



STATE DEVELOPMENT AND REGIONAL INDUSTRIES COMMITTEE

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Mr CG Whiting MP—Chair
Mr JJ McDonald MP
Mr MJ Hart MP (virtual)
Mr RI Katter MP (virtual)
Mr JE Madden MP
Mr TJ Smith MP

Staff present:

Ms M Telford—Acting Committee Secretary
Dr K Kowol—Assistant Committee Secretary

PUBLIC BRIEFING—INQUIRY INTO THE IMPACT OF CLIMATE CHANGE ON QUEENSLAND AGRICULTURAL PRODUCTION

TRANSCRIPT OF PROCEEDINGS

Wednesday, 31 May 2023

Brisbane

WEDNESDAY, 31 MAY 2023

The committee met at 10.02 am.

CHAIR: Good morning. I declare open this public briefing for the committee's inquiry into the impact of climate change on Queensland agricultural production. My name is Chris Whiting. I am the member for Bancroft and chair of the committee. I would like to respectfully acknowledge the traditional custodians of the land on which we meet today and pay our respects to elders past and present. We are very fortunate to live in a country with two of the oldest continuing cultures in Aboriginal and Torres Strait Islander peoples whose lands, winds and waters we all now share. Other committee members with me here today are Mr Jim McDonald, the member for Lockyer and deputy chair; Mr Jim Madden, the member for Ipswich West; Mr Tom Smith, the member for Bundaberg; Mr Michael Hart, the member for Burleigh, who is via teleconference; and Mr Robbie Katter, the member for Traeger, who is also via teleconference.

The purpose of today's briefing is to assist committee members with building a strong knowledge base upon which to take the inquiry forward and identify targeted areas for further consideration. The briefing is a proceeding of the Queensland parliament and is subject to the parliament's standing rules and orders. Only the committee and invited witnesses may participate in the proceedings. Witnesses are not required to give evidence under oath or affirmation, but I remind witnesses that intentionally misleading the committee is a serious offence. These proceedings are being recorded and broadcast live on the parliament's website. Media may be present and are subject to the committee's media rules and my direction at all times. You may be filmed or photographed during the proceedings and images may also appear on the parliament's website or social media pages.

MACKEY, Professor Brendan, Griffith University

MEHMET, Mr Russell, University of Southern Queensland

MENZIES, Professor Neal, Griffith University

POWER, Professor Scott, Centre for Applied Science, University of Southern Queensland

CHAIR: In today's briefing we will be hearing from representatives from the University of Southern Queensland and Griffith University. I welcome the participants. Mr Mehmet is the Strategic Account Director for Willis Towers Watson. Mr Mehmet is a collaborator with the University of Southern Queensland on research into agricultural crop insurance. I invite you to make some introductory remarks to provide a general overview of the effect of climate change or variability on agriculture in Australia, the challenges, opportunities, existing programs to support adaptation and resilience, and ways that policymakers could better support farmers. We will then move on to questions from committee members.

Prof. Mackey: I would like to acknowledge the traditional owners of the land on which we meet and pay respect to their elders past, present and emerging. I would like to start by noting for the committee's benefit that I was one of the coordinating lead authors on the most recent Intergovernmental Panel on Climate Change, IPCC, *Sixth assessment report* on impacts, vulnerability and adaptation with a particular focus on our region and Australia and New Zealand. That assessment included the agriculture sector. There are some findings out of that which I think are very relevant for this inquiry and Queensland in particular. One is the need for every sector, especially the agricultural sector, to really start factoring these climate change impacts and risks into their strategic adaptation planning. To do that you really need to have an understanding of how the climate has changed and will change and what this means in terms of two dimensions, what we call changing climate trends and changing climate and weather extremes. By 'climate trends' I mean rising temperatures and rising sea levels.

An example of the impact for agriculture from climate trends is increasing risks of biosecurity. I have an example at the moment, the guava root-knot nematode. It is a parasite that causes severe damage to many crops—not just guava; that is just its common name. It is currently listed on the industry biosecurity plan for numerous agricultural industries in Australia. It is a tropical species. It requires a hot temperature. As global temperatures continue to increase and Australia's temperatures increase, its distribution changes; its range increases. It was discovered in Australia in November 2022 near Darwin and has since been found near Cairns and a record has just occurred at Hervey Bay. This is an example of a changing climate trend changing the distribution of a significant pest. It is a climate related risk, or what we call a climate risk coming from a climate trend.

The other major finding from the recent IPCC report is that it is indisputably established as a scientific fact that we have this human forced warming and that that is continuing. We have another half degree of global warming locked in which we will get in about 10 years, so we are going to see as much climate change in the next 10 years as we saw in the last 20. We will get about as much warming and about as much climate change. These climate-warming trends are also driving an increase in the frequency, intensity and duration of all extreme weather events that we experience in Queensland—heatwaves, droughts, floods, the intensity of tropical cyclones and dangerous bushfires. Of course, we have always experienced these in Australia and Queensland, but what the science is telling us is that the climate change is causing an increase in them. This of course brings direct and indirect impacts and risks for agriculture; there are obviously direct impacts of having more heatwaves on livestock, for example. There is also the indirect cascading impacts of extreme events on farm operations, infrastructure, supply networks and transportation networks. We talk about the fact that there are more kinds of climate risks we have to consider in our adaptation planning and our strategic thinking as well as how we adapt to climate change in addition to those impacts we are used to thinking about such as increased biosecurity risk.

There is another set of climate risks for the agricultural sector which are called transition risks. These are the unintended consequences on the agricultural sector from society's attempts to achieve net zero emissions. I will give two examples. The federal government has a carbon offset scheme which largely involves the fossil fuel industry buying credits generated in the land sector such as planting trees. If that is at the expense of arable land for agriculture, obviously there is an impact on potential agricultural productivity. Similarly, proposals to increase the amount of soil carbon as a carbon offset are good up to a point. Of course, there is a limit to how much carbon you can stack into a soil before it actually affects the productivity, but Professor Menzies can talk a lot more about that than me.

I note another transition risk for agriculture which is something we again have to think about in our adaptation strategic planning, and that is the policies made by other countries that affect our agriculture sector. The EU has just brought in a regulation banning the import of a large range of commodities, including beef, where that has caused, directly or indirectly, deforestation and forest degradation. There are obviously potential consequences in Queensland if people are clearing bush to grow more grass in order to grow more cattle and they want to export that to the EU. Whether that is happening or not is another issue. I am just pointing out what we would call another example of a transition risk.

Finally, I would add—and this is an area we do a lot of our research in and I am happy to talk about it more—when we talk about adaptation, as global warming continues to increase—and, as I said, we have another half a degree locked in and there is more in the pipeline, if you like—our adaptation options become more expensive, they become more constrained and they involve bigger changes, and this impacts more and more on local communities. We talk about the need for a community centred and stakeholder focused approach to adaptation. It cannot just be a top-down decision about strategies and options; we call it 'deep listening'. You really need to be engaging with the communities, not in a shallow consultative way but right from the very beginning, about the strategies and options that are not only effective in terms of adapting to these climate change risks but are socially acceptable, because it is the communities that have to sustain them in the long run.

CHAIR: Thank you very much, Professor Mackey, and thank you for the paper you have sent to us as well. I am still making my way through it. It is quite extensive. Thank you for the work you have done on behalf of Queensland.

