T R A N S C R I P T

LEGISLATIVE COUNCIL ENVIRONMENT AND PLANNING COMMITTEE

Inquiry into Climate Resilience

Traralgon – Tuesday 3 September 2024

MEMBERS

Ryan Batchelor – Chair
David Ettershank – Deputy Chair
Melina Bath
Gaelle Broad
Jacinta Ermacora
Wendy Lovell
Sarah Mansfield
Rikkie-Lee Tyrrell
Sheena Watt

PARTICIPATING MEMBERS

John Berger
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Evan Mulholland
Rachel Payne
Richard Welch

WITNESSES

Niels Olsen, Beef Farmer and Founder, Soilkee; and

Philip Mulvey, Chief Executive Officer, Ryzo.

The CHAIR: Welcome back to the Legislative Council Environment and Planning Committee Inquiry into Climate Resilience in Victoria. Mr Mulvey, Mr Olsen, thanks very much for coming in today. I will just read you a short introductory statement.

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

My name is Ryan Batchelor. I am the Chair of the Environment and Planning Committee, a Member for Southern Metropolitan Region, and I will ask our committee members to introduce themselves.

Rikkie-Lee TYRRELL: Hello. I am Rikkie-Lee Tyrrell, Member for Northern Victoria Region.

Wendy LOVELL: Wendy Lovell, Member for Northern Victoria Region.

Melina BATH: Melina Bath, Eastern Victoria Region. Welcome.

Gaelle BROAD: Hi, I am Gaelle Broad, Member for Northern Victoria Region.

John BERGER: John Berger, Member for Southern Metro.

Sarah MANSFIELD: Sarah Mansfield, Member for Western Victoria.

Jacinta ERMACORA: Jacinta Ermacora, Member for Western Victoria Region.

The CHAIR: Thanks very much. For the Hansard record, if you could please both state your name and any organisation you are appearing on behalf of, and then I will invite you to make an opening statement.

Niels OLSEN: Niels Olsen, managing director of Soilkee.

Philip MULVEY: Philip Mulvey, founder of Environmental Earth Sciences and Ryzo.

The CHAIR: Thanks very much. The way these sessions work is that we will invite you to make an opening statement of 5 minutes or so each, depending on what you feel like, then we will go into questions. We will take it in turns asking you questions. It is all pretty relaxed. I might hand over to whomever of you wishes to start.

Niels OLSEN: Yes, I will start and put my little bit in.

Philip MULVEY: Go for it.

Niels OLSEN: I grew up on a mixed farming system – dairy, beef, sheep. We had pigs as well. I have a fair bit of experience in different systems and was very keen at an early age to take that pathway of agriculture on. I went through secondary school and then went through a farming apprenticeship and followed all those sorts of conventional systems. Then I think I was 20, 21 when I went out and bought my own farm. I did that for three or four years then started doing some earthmoving. I was milking a couple of hundred cows and doing earthmoving through the daytime. I was fairly set up on the farm, so filling in with something else that was interesting with a focus. Probably two years into that, doing quite well financially and not really having anywhere to put the extra income into, I put it into fertiliser pretty well, putting it back onto the dairy farm. I

was putting two, maybe three, times the conventional rate that you could afford to put on the dairy farm. The first year was fantastic results, just absolutely grew heaps of fodder, heaps of grass – fantastic. The second year my farm got to late spring, early summer and the farm pasture virtually went brown. It had a brown tinge, yellowy tinge, and all the leaves stopped growing. This was not looking good. Production was coming back, the milk was not looking good. I rang the fertiliser rep up and said, 'This is what's going on, what do you think?' 'You probably just need some more fertiliser.' I have been putting three or four times on.

I did not think I needed more fertiliser, so I went off and researched systems, nutrients supply, nutrient cycling in soils – not all around the world, like Phil, but a fair bit around – and came to the conclusion that the system that we were running was not helping nutrients cycle to keep the pasture growing, keep the moisture in, and that is what was happening. As soon as the moisture got a bit restricted, nutrients stopped cycling and the pasture went brown. Because I put so much extra on, it happened really quickly, and because it was a really poor functioning soil, it happened really quickly. Then I had to work out how to do that. Probably over 10 years I did every sort of research on regenerative ag, organics or anything like that under a natural system in New Zealand, the States, Europe – everywhere. I spent all the effort and time into that. Then I developed a machine to plant what were really like summer crops into the existing pasture with minimal disturbance and creating a seed bed. That is the Soilkee system creation. Then the remarkable results from that is what we have learned and observed coming forward and created really a first in the world under a government-regulated system soil carbon credits – first and second sold in the world on credits. It was not a huge amount, but we have actually increased 100 per cent in two years in what we can achieve. We have, at last testing, 20 times more carbon sequestered in the soil per hectare than, say, the Melbourne Uni climate centre thinks is ever possible. We are 20 times above that.

