REPORT ON PROCEEDINGS BEFORE

LEGISLATIVE ASSEMBLY COMMITTEE ON ENVIRONMENT AND PLANNING

SUSTAINABILITY OF ENERGY SUPPLY AND RESOURCES IN NSW

At Jubilee Room, Parliament House, Sydney, on Monday 24 August 2020

The Committee met at 9:30.

PRESENT

Mr Alex Greenwich (Chair)

Mr Anoulack Chanthivong
Mr Nathaniel Smith

PRESENT VIA VIDEOCONFERENCE

Mr James Griffin
Ms Felicity Wilson (Deputy Chair)

The CHAIR: Good morning, everyone. Before we start I would like to acknowledge the Gadigal people of the Eora nation, the traditional custodians of this land. I pay my respects to Elders past, present and emerging of the Eora nation and extend that respect to the Aboriginal and Torres Strait Island people who are present. My name is Alex Greenwich. I am the Chair of the Environment and Planning Committee. With me today are Mr Anoulack Chanthivong, the member for Macquarie Fields; Mr Nathaniel Smith, the member for Wollondilly; Mr James Griffin, the member for Manly; and Ms Felicity Wilson, the member for North Shore. Mr Griffin and Ms Wilson are joining us via videoconference.

Today is the first hearing of the inquiry into the sustainability of energy supply and resources in New South Wales. We will also be holding hearings tomorrow and on Wednesday this week. We will have witnesses taking part via videoconference and also attending in person here at Parliament House. The hearing is being broadcast to the public on the Parliament's website. I thank everybody who is appearing before the Committee today. We appreciate the flexibility of everyone involved in today's proceedings, especially those attending via videoconference.

CAMERON O'REILLY, Executive Director, Energy Reform & Investment Energy, Climate Change and Sustainability, Department of Planning, Industry and Environment, sworn and examined

The CHAIR: Mr O'Reilly, before we start, do you have any questions about the hearing process?

Mr O'REILLY: No, thank you, Chair.

The CHAIR: Would you like to make a short opening statement before we begin with questions?

Mr O'REILLY: Yes, please. First, my name is Cameron O'Reilly. I am Executive Director of Energy Reform and Investment Energy in the Department of Planning, Industry and Environment. My role takes in liaison with the national market bodies and also the Energy Zones that have been the focus of government policy, priority transmission projects, and also the data and analytics function of our energy division that focuses on key energy market trends. In terms of the market, I would emphasise that we are witnessing an historic transition in the energy sector. Over the next 20 years or so 10,200 megawatts of coal generation is scheduled to retire in New South Wales. That is not a decision of the government; that is the advice of the Australian Energy Market Operator [AEMO] and it is also the indicated intention of the owners of those plants, of course, because we have a private-sector generation market.

Importantly, we do have evidence of clear trends, in terms of replacement generation. We have a pipeline in the planning system of over 20,000 megawatts of a proposed new generation investment in New South Wales, but that generation is by nature of a different type. It is a portfolio of technologies, but largely wind and solar supported by various forms of dispatchable generation and long-duration storage. Taking into account the transition, in an industry where really in terms of long-term electricity growth - where growth is largely flat although there is an increasing trend over time for higher peak demand - we will see an enormous investment in the state. Even that pipeline of investment is estimated to be worth over $27 billion. Because it is not like-for-like replacement, a lot of that investment will occur in the regions, and it will also require a more extensive and expansive electricity grid. So with the generation investment will have to come a large amount of transmission investment.

As a result, the government has prioritised four priority transmission projects, which were outlined in both the 2018 and 2020 integrated system plan released by AEMO, a 20-year plan for the overall national market grid. Those projects included enhancements to the interconnector to Queensland and Victoria, but most importantly, a new interconnector to South Australia and further transmission investment to allow the Snowy II development to come into the major load centres of New South Wales, around Sydney and Wollongong and Newcastle. Also, the plans of the government, in its transmission infrastructure strategy, but more recently in its electricity strategy released in 2019, focused on the development of Energy Zones, with the priority being, first off, the Central-West Orana Energy Zone, which the government's electricity strategy indicated would be shovel ready by the end of 2022, with a target of 3,000 megawatts. Encouragingly, an expression of interest undertaken by the government came forward with 27,000 megawatts of market interest in the Central-West Orana Energy Zone.

The government is seeing very positive signs of interest in private-sector investment in New South Wales in generation, and particularly in the regions. Again, the government has a private-sector market-driven approach to generation, and we need to respond to those signals. The signals are positive interest in New South Wales, but the key to that transition is what we term "grid capacity" and capacity to dispatch to the market, because the grid

was built around our historic generation, not around our future generation. Even if you look to the south-west proposed Energy Zone—and New South Wales in its strategy has outlined three priority Energy Zones; the Central-West Orana, which I have spoken about, but also the New England Energy Zone and the South-West Energy Zone—it will be particularly enabled by some of those priority transmission projects such as HumeLink to the Snowy region and EnergyConnect to South Australia. If you combine those two projects with the Snowy II proposal then you are looking at over $10 billion of investment simply in the area from the Snowy region to the South Australian border. So we have huge numbers and we have huge amounts of investment interest. Getting the settings right to encourage that investment is the role of the government, hence its approach to Energy Zones and priority transmission, and playing a coordinating role for private-sector interests to provide the right settings for that interest, ensuring that the grid can ensure that the access for that generation from the private sector is able to come to market.

Obviously, this generation transition will require large amounts of megawatts, because the nature of the new generation being essentially intermittent means that you do need more installed megawatts than you do under the old system. It will also be more land intensive, both the transmission and the new generation. But, as I said, a lot of that investment will be occurring in regional New South Wales, creating huge amounts of jobs but also opportunities for related industries such as value-adding to resources and such things as data centres. Investment will also enable the revitalisation of industries, such as green steel, as we get more and more cheaper renewable energy. There will be land use challenges and there will be planning challenges, but over the next 20 years we will see an electricity grid in New South Wales that will be far more extensive, to enable the cheapest form of new generation to come into the market. That is not the view of the government; that is the view of the Australian Energy Market Operator. Measures undertaken by the CSIRO show levelised cost of energy, so the cheapest forms of new generation are wind and solar—utility-scale solar and also, of course, we have large amounts of New South Wales households, nearly half a million households, having rooftop solar.

There is an accelerating transition occurring in New South Wales. It is driven by the market with the government playing a facilitative role. It is facilitating entry of what the market tells us is the cheapest and also the cleanest form of new generation. Thank you.

The CHAIR: Thank you very much for that very comprehensive introduction. I might start by talking about the grid capacity improvements that need to occur. What is the investment that needs to occur there and what work is being done towards that?

Mr O'REILLY: The government indicated that it would invest some money in the establishment of the coordination and initial technical and planning work around the Central-West Orana Energy Zone, and establish a coordinating body—an NCO, if you like. It has also indicated that in the New England region it would invest upwards of around $80 million for facilitating the planning of the new generation investment and the new grid development in that area. There is a role for government in this, but the focus is in terms of investment, obviously in terms of transmission. There will be a balance between the traditional forms of transmission investment that are—obviously it is a natural monopoly element. It is regulated and the government has been, for instance through funding agreements, ensuring there is early work on the design of the grid, making sure by expression of interest that we understand what sort of designs we need to ensure the entry of the generation; doing some early planning work. With the transmission infrastructure strategy, with the priority projects, we ensured that early work was done on those projects before the regulatory approval, albeit these projects are now moving through the regulatory stage.

As with other transmission investment where the market generation is there, there will be a regulatory investment test for transmission [RIT-T] by the Australian Energy Regulator, and the transmission company will build the transmission. There will be a role in the new Energy Zones for potential investment by the generators to support the new infrastructure, but in essence the focus of the government in all of the regions and the Energy Zones is to ensure that the maximum amount is paid for by the private sector. What will be passed on to consumers will be regulated and will be scrutinised by the regulator, but all with the aim of ensuring this transition occurs at lowest cost to consumers.

The CHAIR: There continues to be significant interest from the private sector in this engagement?

Mr O'REILLY: Absolutely. As I said, we did not create the 27,000 megawatts of interest in the Central-West Energy Zone, people had to respond. We have not created the 20,500 megawatt pipeline. It is what is coming from the market, people with an interest in investing in New South Wales, who can see—they do not need to see the growth in electricity—where there will be the retirements, and they can see the intentions of the owners of those plants. Private sector capital is not willing to make 50-year bets, and billion-dollar bets on the company, on new coal generators or other forms of technology. They are focused on what the AEMO says is the cheapest cost of electricity, which comes from a mix of technologies. They are looking at firmed, dispatchable

generation, long-duration storage, and wind and solar. This is not unique to Australia, but is based on economics. It is something that there is a role for government and coordination. It will obviously present planning challenges; and also playing a facilitative role to ensure that there are the right settings for this investment to get into the market.

The CHAIR: Obviously where we are today is in the middle of the COVID-19 pandemic and we know that this has hit the state significantly economically. From your opening statement and further contributions it is quite clear that renewables could play a key opportunity in the economic recovery of New South Wales. Is there work being done specific to the economic recovery that we will need to experience post the pandemic and the role with which the renewable sector could participate in that?

Mr O'REILLY: Absolutely. This is an historic transition. It was going to occur regardless of COVID, but obviously there will be the spin-off benefits in terms of recovery, in terms of stimulus. But importantly, it is not a stimulus that has to be paid for by the taxpayer. Getting the settings right will ensure that there is a lot of private sector investment, as I said, because it is not based upon electricity market demand growth, it is based on the closure of the existing generation. That is the clearly stated intention of the owners. If you talk about the $10 billion that I talked about investment in the Snowy region of South Australia, all going according to plan with the timeframes for the generation and the transmission, you are looking at that $10 billion investment occurring over the next six years. The Central-West Orana Renewable Energy Zone; $4.4 billion of potential investment for the 3,000 megawatt target, which could be higher depending on market interest. There, you are talking about that up to the mid 2020s, but obviously shovel-ready by 2022. The government indicated an intention to develop the New England Renewable Energy Zone up to 8,000 megawatts up to 2030. This generation transition and transmission investment was already in the pipeline. It reflects market interest.

Latest advice from AEMO is that demand has not gone down too much as a result of COVID. Obviously, there has been some demand shifting from increasing household use, versus decline, some reduction in commercial use. But we are going to still have to continue to meet these demands, particularly summer demand, which can still get up into the 13,500 megawatts, 14,000 megawatts on extreme days, and we have to have the generation to meet that. We know what is closing, so we need to be ensuring that we have that new generation coming through, and there is a lot that will be happening in the next 10 years. Obviously the Integrated System Plan [ISP] goes out to 2040, and the last expected coal generation retirement would be 2042 according to the Integrated System Plan. But a lot of investment has to occur in the next 10 years. Obviously there is a massive spin-off benefit in the fact that that will be in the regions.

Ms FELICITY WILSON: Thank you for that overview. One of the challenges that we have that we are aware of is when we are expecting the market to shift there are then the flow-on effects to the upstream contributors to those industries, in particular the mining industry. Can you talk a little further about your expectations to change that and what kind of transitions would have to be undertaken in some of those communities to support future job opportunities and not have the kind of impact we have seen in other jurisdictions?

Mr O'REILLY: I assume you are talking about some of the regions that are host to the current generators. It is interesting; you may have seen only quite recently that in terms of Liddell and its proposed retirement in 2023, that its existing owner indicated interest in the large battery storage project there. I was a participant in the Liddell Taskforce, and I know the community is very focused on future energy transitions and opportunities that presents, in areas such as pumped hydro and so on. It is also important to note too, in the resources space, that even with the retirement of coal generation in New South Wales, coal as an industry has a lot longer future depending on international demand because really only around 10 per cent or 11 per cent of New South Wales coal is used for domestic coal generation. The vast majority is for export.

I know of other plans. There are other plans at Mount Piper for a proposed waste to energy site. There is solar investment being considered at the Vales Point site. There is also potential, because of the quality of the grid connections on those sites, for other forms of energy investment in those sites, to go with those regions. But there is also that, like all parts of the state they will benefit from a reliable energy grid, but also the lowest cost energy grid. And we are starting to see wholesale prices come off in the market through the increasing availability of the lowest cost forms of generation. If we can get this right, obviously, then we have facilitated lower energy prices in New South Wales, there will be no compromising on reliability. In fact, in the electricity strategy, it was clearly noted that New South Wales had an energy security safeguard, an energy security target that would ensure New South Wales had reliable power as we make the transition. For all regions there will be increasing spin-offs from the lower cost of energy for the state, allowing value adding and new industries and potential processing.

I know of one particular proposal, a rare earth proposal around the Central-West Orana Renewable Energy Zone, where they had talked about potential for cheaper energy to allow more processing on site. For the

whole of the state the interest is in the lowest cost of energy, but for those areas where the closures will occur, there are potential new uses, in an energy sense and a non-energy sense, for those sites and increasing amounts of jobs. In terms of the resources sector, as I emphasise, closure of coal generation should be seen as distinct from the coal industry in New South Wales, which is largely export orientated.

Ms FELICITY WILSON: I have another question which I am hoping you can comment on from an industry perspective, not a government policy perspective, if you are happy to. You have spoken a bit about different potential sources in the energy mix, like pumped hydro and solar. Could you talk us through two other options? One is hydrogen, and the other is nuclear, which is back on the radar.

Mr O'REILLY: First of all, in terms of hydrogen, obviously a lot of work is taking place at a national and state level looking at hydrogen potential for the state, both as a feedstock, but also as an export opportunity through electrolysis. A lot of opportunity in New South Wales comes from cheaper renewable energy for potential export of hydrogen, but also for use as a feedstock to ensure the competitive cost of fuel for industry and value-adding. The government has a strong hydrogen strategy. There is a lot of work taking place at a national level.

In terms of nuclear, I note the Deputy Secretary, Michael Wright, will be here from Resources, so I will leave comment to him, but obviously we go by what the market tells us in terms of energy generation. We do not have proposals from investors looking to invest in nuclear generation in New South Wales; putting aside obviously that there are major facts that would stop that happening at the moment, in terms of regulation bans.

We have not had people coming to the Department indicating their desire to invest in nuclear energy. It may have a role globally, but in terms of the levelised cost of managing nuclear, we are told it is three or four times more expensive than wind and solar. In the market-driven industry, as energy generation is in New South Wales, no-one would be taking a bit like that. Of course, there are the issues of cost. To take a bet on these forms of generation is a huge investment over a very long period of time. The evidence has been of huge amounts of blowouts in costs. Obviously the current regulatory situation and the ban on nuclear generation in New South Wales is a fact of life, but the department is driven by and focused on what the market is telling us, and they are not telling us there is any interest in investing in nuclear generation in New South Wales.

Mr JAMES GRIFFIN: Mr O'Reilly, it is incredibly heartening to hear about the Energy Zones and to read about that. My question goes back to a comment that you made a little bit earlier about timing. With the retirement from coal, and understanding that the obvious investment appetite is there from the market, are you comfortable with the time frames in which the Energy Zones are operating to make a transition happen as seamlessly as possible?

Mr O'REILLY: I can assure you that we have been very focused on the lessons of other jurisdictions where short-notice retirements of large generation, with Hazelwood being the stand-out, led to market-wide impacts, which went on for a number of years in terms of wholesale energy costs in the market. We take the advice of the market operator, but we also look at the intentions of the owners of our plants. AGL has flagged for a long time the closure of Liddell. The market operator and the government has been very focused on that closure date, and has brought forward things such as the enhanced Queensland-New South Wales Interconnector, the enhanced Victorian Interconnector and the Energy Zone in Central-West and Orana, with target dates around the particular time of that. Later this week the Australian Energy Market Operator will release its Electricity Statement of Opportunities, which gives an outlook for the New South Wales supply and demand going forward, and which will indicate the situation in relation to the post-Liddell environment.

Longer term, I think the biggest transitions occur towards the end of the 2020s and into the 2030s, where the large amount of bulk supply in New South Wales will be retiring. Energy Zones by nature, with their expensive transmission and generation investment, and significant planning issues, will take time, but the government is focused on preparing for those market-foreshadowed retirements. Since Hazelwood occurred there are more requirements around notice to the market of retirement but, with the way technology and cost is going, the risk is more on the side of potential retirements before 50 years of age. It is not guaranteed, but at least we should assume the dates that we are given by the owners and AEMO. Not many coal plants ever go beyond 50 years. We need to be ready for those dates. The focus of the government is in developing the zones with those dates in mind to ensure that new generation is ready, or is even prepared before the closure of those plants, to ensure as least disruptive a transition as possible.