Prof. Menzies: I am a soil scientist, not a climate change person. For the last decade or more I was Dean of Agriculture in the University of Queensland. The things that I am thinking about and would speak to you about are not really so much about climate change as about the agriculture sector. I have a strong view that the agriculture sector will change in response to climate change, but it is not that they are looking at climate change saying, 'We need to change.' They are changing because at

each year, at each increment, they are saying, 'What is the best way that we can run our business?' Climate change will drive change in the agricultural community. They are stunningly good at looking at options and making their businesses efficient and productive. I think we can trust them into the future to remain stunningly good at doing that.

I am thinking about what governments should be thinking about and doing in response to that. We do not need to tell the farmers what to do; they will do it. We can look into the future and predict some of the changes that will happen. For example, we are going to see a change of the crops that are grown. We will probably see a lot less winter wheat grown in Queensland. We will probably see a lot more summer crops such as sorghum grown. Then we need to start to think about what are the logistics of dealing with that change. At the moment a large portion of our crop is harvested at the end of winter and another portion of our crop is harvested at the end of summer. If you start to see the largest proportion of your crop harvested in one season, then the logistics change. Do not trust me that this is exactly what is going to happen; I am saying you need some people with real expertise to be looking at this, determining how the crops are likely to change and then how the logistics have to change. Do we need additional silos? Do we need to schedule additional trains or upgrade roads in order to have more transport taking grain out through a more limited part of the year? That is really a business question as opposed to an agriculture question; it is a logistics question.

I think you also need to be thinking about the indirect effect of climate change on agriculture. One of the things that we know is going to happen is there will be a lot more solar farms built and they are going to be built on flat agricultural land. You as a government need to be making decisions about which agricultural land—where should these be placed? In another role I am on the New South Wales Independent Planning Commission, so I can give a little insight into the way New South Wales is thinking about this and identifying areas where there might be higher wind velocities for wind farms—which may have not much impact on agriculture—and areas where they might reasonably put solar farms.

Solar farms are an interesting beast in that the solar panels shed water off them. If you put them in a dry environment, where we are likely to put them, the areas between the solar panels are going to grow more grass than they did historically. There is going to be a compensation of the agricultural production—the grazing animals amongst those solar panels. What I am trying to say is you will not lose as much productivity as you might expect because between the solar panels grass will grow better, but then there is a whole lot of design questions. If you leave it to the people who want to put up the solar panels alone, they will put them up so that they are most efficient for them in putting up the solar panels and managing them, whereas we might reasonably constrain them to say, 'We want a good agricultural outcome here as well.' Once again, it is not something I can tell you how to do, but there is expertise in Queensland that can model that, that can put together better ways of placing solar panels in the landscape and grazing animals between them.

This is an inquiry thinking about variability, thinking about how we deal with some seasons where it rains a lot and some sets of seasons where it does not rain very much at all. The farmers deal with this in their own way. Once again, I am trying to think about the logistics of what government needs to be doing. With so much satellite data now available to us regularly, accurately and freely—thank you Queensland state government for making that available to researchers and farmers—we can predict part way through a season what the yield is likely to be at the end of a season. Once again, I come back to logistics. We do not have to wait until the farmers start harvesting and the trucks start turning up at silos to plan for how we move that grain on, how we sell it and what size crop we are going to have this year. We can now predict that reasonably accurately long before the crop even sets its grain on. At maximum biomass of the crop we can pretty much tell you how much you are going to harvest at the end of that crop. Once again I think there are opportunities here to develop skill sets and predictive abilities within government to help us manage the business. You guys are forever under pressure: there are too many trucks on the road et cetera. Once again, how do we manage this so that the perception of the public—the risk of the public—is reduced because we are scheduling those trucks in a way that spreads it throughout the year?

One last thought: we fully expect some areas of agricultural land, particularly the west, are going to get dryer. I look at the mulga lands and think they have been an interesting grazing environment for a long time but a challenging one and not a very profitable one. Maybe you reach a point in time at which you say, 'Actually, why don't we manage the exit of cattle from the mulga lands and allow it to revegetate and sequester carbon?' My family are beef cattle producers. I cannot imagine them wanting to shunt all their cattle off and manage the revegetation of a landscape, but there would be a lot of people who would like to do that. Maybe it is even more profitable than grazing cattle. The limited data we have on it is that for the past 70 years you would have been better off

sequestering carbon than raising cattle. Once again, it is something to think about as you manage the future. We have done this sort of thing with the dairy industry; we have found graceful ways for people to exit industries that are no longer a good idea for the future.

I just want to finish with the carbon offset idea. I have raised mulga lands as a potential carbon offset and I think it is probably a viable carbon offset. As a soil scientist, I am profoundly concerned by selling carbon credits in soils because, as a scientist, I have not seen anywhere in Queensland where you can achieve that, so I think they are all fictitious credits. We have wonderful datasets from the Hermitage trial at Warwick, one of the longest trials running in the subtropics. There is absolutely unambiguous evidence that carbon is not being sequestered irrespective of how good the agricultural practice we use on that land is. We have considerably reduced carbon loss from the soils; we are farming in a way that is going to sustain productivity, but nothing we have done at Hermitage has shown us how we can put more carbon into the soil. It really does distress me that a lot of schemes out there are literally selling carbon being put into the soil and yet, as a scientist, I do not know how that is possible.

CHAIR: There is a lot of food for thought there, no pun intended. Thank you, Professor Menzies. Professor Power, would you like to share a few thoughts?

Prof. Power: With the committee's permission I would like to talk very briefly about five things.

CHAIR: Absolutely.

Prof. Power: One is past climate variability and climate change. The other one is what climate variability and climate change might look like in the future. Then I will give a few key references on some of the impacts to agriculture and how farmers and others may adapt to those impacts. I would also like to mention very briefly some of the barriers, just following up on my colleagues, to effective adaptation and how to overcome them. I will give some references for that. I would also like to point out a particular barrier I have seen since I have been working in Queensland in the last couple of years. Then if there is time I would like to throw up multiple suggestions on how farmers could better adapt to climate change and also other Queenslanders to some extent.

The only point I want to make about past climate variability and current climate variability is that we can no longer understand Queensland's climate in terms of just natural variability alone. It is clear there have also been these trends and much of that has been driven by increases in greenhouse gas concentrations in the atmosphere. Queensland farmers have been fantastic at adapting to that variability, but these additional factors that are now at play make it even harder for people to adapt, especially given some of the uncertainties about what the future holds.

With regard to the future, we know an awful lot about future climate change. A big part of that information on the physical side of things—rainfall, temperature—comes from global climate models. These are mathematical models that encapsulate our understanding of the physics of the climate system—global models—not too different to what we use for weather predictions, and I worked in the bureau for 25 years. They are very sophisticated, but they are imperfect. We do know some things very confidently. For example, sea level rise is going to continue, ocean acidification is going to continue, temperatures will continue to rise, the frequency of heatwaves is going to increase and the duration of heatwaves will lengthen, things like that. We know these things—they are as clear as day—whereas there are other aspects. For example, what might happen to rainfall variability at a particular location? It is subject to greater uncertainty. That is part of the story. That is what we need to take into account and do the best we can do adapt to that future.

One thing I have noticed since I have been here is there seems to be a widespread belief that rainfall variability is going to increase, and that is year-to-year rainfall variability. In fact, that is a very good rule of thumb. If you look at the climate models, the overwhelming majority of models suggest that that is the case over the vast majority of the world. However, it is not necessarily true everywhere. In fact, in preparing for this meeting I had a close look over Queensland and it turns out a third of the models say it is going to go up, a third say it is not going to change much and the other third say it is going to go down. It is one critical area that needs to be investigated.