The understanding of how that is all happening – as a farmer, as an ag student, I was not quite capable of taking that on. I went around a lot of scientists and stuff and people, trying to get the ag department to come out and have a look, but they have not been. I found out that they were banned from coming to our place. This is where all of this has led to a couple of scientists that understood what we were doing. One is now retired, and then a couple more, Phil and Hamish, have come on board, filling in that gap. We are there getting a really big connection with the banks. The banks are following it, and universities are rethinking their whole system and coming on board. This is not a new focus. It is just actually focused back on the natural system and how it works without all the expensive inputs, which then brings the profitability back and keeps it in the farmer's hand instead of all these inputs. You are taking the farmer's ability to manage his own system and create more profit. Sixty years ago like 90 per cent of what the produce was sold for was kept for the farmer. It is between 2 per cent and 8 per cent today, all these inputs that you supposedly need. So we are converting that back – not all the way, but a fair way to it – and Phil has got the explanation and the 40, 50 years experience on how.

Philip MULVEY: Thanks very much for the opportunity to invite us along. I would like to pay my respects to all elders past and present who believe in the nurture and respect of landscape, as I do.

I have a bachelor of science in agriculture, a major in soil science and animal husbandry, a masters in hydrogeology and a masters in environmental geology. Those degrees are important for understanding my background. I have a number of companies around the world. We have employed over 140 earth scientists across the world, 60 in Victoria up until 2014 where through mismanagement I had to come in and fire 56 of them on one day. That is a good lesson in resilience there, let me tell you. Anyway, we have built back up to about 50. I now live full time in Victoria. I have been an environmental auditor for the Vic EPA for almost 30 years now on contaminated sites. I have been associated with the development of sustainable cities in the Middle East – in Dubai, where we looked at the first sustainable city in Dubai Maritime City with the design. We had a design team of about 20 over there. I was an investor and partner in the first community owned and developed project, called 1 Heller Street in Brunswick, which was the forerunner for the Commons and then became the forerunner for the Nightingale, which I continue to be an investor in. I have been engaged in the clean-up of war-damaged land in Kuwait and transmigration-damaged land in Sumatra, all of which gives me a background in degraded land.

How does this impact agriculture? Because clearly I have come from more a city and urban based aspect of looking at sustainability. Because we employed so many soil scientists involved in fixing degraded land, both mining land – an example was I acted for the EPA here in Victoria on the development of the Donald mine and disposal of radioactive waste out at Horsham, and I was the expert witness for the EPA to explain to the community about issues of groundwater and soil on radionuclides. I come with a background of repairing

degraded lands in extreme environments: tailings dams, war-damaged land et cetera. A lot of our young soil scientists working for us said, 'Dad's on the farm. They've got a problem. Could you come and talk to them?' I went and took a team of our young soil scientists down to train farmers, and I saw what the problem was, but I did not know what the solution was – how to go about fixing the land and keeping farmers in the black. How you go green and stay in the black is the real problem for coming on the land. It is easy to be green if you have got lots of money. The people who often in regenerative agriculture you hear a lot about are people with off-farm incomes, well-known journalists and movie stars and the like, and it is easy for them. They do not suffer crossing the valley of the death, as it is often called.

I formed a partnership with some extreme regenerative agronomists to look at farm systems. Professor McBratney from the University of Sydney came to us and said, 'Can we sponsor some PhDs for farm carbon sequestration?' which we did. Out of it came a patent for new geostatistics, which became the soil carbon method that you see now. As a result of those activities I started to get, because so many soil scientists feed up to me, a good understanding of some of the issues, and I was getting quite frustrated with the way climate change was reported in Australia and across the world. My daughter, who is a lawyer, said, 'Before you retire, Dad' – knowing full well I would not – 'you need to write a book to influence policy.' She and I wrote a book called *Ground Breaking*; I brought some copies in today. The government also, through AgriFutures, paid us to write a book on all the methodologies for sequestration of carbon on farm and how to actually go about complying with that, with Paris 2015, and moving farms towards sustainability.