Mr ANOULACK CHANTHIVONG: Mr O'Reilly, thank you for coming along. I have some questions broken into four sections. I will start with my first question regarding jobs. You have mentioned regional jobs. What is the net job figure in terms of those that will be lost in regional areas and those that will be created? Specifically, what regional areas are we talking about?

Mr O'REILLY: The government will be undertaking a regional benefit study of the transition. In terms of job losses, obviously over time we would be preparing for any transition and the considerations in relation to that. The government was part of the Liddell Taskforce, the report for which in time may be released. It is with government now. But in terms of energy zones, for instance, the Central-West Orana Energy Zone, in New England, it was indicated that $12.7 billion of investment would lead to 2,000 jobs. In the Central-West, again, we are looking at around $4.4 billion of investment and 450 jobs. Overall, in the Energy Zones there will be 2,000 jobs per year. There is going to be a distinction here, too, because there will be the enormous investment phase, with different jobs obviously in construction, design and development, and the huge stimulus that comes from that. But once you have established those zones, then you will see the flow-on benefits to ongoing jobs from the cheaper cost of energy.

Users often like to locate close to generation to deal with loss load and offtake agreements, so it will be a significant job stimulator in New South Wales from the investment in Energy Zones. To date, because we have been focused on the Energy Zones, it is very much an estimate on those jobs, and I have given you those figures. Inevitably, some jobs go in any transition, but the important thing for the state is the lowest cost of energy will see a net increase in jobs and more opportunities. As I indicated to you, in some of the regions where generation will close, if you think about coal generation, the vast majority of coal produced in New South Wales is for export and is completely de-linked from the issue of the closure of energy generation. Like any transition, there is change, but transition that leads to a lower cost of energy for New South Wales will see a lot more jobs created than we will see depart.

Mr ANOULACK CHANTHIVONG: When you talk about the regional benefit study that will examine the net employment outcome, when is that being done and when will that being completed?

Mr O'REILLY: The department is in the process of commissioning that study. I can take that on notice and give the Committee an update on its progress.

Mr ANOULACK CHANTHIVONG: The zones that we have spoken about, up in New England, for example, I suppose the jobs that will be most impacted are the ones in the current energy producing areas, particularly the Hunter. How does this new transition phase look for our communities in the Hunter region and in other parts where they will be most impacted as well?

Mr O'REILLY: As I said, I was one of the New South Wales representatives on the Liddell Taskforce. We spoke extensively to stakeholders in the area, and with councils. Even the councils in Muswellbrook and Singleton indicated they were very focused on the future opportunities for their area. There are such things as pumped hydro and battery proposals, including the one at Liddell. They recognise that Liddell is a 50-year-old plant. There has been a long-term build-up to its closure. As I said, they also recognise that the issue of coal mining is distinct from coal generation in New South Wales. What you have to look at is that there are high-quality grid connections in those sites, so there are plenty of opportunities for transmission or new use in those sites for energy purposes post-coal. As I said, like all regions, they would benefit. There is still the significant manufacturing and export base around the Hunter and it would benefit from the lowest cost of energy, and facilitating the cheapest energy in New South Wales is the best way to ensure jobs for those regions.

Mr ANOULACK CHANTHIVONG: I do not doubt the low-energy focus. I think that is something we can all agree with. If these future jobs are going to arrive, what then are the government levels of training and support and transition to help those workers move from their current jobs to future jobs not only in terms of their training but also their income? What are the plans for that phase of this from old to new?

Mr O'REILLY: There are a lot of taskforces in the Hunter focused on this, some of the local taskforces, there was a taskforce led by AGL, and obviously these were issues that came up in the discussions around the Liddell Taskforce. There are clear timelines around this transition, and most of these go out to most of the plants going for 50 years. There will be opportunities to plan for those retirements and opportunities to retrain those workers. That is a clear role for the communities and for government going forward. Obviously there will be new opportunities in other forms of energy, but the time frame around this is fairly clear. It is even understood by the workers. We will be working, and government will be very focused on working and planning for, future retirements and ensuring the best possible transition occurs in New South Wales.

Mr ANOULACK CHANTHIVONG: And will this be part of the commission of the study that the department is examining in terms of the assistance through the transitioning phase? Will that be a focus of the commissioning study?

Mr O'REILLY: I understand it has been more focused on opportunities but I am very happy to take that question on notice and come back to you.

Mr ANOULACK CHANTHIVONG: It would be worthwhile. It is great that we have this opportunity but people cannot just skip from the current skill set that they have to a new one overnight**.** Not only that, if the training is going to take time, then there has got to be an examination of their income through that particular stage because families have got to live and the communities have got to survive. I am hoping that the study that has been commissioned would actually examine that as well.

Mr O'REILLY: I am sure there would be many parts of government to consider this, but we will take this on notice. I can assure you that in terms of the transition, what I discovered, and those participants from the federal and state government that participated on the Liddell Taskforce found, was that the communities there were overwhelmingly focused on a forward-looking agenda rather than trying to turn back the tide.

Mr ANOULACK CHANTHIVONG: I do not think anybody would disagree with that, but sometimes a transition phase can also create a lot of anxiety, because of the uncertainty involved. I think giving our communities some sort of reassurance that we are looking at it and listening to some of their concerns would actually be quite helpful. In the jobs aspect as well, I have seen a number of reports where you look at it through the comparison of salaries of the new jobs. When it comes the old jobs, there is quite a discrepancy, at least in estimation, of future salaries being much lower than current salaries. Is that an aspect the department is looking at as well? Because it is hard to ask someone to transition from $100,000 at a coal mine to, say, $75,000 installing batteries. That is quite a big adjustment for a lot of communities.

Mr O'REILLY: Look, it is clearly the nature of the generation that replaces the old generation. It is undeniable that in some cases it will be less labour-intensive. However, again, energy is an enabling industry and we facilitate the transition to the cheapest cost of energy. There is a lot of high-paying jobs that flow from a lower cost of energy and so that is an important focus.

The other thing is also to remember in terms of the transition that this is not all paid for by large private investors. A huge amount of investments occur by households themselves in their own forms of generation and future battery storage. Installing new meters, of which there are now 700,000 digital meters in New South Wales; solar installation; future battery installation is very labour-intensive and creates lots of jobs, so there will be a change here. Obviously a lot of work will go into looking at the opportunities from this and the transition, but it is important to note that this is a transition that is happening globally. We want to be at the vanguard of that. We want to prepare for it and take advantage of it, and getting the lowest cost energy outcomes will lead to the highest and best quality jobs.

Mr ANOULACK CHANTHIVONG: It is something that is certainly worth considering in any future study, because families and communities have every right to be concerned if the transition is going to lead to a substantial decrease in their salaries. My only other point of thinking is where those jobs are actually located. For example, with my friend who works in the mine industry, he has never been to a mine in his life. He is just a software programmer, based in Perth, and he can run every single machine from Port Hedland to Broome. I do not want communities who are going to be most impacted by this new change - which is a global movement in energy, which is fine - but then for those communities to then be left behind and not be given the level of support in their training and their transition, and also seeing a substantial decrease and their incomes actually greatly reduced. It is certainly a role for government to be examining these issues.

Mr O'REILLY: One thing I would emphasise is that obviously there has been a lot of focus, for instance, on Victoria and the Latrobe Valley, but in New South Wales generation is in the areas of the Hunter, around Lake Macquarie, Lithgow, close to the mountains. There are very diversified economies that are far less dependent just upon electricity generation than, for instance, the Latrobe Valley. I am not saying that there will not be significant issues with the transition, but again, we have found in our discussions with local communities that they are very focused on opportunities, not just problems.

Mr ANOULACK CHANTHIVONG: Fair point. As part of the new energy world, what thoughts have been given towards the manufacturing aspects of the new energy? For example, from some of the reading I have done with wind generation, a lot of the parts are not even made here locally. Are we looking at assessing whether it is seed investment, or training in those skills, to allow us to take another slice of the new energy world, to allow it to create jobs?

Mr O'REILLY: Again, I will take that on notice. There will be work done on opportunities, but there is a balance here as well, because many of these industries have global supply chains, and you do want to make sure that you are getting the lowest cost of energy. You should always focus on energy as an enabling industry, and the focus of energy policy is on the lowest cost of energy, reliable energy, and then from that you have a lot of value-adding economic opportunities that flow from that.

Mr NATHANIEL SMITH: I know it was brought up earlier. Ms Felicity Wilson mentioned nuclear energy, hydrogen and other forms. In the Wollondilly area obviously we have coal mines, SIMEC and South32, which help produce steel. What sort of research and other thoughts have you put into waste? Because one of the big things we have going forward is waste. We are trying to reduce waste as much as possible. In our area we are very lucky to have freight trains, to be able to move waste and other forms of material. Have you been looking at waste-to-energy in certain areas, especially for the south-west of Sydney, where a lot more homes are going in over the next 10 to 30 years?

Mr O'REILLY: Some of these areas are outside the purview of energy policy. I will not comment in too much detail, but what is the essence of New South Wales policy is to respond to market trends. I am, for instance, familiar with potential interest in investing in waste-to-energy on the Mount Piper site. There will be a portfolio of technologies that come forward as a result of this energy transition. We would be very mindful of the fact that the market will dictate the outcomes going forward. We are looking in this report at economic opportunities, and we will take it on notice where we are up to with that study and come back to the Committee, and take on notice your interest in that area.

Mr ANOULACK CHANTHIVONG: I want to move on to reliance and pricing. You spoke about the grid and the investment in the grid to cater for the new energy sources. My understanding is that the way the Independent Pricing and Regulatory Tribunal [IPART] regulates the grid is that they will get a return on whatever the cost is. Does that mean that the increase in investment in the grid will lead to some price increases as the base price?

Mr O'REILLY: It is important to understand that in terms of the network sector of New South Wales, energy is actually regulated at the national level by the Australian energy regulator. You are quite correct that any investments in the grid are reviewed, because by nature the electricity grid is a natural monopoly. They are reviewed by the regulator to ensure that there is both an achievement of positive cost benefit outcome, and they also review the costs of the proposals to ensure that they are as prudent and efficient as possible. This is an historic investment in the grid, but with the long-term focus on achieving the lowest cost of generation and to access the lowest cost of generation, we are going to have to make investments in the grid.

The wholesale energy savings should offset any additional costs as a result of grid enhancements. That is what we are being advised is the best approach from the national market operator. IPART tracks competition and reviews prices in New South Wales each year to see that the increases reflect the growth in costs; it is monitoring the market. Any investments in the grid that are passed on to consumers are reviewed by the Australian energy regulator and that will continue to be the case.

Mr ANOULACK CHANTHIVONG: With the new mix in energy that is coming from renewables, does that mean that those households who do not have renewables or are unable to afford renewables - that is, cannot afford to put solar panels into their house - do they then wear more of the cost of the grid in their bills because they are using all their energy from the grid, whereas households who can afford renewables are not using as much energy from the grid, so therefore their contribution to maintaining the grid and profit margin on the grid is actually falling on those who are more moderate and lower income?

Mr O'REILLY: The government recognises that, by nature, energy costs are a higher percentage of the income of lower income people, which is exactly why, for instance, in terms of solar, the government supported the Solar For Low Income Households Trial, where people would potentially trade off some of their rebate access in return for solar investment, and participants are very willing participants in that study, at the same time, recognising the fact that people of lower means often spend more of their income on energy as an essential service. That is why 860,000 New South Wales people access rebates from the government each year, at a cost of $300 million a year, and by rights that is absolutely the best approach to ensuring that those sometimes without the ability to pay for energy have the requisite support. They have also established the Energy Switch program in Service NSW, to allow consumers to access the cheapest available offers in the market.

Mr ANOULACK CHANTHIVONG: Is that something that the department should continue to monitor? That is, that the energy costs do not continue to rise as a percentage of income, particularly those on lower to moderate income, as we have a greater mix of renewable energies into the system?

Mr O'REILLY: I assure you that the government monitors a lot of trends, as does IPART. The Australian energy regulator also sets a default market offer in the market. This is an industry where the government has assured there is appropriate scrutiny of prices and consumer outcomes, and in terms of the rebates program, government funding to ensure that energy affordability is addressed, and now increasingly access to solar is enhanced by programs such as the Solar For Low Income Households Trial.

Mr ANOULACK CHANTHIVONG: How much is that program worth?

Mr O'REILLY: I will have to take that on notice. It is not in my direct area of responsibility, but we can come back to you on that.

Mr ANOULACK CHANTHIVONG: And if you can, how many households have accessed that particular program? Whilst we are all for clean green energy, I do note that in the industry, particularly in the solar rebate schemes we have had in the past, they have actually favoured those that already have the means to do it, which means the cost has been borne by those who are on the lower income scale, and that is fundamentally quite unfair from my perspective. As we move towards the more renewable mix, how does that work on royalties, because I do not think we have royalties on wind and solar at the moment. What does that mean for the public coffers in terms of the royalty scheme and our income? How do we replace that?

Mr O'REILLY: I will have to take that on notice. I would suggest that you direct that question to the resource area of the department,, rather than the energy area. In terms of royalties, there is no knowledge in terms of how it would apply to renewables, but I understand that royalties come from coal, which is why I suggest that you direct that question to the resources area.

The CHAIR: You mentioned the Latrobe Valley in a previous answer, they obviously have put in place a transition agency to support the change that was happening there. Obviously we have spoken about existing sites with excellent green infrastructure but a decline in coal. Mr Chanthivong raised concerns about the loss of some of those skilled jobs, requiring people to be re-skilled. Has there been thought in government about the creation of a transition style agency to oversee and combine the energy and skills changes, all in one government process?

Mr O'REILLY: I will come back again to the experience of Liddell Taskforce. There are lots of locally oriented transmission task forces. There is also an AGL-led task force. I think the communities themselves invest quite a bit in it. It was one of the issues that came up, obviously, as part of the Liddell Taskforce, and that may be addressed in time whenever that report is made public.

The CHAIR: Thank you for appearing before the Committee today. You may receive further questions in writing and your replies will form part of your evidence and be made public. Would you be happy to provide a written reply to any further questions?

Mr O'REILLY: Certainly.

(The witness withdrew.)

MICHAEL WRIGHT, Deputy Secretary, Mining, Exploration and Geoscience, Department of Regional NSW, affirmed and examined

CHRIS HANGER, Deputy Secretary, Public Works Advisory and Regional Development, Department of Regional NSW, before the Committee via videoconference, affirmed and examined

The CHAIR: Before we start do you have any questions about the hearing process?

Mr WRIGHT: No, I do not.

Mr HANGER: No, I do not.

The CHAIR: I will start with the statement on coal that was released. A key part of that is supporting diversification in coal-aligned communities to assist with the phase out of thermal coal mining. Could one of you speak to what that process looks like, the funds that are being invested in it, and the role that the community plays in that process? Mr Hanger?

Mr HANGER: I am happy to start, and Mr Wright might be able to add some more context as well. Diversification is really important, as you saw in the statement on coal. We do understand that those communities that have been heavily coal reliant are going to transition, and there has been and is a lot of work that the government is doing to help them through that.

I am particularly keen to talk about a couple of projects that are specifically targeted at those communities that are at the forefront of that transition, especially the Upper Hunter. There is work that has been underway for a number of years, and is continuing through a project called the Upper Hunter Futures Project, where we are looking at the scenarios for those communities, and what is required to help those communities diversify and broaden out their economies as they do move away from coal. The important parts of that are obviously the engagement with the community, with industry and with local government stakeholders. This comes in on what has been underway for a number of years to understand the economies right across New South Wales.

You may be aware that there is a 20-year economic vision for regional New South Wales. One of those industries, one of those drivers is for communities to keep jobs and keep prosperity in regional economies, and particularly for those communities that are very heavily reliant upon mining. We are building off regional economic development but as we do that—and there are 38 of those functional regions in New South Wales, and that tells us which industries are the drivers and what is the future for those communities, and very importantly, where does government work with community and industry to help with those transitions?

The other key element that I would just like to call out is there is a program specifically targeted to mining-impacted communities called Resources for Regions. That program has invested close to $300 million since 2012 in 65 projects to help mining-impacted communities adapt, and make sure that they are vibrant places to live and work. Many of those economies that are transitioning from coal are ones that are accessing the Resources for Regions program. Over the life of that program we have seen that, as well as being able to invest in a project that creates jobs, we also need to invest in the projects that build amenity. The current round is open, and designed very much to have those community-led projects pumped through and be brought forward by local government, who know best on the ground what is required for each of those communities to make the transition.