One thing I should point out is that many of the other states have had the benefit of major multimillion dollar programs that have gone for years and years that have been aimed at addressing those sorts of questions for their neck of the woods. Unfortunately, Queensland has not had the benefit of that. We have had some really great research done on physical climate science to provide downscale projections, which are available through some of the fantastic websites that DES and others have put together—really good websites. However, some of these key issues like what is going to happen to variability have not really been addressed for Queensland to the extent that they should have been.

Victoria, for example, which I have been involved with, has something called the VicWaCI, the Victorian Water and Climate Initiative. One of the many things that we discovered through that program was there was a major drying around the turn of the century called the millennium drought. It was massively impactful not just in agriculture but in other areas in that part of the world. Many people were concerned that that was all driven by human forced climate change. Our investigation indicated that the bulk of it—possibly 80 per cent or more of that drying—was driven by natural processes. You can see that makes a really big difference to how you understand the climate system in that part of the world and what you tell people like farmers and others. Without being able to explain the past properly, people might question your ability to provide them advice on the future.

The other thing is you get an indication of how good or otherwise the climate models are at reproducing important factors relevant to agriculture and water supply, for example. That can be a sobering experience. You can just do the projections: 'Here's the numbers. Go away and use them,' and you can't tell them, 'How good are they?' At least looking at the past in detail you can get some estimate of how good those projections might or might not be. As I said, we should not get too hung up on the fact that there is uncertainty in some of the projections. There is great confidence in other parts, but there is uncertainty and we should try to narrow that uncertainty.

Of course, we should not stop at adapting to climate change and climate variability just because there are some of these unresolved issues. We have to get on with that rapidly now because we are falling behind. Climate is changing faster than the rate at which we are trying to adapt, so things are getting worse. Clarifying these issues should be done in parallel with getting on with the job of adapting. One of the suggestions I make is I do not understand why Queensland does not have one of those big programs that the other states have. It just does not make any sense to me. I have drafted a brief, and I could submit that after I have tidied it up a little bit.

CHAIR: That would be fine. Lovely.

Prof. Power: That will contain some references for the impacts and adaptation strategies for agriculture and also some of the barriers to adaptation and some of the ways in which we can overcome those barriers. I will put that to one side.

One thing I do want to mention is that my impression since I have been in Queensland is that there is a huge focus on managing climate variability and I think there is a world-class capability, but you cannot say the same thing for the longer term. It has slipped behind some of the other states over the last decade or so. When I started coming to Queensland for work 20 years ago the people here were world leaders in how to manage climate variability and they were world leaders in managing climate change as well, but I do not think there is anywhere near as much emphasis given to managing climate change as there has been in the past to managing climate variability. Things are changing, but we are a long way behind. The pace is not as rapid as it should be in my opinion.

I do want to mention one thing which is a major program that we run that my colleague David Colvin manages which is called the Northern Australia Climate Program. That is aimed at helping cattle producers manage climate variability. One key feature there is we have so-called Climate Mates. These are intermediaries. These are people who live in the community. Some of these are producers and some of them are consultants. They are all trusted in their broader community. We work with them on an ongoing basis. They are part-time; they work for other groups, but they work for us part-time. We provide them with training and opportunities to get together with the scientists and to get together with the producers and producer reps. In that way the scientists are able to get a really good understanding of what it is that those producers need and the producer intermediaries get a better understanding of how to use a weather forecast, how to use a climate forecast, what they are good at, what they are not good at and to factor them into fair dinkum decision-making. The suggestion I am making is that that is one tiny little strategy amongst many others that could potentially enhance the ability of producers to manage climate variability and climate change down the track.

I will turn now to some of the specific suggestions I have for strengthening the ability of Queensland farmers to adapt to climate change. First and foremost I think you probably get the impression—and this is what I think anyway—that the challenge is not straightforward; it is a massive challenge to do it. There is a lot that needs to be done for that to occur, especially if you want on-the-ground, fair dinkum practical action. That is the first thing: just recognising it is a big problem. Following up on what I refer to as QAg SAP, Queensland Agriculture Sector Adaptation Plan, which is a fantastic document, one of their recommendations is for each subsection within agriculture—cattle, sugar, cropping, aquaculture, fisheries, horticulture, the whole lot—to have their own specific plan for adapting to climate change and climate variability.

One key thing which relates to what I was saying before about the fact that Queensland is very well set up to manage climate variability, provided the variability does not go much higher, is that there also needs to be a greater understanding of what is viable in the long term. If you are only worried about the variability, you may be less worried about long-term variability, profitability and sustainability. The other thing is you might not be thinking enough about what some of the emerging long-term opportunities might be. We know, for example, the wine industry in Southern Australia looked at climate change and they were affected. It is simpler for them, it is easier for them, because temperature is such a big factor. There is high confidence in the projection and they see it directly on their profits and the effectiveness of what they are trying to achieve with their wines. They decided way back when to purchase land further south in cooler temperatures in Tasmania.

If you are only worried about variability you probably would not do that, whereas if you are looking at the longer term things, as Brendan was referring to, you might start thinking about things you might not have thought about before and you identify and see some new opportunity. It is easy to have a plan, but then a lot of these plans end up sitting on the shelf. The plans need to incorporate clear, feasible paths to impact the Queensland farms. It always has to be in mind how is this going to end up being used and how do you create that use? How do you encourage that use? A plan without thinking about that is not a great plan.

Another thing which the IPCC report emphasises is wherever possible, feasible and practical try to consider the planning in as holistic a fashion as possible. For example, instead of just worrying about adaptation, you also think about reducing net greenhouse gas emissions. You do not do one without the other. If there are higher temperatures, you might adapt and say, 'Let's get a diesel fuelled air conditioner,' but you are obviously failing on the reducing emissions side. They are two examples of where people might want to think simultaneously.

There are also other issues like human welfare. We are talking about farmers and production. What is it going to be like for them to live in conditions where there is a higher fire risk, more heatwaves et cetera? In other words, we have to encourage more holistic planning, but of course it is much easier said than done. You hear that all the time but to actually do it yourself can be quite challenging. As I said, during the planning process they need to very seriously consider the adoption part, not as something that is done after the plan is developed but during the development of that plan. It has to be said. People sometimes talk about the 'last mile'. You generate these products and then you worry about the last mile: getting it used. Actually, it should be the other way around: it is the first mile; that should be the first thing you think of.

I have noticed there is lots of great work in Queensland—fantastic work—a lot of it done by colleagues and other people, but it does seem to be uncoordinated. Some degree of incoordination is probably a good thing, but I would imagine greater coordination for some of it would also be beneficial to the state. QAg SAP, the Queensland Agriculture Sector Adaptation Plan, did a little stocktake. It would be great to update that stocktake. They talk about impacts and adaptation and barriers to adaptation. It would be good to update all of that because that was done in 2018. There has been some rapid increase in understanding, so it would be good to update those, I would suggest.

Another thing that would be good from a state perspective—and I know the federal government is trying to do this at the moment—is to try to prioritise the risks. My view is there are so many challenges and you cannot do everything you would like to do, so how about priorities are set for agriculture in Queensland and they are given greater focus? Again, that is easier said than done. You start to think about how you go about prioritising. You can talk about vulnerability and profitability—it is a complicated area—but it would potentially be sensible to try to work out what are the most important things that Queensland needs to do.