What we did not write about is my experience with Niels. I did not believe the data from Niels initially, simply I was sceptical. But I always train my young scientists in two things. One is a scientist is by definition open but sceptical, and two is data consists of two things, observation and measurement, and if the measurement and observation do not agree, the measurement is wrong. So I came out to look because I am open but sceptical. I did not believe the data because it is at least three times what the carbon can sequester under the rainfall conditions in Gippsland. You can sequester quite well in Gippsland, but not as well as Niels was doing. I did not come along and say I am sceptical. I just came along and said, 'Gee, you're getting great results. Can you show me?'

I went and had a look. I looked at all the data, and the thing to understand about science is we do not teach system science. What is success of climate mitigation in an agricultural environment? It is the drop in suicide rate in young men. It is the increase in primary schools numbers with teachers remaining. It is the fact that regional nurses are still in the regional hospitals, so you have got – dare I say, it is not being sexist – young people in town meeting each other, marrying and staying in town. That is the definition of a successful system. Our systems are failing, and we are getting climate change and frequent storms. I drove up the road here, as some of you might. You may have noticed the trees that have fallen have not fallen from being sheared but have fallen with the whole root system down. That is because the wind has had a 2-kilometre push across a long barren field before it has hit the trees and the first lot have come down.

That is the problem with our landscape. It is causing climate change, not the type of climate change that we are being taught but what we do to the landscape and how we do it. Niels has found a solution that goes beyond standard regenerative agriculture. I looked into that solution, and I have encouraged a variety of people from RMIT to La Trobe to actually be more open-minded about it, because we sponsor PhDs so we can actually dictate more than ARC or DAFF can of our researchers to be actually open. We applied for funding – the La Trobe University team applied for funding with DAFF and got knocked back, not because it was expensive but because they could not find a reviewer that did not laugh.

So I am here with a diverse background. I am happy to take all kinds of questions. I have handed over to a CEO to run environmental sciences so I can concentrate on the greater landscape that needs repair.

The CHAIR: Thanks very much. I might start. What do you think are the biggest drivers of the soil degradation that you are seeing?

Philip MULVEY: Absence of carbon.

The CHAIR: What is causing that?

Philip MULVEY: The main cause is we have shifted from mixed-use farming to being focused on just a series of produce – just focused heavily on dairy, heavily on beef, heavily on cropping – and in doing that we

have dropped the old lay system. The lay system was when you spelled something and allowed it to recover. Now, in modern agriculture we can avoid the lay system and still have always production but to do so you have got to adopt regenerative agriculture, which actually grows carbon. So if you look at the chemical farming that has been undertaken in the last two decades, and even under dairy, under constant ryegrass or rye and clover, if you look at those systems, you are looking at a situation where we are replacing all the nutrients we need except one. We are replacing nitrogen, we are replacing phosphate, of which we put in excess because we cannot store it in the soil so it gets washed out or stored permanently so it is not released. Those are salts of acids, so we are applying acids to our paddocks. What happens, apart from around Melbourne where you have the basalt, if you move out through the goldmining areas into western Victoria, you are dealing with soils that lack resilience. They have low cation exchange capacity. What that means is they rely on their resilience from organic matter and mineral matter, and the mineral matter is impacted by acid and the organic matter is impacted by acid. If you drop the acidity below pH 5.1 or 5.2, you actually stop that holding capacity and you stop the organic matter being effective and it starts to break up, so it stops holding your soil together. You end up with a circumstance where your soil will blow, particularly if it is exposed. You end up moving through Ballarat and Bendigo and further out to Stawell. When you go through that country it is now known as a hydraulic drought, because the organic matter has been lost so badly that the soil is cementing and the water, when it hits, runs off fast. You are not getting infiltration so you are not getting baseline streamflow, which means during the back end of summer your streams are drying.

Published in a leading journal of the world called *Science* was this particular case study talking about hydraulic droughts in Victoria, where the drought has broken but the rivers are not flowing, particularly during summer. These are all connected to absence of organic matter in the landscape in the soil, and it is connected to the excess use of fertilisers, of salts of acids, and those salts of acids destroy the soil. They also destroy the soil biome. The best way to describe it – I am going to just use stereotypes here for want of any other means. We all have children, or in my case grandchildren as well as children, and they have birthday parties. You go along to a birthday party and the kids all wander along. There are all the hundreds and thousands and everything else, but the earth father has come along with some carrot sticks and some hummus. The hummus is in the container. The father has not got good hand skills, so he has coarse cut it, and the kids need it to be fine cut and all that sort of stuff. The kids eat all the fairy floss, all the fairy bread and all the other sweets, and they run around full of energy. Their energy is flagging and they need some decent protein and food, but the adult has got to open it and prepare it. What we have done with our soil is that the bacteria can soak up the nutrient, but they forget to open the container. They need to stimulate the fungi to actually crack nitrogen and phosphate from the soil. We keep feeding them sugar so there is no need for them to crack the nitrogen and phosphate from the soil, so the community of soil biome is destroyed by the fertilisers we add. We are doing two things: we are destroying the resilience of the soil and we are destroying the soil's capacity to resist hydraulic droughts and green droughts, which we are now hearing in the current vernacular, where you can have green pick but it is not growing.