Mr WRIGHT: I might add something else to Mr Hanger's comment as well. The government released the NSW Minerals Strategy at the start of 2019. That was very much focused on being cognisant of that transition away from coal over the coming decades, to look at alternative employment and economic generators in the resources sector in New South Wales, with a particular focus on our metal minerals and critical minerals in particular. There is quite a lot of effort going into promoting investment in the growing metals sector in New South Wales. We have our traditional gold, copper, zinc type metals, which have long been a staple for mining in New South Wales, but increasingly we are looking at critical minerals like cobalt and nickel, which can supply the future renewable-based economies. We are looking at battery-based economies, wind turbines, those sorts of things. That is part of that transitioning that Mr Hanger is talking about as well, so diversification into critical metals, yes.

The CHAIR: For either of you; is the approach very much a place-based approach on the different regions, and/or is there a more strategic framework that the government looks at when supporting diversification or transition in communities?

Mr HANGER: I might start with that. There is an overarching framework. I talked about that 20-year vision for regional New South Wales that identifies those key driver industries. But very much it does need to be what is best for that community, both in terms of the ideas the community brings forward, but also the government in partnership with communities, that does need to be localised and does need to be a place-based approach. We do build off the work I referred to, regional economic development strategies, and then targeted work like the Upper Hunter transition work that I was referring to. That does it in a broader framework that the government has developed to understand how to support economic diversification and economic development for regional New South Wales.

Mr WRIGHT: In the critical metals space we are in some significant dialogue with the Critical Minerals Facilitation Office, which is a Commonwealth body, looking at in particular the Parkes Special Activation Precinct as a potential future critical metals processing hub. So there is lots of good discussion happening about growing the supply chain in New South Wales, from metal extraction, to processing, to potentially metallisation, and hopefully manufacturing down the line as well.

The CHAIR: The process, particularly in the Upper Hunter, could you go into a bit more detail about the role the community plays, how they bring ideas to government, and the role of the various stakeholders in that process of looking at diversification?

Mr HANGER: As there would be for any strategy, there will be work that is undertaken to identify, for that community, where are they now and what are the opportunities, in terms of job creation, which is particularly where we are focused at the moment, and given the high employment in the Upper Hunter in the coal industries, what are the other industries that represent opportunities, and what are the interventions required and the support that is required. Very often that will be both in terms of hard and soft infrastructure. As examples, there may be members of the workforce that can retrain, ready for new industries that present opportunities up there in the Upper Hunter - tourism, for example.

There may also be investment that is required in a hard infrastructure sense, as well as having skills to take advantage of new industry opportunities, there is often investment that is required—again I will use tourism as an example—to invest into the tourism infrastructure, that means people will spend longer in a location, spend more, as well as having the product that will keep them in those locations.

From a community perspective, as I said, outside the strategic work it is very important that community, the residents as well as industry, are actively engaged in the development of those strategies. That is underway at the moment, and in consultation with the commission, to work with us to develop that Upper Hunter strategy. But it will begin the process we undertook with the regional development strategies, where it was very much a partnership between the state government, local government and community to identify those key industry sectors, and also what are the interventions and support that is required for those communities to prosper.

The CHAIR: Obviously you have spoken about Resources for Regions and other sorts of investment. Is there a current plan, proposal, or consideration for skills, retraining and investment in these areas, and what sort of funds has the government put towards that?

Mr HANGER: Skills will be central to that. The strategy development has not yet been finalised. There is very significant investment that has been undertaken to ensure that people have the right skills in the industries of the future. As I said, the Upper Hunter transition strategy is still in development. The outcomes of that, both in terms of hard and soft infrastructure, we would absolutely be looking at, as well as what we need to invest in to ensure that that strategy is successful. I mentioned Resources for Regions, and I did indicate that over the life of that program it has moved itself from equity to hard infrastructure, for straight job creation. The current round of that program enables skills development as well as hard infrastructure investment. As economies and communities transition, we need to adapt our investment and program structures accordingly.

Mr JAMES GRIFFIN: An interesting comment was made earlier about the rare-earth mining in cobalt and nickel. I am interested to see whether there has been any work that aligns that opportunity with the Energy Zones, the creation of the wind turbines and the hard infrastructure that you mentioned, because that seemed like an opportunity to connect and dovetail with some of the strategy and the work that is going on there. I realise that it will not go a terribly long way in offsetting the obvious loss of coal exports but, needless to say, as you point out, it does present an opportunity from the disruption that has taken place.

Mr WRIGHT: I might respond to that to start with. I have been speaking to some of the critical metal proponents like Clean TeQ, which is keen to extract cobalt and nickel just out of Parkes, and which is really interested in burnishing its environmental, social and governance credentials by accessing renewable energy to run that proposed mine. That potentially plays into a circle economy arrangement, whereby that cobalt and nickel is used to produce batteries, which then store renewable energy, which then supplies the mines. There are real opportunities in that space, there is no doubt about it. Certainly a lot of the critical metal proponents, but also some of our traditional miners like the gold and copper players, are interested in getting a bigger feed of renewable energy going forward. We should definitely build on synergies in that space.

Ms FELICITY WILSON: Thank you very much for joining us today. I asked a question of Mr O'Reilly from the Department of Planning, Industry and Environment earlier from a market demand perspective, but I am wondering if you can comment more from a resource industry perspective, because you have spoken a bit about domestic and also export markets here, on a couple of the different feedstock options that we spoke about and that are in the public mind at the moment. One of them is hydrogen, which there is a strategy around, and I wonder if you could comment on how that interplays with or competes against other existing resources and minerals? The other is a question around nuclear energy and uranium as a feedstock for nuclear energy.

Mr WRIGHT: The New South Wales government is supportive of the National Hydrogen Strategy, which is technology neutral. As you are probably aware, there are different ways of producing hydrogen. There is green hydrogen, which uses renewable energy, or there is blue hydrogen, which uses fossil fuels and carbon capture and storage. The government in New South Wales is technology neutral as well, as is the National Hydrogen Strategy, in terms of what technology might be put in place to produce hydrogen and stimulate demand for hydrogen. The intention is that, over the medium to long term, we move to a green hydrogen supply model. But with the way the cost structures are currently, it is cheaper to produce blue hydrogen, if you can capture the emissions and store them safely, than it is to produce green hydrogen.

There is an argument that you should look to produce blue hydrogen in the first instance to stimulate demand for that product, and then transition to a 100 per cent green hydrogen footing. Obviously in terms of blue hydrogen, with the fossil fuel resources that New South Wales has, it could produce blue hydrogen if prospective geology for sequestering carbon could be located, and those emissions could be transported and stored in that geology. Obviously depending on what happens in the gas space, possibly gas; but certainly coal. With our burgeoning renewable energy industry, in the medium term, there are also significant opportunities for green hydrogen. The second part of your question was in relation to—sorry, Mr Hanger, did you want to say anything about that?

Mr HANGER: The energy efficient lights have just turned off here.

Mr ANOULACK CHANTHIVONG: Energy reliability issues.

Mr WRIGHT: In terms of uranium, there has been a prohibition on uranium mining in New South Wales for many decades. The prohibition on exploration of uranium was lifted in 2014, but the mining prohibition was not lifted. An expression of interest was run in 2014 for exploration licences for uranium. None of those ended up being issued, and there are a couple of reasons why. One was that the Fukushima incident happened and there was a significant reduction in the price of uranium, so it became economically much less attractive. But also, exploration proponents could see no pathway towards actually extracting that resource, should it be commercially viable, given the prohibition on uranium mining. The government is currently considering lifting that prohibition on uranium mining. That is all I would say about uranium. I am happy to take other questions, though.

Ms FELICITY WILSON: When you were speaking about blue hydrogen you made reference to what happens with gas. Can you talk about the prospects for gas in the marketplace? We have a fairly significant application under consideration at the moment, not just as a general feedstock, but whether or not we have the gas in the New South Wales pipeline, shall we say, to meet the goal of looking into hydrogen in the short term to transition to green hydrogen?

Mr WRIGHT: New South Wales currently imports the bulk of its gas from other state jurisdictions. Theoretically, that imported gas could be utilised for blue hydrogen production in New South Wales. Obviously there is a proposal, which is still being considered by the Independent Planning Commission [IPC], for coal seam gas extraction at Narrabri. That could also be a potential feedstock for hydrogen, should the IPC determine or approve that particular project, which is still a matter before the IPC.

Ms FELICITY WILSON: I have another question on uranium mining. You mentioned the impact that Fukushima had on price and demand for uranium. What does the global market look like currently for uranium, if we put aside the question of domestic use as an end-of-export product?

Mr WRIGHT: I am not an expert on uranium commodity prices, but my understanding is it is still pretty sluggish, and the global supply is sufficient to meet current demand. I think the view is there may be some medium-term increase in uranium commodity prices, but that the uranium commodity price is still relatively deflated compared to previous historic prices.

Ms FELICITY WILSON: Are you seeing much demand within the market to access uranium mining now? You have previously said with the expression of interest process that there was not significant interest. Are you seeing any interest from the industry in uranium?

Mr WRIGHT: Through that expressions of interest process there were something like 14 expressions of interest received, but none of them actually went all the way through to the issuing of an exploration licence for uranium mining. I am not sure what the industry appetite for uranium exploration and mining in New South Wales currently is. There is not a lot of knowledge about the prospectivity for uranium mining in New South Wales. We believe that there are some potentially commercially viable resources out towards Broken Hill, but further exploration work needs to be done to determine whether there would be a market interest in pursuing the particular resource.

Ms FELICITY WILSON: My last question on those is on when are we talking about communities transitioning. You mentioned the Upper Hunter as one example, but obviously with different views. Do you have a view that feed stocks like gas, or minerals like uranium would play a role in that transition? Or do you think that the strategies we already have in place for transition in both communities around renewables et cetera are currently sufficient, knowing that you have not completed the Upper Hunter study yet?

Mr HANGER: We talked about place-based solutions. So, depending on the location that we are talking about, obviously the future industry opportunities may include energy or other forms of mining outside of coal. Obviously coal is really the transition that will occur in the Upper Hunter, but at locations such as Wollongong, where they are actively looking into opportunities for hydrogen, it really will depend on each location's natural endowments, and whether those are mineral or other endowments that are there, as well as industries that are there, so whether that is renewables or tourism. In the Upper Hunter there is obviously an equine industry and wineries. It really will be a place-based approach, and very much our work is designed [technical malfunction] development strategies to work with the communities on both mapping those economies and their potential, and then what investment is required from government to activate that. Clearly, if it is alternate mining or energy opportunities, that will be a different investment, for instance, than what we would need if it was tourism focused.

Mr NATHANIEL SMITH: You mentioned earlier about Royalties for Regions. Firstly, the Wollondilly local government area just got on the program for royalties for regions, with a benefit of about $2.1 million, which was used in the community. It finished off the construction of the Tahmoor Sportsground and a new active bike track. For the benefit of the Committee, since I am the only regional MP here, could you give us

a bit more information about royalties for regions for the Committee's benefit? How is it distributed per year on the amount of resources that come out of that region?

Mr HANGER: The first thing is that it is called Resources for Regions. It is not a royalties-based program in the same way as in some other jurisdictions. I think people would be aware that there was a Royalties for Regions program that ran in Western Australia. In New South Wales, the program for its entire duration has been Resources for Regions. It is not connected to royalties per se, but it has been a very successful program and it is in its seventh round. In the first six rounds close to $300 million has been invested in over 65 projects across the state. The way in which those projects have been determined—for every round apart from the current one—they had an application-based process, where projects are put forward, assessed to ensure that they meet the criteria of economic benefit to the community, affordability, deliverability, as well as strategic alignment. We are looking for projects that are going to deliver for those communities and, as I have indicated, for the first round we also had an overlay that was ensuring the economic benefit of those projects.

We took feedback. So after those six rounds, we have undertaken a strategic review of the program. Based on the feedback that came from stakeholders, we have adapted the program's current round to move away from the state-based competitive process to identifying those communities most mine impacted, and providing them the funding to bring forward the projects that are going to be most relevant for them, and that enables those local solutions to be delivered. The current round of the program is open until 2 September, and we are really look forward to seeing the new types of projects we may see, outside of just economic infrastructure, which has been the focus to date, as we move towards programs that support communities, provide service delivery in ways that is slightly different than the harder economic infrastructure. There are some really good projects that come through that program. It is one of the areas where I hope our investment into those mining impacted communities and the further investment to come will be well acknowledged by those communities.

Mr ANOULACK CHANTHIVONG: Thank you for your time, Mr Hanger and Mr Wright. You mentioned the Upper Hunter Futures Project. I might have missed it at the start. Is that currently being undertaken? And if it is, when is expected to finish?

Mr HANGER: That is correct. We have gone out to tender and we are working, as I might have mentioned, with Deloitte. That work is currently underway. It is expected to be finalised in terms of the first stage of that strategy before the end of the year. I would have to take on notice and provide a few more details if there is some information of the tender. I will take on notice and provide for the Committee a bit more detail around the time line there.

Mr ANOULACK CHANTHIVONG: Probably related to the questions I asked Mr O'Reilly who was here earlier, will the Upper Hunter Futures Project look at things like net employment because of the change into new renewable mix? Will it look at salaries, assistance, training and support for those who are going to transition from old jobs to new jobs? Will that be part of the study as well?

Mr HANGER: Absolutely. One of the benefits of being online is that I can bring up the summaries. The online summary of the project really is to look at those future scenarios for the Upper Hunter, and what actions are required to help those communities and that economy transition. Importantly, there is not just a move away from coal, but what other industries are going to provide job opportunities. We are aware as well that, for the Upper Hunter, although there has obviously been very significant improvement in terms of the drought up there, that is another issue that community needs to work through. This strategy is not just a move away from coal, but what are the opportunities long term? As I said, what are the investments that are going to be required to support the transition of the community?

Mr ANOULACK CHANTHIVONG: And will that report be made available to the Committee when it is finalised? Or can it be it be provided to the Committee when it is finalised?

Mr HANGER: Yes. I expect, similar to the Regional Economic Development Strategies which we have loaded up so that they are available to communities, we would like to see these documents very much as a guide for community and a document that the community is heavily involved in. It is their future that we are talking about here, so I do not see any reason why that would not be made public.

Mr ANOULACK CHANTHIVONG: Can I just follow on to Mr Nathaniel Smith's questions regarding Resources for Regions. You spent $300 million, what is the actual budget for the program?

Mr HANGER: The total with the additional $50 million I am going to say is $350 million. The current round is $50 million, so that program has probably got $350 million. I will confirm the actual numbers.

Mr ANOULACK CHANTHIVONG: What are the goals of the Resources for Regions program? Is it employment? What is the goal that it is trying to achieve?

Mr HANGER: In its simplest form it is to support—

Mr NATHANIEL SMITH: Energy efficient.

Mr HANGER: Very energy efficient. In summary, Resources for Regions is there to support mining impacted communities. I have talked about this program. In the first of the six rounds of the program, it had a strong focus on projects that were going to provide economic benefits for mining impacted communities. The program in those first six rounds was administered out of the Restart NSW fund. As I provided in a brief snapshot, those initial projects were to enhance the economies of those mining impacted communities, and invested often in harder infrastructure. We undertook a review, and the feedback from communities was the program did need to transition.

So the current round of the program, as well as enabling that economic infrastructure to be supported and for investment to occur, we have broadened out the remit to allow what I would probably call softer service and programmatic responses that communities might need. The majority of projects to date have been hard infrastructure, and might be investments into things like road upgrades, investments into water security, and there have also been some major upgrades to attract business. We are currently receiving applications, and they do not close until 2 September. I have kept a different project and program mix in this round, and that was off the back of the feedback from the communities that the program did need to change.

Mr ANOULACK CHANTHIVONG: Does that mean that the focus on the harder infrastructure upgrades that you mentioned was too restrictive at the start, and hence we are moving towards a greater mix of projects rather than just repairing roads or bridges or main streets, is that correct?

Mr HANGER: Jobs are always important. It is very difficult to have a say in communities if you do not have that clear and very strong focus on job creation and job retention and economic benefits; if the jobs in the community suffer. I think the approach is very much the right approach. The Restart NSW fund is a legislated fund and it does come with restrictions. There are two types of projects to invest in. We transitioned that program because those first six years invested in some fantastic projects, but we listened to the communities, and they wanted a broader set of programs and activities that they could bring forward. The government has responded to that, and the current round allows both economic as well as slightly more community focused projects and programs to come forward. I do not think the first rounds were too restrictive.

Mr ANOULACK CHANTHIVONG: They were or they were not?

Mr HANGER: They were not.