Sorry this is dragging on a little bit longer than I was hoping. As I mentioned before, there needs to be more targeted, coordinated and applied research to support adaptation in terms of clarifying the hazards, something like the programs we have interstate. We already have DCAP, the Drought and Climate Adaptation Program, which is a fantastic program involving DES, DAF and USQ, but some of the projects come from other parts too. As I was saying before, if you actually go through the projects in there, the vast majority are looking at adaptation to variability. There is a little bit on climate change but not much. My suggestion is if the program was commensurate with the challenge, it would be much bigger and it would have a lot more. Keep the really great stuff on managing variability but increase it so there are also projects looking at these longer term issues. What is viable, what are the priorities—those sorts of issues—and how do you help farmers on the ground adapt better than they already are in the face of these looming challenges?

On training, education and extension, I mentioned before the Climate Mates. Maybe those sorts of models could be adopted in other subsectors in agriculture. You could provide climate training to existing extension officers. Do we have enough extension officers in Queensland agriculture? It is easy for people who do not pay for it to say, but it seems like Queensland farmers would benefit from having more.

Finally, before I hand over to Russ, this one relates to the coordination but not entirely. There is a lot going on and we had that little stocktake in QAg SAP. It would be good to update that and to maintain a database of who is doing what so we know where the gaps are and we share the lessons. If Johnny is doing some great work and Sarah is doing something else and she is just starting, wouldn't it be great if she knew what Johnny was up to? Wouldn't it be great if someone said, 'We tried this. It didn't work. We tried this. You should give it a go'? At the moment I do not think there is enough of that happening anywhere, including in Queensland. Sorry to drag on a little bit long.

CHAIR: Thank you very much, Professor Power. Mr Mehmet, we will come to you. I know that Professor Menzies has to go, so we will then go directly to questions of Professor Menzies.

Mr Mehmet: Mine will be a lot briefer. I am at the insurance end of things.

CHAIR: A very interesting end.

Mr Mehmet: Willis Towers Watson is an insurance broker, so we are looking at that risk transfer situation. Looking at all of the risks the gentlemen have been talking about, we are at the end of the road trying to get those risks placed with the insurance market. I have certainly found in my five years of being involved with QFF, USQ and Queensland Farmers' Federation that that has its challenges. We have done a lot of surveys of farmers and peak bodies just to get their feedback on what the real concerns are. I have done a summary paper. Did that get through to people?

CHAIR: Yes.

Mr Mehmet: The findings are that there needs to be a far more affordable and more targeted insurance product out there. That is where the challenge has been. Whatever has gone before has not satisfied farmers. They either do not get the settlement they expect or it is a long, complicated process, so there has been that general dissatisfaction with the insurance industry. We are talking about crop insurance in particular. If you are talking improvements and public liability—which was my expertise going back prior to the last five years that I have been involved in the agricultural side of things—it is a different world, particularly for insurers. Because they have not dipped their toes in the water enough they have not been able to get a really good feel for what insuring crops is all about. That is vital; they need that.

Internationally, I work very closely with our London team. Julian Roberts and Claire Wilkinson have been out here and presented to the federal government a few months ago on the Future Drought Fund work that we are doing with USQ. They very much made it clear that in other countries, particularly the USA, the EU and African countries, there is a tremendous uptake of insurance. There is one main reason for that, and that is government subsidies. There are government subsidies in each of those countries. In America the rate of subsidising insurance is around 66 per cent. Here we concentrate on the post-loss handout, if you want to call it that, from federal and state. What we find when we are dealing with farmers is that that takes quite a bit of the incentive away from them. I know it is a political hot potato to talk about withdrawing and that sort of thing. However, from their point of view they think, 'Insurance is expensive. We seem to be better off and we get up to 75 grand for a natural catastrophe situation through either state or federal government. That is sufficient.' It is the current situation that three per cent of Australia's farmers take out crop insurance. It is at the very low end, as you would imagine, whereas somewhere in the order of 80 per cent in the USA have the cover. That goes back to the 1930s when there was that whole dust bowl situation when the government felt they needed to protect the farmers, and it has rolled on and been successful ever since. That is the challenge we have.

The other thing of course is the volatility of Queensland. It is far more volatile weather-wise than any other state. Therefore, there is more chance with climate change continuing to grow, and it is even likely to continue. The expenditure—and we put that in that little summary—for natural disasters is expected to rise by 300 per cent by 2050. That would come from your forecasting side of things. Those are the sorts of numbers and that is the concern. The impact on farmers was mentioned earlier. Economically, it is horrendous as far as the financial exposure is concerned and the rest of the community. As you know, once the farmers are suffering there is a flow-on effect. There is a great effect. There are mental issues when they are struggling. There is the financial side when finance is not available. If there was insurance, it probably would take care in a big way of that financial exposure concern. As I mentioned, the high take-up in other countries is something that we are not seeing here.

If we are looking at what might work for farmers in Australia, we have concentrated on what is called parametric insurance, or indexed based insurance—they mean the same thing—as an alternative to conventional insurance. Pretty much just fire and hail in Australia is all you will get through conventional insurance. When I say ‘conventional’, it is like insuring your house: the loss is based on the damage that occurs. An assessor comes out, decides that you have had your roof blown off so you will get \$50,000 out of your \$1 million house and that is the payout. With parametric or indexed based it is based on a pre agreed event occurring: a certain amount of rainfall in the case of drought or flood during a certain period of time. If the BOM records that amount of rainfall either above or below, whatever your defined agreement is, the payout is made. So if it was 50 millimetres of rainfall in the growing months, March to June, say, and you got less than 50 millimetres recorded, the payout is made within two weeks of that notification being made. That is the difference and in our opinion it is the only way that it can be a successful insurance proposition for Australian farmers.

Multiperil crop insurance has been tried. It has been a disaster. It has just been too expensive, and not only too expensive: when it was taken out the farmers took it out with a little bit more probably pre-existing knowledge than what the insurance industry had, particularly in Victoria in 2019 when CGU decided to do a pilot, and every farmer had a claim. It burnt the deal, and they are never going back to multiperil crop insurance after that. There is pretty much no market these days for MPCl. This parametric option is similar, but you concentrate just on the event that you are concerned about most of all. It can be rainfall too little, flood too much or a cyclone. If a cyclone comes through within a certain radius of your farm, and I will mention in a moment about a canegrower’s proposition we put together, then the payout is made if it is above a certain category. There are products in the market for that for North Queensland at the moment. For example, anything category 3 or above you take out a sum insured of, say, \$50,000. If it passes within a 50-kilometre radius of your farm, the payout is made. The damage does not have to be anything like the \$50,000—it just does not matter—and you can spend the money on whatever you want to spend it on. If you do not get enough in your payout on your house, then that money is available for that or for your crop, whatever the purpose is.

There is something attached to that called basis risk with parametric insurance and that is the downside, if you want to call it that, because the payout might not be what the actual loss was. In other words, if he gets \$50,000 but he has had \$100,000 worth of loss, he still only gets \$50,000. That is the agreed payment. It is like an agreed value policy on a car. That is the payout. The other thing is that the BOM reading might not correlate with the reading at your particular farm in the case of, say, rainfall. I have had experience at Dalby where one chap out at Cecil Plains said, ‘Yeah, I tried that one year but when I had not enough rainfall Dalby BOM said, “Yes, you did; you are a millimetre over the cut-off limit”.’ So that is the danger. That is where the BOM involvement and any of that additional science that can be brought in from a governmental point of view would be of tremendous assistance to the whole insurance market. We know they have been working on what they call the TPAWS—that is, trusted permanent reading stations basically—on private properties and that has been gaining momentum, so that is certainly going to be a help. However, the more reduction of that basis risk the less chance of a farmer not getting what he thought he was going to get, even though there is no question about what the policy is, but it might not be what he has in mind and then the more trusting they will be in that side of the cover. That has been a gradual growth.