The CHAIR: All right. I might just ask Ms Bath if she has got any questions.

Melina BATH: Thank you. Thank you, gentlemen. Thank you very much, Niels, too, because I have been to your place and seen with my own eyes that richness that is coming out of the pastures. That is fantastic, the health of the soil, to my relatively uninitiated eyes.

What I want to just make you aware of is that we have terms of reference. I think you have got a compelling case here and an incredible story and that we should be listening, but I need you to put it in a framework that we can actually use in this inquiry. One of the terms of reference talks about what more could be done to better prepare Victoria's built environment and infrastructure and therefore community against future climate events. Can you put some of the conversation that you are having and the impact on soils as the starting force of life so that we can use this in our inquiry? Do you see what I am saying? Tell us your compelling case but reframe it so that it can be used. We make recommendations to government. What do we need to hear about your case, your compelling case, with that framework?

Philip MULVEY: I will split it into two areas. One is the green wedge zone for Melbourne and the other is the bushfires.

Melina BATH: Thank you. The last one is of particular interest for me because this is my patch, but keep going, thank you.

Philip MULVEY: Okay. I will talk to the bushfires first. Central and eastern Victoria are 2 per cent of Australia's landmass. Of the significant bushfires since 1852 which occurred here, if you look at those where more than 100,000 of hectares burnt or one or more person died, 28 per cent occurred in central and eastern Victoria. Since the irrigation areas of the Murray and MIA opened – but to go backwards, bushfire frequency between 1850 and 1920 was one massive fire per decade. Post 1920 – 15 years, roughly, after the irrigation areas opened – they doubled in frequency. Post 1970, when the MIA stage 2 and the Murray stage 2 got expanded – so the Murray got expanded and then the Murrumbidgee increased – the bushfires doubled again. Those areas are up gradient in terms of wind from central and eastern Victoria, so the number of hot days and the wind driven by the heat that is caused by the ploughed land that is not vegetated have increased significantly. Instead of a hot day at 42 degrees for a day or two, you get five or six days of it. You get the high being stabilised; heat keeps the wind coming down. That is all caused by agricultural mismanagement.

Melina BATH: I am not going to go out there and stand on a hill and say, 'Let's wipe out MID.'

Philip MULVEY: No.

Melina BATH: So explain how we can keep the infrastructure but enhance the environment.

Philip MULVEY: Part of it has already started, but there are other things impacting it. Among them are the principles of regenerative agriculture, which are to ensure diversity and ensure that land is covered. For instance, inter-row cropping in the oranges and the almonds is just starting to occur now. A major almond grower has inquired about how we can assist them in inter-row cropping to keep cover on the land so it does not get so hot. Those in the regions will have seen willy-willies go down the aisles of trees in the inter-tree zone and punch out the inter-tree zone, so part of that is understanding when to destock and when to prepare your land. Normally we get a few months warning about when there is going to be insufficient water for irrigation. In those instances what has been happening is there has been a lot of preparation of land, particularly for rice – and cotton now – in advance of irrigation, and we are seeing that that land gets left unsown because they do not get the allocation and you end up in a circumstance where for the next three years that is bare land. The change of practice now means we are starting to put green cover crops on and we are starting to have stubble retention, except in the irrigation areas because in those instances you are putting up so much fertiliser and so many chemicals because your returns are significant and you do not run a system of cover crops. Ensuring coverage reduces your cost of sales significantly, but there is a two-year crossover, which is called the valley of death, to actually get there. So that is one of the things.

The CHAIR: Mrs Tyrrell.

Rikkie-Lee TYRRELL: Thank you, Chair. Is it possible I could pass, just for the time being? I am just doing some research.

The CHAIR: You sure can. That is fine.

Rikkie-Lee TYRRELL: Thank you.

The CHAIR: Ms Ermacora.