Mr ANOULACK CHANTHIVONG: Do you think that the amount that has been allocated—because I think that the impact on some of these communities has been quite substantial—will be enough going forward?

Mr HANGER: It is important to remember that Resources for Regions is one program, and is part of a broader suite of what the government calls the Regional Growth Fund. That program is $1.7 billion that is being invested across the state. There is over 2,000 projects. Many of the programs are targeted at a local government level. Stronger Country Communities, for instance, has invested $400 million in every regional local government area in community infrastructure. The Growing Local Economies program is again targeting economic activation and that is another $500 million. There has been record investment undertaken. There is also the $4.2 billion Snowy Hydro Legacy fund. There is not a shortage of investment. We have adapted the program to make sure that it meets the needs of communities, and that has changed over time. My responsibility is regional development, and I think this has been a period of record investment, and the program suite needs to be seen in its full context, not just one program on its own.

Mr ANOULACK CHANTHIVONG: You did say you were focused on economic benefits and employment. What has been the employment rate impact as a result of your projects? I am asking whether when you fund a particular project and it employs a particular individual for a certain time, has that then led to much longer term employment post the project actually being complete or funded?

Mr HANGER: There are a couple of comments there. Every project needs to provide a business case and that business case needs to outline costs and benefits that the project will deliver; for projects that have an economic focus, in those first six rounds we undertook a cost benefit analysis to show the economic benefits that each of those projects would deliver, and we would typically look at jobs reconstruction. Once that project is up and running what are the jobs associated with that? At a slightly more macro level, which is where we are headed in terms of unemployment rates, probably it would be best for me to take that on notice to show the changes between employment and unemployment. There will be a whole range of factors that impact regional employment. I refer very briefly to drought. The Upper Hunter is one example. Although it has had rain and things are

improving, that would be an impact as well. A Resources for Regions program would not necessarily be able to mitigate that. I will take that on notice.

Mr ANOULACK CHANTHIVONG: I assume that every project would have had a benefit-to-cost ratio greater than one?

Mr HANGER: That is right. Restart NSW is a legislated fund and those projects all needed to have a positive benefit-to-cost ratio.

Mr ANOULACK CHANTHIVONG: My last question is to Mr Wright. In terms of royalties, at the moment we get some royalties from gas and natural resources, but we will not get that from wind and solar, as far as I am aware. How do you plan to close that fiscal gap going forward?

Mr WRIGHT: Your question is transitioning away from fossil fuels?

Mr ANOULACK CHANTHIVONG: Yes. The impact on the royalties.

Mr WRIGHT: The bulk of the royalties that the state receives currently are from coal, and to a lesser extent from gold and copper. I am not aware of the government having applied its mind to whether there should be some sort of royalty stream on renewables. I could not comment on that at this point of time. No doubt, over the next decade or so, as we transition away from coal, that will impact on the royalty stream for this state, and that is something that the state will need to plan for.

Mr ANOULACK CHANTHIVONG: We have not done any major studies on that at this stage?

Mr WRIGHT: That is probably a question for Treasury.

The CHAIR: Mr Hanger, what would be the government agency currently ultimately responsible for supporting the community through a transition of the local economy, relating to changes in the energy mix?

Mr HANGER: The lead agency will be the Department of Regional NSW and in particular my regional development team. Depending a bit on exactly what is required, Training Services NSW will take the lead on skilling requirements. You may find again, depending on the types of investment and support, that if needed, it may be that some of that investment occurs to improve transport connectivity, for instance, or it may be in partnership with someone like Destination NSW looking to build a tourism offering in those locations. Typically it will be these economies and communities that are transitioning, they are all regional communities, so I believe the Department of Regional NSW, newly created in April this year, and it will be my regional development team that will oversee with other agencies how we support those communities transition.

The CHAIR: Thank you very much Mr Wright and Mr Hanger for your time. The Committee may have additional questions on notice. Would you be happy to provide a written reply to any further questions?

Mr WRIGHT: Of course.

The CHAIR: Mr Hanger?

Mr HANGER: Yes, absolutely.

The CHAIR: There have been a number of questions that have been taken on notice. We will make sure that they are sent to you.

(The witnesses withdrew.)

(Short adjournment)

ANNA FREEMAN, Director Energy Generation, Clean Energy Council, before the Committee via videoconference, affirmed and examined

The CHAIR: Please begin if you have an opening statement.

Ms FREEMAN: Thank you, Chair. Thanks for the opportunity to speak via video link from Melbourne, where our movements are currently quite limited to the four walls of my house. My name is Anna Freeman. I am the Director of Energy Generation at the Clean Energy Council, which is the peak body for the renewable energy sector in Australia, with over 850 company members working on large scale renewables, wind, solar, hydro, energy storage, and also distributed energy. We are responsible for policy and industry development for large-scale generation. Your inquiry comes at a very important time in New South Wales energy transmission, as it is

gathering pace with the recognition by the state government of the necessity and the urgency for change, as well as the tremendous economic and social benefits that would flow from clean energy.

Seventy per cent of the generating capacity due to retire between now and 2036 from the National Electricity Market [NEM] is located in New South Wales. The state also has the second lowest penetration of renewables of any Australian state based on levels at the end of the last calendar year. It therefore has the most significant and urgent task of any state in the country. [Audio malfunction] the last three years with 11 per cent of renewables to 17 per cent renewable energy filtration between 2017 and 2019, and in doing so attracted 4.7 gigawatts of new, clean generating capacity [audio malfunction] commissioned, financially committed or under construction and which would go up to $8 billion of private investment and create almost 6,000 future construction jobs.

The overwhelming majority of these projects have been built in rural and regional Australia, providing a major boost in employment, and local supply opportunities for regional communities. There is good reason for the state to maintain the momentum. There is a difference of about 9,000 jobs between the central scenario, under the AEMO's Integrated System Plan, and the stepped change scenario. In the long term a central scenario would involve around 5,900 jobs on average each year for 15 years. In the stepped change scenario, we could see the number of jobs peak at around 2025 of 15,000 jobs and the long term average of around 9,000 jobs a year. So there are strong economic and employment reasons why the state government should move decisively to accelerate clean energy. I have seen a number of [audio malfunction] in the area of transmission.

We are facing a very congested transmission network, which has very little spare capacity to accommodate any new investment. In the last TransGrid annual planning report I think it was around 500 megawatts spare capacity left in the state, which does not allow much room for new investment. And we are really seeing that show up when new financial commitments start up. The Clean Energy Council recently released a report showing that the commitments for the two remained fairly low in New South Wales, and since the start of the year we have only had three new projects committed, and all of them were under five megawatts each. The state government has recognised the urgency of the task, and the challenges within the network, and it has taken decisive and practical action, principally through the development of the new Renewable Energy Zones. As a result of those announcements, we have really seen the confidence of building a clean energy sector for New South Wales increase where it now enjoys the strongest [audio malfunction] in Australia.

The CHAIR: Sorry, Ms Freeman, just one second. You stalled there for a little bit. Could you repeat your last sentence?

Ms FREEMAN: The regions present an unparalleled opportunity to coordinate the investment, deliver efficient planning and design outcomes, reduce the risks associated with grid access for proponents and undertake strategic workforce planning and optimising employment and economic benefits for regional communities. [Audio malfunction] still need to improve concessions for clean energy investment in New South Wales. Specifically, our members say that the planning assessments process is lengthy and costly. There is a sense that the planning assessments team is under-resourced - while acknowledging some improvements made in recent months - that there is a requirement for duplication of work and cost through the scoping report process, which proponents have to undertake to request our Secretary's Environmental Assessment Requirements

There is a burden of evidence placed on proponents to refute claims made by objectors, rather than the objector needing to substantiate the claims. There are very high planning application fees. You might compare a large scale project in New South Wales to one in Victoria. A number of my members tell me that the costs can be in the order of several hundreds of thousands of dollars and, indeed in one case I know of almost a million dollars for a planning application fee, compared to the fees being capped at $57,670 in Victoria. That can present a major risk and a bit of a turn-off for new investment applications in New South Wales.

There are also volatile and potentially huge additional costs for biodiversity credits and offsets through the Biodiversity Offsets Scheme, and an overly oppressive environment compliance regime that is significantly more intensive than other states and necessitates frequent duplication of effort, time and cost. Notwithstanding these challenges, the CEC recognises that the state government, led by the Department of Planning, Industry and Environment, has undertaken enormous efforts over the last few months to fast track planning assessments for eligible projects, and there is an opportunity to carry this great work through a case management service.

In conclusion, New South Wales has a tremendous opportunity before it to seize and leverage the economic and social benefits for the transition to a clean energy future. Significant progress has been made in a relatively short period of time, and we encourage the government to maintain its current focus on lowering barriers to investment in the state, in order to stem the decline and realise its vision to become the most attractive destination for all energy investment. Thank you.

The CHAIR: Thank you very much. With my question I might begin where you finished. Obviously we are now in the middle of a massive economic crisis as a result of the COVID-19 pandemic. Your report talks about the tens of thousands of jobs that the renewable energy sector could generate. What action does the New South Wales government need to take to ensure that we get access to those jobs in our state, and where do you see the hurdles preventing that from happening?

Ms FREEMAN: Just picking up from where I left off, the Renewable Energy Zones really set the benchmark for how governments can very practically provide strong investor confidence. That will really be at the centre of the New South Wales recovery for the renewable energy sector. It is a pretty ambitious time line and projects will need to work pretty fast over the next couple of years in order to be in a position to get development underway in the next five years. You may not see those jobs materialise immediately, but certainly the government is putting the framework and the groundwork in place now to enable us to get investment going in those two initial Renewable Energy Zones, and I think there could well be a third one. The work we have been doing has been very positive, but at the moment we are a little bit stuck. There is a bottleneck in the transmission. Unfortunately, transmission reform moves at a glacial pace. That is why I think the derogation on the Renewable Energy Zones has been very important, and New South Wales has to take the lead in the development of those new zones.

The CHAIR: Your report discusses in various places the need to have an investment pipeline to establish a renewable energy workforce. You also talk about the training and skilling up that is needed for the sector. Could you talk to that and where you see the priorities to get that work underway?

Ms FREEMAN: We recently commissioned a study called Clean Energy at Work, which was the first national survey of the renewable energy workforce in Australia. It only covers projects, it does not think about the white-collar professionals who might be sitting in legal offices or banks that also support those projects. That is just a part of it, but it very much focuses on the operations, maintenance and construction workforce, large-scale projects, as well as the rooftop solar area. The study very much shows that there are some real needs in particular professions. By far and away the profession in greatest demand in the renewable energy sector will be electricians and electrical workers, but we will also need project managers and grid connection managers.

Understandably, that is in very high demand at the moment, those who can understand how to work with the network service providers to connect new projects. We will also need a new generation of people who are skilled to work in areas like wind, with wind technician expertise, but there are opportunities right throughout the supply chain. There is a need to do some work across all the states now to map out the training opportunities that exist to support those key areas of need. That is something that the Clean Energy Council is currently working on developing with its stakeholders.

The CHAIR: In your opening statement you raised a concern about the planning and assessment costs and processes, which you compared to Victoria, which has caps. What are the real impacts for New South Wales in keeping the status quo, versus the opportunities of moving to a model like Victoria has?

Ms FREEMAN: It sets the bar very high. Proponents that I speak to will say to me that, because the cost is so high - it can regularly be several hundreds of thousands of dollars to make an application - especially if you are concerned about the grid connection viability, it really makes you think twice about whether it is worth even applying for a planning assessment. You are going to have to be very confident that the project is going to proceed, and often proponents will not be, in this current climate, with the network transmission issues, because you are not going to get a refund if it does not work out. In the case of a project that is paying close to $1 million, you need to be very damn sure that your project is going to be successful in getting up. I think that is the biggest thing. It just sets the bar of entry very high.

The CHAIR: Just going back to the questions around the workforce. Obviously when we talk about an increase in jobs as a result of the renewable sector, that is also met with a decline in jobs in coal-related communities. What connections can we draw, and what work can we do, to make sure that those communities are looked after, skilled, and could they potentially seek those new jobs in the renewable sector?

Ms FREEMAN: There are a few areas. First of all, where there are opportunities, that is what the state government, in particular, can look at as part of the Renewable Energy Zones [REZ] development. That is one of the real opportunities through REZ development. It allows a holistic workforce planning effort to be undertaken. It is such a vast amount of new builds, over many years. It is an opportunity for ongoing employment in construction, in the supply chain, to service the development of those projects, and also in operation and maintenance. This is probably one of the best shots that we actually have to develop long-term career change opportunities for people. That is something that can and should be actively looked at. It is not only through renewable energy generation directly that the job opportunities emerge. It is also through low-cost, cheap, clean renewable energy underpinning an energy intensive manufacturing sector.

That is a real opportunity that was also borne out in the recent *Start with Steel* study that the Grattan Institute did. It looked at the opportunities for iron ore to be processed in the Hunter Valley. The jobs associated in the scenario they investigated showed that it could end up being 15,000 ongoing jobs in the Hunter Valley, by virtue of the fact of being able to process our iron ore onshore, as opposed to shipping it offshore for processing. You can do that through the development of renewable hydrogen. There are quite a number of different aspects to the jobs story that emerges through the development of renewable energy generation. Renewables is just the start of the employment story for the sector.

Mr JAMES GRIFFIN: Ms Freeman, thanks for joining us. I hope you are faring well down there. We heard earlier today from the Department of Planning, Industry and Environment. One of the key concerns it raised was similar to yours, around improved capacity issues. Do you feel that we are moving as quickly as we can with the streak of investment into the grid and transmission in New South Wales, in parallel with the Renewable Energy Zones, or would you like to see that sped up, given the handbrake that it has essentially put? I was interested in those numbers. There are only three new projects. That is really quite small in this financial year so far.

Ms FREEMAN: Nothing moves fast enough in transmission for proponents, I am afraid. We are definitely on the back foot. We started probably five years too late, but that is as a nation, not just New South Wales. There is an opportunity to put in the submission that there is an opportunity, potentially, for a review that TransGrid and the distribution companies could undertake, to see if they have the most streamlined processes that they could have. But again, with 500 megawatts of spare capacity in the system, we are simply bulging at the seams at the moment, in terms of what the current network can handle. I think the government has done what it can so far by seeking the derogation for the REZs, and it has clear time frames and, as I mentioned, they are ambitious time frames. In that respect, the current plan of action is probably as good as we can get, but there might be an opportunity for network service providers to conduct a review to see if there are any other ways they can streamline the current process, working together with AEMO in the grid connection process.

Mr NATHANIEL SMITH: You spoke earlier about skill shortages. Obviously, in any industry as technology advances, whether it is education through TAFE or through industry bodies—I know other industry bodies like the Master Plumbers Association, National Independent Contractors Association, the Master Builders Association, run their own courses that specialise in certain products, especially with BASIX products for renewables and other things like that. Has the Clean Energy Council, or any industry bodies in that area, looked at any training facilities? Obviously, when you install renewables on a home, you need a licensed electrician to commission it and kick it off. Are there any other roles less qualified than the licensed electrician that could be trained up through your body or other industry bodies in the renewables area?

Ms FREEMAN: The Clean Energy at Work study was, in essence, the first step for us trying to understand the needs were so that we could start working with the TAFE sector and state governments to map out the training pathways - whether they are adequate, what they are currently providing, and where the opportunities are. I think it is something that the government can be looking at in New South Wales, particularly underpinned by the build-out of gigawatts that are used and planned to get into place over the next decade or so. That is a real opportunity, because you can build something at real scale in a particularly concentrated way. I know that in Victoria, out in Ballarat, there is a regional university called Federation University, which is currently looking at, for example, setting up a dedicated course for wind technicians, which is a very specialised field.

Unfortunately, because of the lumpiness and the policy rollercoaster that the sector has undergone over a number of years now, it can be difficult to develop up those training pathways and those courses that are permanent and available to support the sector. With a more certain pathway towards a build-out, we can provide the opportunity to put in place some new, permanent training pathways through the tertiary system. That is a real opportunity for the state and we should absolutely be using it. It is something we have just started working with state governments on in the past couple of months, now that we have this report and the numbers.

Mr NATHANIEL SMITH: I know that in this COVID world it is a bit hard to put an answer on this, but have you done much review into your supply chain of getting solar panels, which is probably the biggest take-up on residential homes? Has there been any interference in that through COVID-19 through trade with other countries around the world?

Ms FREEMAN: Surprisingly not. We thought initially that there may be, but it seemed to sort itself out pretty quickly. A lot of the supply for the renewable energy sector—for panels for solar systems, in particular—come out of China, and their recovery started earlier. Just as Australia was going into COVID-19, they were already emerging from their first wave, and the regions that have been most affected by the pandemic are not the places where those productions happen. So we were still managing to get the supplies and equipment into Australia. I have not heard of any new difficulties in obtaining supplies in the past month or two.

