifically in South Australia, which is a much more heavily gas dominated grid, we are seeing the same thing. There is a divergence between renewable energy, which is growing, and gas, which is declining, and similarly also in the case of Victoria we have not seen a massive rise in gas as renewable energy has expanded.

Even looking back at these diagrams I showed earlier on, you can actually basically not even see gas on these. It is this very thin yellow or orange line in the step change scenario and in the superpower scenario. So it certainly suggests that the experience of the transition so far does not support the idea that gas becomes more important in the electricity sector, and certainly the results of the draft ISP do not point to it being a big part of the electricity sector moving forward either.

There is actually a huge opportunity for electrifying our heating, particularly in Victoria. Actually, I think the industry pointed out there is a big seasonal mismatch or a big demand for gas in winter, and that actually works

quite well with our electricity system in that we have actually a summer peaking electricity system versus a winter peaking gas system. So you actually end up utilising the electricity infrastructure—the transmission and the poles and wires and the distribution network—much more efficiently if you end up moving that load across to the electricity system.

Another point to think about here is this idea of redundant infrastructure or the fact that energy users and consumers want energy, they do not particularly care about whether it is electricity or gas. The idea of having two sets of infrastructure to deliver that is a waste of resources. We are talking about significant costs here, like just for the gas pipeline I think Victorians pay in the vicinity of \$750 million a year. That is just for the pipelines, not the gas that flows through them. Now, if you can derive your heat, particularly residential and commercial low-grade heat, from electricity, then that is a huge saving, a huge avoided cost through this sort of redundant infrastructure that exists for the same service. There is a reason we do not have competition in the poles and wires. We do not have three sets of poles and wires running down a street, because that is a natural monopoly; it does not make sense. That same argument can now be equally applied, because of the emergence of things like heat pumps in particular but also other ways of using electricity more efficiently, to the gas network. Why do we have two sets of infrastructure to deliver the same service? That is actually a big opportunity for saving for consumers. There is a huge opportunity to electrify a lot of that heating load and further reduce emissions and reduce gas consumption.

Dr RATNAM: Great. Thank you.

The ACTING CHAIR: Thanks, Dylan. I might ask a question here and then just see if anyone else has got a follow-up as we go on. I wanted to ask about planning for the network—and we have to make a move on it very promptly is what we are hearing. How do we get rooftop solar generation locally to mesh with what we are planning for in the way of bringing energy into, say, Melbourne from remote areas? Is it something that we are planning: how much we are going to get from local rooftop solar or microgrids compared to what we are planning for from transmission lines and the like? Can anyone answer that? Kelvin was talking about it before.

Dr SAY: Yes. Rooftop PV from a system operator perspective is seen but not planned around or long-term managed; it is sort of reacted to. So the rest of the electricity market reacts to the presence of rooftop PV but does not engage with it in the form of, ‘We need more here. We need less here. We’ll pay for this much. We’ll work this out with certain arrangements’. So although that dialogue, that conversation, even that market mechanism, is yet to exist, there are opportunities. There are a couple of projects that AEMO is running in order to actually protect the distribution network from too much solar PV but that also allow you to say that you want more solar PV, and what is the envelope in which you can do so. These are the technical safety considerations that are being built. We currently lack the market mechanism in order to actually coordinate this in a non-reactive manner.

The ACTING CHAIR: Is there a role for government planning in this or are we just going to leave it to the market to sort it out?

Dr SAY: There is a role in actually putting the requests in such that AEMO actually can deal with that resource, and in the form of retail aggregators, for example, which actually act as a body of coordination across the rooftop PV fleet to engage with the electricity market. That is still nascent as a sector. Its institutional strength is still very small, but that is the natural home for that form of operation and to actually engage that level of engagement.

The ACTING CHAIR: Thanks, Kelvin. I see Dylan and Greg have got their hands up, if either would like to contribute.

Dr McCONNELL: Yes, sure. I will just quickly add to what Kelvin said. So at the moment the market operator in their integrated system plan suggests or forecasts or assumes, I should say, that about 3.5 to 4.5 gigawatts of rooftop solar will be added to the Victorian grid by 2030, and then they plan around that. I would say there is a little bit of a feedback mechanism in that feed-in tariffs are set by the Essential Services Commission Victoria, and they reflect the wholesale electricity price, and they are coming down. That may actually have a moderating effect on the breadth of rooftop solar potentially. I think there was a new determination on that just a month or so back, and the feed-in tariff rate for rooftop solar was decreased. That may discourage rooftop solar generation compared to if they are left as they are, so there is a little bit of a

feedback mechanism there, a market-based feedback mechanism. But the current approach is very much that it is considered as essentially like a consumer good, I guess, and modelled as such, and that is put out as an input into the big optimisation of the system that they do in their ISP.

The ACTING CHAIR: Is there anyone else who would like to ask a question—Bev?

Mrs McARTHUR: Thank you, Chair. Any new housing development is forced to put energy distribution underground. If that is a good thing, why is it not feasible for the country to lead the way in an environmentally better option of putting transmission underground? You mentioned poles and wires. In Mr Grimley's and my electorate we have poles and wires that are so outdated they cause fires because they snap and trees fall over them, because we like to put trees on the sides of roads, and they are a major issue. So if we really want to green this country, why wouldn't we ensure that distribution and transmission are done in the most environmentally sustainable way for the next century, not just the next determinant time line of getting to 100 per cent renewables or whatever?

The ACTING CHAIR: Who would like to take that one?

Dr McCONNELL: Just quickly I would say that I think it is quite simply a cost question. The bushfire royal commission actually looked at the cost of undergrounding the distribution network in high-risk zones about a decade ago, and if I recall correctly, the cost of doing that in all bushfire risk regions was in the vicinity of \$10 billion. I think they made three recommendations of what to do within that inquiry. That was the most expensive and the one that was not taken up, but from a bushfire risk perspective there were other options that were considered cheaper and more effective at the time. But basically it is a cost question. Ten billion dollars is not a small amount of money. To underground the entire network—that is I guess a public policy question: the cost trade-off of doing that. There is a cost of doing it, and that is why we have not done it.

Mrs McARTHUR: But the cost to the environment—what is that? You have not costed that.

Dr McCONNELL: No, I have not. That is a little bit out of my wheelhouse, I am afraid.

Mrs McARTHUR: It seems to be out of everybody's wheelhouse, yet it should be the most important factor, surely. If we are going to have green energy, then we must have the most green, environmentally friendly place as well—in all aspects.

The ACTING CHAIR: Thanks, Mrs McArthur. We will take that as a statement. I would like to thank all the witnesses. Dylan, Kelvin, Paul and Greg, thank you very much for your evidence here today—very interesting indeed.

Witnesses withdrew.