Just an example of that in the science side of things, insurers are, believe it or not, even though it is so volatile, keener, particularly international insurers—the French insurers like Descartes and AXA XL and some of those ones, but not so much the Australian insurers that do not get into parametric insurance generally. Liberty is another one. They are a small group that are investing in the science side of insurance—radar and satellites particularly—to be able to pull the premium down and then have a loss that is far less risky than the BOM reading down the road type situation. Radar for hail, for example, is something where at the moment it is the conventional type cover—the assessor goes out, looks at how much damage has happened to your farm and pays out based on that damaged area, and it can take quite a while for settlement. If there was radar capability installed near enough, then they are able to use that method to be able to decide on what the payout is on an index basis. So you insure against a certain amount of damage and you are paid out for that. Farmers should only be covering what they would like to and based on the affordability. If they think, ‘\$100,000 cover is all I can afford’, the premium of that—the exposure might be five per cent probability; it is all based on probability, as you imagine, over historical data—‘the premium will be \$5,000 and therefore I can afford to pay \$5,000 and \$100,000 would keep me in business and keep a mortgagee off my back, basically, to be able to get my finance next year.’ If that is all he needs, that is all he has to take out. That is the advantage of having that type of cover.

CHAIR: We might come back to that. I am conscious of the professor’s time. We will go to questions and come back to you because I know the question of insurance is important.

Mr Mehmet: Yes, and there is a bit of nodding from Jim.

CHAIR: Professor Menzies, one of the things you talked about was logistics and the indirect effects. How are we doing so far on that in Queensland? You talked a bit about how we can improve that. As policy makers we would very much like to hear about that.

Prof. Menzies: To be honest, we have not connected the datasets that are available to decision-making at all really. The way that we operate our systems at the moment is very largely on the basis of existing knowledge: 'This is the way we did it last year, the year before, the year before,' as in an established practice rather than, 'This is a dataset available for this year and we are changing our practice for this year.' It sounds very simple and I think, in fact, it is very simple, but until you start to connect up the dataset with the decision-making nothing is happening. The linking bits are not too hard to build, but until somebody has built them nothing is going on. In the strictest sense I do not think this is a government problem. It is one where a limited government investment in some research may assist, and there is no-one at Griffith who can do this so I am not pushing a Griffith idea. You are going to have to go back to my old stomping ground of UQ to build that linkage of, 'Here is the remote sensing data and here is a predictive tool,' and you guys as a trucking company can look it up and go, 'Oh my goodness, we've got some good business in Queensland. Let's shift 10 trucks from Victoria up to Queensland for this season,' rather than, 'The silos are full, there's lots of phone calls going on. Can you get us more trucks?', and then the problems of trucks lined up for kilometres because they cannot get stuff in the silos into the system, which we do see pretty routinely.

My view is that we have the data available, and once again I say thank you Queensland government because it is remote sense data that you can access because the government has made it free. We need the linking part that says every time the Landsat or Sentinel goes over it collects a dataset, accumulates it, DAFF makes it available on a website and the companies that are making a profit out of shifting stuff can get their logistics together better. I think in the longer term there is work that the government could do looking at whether we need to change roads, whether we need to change rail infrastructure and whether we need to change what silos we build, but that is a sort of longer term response that would build out of the early work that you do to get simple road logistics working better. With the internet and things, you can put monitors in silos so that you can know in real time how full the silos around Queensland are and how much storage capacity we have. Once again it is not done, but you could do it pretty easily. The technology is out there. Farmers use it to know how full their water tanks are. We can do exactly the same thing in a silo to know how full the silo is.

CHAIR: I think it is a good point. We are looking at what we are doing as policy makers and if we are able to say to businesses that this is how they can improve, we would encourage that.

Mr McDONALD: It is great to catch up with you today. I have two questions. Firstly, for the benefit of everybody we are starting this inquiry and capacity building for ourselves through exposure to the likes of you, so thank you for your time and the work that you are doing. Neal, with regard to the soil and the issue of farmers saving carbon, if you like, rather than sequestration because of the limitations you mentioned before, why do farmers compost or mulch and are they all doing it now, or what is the situation?

Prof. Menzies: Thanks for the Dorothy Dixter question to a soil scientist, and it will be my pleasure to respond. There is a virtuous circle here, there really is. The things that a farmer should sensibly do to respond to or to do the right thing with respect to climate change—trying to build carbon in their soil, taking carbon dioxide out of the atmosphere—are also the things that they should do to make their farm more fertile. Once again I would say the farmer is going to do it because it works for them, for their children and for their grandchildren rather than think, 'I've got to do something for society and sequester some carbon,' and hence it is likely to happen. When I first finished my ag degree back in the 1980s we already knew at that time that conservation tillage practice was going to make you money as a farmer. It took about 25 years for widespread adoption of that and even today you would find some farmers still burn stubble—a limited number. The vast majority of the cropping population are using agricultural practice that is pretty conservative of soil organic matter and the soil has improved as a result of that over the intervening decades.

If we move to grazing systems, there is a lot of work showing that cell grazing can increase your productivity and improve your soil quality. Once again farmers are going to adopt it because it increases their productivity. They are going to enjoy the fact that the soil has improved, but that was not their motivation. Across the board though I say this is likely to stabilise levels of carbon in soil. Over a short time cell grazing you might see an increase. The real difficulty here for a market is if I want to sell you guys some soil carbon credits I am going to wait until the end of a drought period and

I am going to go out and measure how much carbon is in my soil. Then after I have had four or five years of good rains, like right now, I would be going out soil sampling and telling you, 'Guys, look what I've done.' We go into a period now of three or four or five years of lower rainfall and my soil is going to be back to where it was when I first took my soil sample—the intervening bump.

Once again I do not think we should be going out sampling soil to know how much carbon is in the soil. Once again I would go to satellite data and say, 'I've got a decade of satellite data or I've got two decades of satellite data here that says how much vegetation grew in this area.' As a farmer you are saying to me that you have done some intervention that increases soil carbon. I am going to look at the next decade of satellite data and say, 'On average was there more vegetation growing there than there was in the preceding decade?', and if there is I know that there is more carbon in the soil. I do not even need to go and measure the soil. Once again I think there is an opportunity for government investment in kickstarting schemes that would do that. I am not a believer in government driving these things. You should be setting it up so that private enterprise drives it. You guys would share this view: agriculture is a private enterprise activity. Government largely should stay out whilst helping to make things happen. Jim, I hope that is a sensible answer.

Mr McDONALD: It is. I just wanted to link some awareness I have of your past with QAAFI, the Queensland Alliance for Agriculture and Food Innovation, and some comments that Scott made regarding their drought response and that system that is there and also the issue of extension officers. I think it is a fair reflection on the community that if government goes and tells people to do something about climate variability they are unlikely to do it, but they may if there is some science and there is some smarts and some partnerships. From your experience in the past, is there anything that you could offer the committee that might be promising for the future in terms of those partnerships?

Prof. Menzies: The QAAFI partnership has been a stunningly successful one. I expect that when we put it together 12 or 13 years ago we expected it to give us a system that worked a little bit better whereas it has given us a system that works unbelievably better, and I give you UQ's standing as an agriculture research organisation as a measure of this. We were in the 50s in terms of ranking in the world, which is not bad. That is a pretty good status. With QAAFI's help, we made it to No. 2 in the world. Just think about that: there are 10,000 universities that teach and research in agriculture. Our little University of Queensland—and I say 'little' because the University of Florida and the University of California are massive—got to No. 2 in the world. We will bounce around in the top 5 for quite some time to come. That is because the state government's investment, the sector's investment and the University of Queensland investment together was enough to get that critical mass and gave the university the more esoteric type researchers that you find in a university and partners to work with who are more applied and have a direct connection to the farming community, and that has allowed the sort of research that has had that kind of impact. Around the world that partnership is now recognised for the huge success that it has been.