Mr ANOULACK CHANTHIVONG: There are two broad topics I want to touch base on. The first one is, you talked about lowering the barriers for entry to improve investment in New South Wales. Which particular ones do you think might be worthwhile pursuing?

Ms FREEMAN: In terms of the planning environmental assessments?

Mr ANOULACK CHANTHIVONG: Yes.

Ms FREEMAN: The time frames. If we can find a way to—I guess, in recognition that this is essential infrastructure, the government—or the department—has really focused strongly on improving assessment time frames. If we can see that continue, that will be extremely helpful. Obviously, the grid issues persist, and that has made it difficult for the fast-tracking process that is currently underway to assist these renewable energy projects because, unfortunately, it has required that you must be able to begin construction in six months. Because of the concerns with the ability to get grid connection, proponents are nervous about being able to sign up to that commitment to commence construction in six months. Potentially, there might be an opportunity for the fast-tracking to be afforded to projects that start in the next 12 to 18 months, rather than just the next six months. Certainly, there are plenty of jobs available in the renewable energy sector, we just cannot really meet that time frame with uncertainty regarding the grid connection.

I think the fees are a bit of an issue, combined with the biodiversity offset costs. I have had projects tell me that they have had a look at what it will cost them to do an offset for what they need. Obviously, they try to avoid relying on offsets where they can. Where they are required, they will have a look at what the cost will be and then they will come back a few months later and the cost has increased tenfold from the last time they looked at it.

That can provide a bit of a price shock, so there is also a need to try to find a way to reduce the volatility in the biodiversity offset credits system. That is a bit of a tougher one but if that is something that the government could also review, that would be very helpful. Because, again, it adds to the volatile costs associated with projects. Also, taking into account that a number of these projects have been required to install synchronous condensers at the last minute, which just adds on an extra $20 million or an extra $25 million to their project. Sometimes, it can be in the 10 per cent, or 15 per cent or 20 per cent—

Mr ANOULACK CHANTHIVONG: What was that last bit—the word that you used? You cut out.

Ms FREEMAN: This is a bit of a diversion from the environmental assessment—to talk about the volatile project costs at the moment, which are a real problem. The grid connection now, there has been a number of proponents who have been required to build a synchronous condenser, which is effectively an old piece of kit that provides system strength for a project. It is something that has been required of at least a couple of projects in New South Wales that I am aware of, and can often be quite late in the process. Some tell me that their project cost can increase by $20 million to $25 million to install this piece of old equipment, which is basically providing system strength into the grid. That, combined with high prices for the assessment process in New South Wales and the biodiversity offset costs—the volatile costs there—can create a high level of project cost risk for projects in New South Wales. So if those—particularly the fees and the offsets system—could be reviewed, that would be very helpful.

Mr ANOULACK CHANTHIVONG: The regulatory framework, from what I am hearing, seems to be okay, it is more about the timing, apart from the fee structure, which I think you mentioned was not central?

Ms FREEMAN: There is also a very onerous compliance system. Once you have actually got a project built, there is a very onerous compliance system. Every year all of the conditions under which you might be required to operate under your planning permit - one proponent has told me that they have 130 conditions that they must meet - they are audited by a third party every year. In this case, it is a wind farm that is due to operate for 25 years, with every condition being audited every year, and there is 130 of them. It is a lot of continuous work by the project owners to add that compliance system, or just to meet the requirements of the compliance system. There are elements of that compliance system that are duplicated by an Environment Protection Authority [EPA] license that is also required for every renewable energy asset. If you consider for a project like a wind farm, it has not much by way of emissions, the most you could consider to be an emission would be noise, which is required to perform at certain levels. There are post-construction tests that come after a project is built every year for an EPA license to be reviewed, together with the third-party auditing of every condition of the planning permit, it can be quite an onerous compliance regime for projects to meet.

Mr ANOULACK CHANTHIVONG: How long ago did the Clean Energy Council do its analysis of employment in particular locations where communities would be most impacted, coal country essentially? The jobs you estimate to be created, are they actually located and relatively close to where most jobs are lost?

Ms FREEMAN: You are talking about the coal communities?

Mr ANOULACK CHANTHIVONG: I am talking about the employment in those areas, and whether in the analysis that the Council has done shows what the net outcome has been for those communities?

Ms FREEMAN: I will need to go back to the report and refresh my memory on the impacts of that. I do think you have the author of the report coming to speak to the Committee today, Dr Chris Briggs. He will talk to you a bit further about the impact upon the jobs generated in those communities.

The CHAIR: In terms of improvement to the compliance regulatory duplication and auditing process, has the Clean Energy Council made representations to the government on how these processes could be improved and, if so, would it be possible for the Committee to understand that and be provided with that?

Ms FREEMAN: We provided feedback similar to what we have provided to you in a submission over the course of the last year to the department, and to some extent also to the government, but principally to the department. They are aware of our concerns. We will continue to work with them. At the moment we are looking at how competitive New South Wales is in attracting projects because what happens when it is just a higher entry, although that might provide some advantages that the state is happy to live with, it does make you think, if you are a proponent that has potential projects that you are developing and exploring in a number of states, it might make it easier for you to go to a different state first rather than New South Wales - where the costs are higher and the timelines are longer - and it may mean that you prioritise projects in other states first, if you can get them over the line quicker and more cheaply.

The CHAIR: Thank you for appearing before the Committee today and for the recent report into Renewable Energy Jobs in Australia 2020 done with the Institute of Sustainable Futures. The Committee may send you further questions in writing, your replies will form part of evidence and be made public. Would you be happy to provide a written reply to any further questions?

Ms FREEMAN: Absolutely.

(The witness withdrew.)

CRAIG MEMERY, Leader, Energy and Water Consumers' Advocacy Program, Public Interest Advocacy Centre, affirmed and examined

DOUGLAS McCLOSKEY, Policy Officer, Energy and Water Consumers' Advocacy Program, Public Interest Advocacy Centre, affirmed and examined

The CHAIR: Do you have any questions about the hearing?

Mr MEMERY: No.

The CHAIR: Would either of you like to make a brief opening statement?

Mr MEMERY: I have a couple of minutes of brief opening comments about our role and ourselves and our priorities for this inquiry, and some thoughts on some key issues that have emerged. A little bit about us. The Energy and Water Consumers' Advocacy Program of the Public Interest Advocacy Centre was established in 1998 to promote the interests of New South Wales households with respect to their energy and water use. Specifically, we promote sustainable and affordable access to all New South Wales households with particular focus on people experiencing disadvantage. We have a number of priorities to achieve that in different areas.

On the supply side, we seek improvements that lead to effective regulated networks and effectively competitive markets. In terms of outcomes for people, we seek comprehensive supporting measures for people doing it tough, and tools to allow access to the benefits of new technology and so on for people who are traditionally blocked out of those markets. Another area of priority is to seek outcomes for energy and water users in complementary areas such as health and housing policy, transport, data and so on. Our objectives are that by 2025 New South Wales household energy bills will be 25 per cent lower than they were in 2017, while maintaining supply that reflects what people's preferences are, with respect to reliability and security of the energy system, and decarbonising the energy system. To achieve this we have got about 50 priority reforms, changes, that we seek in the energy market, and these have informed our contribution to this inquiry to date.

A number of those that I would pick out would include our work on seeking transmission reform for transmission frameworks, both to ensure that we have user pays or a beneficiary pays framework to allow us to make the expansion that we need in decarbonising the energy system without lumping all of the cost of that on to

just consumers. You will see in our submission to the inquiry we have brought attention to our models for Renewable Energy Zones. We certainly commend the work of Minister Kean and the government to date in developing policy around those Renewable Energy Zones, and that reflects what our priorities are. We also seek targeted support for households that are doing it tough and enduring measures that focus on things like energy efficiency and demand management, which also bring about benefits to the wider community through more efficiencies through the system.

I would flag that we are a bit concerned about some of the narrative around gas and where gas is going. Gas has obviously been an essential fuel in different applications and a fuel of choice over time, but it does appear that the desire for promoting a gas-led recovery, for example, is not really in step with what people's interests and consumer's interests are with respect to COVID response, for example. People seek the end uses that are provided by energy sources, be they gas or other; it is heating their homes, it is doing the cooking, it is heating their water. I think we see that the prospect of focusing on any specific fuel source in leading that recovery to potentially be out of step with targeting solving the actual problem of affordable energy supply for the people and end users. We also, of course, focus a lot on water outcomes. Increasingly with the changing climate, the nexus between water, energy, and the specific water issues themselves are paramount for us, and certainly when we have questions on those I will be deferring to my colleague, Mr McCloskey, who leads our work with water.

The CHAIR: We might start with the increasing price of electricity, which forms a large part of your submission, and the concerns that you have identified there. If you could talk to how the transition to renewable energy could address those concerns and do so in a way that ensures those costs are passed on to households, particularly the more disadvantaged households.

Mr MEMERY: We could probably give a long answer to this, but the short answer really is around the need to seek optimisation in the energy system that revolves around what is classically known as the trilemma; finding a balance between price, sustainability, and reliability in the energy mix. If you look at the history of the national energy market over the 20 or so years that it has been around, we have seen significant transformation and change, not just in relation to the fuel mix, but we have seen energy go from being a more centralised resource to a decentralised resource. We have seen the move from higher to lower carbon emissions. We have seen that supported by policy, but we have also seen that happen naturally through the changing economics of different energy supply. Obviously the different energy supply options, be they fossil fuel or be they renewable, come with different attributes around predictability, scheduleability and as we change the mix of energy in the system we need to introduce new measures to ensure that the system services that are needed to maintain the secure and reliable system are maintained.

Sometimes there is a narrative around that that is meant to suggest that—the over simple version that we hear is people remind me that the sun does not always shine and the wind does not always blow. The reality is, we have a diverse energy system, we always have, and it is a complicated task for our energy market operators and planners to ensure that it reliably provides the energy that is needed to people. Looking back over the last 20-odd years our system planners and operators have done that very well, and they have done that throughout the transition to date and we are confident that they will continue to do that. The transition to lower emissions and decentralised sources does require fundamental rethinking of how we recover costs through transmission frameworks, and we see it as a priority that, to prevent further significant cost increases in distribution and transmission, those frameworks are readdressed so that the cost recovery mechanisms do not require consumers, and particularly households, to take on the costs and risks that really should be attributed to beneficiaries, which in many cases are generators that are connecting.

In terms of the history around that particular issue, we have seen a lot of decisions that have been made in the past with respect to network cost recovery that have resulted in great gold plating. There is a need to avoid further rounds of that through interventions that do not seek the most efficient outcomes. Certainly any outcome of the national arrangements or the New South Wales specific arrangements that are made around that, we would seek that they would reflect efficiency as a priority, while maintaining a balance with the need to decarbonise and build the extra networks that we need to maintain that security and reliability.

The CHAIR: Thank you. I will go to Mr McCloskey to talk about water, and concerns that your submission raises with the economic and environmental impacts of mining on water security, particularly the role that water pricing plays as well. Could you talk to that?

Mr McCLOSKEY: In a similar way, it is an answer that could be given over four days on its own, but to boil it down, I think that it is important to highlight that where energy has a very well established set of responsibilities and regulatory frameworks that govern it in a relatively automated way, the same does not necessarily apply in water as it stands and there is a real need for rationalisation of the way that water resource issues are integrated into planning, resource and other decision frameworks. Obviously one of the clearest

highlights of that is where water interacts with resource decisions. I think that there have been plenty of examples recently, with regards to water and resource decisions in the Sydney basin.

Where pricing is important goes somewhat to the point that Mr Memery raised earlier, that it is ensuring that benefiters pay the cost of the risks that they impose and pay a fair contribution according to the benefits that they reap from any particular decision or development. At the moment the way that a lot of our water is received is that, again, consumers tend to assume a lot of the cost of decisions and through that they assume a lot of the risk that is inherent in some of the decisions that are made. That is particularly important when we are making decisions with regard to access to potentially insecure water resources and increasingly insecure water resources in relation to the impacts of climate change.

While we did not go into detail in the way that we think they should be undertaken in this particular submission, we do have fairly established frameworks for looking at the way that water pricing should internalise some of the balance of risk and cost that is currently being assumed. For example, where decisions may have an impact on the security of a water resource, that that should be priced into the decision and allow a much more transparent assessment of the benefits and the costs and the future risks of any particular development on water resources. While that seems a long way down the line from the household impacts of that, the reality of that is that these are very long-running decisions. Decisions that are made today will have increasing impacts for the next 20, 30, 40, 50 years, and those compound, not only on the community when they are made, but they have impacts on household affordability for essential services into the future.

Mr NATHANIEL SMITH: Talking about renewable energy technologies into the future, especially after COVID and the economy being hit quite hard, there has been a lot of focus on construction of infrastructure and things like that. Would you like to see in the future homes being designed—I know the BASIX code continually changes, in terms of storage, to take pressure off water supply coming in, the use of recycled water to fill up appliances in the household and backyard use. In some areas there will be thousands of homes built.

Buying in bulk and economies of scale will see push on the code to have more solar installations, depending on south or north-facing homes. I suppose when you have a massive push-out, as we saw with a former federal government's pink batts, you may have people who are not qualified installing certain renewables. Especially with solar, you have to make sure that it is north-facing. We heard tragic stories in the past of people putting solar panels on south sides of houses, and that not having the impact it should. Would you like to see building codes push for further renewables on homes in the cost of the whole package?

Mr MEMERY: Thank you for the excellent question. To answer the specific question and to provide some broader context, it is a broadly held view among consumer advocates, community advocates, proponents of sustainable design and environmental advocates that there are a lot of cost-effective opportunities to improve affordability, health, good outcomes in respect of people's wellbeing, energy savings, reduced energy costs and reduced demand on the energy system and on water, by having stronger standards for new homes and for renovations in respect of their energy consumption and, as you point out, their generation. There is an opportunity for more households to be able to generate some of their own energy and offset their own energy use by having solar on roofs.

To pick up on a couple of specific points, the economics of solar have changed quite a lot. Whereas once upon a time to have north-facing, unshaded roof space was essential for getting a good return on solar, these days having systems that even have a bit of shading, that are east-facing, west-facing, or potentially even south-facing can provide enough energy to provide economic returns for individual households, and can start to make a small but important dent in the emissions profile of the energy system, and the collective energy consumption. We think that solar should generally be promoted; however, there are some supporting policies that are required to address disadvantage in the process of doing that. One is that people who have less access to the financial means to put solar on their roof should be supported to do that.

There are some existing mechanisms that the New South Wales government has put in place to support that well. Another is that people who are disadvantaged, with respect to their tenure, are unable to have solar on their roof, particularly renters. There are a lot of rental properties where energy demand could be offset quite effectively by having solar on the roof, but because of the landlord-tenant issues and the split incentives, that is not optimised. The other area that is really key is tariff reform. At the moment, people who install solar panels on their roofs, much like people who install big air-conditioners, end up getting a free ride on the cost of their network access because of the cross-subsidy from other people, due to the way network tariffs work. We think it is an important part of unlocking the benefits of solar that that is addressed, so that the people who could not afford to put solar on the first time around when everyone else did are not locked out from doing so now as more and more solar is on the system.

There is a fixed limit to what the system can absorb, in terms of solar, before it starts to impose new costs. To go to the other part of your question, around building standards and the level at which it is appropriate to set those, from the analysis that we have seen and undertaken, it appears that there is a significant net benefit to be made from having a material increase in the basic minimum standards of buildings with respect to the energy and water efficiency. If at the moment buildings are in the realms of a five-star efficiency level, for example, that could easily be made 7.5 or eight stars, with a benefit that is far greater than the additional cost in doing that. The payback time is pretty low. Integrating rooftop photovoltaic power [PV] is one element of that, but the thing that is not given enough attention is basically energy efficiency.

Rooftop PV is quite sexy and it is very visible. It has become popular, it is advertised, it has become subsidised, and it has become politicised. Energy efficiency remains, and has for some time, low-hanging fruit that goes unpicked, in terms of getting good outcomes for people with their housing stock. We would certainly support significant improvements to the energy efficiency requirements for new builds, as per the building code, as you refer, as well as seeking energy efficiency upgrades for existing housing stock, particularly social housing, government housing and other places where people on low incomes find themselves living.