Jacinta ERMACORA: Thank you. It is fascinating, the work you have been doing. Just with the carbon sequestering, what are you planting and what are you ploughing in? Is that what you are doing?

Niels OLSEN: You are better at this than I am.

Philip MULVEY: Niels is tremendously modest. He has invented a machine that will change agricultural practice. He does not actually turn anything in; he disturbs 17 per cent of a paddock. He has a tine that is approximately 50 millimetres in width and it goes every 300 millimetres, so it is about 17 per cent of the paddock. It is peculiar in what it does. Most inventions and innovation occur behind the farm gate without them knowing what is happening, and it would be fair to say that that is what happened with Niels – he found this worked very well. So what it actually does is create a row that does not disturb the land too much, does not go very deep – it only goes about 40 millimetres deep – and drops a line of multispecies seeds, 18 to 21 seeds, which is way more than what is normally put in place. I will come back to that in a second. But as the tine comes out it is at about a 120-degree angle and it flicks a cover of dirt across the inter-row zone. Ahead of the

tractor is a crimping tool or a mower that lays down the dry stalks or the green cover crop in front of the machine, and what that does is ensure that the fungi get going. So you end up with a slight perturbation of the system that is an acute short-term impact without it being chronic, and it stimulates a whole variety of biome and plants so you end up with carbon sequestration not just in the growing zone of 150 millimetres but all the way down to about 1.2 metres.

Jacinta ERMACORA: So, Philip and Niels, does that mean that you have measured the reduction in carbon emissions that that achieves as compared to traditional farming?

Philip MULVEY: Work is just starting on that now, but it is fair to say indirectly yes, because Niels's farm was traded as carbon, so it had to go through an auditor – a carbon auditor as opposed to a contaminated site auditor – and then be approved by the government. There were two things. One is that emissions were reduced because of less heavy use of sprays and fertilisers, and so there was a reduction in emissions from the farm as well as a substantive increase in sequestration during the drought of 2019 and 2020.

Jacinta ERMACORA: Sure. That is interesting. The other really fundamental question that I am keen to understand for myself with what you have been doing – obviously it is a part of a carbon strategy, but it is also a productivity strategy. How does what you are doing compare to using indigenous species? Some farmers introduce native grasses and more diversity of grasses to achieve some similar outcomes – quite innovative in terms of less fertiliser, less spray. Is this an augmentation of a European style of farming or is it an introduction of indigenous approaches?

The CHAIR: Just keep your answer brief if you can.

Philip MULVEY: It is a variation on European farming. Indigenous farming, which is still being worked in eastern Gippsland and via various universities, involves historically plants that are sensitive to fire, and we are still looking at the genetics of those to be further developed. But the principle of prairie-based systems being 15 to 30 species of diverse nature is common to both systems.

Jacinta ERMACORA: Okay. Terrific. Thanks.

The CHAIR: Thank you, Ms Ermacora. Mrs Broad?

Gaelle BROAD: Thank you very much for appearing today. Earlier, Mr Olsen, you mentioned I think a government department that was banned from coming to your place.

Niels OLSEN: Yes. Big ag.

Gaelle BROAD: Yes. Can you expand a bit further on what happened?

Niels OLSEN: I have been to all the seminars in the local area for probably four or five years, inviting different people out to come and have a look, and they never sort of got there. Hamish was talking to one of their more senior people, and they mentioned that they were banned from coming out and that was why they have not been turning up.

Gaelle BROAD: Okay. So you have invited them, but they have not come?

Niels OLSEN: Yes, like 50 or 60 times.

Gaelle BROAD: Wow. Okay. Mr Mulvey, you talked about applying for funding that had been knocked back because they could not find a reviewer that did not laugh. How supportive has government been of these innovative practices? Is there more that can be done?

Philip MULVEY: It is not government that is the problem directly. It is actually the way we address science in Australia. This is not a Victorian government problem; the application was to DAFF. But the problem is that the way grants are assessed – and appropriately so – is to have people with experience in the field assess them, but they arrive with very much a closed view in that if it is not peer-reviewed and published, then it is not defendable. So they are not looking at other types of assessments such as, 'Is there more work–life balance for the farmer? Is there more profitability? Is cost of sales less?' So there are some other measures that may not be

scientific, but they show that there is something the farmer is doing that is different that is worthwhile to evaluate from a science perspective.

Gaelle BROAD: I am interested too because you mentioned mines earlier. I guess with renewables there is a lot more need for further mining, and I know concerns have been raised about mineral sands and the ability to rehabilitate afterwards. You have dealt with a lot of contaminated soils across the world. Is it possible to rehabilitate that type of facility?