To come back to farm advisers, once again when I finished my ag degree that was one of the jobs that you would get. You would go and work for the department of primary industries as an ag adviser. Jim, the loss of those farm advisers is something that you will hear a lot of talk about in agricultural communities, more so a decade ago than now because the private sector has stepped up to deliver a good product. Initially it was just people who had worked for the DPI such that it was like, 'Jim McDonald, adviser. You're Menzies's adviser.' It is now much more coordinated with bigger companies getting involved and a much more professional service. In growing that way, I think it is actually working better now than the DPI ever achieved it. You have to pay for the service, but there are multiple people that you can go to whereas in the past if you happened to have a good adviser—like Jim McDonald—that was great; if you had a [REDACTED] adviser like Neal Menzies, where were you, because you did not have choice whereas the privatisation has given you choice?

Mr McDONALD: 'Menzies-McDonald Consultants'.

Prof. Menzies: Maybe.

CHAIR: Professor Menzies, do you have time for one more question?

Prof. Menzies: I have.

CHAIR: If we have other questions we might need to email those through.

Mr MADDEN: I have a question that is leading on from what you said, Professor Menzies, about the mulga country. I have just noticed this: in the time that I have been a member of parliament, I have noticed—and this is to do with the grazing industry—three major changes in the grazing industry. First of all, it was wild dogs. That meant that we had sheep country that became cattle country because the wild dogs were taking out the sheep. Then I saw that when the drought broke in places like Winton and Longreach it was not merinos that came back; it was sheep, but it was meat sheep.

Prof. Menzies: Yes.

Mr MADDEN: Black face Suffolks, Dorpers and that sort of stuff. I have now noticed in the mulga country, getting back to what you said before, goats replacing sheep. I like this concept that you were talking about that governments should not be driving agriculture but should be supporting agriculture. There was an interesting thing in that a group of our committee went to visit the abattoir at Charleville and we have made a major investment there to allow them to process more goats. It was never said that we were doing that because goats were replacing sheep in mulga country. That was never said, but that was a fact—that is, by us investing in the Western Meat Exporters meatworks, there would be more graziers switching from cattle to goats. Is that something that the government should be looking at—supporting more change in the type of animal that is run on certain country? I like this idea that you said that government should support agriculture; it should not drive agriculture. Do you see any other areas where governments could be more active with regard to movement of a type of animal that we put on a country that is more suited to that country?

Prof. Menzies: Once again what a wonderful question to be presented with. I do not think that government should drive agriculture; I think that government should be providing agriculture with well-thought-through possibilities and advice. Before I go into that change to goats, I also think that the agricultural community is so creative and so inventive that they are always going to be ahead of government decision-making or, for that matter, university researchers. We follow and help rather than create the idea. Jim, I think there are 100 ideas that get tested that fail. Someone will have tried other animals out there—

Mr MADDEN: Alpacas or something.

Prof. Menzies: Yes. The person who tried goats and was successful talked to their neighbour at the pub and they got into goats and it works that way. You cannot fund the 100 experiments that the sector will do for itself, but once something starts to take off you can invest to make it work better, and the abattoir investment is an example of that. With regard to the question of what you do with the mulga lands, I was in no way advocating abandoning them; it was just a way of illustrating that there are other kinds of industries that work well, and your example of goats is an equally useful example of that.

Let us take the sugarcane industry, and note that I said 'sugarcane industry' as opposed to 'sugar', because I think the future is not necessarily sugar; it may well be growing cane that produces a precursor for plastics. That sort of whole-of-area change is something that is going to be very difficult for individual producers to achieve. If we are going to a type of cane that is a precursor for plastic, the whole mill area has to go at once. Once again this is an area where a good idea can probably only happen because government got involved with private enterprise and made that change. The sugar industry booms and busts, as you well know. When they are booming they do not have an appetite for change but when they are busting they might, so we need to have well prepared ideas and options available to be able to go to a delineated mill area and say, 'Guys, maybe this is the time. Do you want to think about growing genetically modified plastic precursor cane?'

Mr MADDEN: Thanks for that answer.

CHAIR: Thank you for your time, Professor Menzies. We appreciate it.

Prof. Menzies: I am sorry to have to leave you. I am now going to work for the New South Wales government.

CHAIR: Today of all days!

Prof. Menzies: Sorry. We can hope for a good result.

Mr McDONALD: Well said!

Mr SMITH: I have a question probably more for Professor Power or Professor Mackey to answer. Talking about research institutes and universities and engaging around the science and then engaging back with government or, I guess, your lead bodies, how much of a role do you believe research institutes and universities have with communicating the science that you are finding and the data you are finding with smaller groups and towns? I am from Bundaberg, so we have the Bundaberg Fruit and Vegetable Growers and we have our Canegrowers as well. What role do you see universities having engaging with a more boots-on-the-ground-farmer approach? Part of why we are careful in the wording of this inquiry is there is that hesitancy to engage with the words 'climate change' and acceptance of climate change, and any time you have someone in a suit from government come along anyone is hesitant. What role do universities have with playing with the boots-on-the-ground farmers?

Prof. Mackey: That is a very good question. We have been doing a lot of research in this area but not directly with the agricultural sector per se, but we had a program running for a couple of years called the Deep Listening Tour where I and some of our colleagues went into regional Queensland, specifically to regions around Bowen et cetera where the local economy is very heavily dependent on fossil fuel mining, and we just made contact with the local community groups, women's groups and Rotary and such and said that we were there to listen and talk to people about climate change. We said that we were not there to tell them what to do; we were just there to hear what they think. We were overwhelmed with people wanting to come and talk to us. Again, it was very interesting: once people accepted that we were genuine about just wanting to hear what they had to say, we learnt a lot. We learnt a lot about what their priorities are and what their concerns are and they are aware that the climate is changing. There were landowners there and land managers there. They were doing what Neal said. They are responding because it is their livelihoods and they need to.

I think we have an important role to play. Universities are not political; they are a neutral platform. We endeavour to be evidence based, so I think we can play a role in going in and helping enable constructive dialogue. I am asked to talk to community groups all of the time about climate change, especially when word got around about my role in IPCC, and we also do a lot of work with landcare groups, all of which are farmers of one kind or another. We have experience at doing that. We have seen the benefit of it. People are hungry for information and for reliable information and they want to know what the facts are, so we have been very encouraged by all of that. I think all of the universities would welcome the opportunity to do more of that and to do that in a more collaborative way.

Mr SMITH: Professor Power, did you have a perspective?

Prof. Power: Yes. I agree with everything Brendan said, particularly that last point that there is a role for universities. On the role of regional universities like the University of Southern Queensland, the vast majority of our projects are externally funded—the vast majority—including the one I mentioned before, the Northern Australia Climate Program. That is co-funded by MLA, the government and the university. As part of that program we do exactly that sort of thing. By the way, that group of people do not want to hear about climate change. Everything is framed in terms of the hazards that they face—severe weather, severe climate—but it still is a very effective program. It is an award-winning program. As Brendan was saying, for anyone in the community, people from the universities or it could be the Bureau of Meteorology or the CSIRO, as long as it is based on sound science, then I see that there is a big role there. My experience is the same working at the bureau here in that people absolutely lap it up. They just love to hear about it. Sometimes you have to frame it a little bit differently to different groups, but I have never come back from one where at least someone comes and says, 'That was fantastic. I always hear all these stories in the media and it all seems like this, that and the other,' whereas they really like it when a technical expert comes along and lays it out in a sober fashion.