Mr McCLOSKEY: Might I make one additional statement to that? You raise a really valid point around the building standards, because in a lot of our advocacy work there is a really good example at the moment. There is a lot of talk about masks in relation to COVID, and looking at what is the fundamental way of addressing the circumstances that we are in. It comes down to maintaining distance and maintaining the basic fundamentals of cleanliness. The situation with housing is very similar. People want to go straight to the mask—they want to go straight to putting solar on their roof. There are circumstances where there is a massive benefit to be gained for the household and for the system as a whole in doing that, but that is only subject to the building envelope, the house itself, being in its best possible circumstance to deliver those benefits and to deliver the reason for energy in the first place, which is the ability to sustain household health and wellbeing.

That comes down to the building envelope itself, and that goes to the quality and the efficiency standards of the house. When we talk about upgrading building standards, that is where it comes down to exceeding the current limits of the star ratings of housing. There is currently a process underway to increase the efficiency standards for new builds. We think there is an even bigger opportunity to address the existing housing stock, which is in some cases zero or two-star equivalent. If we are talking about benefits for households, benefits for the system and benefits for health, wellbeing, and affordability, there is a significant untapped gain to be had in addressing existing builds.

Mr NATHANIEL SMITH: Just on that, the other important factor when putting this into the build is the supply chain, because many companies in south-west Sydney will do sliding-door installations, but there might be a requirement to have double-insulated glass, which creates another problem for the supply chain. It might have to come from overseas or something like that. All of these things need to be considered as well.

Mr MEMERY: I would agree. If I could make a point, picking up on that, and noting that it did not appear to be a question, but I think it is a very important point that you make. This is where enduring policy to support these changes is really important. We have seen time and time again—you referred to the pink batts issues. It is a great example of where there is definitely a need to have policies that are long term, not reactive, but that seek to address those background and supply chain issues. It is our view that, with the housing standards, that we have a forward plan that goes into the years and decades, so that home owners and investors can see what is required and can expect changes, then businesses that are involved in the supply chain can prepare themselves to meet the expected future needs.

That is really essential, especially so that we get good development of new Australian business and innovation, and so we are not reliant on just exports or imports and supply. The other point I would make is that we are currently the victim of a lack of positive policy on that front, because Australia gets a lot of something akin to the dumping of poor-quality appliances and poor-quality materials at the moment. Other countries have better standards than ours and they will not buy it, so we are certainly the victim of our own lack of positive standards on energy efficiency there.

Mr ANOULACK CHANTHIVONG: I wanted to pick up on your point on tariff reform. Do you think the suite of programs that are available to help those on the lower income scale in particular are actually adequate at the moment?

Mr MEMERY: That is a great question. To provide a bit of background context, tariff reform is not by any means a new thing. The longer we go without changing the structure of energy network tariffs, the longer we entrench cross-subsidies that exist. Those cross-subsidies—it all gets a bit technical, I am afraid, but it comes down to the fact that network tariffs, which comprise up to half of some people's bills and which recover the cost of building the fixed assets, like poles and wires, or the monopoly regulated assets, are recovered through a

volumetric charge. That means that the amount of energy that you use determines how much you pay. Unfortunately, that is increasingly decoupled from the costs that you impose and the decisions that you make, which are based on how much energy you use in peak time. In the case of when you export solar, for some people with large solar systems it is determined by how big that solar system is.

The beneficiaries of the current cross-subsidy, if you like, are people who have air-conditioners, people who have solar, and people who live in large houses, and the people paying for that privilege in others are the same people to whom you are referring to—primarily, but not only, people who are living in small houses, people who do not have air conditioning, people who do not have solar. Inherently, in making that change to move to cost-reflective pricing, there is a net benefit that can be made for those people. The concern that you raise goes to a really key issue, though, which is: What about the outliers? What about the people who are made worse off? We think that it is imperative that there are good supporting mechanisms in place, so that where those people are disadvantaged and vulnerable, they do actually have the relevant supports that they need.

The New South Wales government's Energy Accounts Payment Assistance program, which was recently expanded in terms of its budget and accessibility on a couple of fronts, does have some elements that go to help support that, but that is an emergency program. What we really need is something that is longer term that acknowledges people's persistent disadvantage where it is occurring. There are ways that they can be achieved through concessions frameworks and rebate frameworks. I would bring attention to one particularly effective measure which is used in at least one other jurisdiction, which is a proportionate concession. A proportionate concession is one where a disadvantaged person has a concession that is linked to the size of their bill or the energy that they use. It means that when they use more energy, the concession goes up. When they use less, the concession comes down.

There is actually, I think, an important opportunity to link these two last questions by looking at the opportunity to provide fit-for-purpose support, where we do have a proportionate-based concession arrangement, and linking that to better energy efficiency outcomes for people who are disadvantaged. If you have a proportionate concession and you help people to use less energy, you actually bring down the concession budget burden on government as well. It is a really important question about how concessions fit in with tariff reform. Clearly there are opportunities for those supporting mechanisms to provide benefits beyond just compensating for impacts of tariff reform as well.

Mr ANOULACK CHANTHIVONG: Thank you for that answer. I think it is quite insightful. I would be interested to see that in your submission. Do you have a report on that?

Mr MEMERY: I would be very happy to provide some information on notice.

Mr ANOULACK CHANTHIVONG: That would be good, thank you.

Mr MEMERY: I can save you wading through the many hundreds of pages of other submissions and do some of that wading for you, take that on notice and provide you with some more information.

Mr ANOULACK CHANTHIVONG: Certainly I think the pricing issue has, for a long time, been quite lopsided against those who can least afford it. For instance, they cannot afford $10,000 for new panels or $15,000 for a new battery, but they still have to pay for the grid to be maintained and for that return rate to be sustained. Certainly in this particular area, I am not sure we have done as much as we can or that governments have done as much as they should to support those who feel the biggest economic impact of this new transition, which is quite unfair, I think.

Mr MEMERY: Yes, agreed. There is more to be done. I would make one related point as well on the tariff side. The Australian Energy Regulator determines, through the same process that network businesses go through with revenue, which is a propose-respond model, they determine the network tariff requirements. They have been put in a pretty tricky situation because of the government concern that has arisen. It particularly came around in Victoria a while ago. We—as in Victoria, or they—had some good work done by network businesses in making progress towards having a plan for cost-reflective pricing, including those measures to make sure that people were not disadvantaged. Then there was concern from the Minister's office and an intervention that really set them back.

I think it is fair to say that that left the regulator in a difficult place, because they sort of have to pre-empt now what the political response is going to be to tariff reform. I think it is a potential opportunity for the New South Wales government to support tariff reform, with the supporting measures that are needed to ensure that those who are worst served by the system do not experience that. That can help give the regulator the confidence that they need to move in the direction of avoiding those impacts on people too.

Mr ANOULACK CHANTHIVONG: I have just one last question but I will put this just for comment. I do note a couple of sentences in your submission about restricting the use of new thermal energy resource developments might be a way to guarantee the sustainability of existing communities. I am not sure that I agree with that assessment. Sometimes a swift or low transition can actually harm those communities even more, because that is the economic centre for how those communities survive, and of course you have all the other flow-on effects of all the other supporting services—for example, catering services—and other industries that support those industries. I think those sorts of sentences might downplay some of the impact on the communities. I think that so long as the market determines that these resources are available and acceptable, then we certainly need to factor that into our consideration as well, rather than just have a swift transition, which can be very hard, and the impact can be quite long term and quite detrimental to a lot of our communities that rely on energy for their income and their standard of living.

Mr MEMERY: I think that is a really important point. Would you like us to respond to that with some thoughts?

Mr ANOULACK CHANTHIVONG: Yes, if you like. Of course, that would be good.

Mr MEMERY: Thank you. Look, the biggest challenge that we face, that cuts across all these transitions and all of the needs, is finding balance. It is finding balance between the needs of different people in the community, finding balance between providing certainty for new investors with avoiding scaring the horses too much for existing investors so that they are not put off for investing in the new stuff that we need, and finding a balance, I guess, between the clear need that we have to decarbonise the energy system and the needs of those who might be perceived to be disadvantaged by that. There is probably an overly simple argument that goes, "Oh, we will just find new jobs for those people."

Mr ANOULACK CHANTHIVONG: That is correct.

Mr MEMERY: I think it is picking up on your point that it is very fair to say it is not as simple as that. There are other mechanisms to support existing jobs. What I would caution against is going down the same path that we have been on with automotive manufacturing, where the amount of subsidy that has been poured into that, and the amount of protectionism and grandfathering, has ended up far exceeding the value that has been given. I think it is fair to say that for the last five or 10 years of subsidising automotive manufacturing we could have just given people the money instead of the jobs, and it would have been much cheaper to do so. There is a risk that we go the same way in seeking to protect those communities. It is really important that we understand what they want and what they need, so that we can maintain those local economies but still make the transition we need to make. The risk is on a global scale. The economic risk of maintaining as high an emissions profile as we do in our energy network places our energy users' households across the state at great risk.

Mr McCLOSKEY: I would add one final additional point to that: We absolutely agree, and I think we outline in our submission, that there is an important need to have a nuanced response in trying to strike this balance. I think what you are referring to is that we did say that there should be consideration for a moratorium on new development, on the basis that potentially one of the best measures to protect existing jobs in existing communities is not to create those new resources that are likely to be lower cost and put further pressure on the existing developments, which are, by their nature, often higher cost. Bearing in mind that existing communities and the sustainability of those communities should be the priority, it is about taking that balanced approach and saying, "We haven't yet worked out the solution for those communities." While we are putting in place those processes that do assess what they want, what they need, and what can be done for them, potentially one of the best things we can do is not, essentially, double up the problem by increasing the number of people who will need to go through that process.

The CHAIR: Thank you both very much for your time today and for appearing before us. We may send you what we have already flagged—some further questions in writing. Your replies will form part of your evidence and will be made public. Would you be happy to provide a written reply to any further questions?

Mr MEMERY: We would be very pleased to do so. Thank you for the opportunity, Chair.

The CHAIR: Excellent. Thank you both very much.

Mr ANOULACK CHANTHIVONG: Thank you very much.

(The witnesses withdrew.)

(Luncheon adjournment)

MICHAEL LORD, Head of Research, Beyond Zero Emissions, before the Committee via videoconference, sworn and examined

JOHN SHIEL, Lead Volunteer Researcher, Heavy Industry, Hunter Diversification Project, Beyond Zero Emissions, before the Committee via videoconference, affirmed and examined

CHRIS BRIGGS, Research Principal, Institute for Sustainable Futures, before the Committee via videoconference, affirmed and examined

The CHAIR: Does anyone have any questions about the hearing process?

Dr BRIGGS: No.

The CHAIR: Mr Lord, your video is off. I just wanted to flag that.

Mr LORD: Thank you for that. We will see how it goes.

The CHAIR: Each of the organisations may make a brief opening statement. We will start with Beyond Zero Emissions.

Mr LORD: Beyond Zero Emissions is an independent and apolitical climate and energy think tank. We are unusual in that much of our work is done by passionate volunteers such as my colleague, Dr John Shiel, an engineer whose PhD is in adapting homes to climate change. I am the lead researcher at Beyond Zero Emissions. Our detailed research shows that we already have the technology to eliminate greenhouse gas emissions in all sectors: electricity, buildings, manufacturing, transport, and land use. We do not just show that terminating emissions is achievable, but there is a huge economic opportunity for Australia. Our recent Million Jobs Plan shows the many benefits of putting renewable energy and other zero carbon projects at the heart of Australia's economic recovery.

These benefits include job creation. We would like to highlight three areas of employment potential for New South Wales based on renewable energy. Firstly, manufacturing. With plentiful low-cost renewables, New South Wales can attract new industries like green steel and green ammonia, as well as securing the future of existing important manufacturers such as Molycop and the Tomago aluminium smelter. Secondly, buildings. A statewide program of home energy retrofits could create thousands, tens of thousands, of jobs and reduce household energy bills for everyone in New South Wales. Thirdly, transport. The future of most land transport is electric, and there is huge employment potential in the transition to electric transport.

We would like to congratulate New South Wales on their ambition to electrify the bus fleet, and we see this as an opportunity to create new jobs in bus assembly. In recent years Beyond Zero Emissions has produced several reports focused on particular regions such as the Northern Territory and Collie, Western Australia. These reports showed how the zero carbon transition will create new industries and jobs in these regions. We have now launched "Diversifying the Hunter", a project involving local staff and volunteers identifying sustainable, prosperous jobs for the whole of the Hunter Valley.

The CHAIR: Dr Briggs, would you like to make any opening remarks?

Dr BRIGGS: I will make some brief remarks. I am from the Institute for Sustainable Futures, which is a university research institute. It is a self-funding research institute, effectively a university consultancy, which works across a whole range of sustainability disciplines, including energy and transport. Our submission focused on some of the employment opportunities from renewable energy, and since that submission we have completed what is the first large-scale survey of employment in renewable energy in partnership with the Clean Energy Council. I submitted a PowerPoint to the Committee.

There are three key points. One, to highlight the opportunities for renewable energy. You will see from the PowerPoint that New South Wales could be the largest beneficiary of renewable energy employment from the buildout across Australia. We had a narrower focus than Beyond Zero Emissions, which was primarily around the projects themselves. But, an average of 10,000 jobs, peaking at 15,000 jobs, primarily through the construction phase, but also with an increasing number of operations of maintenance jobs. We wanted to highlight some of the further opportunities to builds and employment around renewable energy New South Wales.

Our employment in the supply chain, in particular, is very low, and there are opportunities to do more, particularly in the renewable zones, which I think is a fantastic initiative, but will need supplementary quality training to address central skills shortages. It will need smoothing of development. It will need local content requirements to try and provide jobs, and it will probably also need the government to provide power purchase agreements for the same consumption to help the project get off the ground. I am happy to elaborate on that. I am

happy to highlight some of the lessons from other nations around the world that are currently adjusting to the transition.

To highlight four key lessons: one is the importance of building a social pact and framework around transition; secondly, was around diversifying economies; thirdly, was around approving the planning provisions; and fourthly, building a purpose-built justice transition authority, or some equivalent, to oversee the process. If we wait until the transition is upon us, the example of Hazelwood shows what will happen. The Hazelwood Power Station in Victoria closed with a few months' notice, and three years later there is still only one in three of those workers in a full-time job, based on data provided in the Victorian Parliament, notwithstanding the establishment of the Latrobe Valley Authority and a lot of very good work and funding. It is very important that we get out ahead of that and start building alternative jobs in industries for these regions. I will stop there and take any questions.

The CHAIR: We will begin with questions about the economic opportunities that both organisations see from renewables, particularly in the context of the COVID-19 pandemic and the impact that is having on people's jobs and employment. With the decline in coal and the dependency that so many communities have on it, how do you see the skills development process that is required to make the most of the economic opportunities that come with the renewable sector? What processes do you think government needs to be taking to invest in skills, in coal dependent communities, but also in the broader workforce, who may be seeking new employment opportunities as a result of the pandemic and its impacts on so many workplaces?

Dr SHIEL: I might make just a few comments there. We should not leave our miners and our mine workers behind. These people are trying to look after their families in the best way that they can. Sometimes it involves risky work and it is well paid. A lot of these guys came in with skills that we know they had and those skills should not be ignored. First, we need a skills assessment. There are a lot of guys with construction skills and on and on. We can leverage those and from that we can fill the gaps. There are things like, the AiGroup has a Victorian advanced manufacturing diploma in the TAFE system.

There is another area within the AI and information and communications technology initiative around manufacturing, and also in terms of electronics and renewable energy. I will put a word in for the *Electrifying Industry* approach where we can show a boost in jobs. We need to find out ways to get TAFE and universities to restructure their courses to take up the skill gaps that are missing for the mining and power station workers that need to convert to renewable energy. It covers everything, from transmission right through to power generation right through to the supply chain.

Mr LORD: I will just add that the Committee might be aware of a report a few years ago by the Construction, Forestry, Maritime, Mining and Energy Union. They commissioned the University of New South Wales to do a report about different transit terms for coal communities around the world. They listed several successful ones and several unsuccessful ones, the main difference being just the planning toward exiting coal or the possibility for exiting coal. I know that New South Wales has started down that road with things like the *Future of Coal* statement. That is the key thing, just a plan for this, which is clearly now a material risk, that demand for thermal coal will die. I also mention the Grattan Institute's recent report *Start with Steel*, which did some high level mapping of what the skills are in the coal mining sector, compared to the skills that could be available in manufacturing with renewable energy, particularly green steel. In that report they showed a pretty good correlation between the existing skills and the skills that will be needed in the new industries.