Philip MULVEY: Yes. It is. But it is 'Rehabilitate to what end use?' for instance. A lot of the sand mining has been naturally revegetated quite well on the east coast. You would not even know that it was there, except they left some radioactive material which had to be picked up. But coal mining, for instance, outside Gippsland has not been well done. Our company is involved in trials in Gippsland, so I cannot talk about that, obviously.

But in terms of defining a use, the problem with revegetating mining land is weeds. You can fix the physics, you can fix the chemistry but lots of mines have not been handed back right across Australia because of invasion of weeds, and weeds are colonisers. Once again – this is how I know about organic matter – you can jump the whole problem with mines if you manufacture your own organic matter from organic waste paper, cardboard or what comes into the mine and you create an organic topsoil which overcomes these problems to some extent once the physics and chemistry are addressed. So the issue is yes, you can bring it back to a use, will you bring it back to mountain ash, for instance? The answer is probably going to be no. But can you bring it back to what is consistent with the farmlands in the area or can you bring it back to an appropriate use? Yes. If you look at the lands at Stawell and Ararat that are now government reserves that have all those dug-up mullock heaps through them, they have a forest use. They have a use for the community, but they are not what they looked like before.

The CHAIR: Thanks, Ms Broad. Dr Mansfield.

Sarah MANSFIELD: Thank you. It has been a really interesting presentation today. Thank you for appearing. Just further to Ms Bath's point about the terms of reference and relating some of the work you are doing to the climate resilience of built infrastructure, from what you are saying it sounds like regenerative agriculture in and of itself can reduce the impact of some of these extreme weather events on built infrastructure. Is that correct if that is something you have implied through what you are saying?

Philip MULVEY: Yes. Would you like me to spend 30 seconds elaborating?

Sarah MANSFIELD: Yes. That would be great.

Philip MULVEY: Okay. The peri-urban area of Melbourne, particularly the north and to the west, is on basalt. It is on those plains that bake really hard and get very hot. It is covered in a lot of weeds, mostly thistles, as it is land banked for future. So you are finding these peri-urban areas do not have a use. They are heat-generating in themselves and they have poor tree coverage because they are former farmland, but they do not have the moisture in the soil because it is not penetrating. So you are getting a situation where you have the heat sink of the city exacerbated by the peri-urban lands, making the heat worse. At the moment I drive out to the west of Melbourne and to the north of Melbourne and I just cry in despair about how much the land is crying. It is the peri-urban area, held by overseas investors mostly but also locals, that is not being looked after – not all of it, but a fair degree of it. You go out beyond Mount Atkinson and through there and you see vast amounts of land just land banked, and whilst it is land banked it is a major problem. Melbourne Water are concerned about it for the rivers and tributaries, and the neighbours are all concerned about all the thistles and the pests coming in. To insist that the lands be properly tended to in the green wedge zone would greatly assist the amenity of the city.

Sarah MANSFIELD: That is really interesting. Just on the value of regenerative agriculture, I think that is a really good example of how regenerating landscapes can have an impact on the kind of resilience of – in this case of the whole of metro Melbourne can benefit from that. When the agriculture minister was asked about the state government's investment in supporting regenerative agriculture at the budget estimates earlier this year the response indicated that regenerative agriculture is still seen as something that is a bit boutique – it is a nice-to-have. I would be interested in your views on that.

Niels OLSEN: I have got a bit on this. Regenerative agriculture is really bringing back what was lost. Where we were a hundred years ago we were relying on the natural system; there were not a lot of inputs. The Soilkee enhances that system by up to 10 times the production in some of those systems. Once you have got the whole system, multilayered, biology working, soil structure, that is what is achievable in some of these dry climates that just are not productive at all. Back on our farm, where we are 10, 12 years in now, we have had no nitrogen fertiliser for 30 years, no inputs of fertiliser for over 17 now, I think. Where we are getting those actual results from is the natural system, the natural minerals that are in the soil, air, water and sunlight. Plus the machine and a bit of diesel – that is all we are running. We are achieving double the district average in dry matter production, and it is healthy food for the animals. We have just had a farm over in the Western District – we are having a field day on the 10th.

Philip MULVEY: A dairy farmer.