Mr McDONALD: Just for clarification about the Northern Australia Alliance, we visited James Cook University. Are you guys in partnership with James Cook with that in terms of drought?

Prof. Power: I think one of our Climate Mates is going to be doing some of the climate mate work. Climate Mates are the people in the community, intermediaries. I think maybe one of them is from there.

Mr McDONALD: I thought it was about the Northern Australia Climate Program. When we met with them I am sure that they said they had a partnership with you.

Prof. Power: Yes, that is probably what it is.

CHAIR: Yes, a very good partnership.

Prof. Power: Yes, one of the climate ones.

Mr McDONALD: That was all it was.

Mr HART: What do the forward plans that you were talking about look like in other states? Is there any control over them? Do they need enforcement or encouragement? What does that actually look like and who is doing it?

CHAIR: You mentioned VicWaCI.

Prof. Power: Brendan, did you want to say something?

Prof. Mackey: I think we both have something to say to that. They tend to be state government driven. I think the Queensland government has done a great job in taking a sectoral approach and a collaborative approach with sectors to developing climate adaptation resilience plans. I completely

agree with what you were saying that this needs now to be much more finely grained for the different subsections within the agricultural sector. I am more familiar with the work in New South Wales. Again, it is state government led but it is analogous to what has happened here. As you noted, there has been more advancement in terms of implementation, certainly in New South Wales.

The gap I see, again, is it tends to be top down. What we have been talking about this morning is that, in addition to variability, we have these ongoing trends and the increase in extremes. As those continue, the adaptation becomes more expensive and more constrained and potentially bigger changes are needed. This is where the role of government comes in to help with those big changes and anticipate those big changes. What is being proposed needs to involve the farmers. It needs to involve the companies and the businesses that are doing it. You cannot develop the options and strategies from a top-down approach. I am not sure what the case is in Victoria. I still think New South Wales has some lessons to learn in having that kind of bottom-up approach rather than a top-down one. I think the Queensland government has been trying hard very much to involve all the stakeholders in a given sector in these plans. I think that is a big tick up here.

Mr HART: And on the need for enforcement KPIs or encouragement for those plans?

Prof. Power: If you are referring to on-the-ground practical adaptation plans, then it is their plan. I am not an expert in that area but my hunch as a layperson is that it would be pretty fraught to be thinking about enforcing someone's plans when it is so context laden. As I said, I probably should not have spoken up because I am not an expert.

Prof. Mackey: That is why I used the term 'strategic adaptation planning'. We are not talking about occupational plans or year-to-year business plans or what a corporation or a family farmer would be investing from year to year. This is why it is important, even though it is difficult to go beyond talking about climate variability.

As Neal mentioned, we have this issue in many parts of Queensland with declining winter rain. It has dropped about 17 per cent since the 1970s. The trend is going to continue. That does have implications for what you can grow in winter. That can be compensated up to a point. You can adapt up to a point, but at some point there is going to be a major transition in what you grow. That has all sorts of implications for the associated infrastructure, the markets et cetera. Government has a role to play in that strategic planning about how that kind of major adaptive change would be needed.

It is not a matter of enforcement. It is really about government working with the private sector and the agricultural stakeholders in identifying what these risks are from the ongoing trends and the increase in extremes and having these decision points where the government has to intervene to help so that you have a smooth transition and you do not have people falling over a cliff or industries or parts of industries falling over a cliff. Enforcement is not the issue.

CHAIR: Mr Mehmet, you described the changes that are happening around the world but not here in Australia. What you have outlined is a big change for the insurance industry in Australia.

Mr Mehmet: It is.

CHAIR: Do they have much of a choice in changing? If they are going to survive, they have to make this large shift; is that correct?

Mr Mehmet: For sure it would be a gradual shift. There is no question about that. Really, from our experience of five years of those inquiries, it is that affordability that is the issue. They have been risk managing for 200 years and know what to do on a farm. The feeling is, 'We don't really need insurance.' It is only for the situation where they lie in bed sweating about the catastrophe that they hear might be coming. That is all the intention is. It is not there for the day-to-day working losses or anything of that nature. The house and a little bit of fusion damage or something is not the purpose. It is there for the catastrophic event so that the pricing can be affordable and they can get across that real issue that they worry about. That has to be a gradual approach.

The products are there; that is the thing. The products are available now and the science continues to improve. A very quick example would be CSIRO in North Queensland and working with them on nitrogen application reduction for canegrowers. We have come up with an insurance product that is now commercialised if a farmer is prepared to reduce the application of nitrogen, which, as we all know, causes an issue with the Great Barrier Reef, within six easy steps—which is what they are supposed to follow. They say they will do a 20-kilogram reduction with the soil type and the weather conditions and the location. A modelled outcome—not the actual on-the-ground yield but on 50 years of modelling—would show that with that reduction in application they would have had, as an example, a certain amount of yield loss. That yield loss is the parametric index base. It is immediately paid into the farmer's bank account. That is the sort of quality of the science.

That is unique in the world, that particular program. No-one else in the world has come up with that through CSIRO and the APSIM, which I am sure you have heard of, modelling process. Modelling, radar and satellite technology are all now there for insurers to give the farmers the best outcome. Say there is a willingness to subsidise and find a way, not through direct premium subsidies but maybe participating in a group thing where the government has a layer of cover above a certain limit and the industry—let us say horticulture somewhere in the Lockyer—agrees to cover vegetables up to a certain level in a certain area. If that limit was exceeded, then the government would come in and pay for that.

Very quickly, that is what is called a mutual discretionary fund approach, which we submitted to the Queensland government a couple of years ago with Canegrowers. It did not get off the ground, for whatever reason. The thinking was around looking at the 12 mills up the coast of Queensland which are very ergonomically important. If a cyclone came within any one of those locations, within 50 kilometres, a \$50,000 payout would be made to the farmer. We did the calculations. Based on a 20 per cent participation rate, it was \$5 million that the farmers would carry as an exposure. On top of that, \$10 million would be carried by insurance so we would have that \$10 million insured. The problem with the \$5 million that needed to be collected to be the primary payout situation was that it needed capitalisation—from the government, most likely—because the farmers were not prepared to pay their proportion of that \$5 million and split it out. Let us say they paid \$1,500 and the government contributed \$2½ thousand or \$3½ thousand, then that would mean that that limit of \$5 million means we save on the insurance cost that sits above it.

The bigger attraction for that is that it is really a loan only because if the loss does not happen then that \$5 million sits there in the fund, or a big part of that after you take out insurance and the costs of buying the cover. Let us say \$3 million was available. That sits there and does not get handed over to the insurance industry, which they get every year now with these ridiculous premiums they are charging for cyclone cover even when the cyclones are not happening. That is all money that they collect. If you have a fund arrangement, then that money sits there to smooth out potential costs in the future years and you always have that \$10 million protection sitting above it. The government's exposure is only in the early stages if a loss actually occurred and then they would have to contribute to that \$5 million limit. The \$3 million that, say, sits there is just a loan because then it gets paid back to the government through further contributions as the years that do not have claims continue to build up.

To us it is a fantastic way of thinking for groups, particularly in a canegrower situation where they have the ideal spread of risk. You have 12 locations. There is only likely to be one cyclone in one place, so insurers think it is a great idea. Again, it comes back to the need for capital in some form. It is not called a 'subsidy' as I know that word is not popular, so we find another way: an insurance layer or something. Anyway, that is my thinking. The battle is that farmers would rather trust their own 200 years of risk management capabilities than spend money on insurance and take their chances.