Dr BRIGGS: I would add, on both the side of the renewable energy projects and on the coal side: on the renewable side of the network we tested skills for skills shortages amongst renewable energy project developers and construction firms, and we found they were quite widespread in the past year, particularly around areas like electrical engineers, construction managers, but also surprisingly on the operations side, around wind farm technicians. We found that one of the responses of the businesses to this was that they were importing labour, even for jobs like wind farm technicians, which is a real missed opportunity, because they are very good quality jobs, they are $90,000 and upwards, and they are ongoing jobs, and we are having to import people on occasions to do it. Part of the problem there was around training. They said there was a lack of local training courses to bring people from other associated - like mechanical and electrical - backgrounds across, and start up costs were quite expensive. I spoke to a group of wind farm operators in Victoria, they were looking into a group training scheme where the area they would employ across themselves and across other entries because they probably did not have enough work to give them a proper grounding in the sector.

There is a range of things to consider around skills and renewable energy. One is the Renewable Energy Zones that the government set up are likely to experience skills shortages without some serious up-front training, particularly when you get the combination of transmission construction, along with the project development. I think some sort of initiative around a training centre for skills could be really important to maximise the local

employment opportunities, for companies ideally to have the sorts of labour when you can do it, but there are a few years for the government to prepare. I think on the skills side there is very little around New South Wales currently. Victoria is a bit more active, so there is definitely a bit of a gap to be filled there.

I think there are other things, I would talk to that. But on the mining side, we also did some detailed comparison between the occupation within coal mining and renewable energy. What we found was a range of occupations and trades, like mechanical trades, engineers, electricians. The big challenge is that around almost one in three coalminers is a semi-skilled machine operator. Which, in the case of renewables, there would not be any comparable match. I think that really goes to some of the work that Beyond Zero Emissions and others are doing to carry over to other industries. Renewable energy can play a role, but it will not be a replacement, and we really need to see I guess, as they say, an assessment of the stock of skills there and the development alternatives through the training and try to transition those workers across.

The CHAIR: Mr Lord, you talked about the importance of planning for transition. Obviously transition is already occurring and it is particularly felt in places like the Hunter. We will have an entire day of hearings specific to the Hunter in September. How would you, and you Dr Briggs, assess the transition planning that is occurring in the Hunter by the New South Wales government and local government in the area?

Mr LORD: I might actually defer to Dr Shiel for that, because he is a Hunter local, and he is involved in the Diversifying the Hunter project.

Dr SHIEL: There is some activity going on in terms of - certainly in terms of councils, Muswellbrook Council has got an economic plan - the state government actually as far as, I am not aware of too much in terms of their involvement. Certainly the Department of Planning, Industry and Environment, they are focused on supporting industries and they are looking at programs, and I guess out of that could come some support. We have had discussions with Ai Group and many councils, including the Hunter Joint Organisation of Councils. There are many transition type authorities up here in terms of organisations helping the Hunter. There is a lot of activity happening. As far as actually developing courses and developing areas to actually get training underway, there is a centre within the university, an energy steering group inside the Newcastle Institute for Energy and Resources. They have a campus up there in, I think it is Tamworth way or Muswellbrook, and there is something happening up there. So this one, definitely, the state government and the federal government and the University of Newcastle. The other thing is that knowledge hub which is looking at jobs, and how they can put forums together to encourage more work.

I am trying to think of other areas. Certainly the university itself, trying to reduce the emissions of coal happening. There is Professor Behdad Moghtaderi, there is the solar paint, there is all these areas which introduce PhDs, and I guess there are also courses across masters and areas like that, a renewable engineering degree inside the University of Newcastle, fairly recent, the last couple of years. That is on top of its engineering, that is on top of other TAFE courses. So, I know those things are happening up here. But, as you say, you can come up to the Hunter, you will probably get a better chance to get more representatives, particularly academics and also TAFE representatives, to get a better idea.

Mr LORD: Thanks, Dr Shiel. I guess what I would add to that as well, what I have not seen is really any government, not just New South Wales but around Australia, seize the opportunity that we see in the transition to renewable energy. It is not just in those very real renewable energy jobs that Dr Briggs is talking about, but a whole host of things in manufacturing and transport. I do not think anybody has really captured this full potential, in terms of job creation and boost to the economy.

The CHAIR: Dr Briggs, did you want to add anything to that? Potentially, you flagged different international models of transition that have been successful. What comparison points would you use from those to the Hunter?

Dr BRIGGS: I think my comments would be similar to Dr Shiel, in that there are clearly a lot of initiatives happening at industry level and regional level, but there is a lot of threat that there is no overall plan for transitional strategies. [Audio malfunction] overseas, particularly Germany, is that the transition process, where you have got a grant and some sort of social contracts, a framework agreement where you get all the parties together, and they are difficult negotiations, but there is at least some acknowledgement that there is a transition process happening, hammering out some form of group agreement, in terms of broad time frames. That is difficult for Australia, because of course three quarters of our coal is exported, and nobody knows how long it will continue to be black coal.

Certainly, for our own power stations, I think now it is clear that there is a transition happening, and potentially going to happen quite rapidly, and the act of preparing a framework is a real problem for the energy market as well as these communities. I think that the German model is the standout, where I think there is, it is

called the Coal Commission, it is 38 different parties, including scientists, local committees, the industry, all the different stakeholders, how they get together and essentially negotiate a broad range of frameworks there, it is a recognition process. It is obviously going to happen over an extended period of time, 10, 15, 20 years. So that I think is essential to happen.

Mr JAMES GRIFFIN: Earlier this morning we heard from the Executive Director, Energy Reform and Investment, Department of Planning, Industry and Environment. The comments that he made spoke directly to what you were just talking about then, around really appreciating and understanding that the transition that we are going through, really a flow-on for jobs, will be as a result of simply the decrease in cost of energy across manufacturing. That was really heartening to hear, and also this view of the Energy Zones and the good work that it is going on out there. My question to each of you is that, given we have to balance the timing of when this happens, without doubting that the transition is happening, is there still a role or what is your view on the approval, for example, of the Vickery Whitehaven coalmine that was just approved recently? Is that understandable, given we cannot just switch off coal right now and then click on other Energy Zones, even though they have attracted a significant amount of capital?

Mr LORD: As an organisation, Beyond Zero Emissions tries to talk about solutions —things we do like—rather than things we do not like, but obviously underlying that is, we would prefer the attention and resources to be on put on renewable zero carbon projects rather than new coal projects. I am sure you will hear other evidence about this, but you have to wonder - in a world where, in most countries, including China, the cheapest ways of producing electricity are solar and wind - how long are they going to demand coal for? It certainly is a risky strategy to assume that that demand is going to continue, not just from China, but from any of the places that buy Australia's coal.

Even if that does go ahead, that does not stop us going full steam ahead, with not just Renewable Energy Zones, but what we call renewable energy industrial zones. This is the idea that you have, let us say, an industrial zone in the Hunter, and every manufacturer knows that they can go to the Hunter and they can get low-cost renewable energy and that is guaranteed. In my introduction, where I was talking about securing the existence of existing manufacturers with that low-cost renewable power, but the even greater opportunity is to attract new ones—things like metal processing, that Australia could do a lot more of, rather than just exporting ores, or the production of hydrogen, the production of ammonia, there are many opportunities for using that renewable energy, and manufacturing opportunities from producing the things that we will need like wind turbines, electric buses, or electric mining equipment.

Mr JAMES GRIFFIN: That also aligns with some of the comments from the Deputy Secretary of Mining, Exploration and Geoscience, which was, equally, they are looking to improve onshore capabilities as opposed to exporting raw materials overseas. Looking back at that nickel, that sounds like there is some real alignment about the mix there.

Ms FELICITY WILSON: One of the points of discussion we had earlier today with some our witnesses was around transitioning communities, and how you need location-based solutions for different communities, particularly regional communities. You were speaking about training and skills, which is obviously a significant challenge. I am just wondering if you can talk through, how do we look at getting the right skills for people who already live in certain communities, and want to stay in those communities, for the types of jobs that will be potentially transitioned to in those communities, because I think sometimes we look quite macro at the numbers of types of jobs, rather than the specific location of those roles and those people.

Dr SHIEL: Can I start and bring up some previous research that Beyond Zero Emissions has done in Western Australia? We did that Collie report there, and that is another very similar microcosm to the Hunter. It is a region where coal is starting to die, and people are starting to lose their jobs. We went there and did some research about trying to look at, without displacing the people—in other words exactly what you said: take the people who are in their current locations and what skills they have—we did a skill analysis—and then what kinds of projects and industries could we kick off that those areas could then basically blossom in. If you look carefully at our report on the Collie, and you get that on bze.org.au., you can look at the research and areas and look at, in the Collie report, and on page 20, there is a graph that talks about—you have got the biggest jobs of all in renewable energy manufacturing. This is not to be sneezed at. You can actually do PV manufacturing plus wind turbines. This is something that has not been done in Victoria even now.

Then the next largest area of jobs was in coal closure, where the mines were being rehabilitated. That is a great area here, because we have some of the best mine rehabilitation skills in the whole of Australia, and we can apply that when some of these mines close down. You can actually remediate them very well, and then it goes into the next largest area, which is battery recycling, and then it got into things like pumped hydro and renewable

hydrogen, which is a bit later on. You can see that immediately you have got jobs that can be capitalised on in the area, and you do not have to go elsewhere.

Mr LORD: Thanks for that, Dr Shiel. In the Million Jobs Plan, the biggest single sector that produced jobs was in building home energy retrofits, which will create jobs all around Australia. They tend to be local jobs with local people trained in construction or installing solar panels—all the different aspects of home energy retrofits.

Ms FELICITY WILSON: Dr Briggs, you said Hazelwood has only got one in three people [inaudible] so you spoke about skills, but you also said that Victoria has a skills training program. What do you think is lacking or can be done better, or is it just about workforce profile? What are the challenges that we need to consider here?

Dr BRIGGS: I think fundamentally it was the fact that there was no time to develop alternative industries. There is a demand-side question here and there is a supply-side question like most economic problems. The demand side, of course, is creating alternative industries and that takes time. I think the Latrobe Valley Authority from the outside looks to me looks like an excellent initiative. It is well run and well resourced, and they are starting to develop alternative industries. It just does not happen overnight, particularly not in regional areas, and so it is something that needs to be done over time.

The key thing is, as we have been saying, I think in different [audio malfunction] is developing some recognition that there is a transition going to happen and trying to do an inventory where we work out alternate employment opportunities. Smart specialisation is a term often used in the international literature, so, you are not trying to create tourist workers out of coalminers; you are looking at proximate industries, where the skills and the capabilities are reasonably transferrable, and where the [inaudible] has a genuine prospect of becoming competitive in a sector. Once you have done that, then you will start to work on the supply-side solutions, such as managing the decline, redeploying workers between coal-fired power stations and coal mines as much as possible to keep them in work as the sector starts to power down and employment opportunities at the time close down, such as the remediation, which I mentioned, and then retraining programs over time, to identify pathways for them to move across to the other industries, which are hopefully starting to build up over time as this happens.

Mr NATHANIEL SMITH: I want to talk about one of the things that my region went through. Last year we had the bushfires that hit pretty hard from basically November all the way into the New Year in my region of Wollondilly and further down towards Goulburn, and then we obviously had the south coast. It was very tough on the community. I remember one of the fires hit about four days before Christmas and, due to it going through Balmoral, Buxton and those areas, all the power lines and power poles got burnt. Therefore, communities had no power for several days, especially just before Christmas. You would see that a lot of people who had been shopping for weeks for Christmas lunch having no power for an extended period of time. A lot of these peoples' homes were not burnt but they were in that evacuation area where that grid was. It is a hypothetical question: If you were replanning communities and the energy supply going to some of those regional areas, what would you do after the effect of a bushfire? If you had to rebuild, what sort of systems would you try to put in?

Dr SHIEL: Could I mention the response that happened, by 5B and Mike Cannon-Brookes, in that area? They took a battery PV solution, where they could just immediately set up a local power hub. The 5B technology is incredible. They can roll out one megawatt of PV panels in a day with one person [inaudible], and they coupled that with a battery. I think it was a Tesla battery, but I am not sure. Mike Cannon-Brookes helped invest in this,, and they jumped it straight into these bushfire areas. Frankly, that was an incredible solution because, all of a sudden now, that area has power, and you can get back to normal. When those containers came in and put instant pop-up shopping centres, they were immediately powered. This is not a bad way to go. Frankly, this is what is happening more around the world, where the actual grid is being threatened, by tapping into these remote areas basically off the grid, and having them powered by renewable energy. That is where the miners have been seeing the light, and they are actually starting to power their mines with renewable energy.

Dr BRIGGS: I do not have a lot to add. I was just going to say that it is not an area of expertise of mine, but colleagues and others are certainly looking at microgrids as an alternative solution in these areas, and I think it is worth noting that Essential Energy, the main network operator in regional areas, has a plan that involves taking from the grid areas and converting them into microgrids, because it is quite expensive to maintain skinny lines with small numbers of consumers on them. I think combinations of microgrids powered by renewables and batteries, probably with maybe some diesel as well, in the short term, this is certainly a solution that should be looked at.

Dr SHIEL: Mr Nathaniel Smith, there is a double effect here using renewable energy. You get fewer bushfires in the future if the whole world lowers its emissions and so it is a double whammy.

Mr ANOULACK CHANTHIVONG: I think most of my questions today have really been about the transition and the net employment outcomes, in particular for our communities up in the Hunter, which is where most of the thermal energy is being extracted. What is your current assessment in the transition plans that are being developed or implemented? Do you have any views on that at all?

Mr LORD: On the net job creation potential?

Mr ANOULACK CHANTHIVONG: The net employment potential, yes.

Dr SHIEL: If you are talking about the various plans, I know of probably maybe six or eight different areas working on the basic transition. They really need to have this Ruhr area in Germany approach, where unions, the community, and all the big organisations in terms of miners, generators, and government—you have to have those in the room—and basically work through the issues. You have got a little very interesting area up there. Liddell is right next to Bayswater, and they are both owned by the same organisation. These guys, AGL, are putting together that kind of strategy there. How do you transition workers from Liddell who are eventually going to lose that job in, say, 2-3 years time [inaudible] and you have got the opportunity next door, which is in Bayswater? Across both sites, you have older workers, and perhaps they can take a redundancy. Then you have the younger workers and perhaps they can get retrained not just in other parts of the power station, but perhaps get some electrical engineering experience in renewables as well, for the future. You should realise that Liddell does have actually a solar thermal plant there as well, so there is great opportunity there.

There is a whole list of strategies that you can get for different age groups and people [inaudible] working part-time on coal areas and at the same time, getting trained up in new areas. There is some great strategy that AGL is working on, but that could be then amplified across the whole region and be taken into account for Eraring, Vales Point, as well as later on, maybe Mount Piper. You can see that if you had set up a transition authority that had this power to assist people to stay in in their regions, and at the same time, work out strategies to train and migrate workers around stations that are close together and things like this, you will find you get a very good solution for workers [inaudible] and for the mines for that matter. The mines have a staggered retirement date and workers could be rotated around them. As long as these organisations—often they are multinationals that own the mines—are cooperating, and really cooperate through the transition, you will get a great result.

Mr LORD: In terms of numbers, the Million Jobs Plan was a national assessment; are we are working on a more localised Hunter assessment. I think I am right, Mr Shiel, is it about 15,000 people in the Hunter working in coalmining**?**

Dr SHIEL: Yes, as far as I know. I think it is 12,000 to 14,000 in the Hunter, and then 2,000 in the power stations.

Mr LORD: It is in that order. I would be pretty confident that if we found more than one million jobs across Australia, especially in a region like the Hunter, which has a manufacturing background and heritage, there would be many times more 10,000 to 15,000 jobs that could be created for the various economic sectors in zero carbon transition.

Mr ANOULACK CHANTHIVONG: I also understand with the German approach, which you were talking about, Mr Shiel, their program went on for quite some time. We are talking decades for the transition from the coalmines to the new industry, which, from some of the things that I have seen and read, involved education sectors and other skill-based sectors, but they also had an income support program as part of it as well. Is that something worthwhile to consider, in terms of the transition, so that people who have to develop new skills also have to have some income to support them; because otherwise it is going to be very difficult for them to survive with no income, as we move to this new phase.

Dr SHIEL: I agree completely. When these workers are getting trained, if you like, in a new area, people will think, "Who bears that cost?" Do you leave it to the organisations that employ them, or do you help defray that and somehow give some kind of education levy at the same time? If, for example, they end up working only part-time, is there some other income we can provide to them to help support their families? I think you are right on there that we need to—there is universal basic income that is being trialled right now in Germany. It even got crowd-funded. They are going to do a couple of hundred people or something, and see how that goes. There are all sorts of initiatives that we should be thinking about that support these workers, because, really, they cannot become the scapegoats, just because the government is not coming to the party and getting its act together and getting well organised.