Niels OLSEN: A dairy farmer. His supplementary feed that he feeds in the bale – the company that provides that has come to him because he is the only one with high butterfat and protein in his milk compared to all the other people that are struggling to keep the butterfat and protein up. They are feeding the same grain – what is going on? They have come and tested his production in the paddock – this is the dry-feed company, testing the pasture in the paddock. They are 15 to 17 per cent in all the surrounding farms. At all of the surrounding farms that is about the level of dry matter in their fodder. The rest is water, pretty well. His is up to 30 per cent, so it is nearly double, right? It is probably between that sort of 23, I think it was, and 30 per cent. It is well above or nearly double. Then the other thing that is a significant factor in the Western District is the vets over there have had a really big problem of heifers coming in after they have calved for milk production and up to 70 heifers out of 200 on one farm have had broken legs. Their legs are that brittle that they cannot even support their own weight, so that is the nutrient requirement that is needed. It was not there under the conventional system. So the vets have come on and tested all fodder and the soil around on these farms. Andrew Whiting's farm is the only one that tests fine for the nutrients that are required that are lacking in the animals. Hence he has got no broken legs on his property. So these are the full nutritional things coming through for the animal and following that up to a significant level is for us to eat. If we are not eating the right stuff, that is it.

Philip MULVEY: Andrew has given us permission to talk about his farm. I apologise.

The CHAIR: That is all right. I appreciate that. Ms Lovell.

Wendy LOVELL: Thank you, gentlemen. You have just brought my parliamentary career of 22 years full circle. My very first inquiry that I participated in was the Environment and Natural Resources Committee's inquiry into the impact and trends in acid soils in Victoria. So the Parliament looked at this a very long time ago – 22 years ago – but it is bringing memories flashing back.

I was just wondering: from your perspective what are the primary barriers to the broader adoption of carbon-sequestering technologies like the ones that you are using here in Victoria?

Niels OLSEN: The main thing is the understanding of how – like, 'I don't really know how; I'm just doing it and it works' – and visually understanding what structure you need to create for that to happen so you can visually see that in a soil once you have been trained. He is running a course to train farmers to see that. This is where, once you have got that and understand that, what builds carbon is photosynthesis of plants. So if you have got pasture this high on your whole property, that is the ability you have got. If you have got it 2 metres high, you have got 10 times that ability because you have got 10 times the solar panel to capture sunlight to photosynthesise to put carbon in. Well, all the CSIRO research that the universities are basing their prediction that we are 20 times above that is on pasture this high. We have got a 2 metres high, 1200 high, raising point, and it is pretty simple: more solar panels, more sugars, more carbon. It is not that hard to understand, yet they say it is not possible because they have researched, you know, 20 farms with the CSIRO: 'This is what's achievable. That's it. You can't do it.' Well, you could probably come and have a look at how we are doing it, ask us the question and we will tell you. That is where we have got that to happen.

Philip MULVEY: Can I respond with a telescope view?

Wendy LOVELL: Yes, definitely.

Philip MULVEY: Adoption agriculture has got certain curves that are well known in how farmers adopt. Currently carbon uptake is one-fifth of the uptake of no-till, so it is very slow. We had a look at it. There is a lack in general of consulting agronomists because most agronomists work for the bulky goods sales companies. There are probably almost no consulting agronomists in the state that do cropping systems and there would be three or four that do regenerative grazing systems, so there is not a lot. That is part of the problem. There is also a lack of knowledge of innovators in the area. They are not game to stick their head up because they get it chopped off, so we are pulling together a pool of innovators to run field days around those farms so the farms can see them. Finally, there is to some degree a lack of products available because you have got to buy them outside the bulky goods companies at the moment. Though some of the bulky goods companies, some of the ag distributors, at a single shop point of view are starting to take on, for instance, the 20 mixed seeds that you need for some of this work. So they are the main reasons that stopped it. The other reason is to do with the noise in the market from various academics that say it does not work, the noise in the market from bad experiences from carbon aggregators. So there are some negatives. Finally, if you do not have to, why do you want to suffer the valley of death if you happen to pick a drought when you make your change?

The main inhibitors sit in those areas, but really it is a lack of advisers and the negative advice from the department of ag and the universities. I do not blame them necessarily because – and they will not agree with this statement I am about to make – fundamentally, if you look at a lot of the research that has been undertaken, one of the commercial partners will be a seed company, a fertiliser company or a pesticide company. That tends to frame the nature of the study. A lot of work done on multispecies pastures within Victoria has been funded by the ryegrass seed association. They do not want you to come up with 'You don't need ryegrass anymore'. So it is important to look at who are the funders behind each of the studies. It might be that the state has funded 90 per cent of it but the other 10 per cent is picked up by the commercial partner, who wants it steered in a certain direction. They tend to have been some of the limitations.