CHAIR: We will go for an extra five minutes and see if we can fit in an extra question to these gentlemen.

Mr MADDEN: Professor Power, you covered a fair bit of territory on what you were doing. I want you to clarify one aspect. You said that the other states were doing big projects but Queensland is not doing those big projects. I presume you are talking about modelling with climate change. My question only requires a few words to answer. Can you tell me the name of one of the other big projects that we are not doing?

Prof. Power: VicWaCI. It is an acronym for Victorian Water and Climate Initiative.

Mr SMITH: Professor Power, at the moment Bundaberg is diversifying into a lot of tree crop and with tree crop comes risks. I am wondering about cyclone trends. If we are seeing a pattern of cyclones coming further south and where there is predictability as climate change continues and is not arrested in terms of its acceleration, what is the likelihood of us seeing cyclones drifting further south or at least feeling the damaging wind impact of those cyclones throughout the years?

Prof. Power: There was talk at one point that they may be coming further south, but I must admit that I would probably have to get back to you on what is the latest on that particular issue. First of all, we know that the number of severe tropical cyclones making landfall between about Port Douglas and further south and into northern New South Wales has dropped markedly since the late 19th century. We had a paper about 10 years ago and I have just been updating it and that trend has continued. There are fewer what we would call severe tropical cyclones, which is categories 3, 4 or 5—the sort of thing that Russ was interested in. The projections are that we may end up with fewer

tropical cyclones but there might be a larger proportion of the more intense cyclones. It seems likely that they would be intense in terms of the rainfall and the pressure and the associated winds. With regard to the more southerly part, I would probably have to get back to you on that.

CHAIR: We might put that question to the panel as well. Professor Mackey?

Prof. Mackey: That is an accurate description. Tropical cyclones have often drifted down. Byron got hit by one many decades ago. The science is still uncertain, for the reasons you said—these kinds of very specific things about whether they will drift more. There is clearly a trend and a projection of an increase in the intensity and, as you say, the frequency of the more intense ones, so not more tropical cyclones but the likelihood of more intense ones.

It is similar to some of the complexities about rainfall. As we have heard, rainfall is very complicated. Some parts of Queensland, like South-East Queensland and parts of inland Queensland, have got this long-term declining winter rainfall trend, but overall in Australia and in a lot of Queensland there is an observed increase in the number of intense rainfall days and the intensity of the heaviest rainfall days. We have seen more heavy rainfall days and that of course is a flooding issue, and that trend is to continue.

I just add that this is why it is important to talk. It links to this issue of insurance, as my colleague noticed. It is the extreme weather impacts that is the insurance issue. That is why, in addition to climate variability and climate trends, we are seeing an increase in the frequency and/or severity and/or duration of extreme weather events—heavier rainfall days, more heatwaves, increased bushfire risks and deeper droughts. It is the extremes that are really driving the change in the insurance, not the trends, not the variability. It is the link between the climate change and the extremes and the insurance that is coupling here.

Mr SMITH: Are you aware of any sort of genetic engineering to increase the strength and depth of roots in trees? Is that a possibility? Is there a way around adaptability to strengthen tree roots and so forth?

Prof. Mackey: I am not aware of any research into that. Different species obviously have different rooting capabilities. I assume there is some prospect for some varieties. What are you thinking of?

Mr SMITH: Macadamias is really the big one moving forward.

Prof. Mackey: Potentially that is an area for varietal improvement. I am not aware of any research into it.

Mr McDONALD: Tom, I am sure that work is happening in a number of different places. I have a question for all of the panel. Professor Mackey, you mentioned the Deep Listening Tour. If you come to my community, you will get innovators and people who engage directly with these things, but there is a very large cohort out there who do not. That is one of the things I am very mindful of when we finalise this inquiry—that we actually have some real meaningful outcomes on the ground. Professor Power, I think you mentioned about having a farm plan. I turn my mind to some of the innovators in the Lockyer Valley with the floods that have happened in the last 12 years. The strong businesses now have disaster management plans so that when there is another flood and something gets washed away they do not build back there; they relocate somewhere else so it does not get affected again. I turn my mind to those sorts of learnings that innovators have done and modelling it to something like this. Do you think something like that is a possibility in terms of having your plan?

Prof. Mackey: Absolutely. One thing that our research and other research has shown is that when it comes to responding to climate change people listen to their peers. They will take more notice of their neighbour than they will of me, so set up some programs or processes whereby the local champions who are doing it can showcase what they are doing. I think this is happening at some local government level.

I was invited to an ag day at the Tweed Valley south of us last year and it was exactly this. They had three farmers who had farm plans. It was in the wake of all the floods and the fires, so they were talking about farm plans for disaster management but also the climate change impacts we have been talking about. They had one who was a fifth-generation dairy farmer, a young innovator who had recently invested. They also had the director of the cattle growers collective for the Tweed talking about what they were doing with the cattle collective et cetera. There was a very good turn-up, maybe 50 or 60 farmers. I gave an introduction about the science but it was listening to what they were actually doing and how they were changing their farm plans. I think the way to go is a program that taps into that local knowledge and experience and shares it.

Mr HART: I have a question for Russell on insurance. Are you seeing in the rest of the world any changes to the availability of crop insurance and the uptake from farmers because of subsidies?

Mr Mehmet: Absolutely. There is a little report that we did previously for the federal government when they were in town a few months ago. I mentioned Julian and Claire from London. We did some preparatory work on that. There is definitely a consistent uptake. It seems to be on the growth side where we are very static; there are no signs of growth here. Again, because of that subsidisation there, that is what makes the difference it appears.

In the USA there is a 90 per cent take-up with 66 per cent subsidisation. In Argentina, it is purely private, with no state involvement; the key risk is mainly hail and multiple perils, so that is a bit more than we have; and the key management technique, indemnity. Argentina is a bit similar to us where it is very much piecemeal. In the EU there is a difference across various countries but it continues to improve. Our people in London get involved with the EU side, so that is growth all the time. There is a 35 per cent subsidy there so that makes a big difference to them. In India, it is 100 per cent subsidised with 100 per cent subsidies to the poorest farmers. That is a no-brainer for them. It is pretty solid subsidies for the rest of the farmers across India.

In Africa, where we are very much involved with what is called the ARC, the African Risk Capacity, that is done right across the countries individually by parametric cover. Most of the countries across Africa participate in a scheme which gives them parametric cover for insufficient rainfall. They all participate in that mutual that I described before. They all contribute to that. If they do not have a bad season, they keep the money. If they get hit, then the re-insurance which sits over the top of their fund pays out. That is very successful in Africa.

I will read what it says for Australia—ad hoc; private initiatives; failed traditional multiperil initiatives and income protections, that did not work; key risks, drought, flood, hail; and key management technique, parametric and cyclone pool mutual. That is what we would like to see, but it is very much ad hoc in Australia and there is very low participation. In summary, because of subsidies in other countries, it continues to be what most growers would look to do—they would look to insure, particularly when they can get a subsidy. They would be unwise not to.

CHAIR: Thank you for that answer. That is a different document to what you have sent through. Is it possible to get that?

Mr Mehmet: I only have one with me, or can I email it through?

CHAIR: Yes, just email it, thanks.

Mr Mehmet: Did you get that flyer?

CHAIR: We did, thank you. That concludes this public briefing. We have found it very informative. Our knowledge base has increased enormously. Thank you to Hansard and our secretariat. I thank everyone who has participated today.

The committee adjourned at 11.39 am.