Niels OLSEN: Also, that is where the learnings come from, from the professors, and one of the professors who is a soil scientist at a university has apologised for what he has been teaching for the last 40 years to his students.

The CHAIR: Mr Berger, do you have any questions?

John BERGER: Thank you, Chair, and thank you both for your appearance. Just a quick one. Mr Olsen, you have been a beef farmer in Gippsland for quite some time. You have seen some climate change impact. What is the climate change impact on your community and your sector?

Niels OLSEN: Percentagewise, like in yield percentages?

John BERGER: Yes.

Niels OLSEN: Look, between that 25 to 30 per cent. This is a general look at what is happening. It would be 50 per cent or maybe 60 per cent in real terms if you took away the high levels of fertiliser to try and compensate for that. So what they have been doing over the last 15 years is using high rates of fertiliser from spring into early summer to capture the yield. So they capture as much yield as they can, harvest and store it, and then two weeks later start feeding it back out. Whereas what we are doing is growing in the summertime and in the cold, so we are actually building the resilient soil system that is growing fodder where they cannot even grow it.

Philip MULVEY: Can you talk to the number of frosts and the rainfall storage you have got and how you go into drought, because I think that is part of the question as well.

Niels OLSEN: Yes. We had a significant increase in moisture in that meter that we tested on the property. We did four random tests over the 100 hectares on the property. I cannot remember how many gigatonnes of water, but a huge amount of water was extra stored, and that is what we are finding. All of the little wet soaks around the property have doubled if not tripled and continue all summer, so we are actually rehydrating the landscape because the soil structure and fungi are drawing it into a whole sponge effect. Then you add that additional capturing of water or taking of water from the subsoil back to the plant. The fungal population can increase that by 40 per cent to what the plant root can get. In current agriculture – zero – that does not even happen, so it is another 40 per cent of moisture. What is happening is you might have 1000 mil of rainfall. The

neighbours to our property are utilising 500 or 600 of that. We look like we are doing 850 or 900 of that. That is the structural change.

It is not rainforest where we are. I do not know what you would call it, but it is nowhere near as good. Since the planet got here, we had about 80 mil at best and about 50 mil of actual topsoil on top of a yellow high-aluminium clay. That is all the property ran with. That is why when I put heaps of fertiliser on, it just wiped it out. There was not much guts in it; there was nothing much left. Whereas now we are 250 mil – so that is five or six times – to 300 mil of actual aggregated topsoil, fully functioning, breaking all the roots down, 40 worms in a shovelful, just better than anyone else's veggie garden on the whole farm. That is what we are achieving. If you look at the carbon levels that we have increased, we were doing about 12 carbon credits per hectare – so that is after the footprint, to neutral. So 12 carbon credits per hectare, paid by the Clean Energy Regulator, then 13.7 I think it was. Then we have tested further again – 26 per hectare per year. So here you are with the ag department not even coming to carbon neutral – 'We're just going to reduce your emissions.' We are carbon neutral plus 26, and they do not come and have a look. What planet are they on?

Melina BATH: We will make it a recommendation. I will say now: we will make it a recommendation.

The CHAIR: We do very much appreciate the evidence you have given today. It is a remarkable story. Mr Olsen and Mr Mulvey, we are out of time for this session.

Philip MULVEY: Can I just –

The CHAIR: Yes, very quickly.

Philip MULVEY: There is a property in Kilmore that got a 150-millimetre rainfall event in 2 hours – not one bit ran off. The thing to answer about this for climate impact on the city is what they are doing in England now, which is they are returning not only regenerative agriculture but they are returning what is known as water meadows. They are actually paying farmers to put them back. So if you want to reduce the flood, how long the flood takes to get to you and what peak it is going to get to, you have got to hold water on land. The way you do that is regenerative agriculture. That is the really major benefit for the cities in the peri-urban areas or as you move out. If you want to stop those floods, you have got to hold water in the landscape. You hold it, and the best point to hold and release is in the soil. That eliminates droughts and lots of things.

The CHAIR: A very, very useful contribution to tie all this back to the central point of our inquiry, which is how we adapt and make the built environment more resilient to the changing climate, and this is clearly a big part of that story. Thank you very much, both, for coming in. You will receive a copy of the transcript in about a week to review, before it gets finally published. With that, we are going to take a short break to reset for the next witness. Thanks very much.

Witnesses withdrew.