Mr ANOULACK CHANTHIVONG: My concern always has been that sometimes the word "transition" is a bit of a euphemism that you are about to lose your job and your livelihood, and that is very unfair, particularly in regional communities, because they can take much longer to adjust to the new world, so to speak, and a proportion may actually never re-enter the workforce. That is quite concerning, both socially and

economically. The market cannot be left alone to allow the transition to happen. There has to be a holistic program that is supportive and also reassures people's sense of confidence that the new change is beneficial for them. At the moment, I am not sure that that is the mindset that people are in at this time.

Dr SHIEL: Yes, and that is why we called our project in the Hunter "Diversifying the Hunter". It is more about "Let's get more opportunities," rather than saying, "Well, you've got to leave that and go somewhere else or take on another job."

The CHAIR: Dr Briggs, your submission talks about the role of hydrogen in the mix. In the time we have left, could you speak to the challenges or opportunities associated with renewable hydrogen for New South Wales?

Dr BRIGGS: Sure. I think it is, obviously, an enormous opportunity that has been identified with the National Hydrogen Strategy. Potentially, it could see us developing an export sector for renewable energy comparable to mining over time. There is a range of jurisdictions overseas that are less blessed than we are with resources. Once low-carbon constraints kick in, they are going to need to find energy from somewhere, so I think there are various advantages that Australia or New South Wales might have. Obviously, it would be, again, centred around Newcastle and the Hunter. There is the port, ammonia production and chemical facilities, and heavy engineering expertise. There is a big pipeline of wind and solar projects that it could supply. I think the challenges are probably ones that apply to hydrogen more generally. You are looking at getting the cost down sufficiently.

But I think in New South Wales, it does not seem the development of strategy and thinking around it is probably as advanced as a couple of other states. There are various other states that have road maps and plans, which I do not believe is currently the case for New South Wales. But it seems like a clear opportunity that should be investigated further and quickly, through development of a cross-industry working group. We identified key recommendations. The potential for hydrogen industries and associated industries to locate in areas around the Hunter in particular—I would try and identify some pilot projects. I think it is a clear opportunity, and really reinforces what Beyond Zero Emissions has been saying but one that New South Wales at the moment has not probably explored as actively as some other states.

Mr LORD: To add to that, if I may, I think it is great how much there is cross-party support for the idea of exporting hydrogen, including renewable hydrogen. That is good; it is an opportunity in the future, particularly if it was Japan and South Korea, who said they are interested in buying it, and moving to hydrogen economies. What Beyond Zero Emissions would love to see is the same kind of enthusiasm and ambition for a whole host of industries that could be using renewable energy—industries for which there is already an international market, which there is not, really, in hydrogen. So there is already a massive aluminium plant in Tomago. How about making aluminium with renewable energy? How about moving to the kinds of metals and steel and a whole host of things? Where we have gone in New South Wales and as a country with hydrogen is where we would like to see us going in manufacturing more generally.

Dr BRIGGS: Just adding to that, I very much support that, and I think battery manufacturing is something in particular that Australia should be looking into. There is going to be an enormous global market for batteries over any scenario. Australia has a lot of the minerals that need to be supplied. There seems to me a real opportunity for battery manufacturing that should be looked at very seriously.

Dr SHIEL: There is a unique opportunity here in that there is a thing called a battolyser. The battolyser is a battery and it can produce hydrogen as well. So you can have the best of both worlds: You can have the storage or you can have the hydrogen. There are industries up here in the Hunter that could really capitalise on this. Just to add to the second point that Dr Briggs stirred up, it is not just batteries that we could manufacture. Because we have got so much raw material that gets exported and then brought back in as steel or brought back in as whatever, we could actually do that manufacturing here. So if we boosted our renewables—the Australian Renewable Energy Agency [ARENA] CEO is on record for saying 700 per cent, but we are even saying 300 per cent to 400 per cent—then you can get into some really interesting manufacturing. We would not just be the superpower for the power, but we can also be for exporting goods.

Mr ANOULACK CHANTHIVONG: There has been a lot of talk about hydrogen. It seems, from the little that I have read, that its price competitiveness is still some way off. Is that about right? What are we talking: five years, 10 years, 20 years?

Mr LORD: I will have a quick go at that. It really depends on what you are substituting it for. We said in our intro that we see most land transport being electrified in the future. For things like very heavy trucks or road trains, hydrogen could be an answer to that. Hydrogen is already a cost-competitive fuel for that type of thing. It is getting closer to cost competitive for making ammonia and ammonia-based fertilisers. Really, the cost competitiveness is to do with the cost of the renewable energy input and the cost of the electrolysers, which are

both coming down very quickly. So it is worth planning now, because we can see in five years time hydrogen is going to be cost competitive for many of its current uses.

Mr ANOULACK CHANTHIVONG: I know Professor Finkel put a report on the hydrogen road map for the nation. What part of that report do you think might be viable for New South Wales, given its natural resources and its manufacturing capabilities?

Mr LORD: Well, lots of it. People have mentioned that New South Wales already manufactures ammonia and exports gas. I have forgotten my second point.

Dr SHIEL: The point is that China, Japan, South Korea and Singapore all have these plans in place to have a big hydrogen industry in five years time, and they are looking for renewable hydrogen. If we could gear up for that, basically, we would be home and hosed. So, really, it is our ammonia and ammonium nitrate areas here, as well as the gas area. You can put hydrogen gas in your pipeline. There are a whole lot of ways we can capitalise on this, so we should really just power ahead.

Mr LORD: Yes. Linking to that, and remembering my second point, Finkel's hydrogen road map is great, but it really relies on policies of other countries—Japan and the others. We could get going with local demand for hydrogen and get that industry going in things like heavy trucks and ammonia. We are big proponents of green steel, which you can make with hydrogen. In five years time, Sweden is going to start selling zero-emission steel made with pure hydrogen. The only by-product of that is water—no carbon emissions at all. So there is a whole lot of domestic demand that we can create.

Mr ANOULACK CHANTHIVONG: I sort of see the hydrogen versus electrification debate over the energy source as sort of like the VHS vs Beta competition: Inevitably, one was adopted and the other was relegated to the dustbin. What are the government policy settings that can be used to assist hydrogen becoming a bigger market than it actually is? Electrification is moving very quickly. I am wondering how we move hydrogen up along that demand scale for here and abroad.

Mr LORD: Beyond Zero Emissions would say if you can electrify something then electrify it, rather than use hydrogen, because you pay an energy penalty in converting the electricity into hydrogen of maybe 30 per cent. So, yes, electrify—certainly we can set the policies to encourage that. But there are some things—like, at the moment you cannot make steel just with electricity. You would need to make hydrogen first. It is the same with very heavy trucks—they are hard to electrify. You need hydrogen as part of ammonia. So there are certain places where hydrogen is vital and we say it has a future. We just need to concentrate on those opportunities for hydrogen.

Dr SHIEL: The other setting could be—you could take a model from Western Australia, with the Asian Renewable Energy Hub there. They are putting together—I cannot remember how many gigawatts of power. Is it about 30 or 20?

Mr LORD: It is 15.

Dr SHIEL: It is 15. Basically, they are creating this enormous renewable energy hub. Out of that they are going to export hydrogen, possibly to all those northern markets. So you can see that instead of just having these REZ zones—we have got one out west now, and the New England one. It is quite possible that if you go just west of New England, where there is a lot of good sun, and there are areas in Australia where you get good sun and wind, and that is the magic when you can get those complementary sources. Just west of New England you could create another super renewable hub, if you like, and that could be the target to set that up and to generate [inaudible].

The CHAIR: Thank you all very much for your time this afternoon and for appearing before us. We may send you some further questions in writing. Your replies will then form part of your evidence and be made public. Would you be happy to provide a written reply to any further questions?

Mr LORD: Very happy.

Dr SHIEL: Sure.

The CHAIR: Thank you for taking the time to engage with the Committee in making your submissions. It is greatly appreciated.

(The witnesses withdrew.)

JOHN GRIFFITHS, Chief Executive Officer, Gas Energy Australia, before the Committee by videoconference, affirmed and examined

BEN WILSON, Chief Executive Officer, Australian Gas Infrastructure Group, before the Committee by videoconference, affirmed and examined

JENNIFER PURDIE, Executive General Manager, Gas Distribution, Jemena, before the Committee by videoconference, sworn and examined

The CHAIR: Does anyone have any questions about the hearing process? If not, we will proceed to opening statements.

Mr WILSON: I am happy to make a short opening statement first. Introducing ourselves might provide some context to the Committee. I am Ben Wilson and I am the chief executive of Australian Gas Infrastructure Group. The Australian Gas Infrastructure Group is one of the largest gas infrastructure businesses in Australia. We are active throughout the value chain: gas storage, gas transmission, gas distribution, and distribution networks. In gas distribution we trade as Australian Gas Networks or as Multinet Gas, and we are the largest gas distributor in Australia, with more than two million customer connection points. In New South Wales we are a relatively small player. Jemena is the large distributor.

We are actively only in the south of the state—Albury, Wagga Wagga and areas around there—with around, I think, 60,000 connections in New South Wales. Today all of our customers are provided with natural gas, but we are embarking on a journey to increase the new supply of renewable gas—either hydrogen or, potentially, biomethane. Our first green hydrogen project should be commissioned within the next three months. That is in Adelaide. It is a project for the Hydrogen Park South Australia, and that will provide a blend of up to 5 per cent green hydrogen to 700 existing customer homes, in a part of the Adelaide network that we are sectionalising for that purpose. I will probably stop there with my opening remarks. Thank you.

The CHAIR: Thank you. Ms Purdie, any opening remarks?

Ms PURDIE: Yes, I would like to make some opening remarks, so thank you for the opportunity. Jemena Gas Network is owned by Jemena. We have 25,000 kilometres of mains and we are a very large distribution network. In fact, this is Australia's largest single gas distribution network. We were established in 1837 and we deliver gas to more than 1.4 million homes, businesses and industrial customers in New South Wales. We see safe, reliable, and affordable energy as being essential to our communities in terms of economy, health, and prosperity. In terms of what we are interested in talking about most today, we are interested in highlighting the opportunities for proven technology to produce renewable methane from organic waste materials, and that is principally waste crop residues. Then we can inject that into the gas network to supply New South Wales gas consumers, particularly those who have expressed a preference for a biomethane or green gas product.

Currently, New South Wales is importing about 97 per cent of its natural gas in our network from interstate, but we see the opportunity to complement the existing natural gas supplies with renewable gas from biomethane. We see benefits for New South Wales that could include creating a circular economy; retaining value within the state; support for local jobs, particularly in regional areas; reduced greenhouse gas emissions in the network; reduced greenhouse gas emissions in the broader economy, including farming and food processing; reduced landfill; capture of nutrients; and so on. Therefore, we are very excited about the opportunities to work on this aspect of renewable gas. I should also comment that we are also very interested in hydrogen, and we also have a project in western Sydney where we are trialling the injection of hydrogen into the network. So we see the two renewable gases as being quite complementary. Thank you.

The CHAIR: Thank you. Mr Griffiths, would you like to make any opening remarks at all?

Mr GRIFFITHS: I will probably just say that Gas Energy Australia is the national peak body that represents the bulk of downstream gaseous fuels industry. That covers liquefied petroleum gas [LPG], liquefied natural gas, and compressed natural gas. That is downstream, so that is to be used in Australia—so, essentially, gas in tanks. Our association comprises major companies, small and medium businesses, some who supply the fuels, refiners, fuel marketers, equipment manufacturers, companies that convert vehicles and trucks to add on gas fuels, and various other consultants. Our objectives, I guess, are pretty similar to what has been said by some of the other attendees as far as gas. I guess where we come into play is where our communities are not connected to the natural gas network, and so gas which is transported by road is the best option to get those benefits of lower emissions of gas, that sort of reliability, and low costs, and so it is hard to cut the supply chains. So there are a lot of jobs there for Australians with the processing, distribution and storage of gas fuels. Thank you.

The CHAIR: Thank you. Could we start with a discussion of the role that hydrogen could play in the mix, especially renewable hydrogen, and the opportunities or challenges that your organisations have found in this space?

The CHAIR: We might start with Ms Purdie, given Jemena's project in western Sydney. Could you talk to that, about any early findings or challenges that have been discovered throughout the project?

Ms PURDIE: Thank you. We are not yet at an operational stage on that project, so early in terms of our learnings from that project. Our power-to-gas project is a $15 million investment supported by ARENA, and we are converting behind-the-metre solar and contract renewable electricity into renewable hydrogen. The objectives for that project are around exploring the coupling between the various sectors. We will be injecting that into the network to provide a platform to understand, if other proponents later want to inject hydrogen into our network, how do they need to do that, what are the constraints, what are the operating variables. We are going to be demonstrating the gas electricity network coupling, obviously putting gas into the network. Then we will be able to take gas out again and move that back into electricity.

We have also explored, and have just announced, a contract to supply some of that hydrogen into the transport sector with the partner being Coregas, and into Hyundai vehicles. That is the context of the project. The commissioning will be in quarter four this year, and we will be operating from quarter one next year. In terms of some of the challenges that we are mindful of, some of them will relate to controlling the injection rate, making sure that we meet the gas specifications, and just managing the various impacts that hydrogen might have for our teams in terms of maintenance and proactive asset management in the network. Early days for us on that project.

The CHAIR: Mr Wilson, would you like to add your perspective in this space?

Mr WILSON: We are in a similar stage with our project; it should commission, as I said earlier, in October, November, and start injecting into the network at that point. I will comment on a couple of other areas. Community engagement has been a key focus for us and we have run a pretty intensive community engagement process in Mitchell Park, which is the suburb which will be receiving the green hydrogen. It has been very well received. We have explained to people from late 2020 you will be receiving a blend of 5 per cent renewable gas in your gas mix. Will you notice any difference? No. Will there be any difference on your bills? No impact on the cost. And if you would like to know more there is a link to Hydrogen Park South Australia and we will give you more information on it. We have either found people are kind of indifferent, or they are interested. Those are the two responses that we get. I think overwhelmingly people just expect these days that the gas company is trying to decarbonise, just the same way that every other energy supplier is trying to decarbonise. So that has gone very well.

There has been a lot of focus and effort on appliance testing. That is being done at industry level through something called Future Fuels, which us and Jemena are both contributors to. The appliance testing is very important, and actually will be the limiting factor on the amount of hydrogen that we can blend into the methane mix. We think that the pipes themselves can take very high levels of hydrogen to the customer, which is a limiting factor. I should also mention that, a bit like Jemena, we are exploring other use cases. The gas blending is a very good use case for green hydrogen, because the demand is there immediately from day one in the form of blending. When you have got that you can then build other use cases on. We have signed a contract with BOC, for example, for the supply of clean hydrogen to Whyalla, for them to use in the steel making at Whyalla. So there is a use case there.

We are also exploring using green hydrogen for transport, both commercial, buses, and private vehicles in Adelaide and we hope to achieve that. I should also mention we have a current bid into ARENA in the current ARENA funding round for Hydrogen Park Murray Valley, which will be in Albury-Wodonga and we will put the whole of Albury and Wodonga, that is 40,000 connections, on up to 10 per cent hydrogen if that were to be successful. It is a very interesting project, because it is co-located with a water utility and there are significant synergies between green hydrogen projects and water utilities. They buy the oxygen, that is the other thing that green hydrogen plants produce as well as hydrogen, and we can piggyback off their grid connection and so on.

The CHAIR: Mr Griffiths, would you like to comment on the role of hydrogen in the mix and any opportunities or challenges that you are seeing?

Mr GRIFFITHS: Probably for our industry association, hydrogen is not our main focus. Some of our members are involved in hydrogen development and some of our members are also party to the Standards Australia group that is developing standards for the use of hydrogen in Australia, but that is probably all I can really state.

The CHAIR: In submissions and comments everyone has spoken about the need to decarbonise gas. Could you all talk to any incentives that you believe are needed in this space to further promote this? Happy to begin with you, Ms Purdie.

Ms PURDIE: I guess the approach that we have sought to take is to be guided by our customers. I think that there is a real pull, from some customers at least, certainly in hard to decarbonise sectors, such as industry.

Some industries are very keen to reduce their emissions. And also we find in sectors, such as development and housing, the likes of Dexus and Mirvac and so on, are also very keen. In fact, a number of our customers in this sector have told us that, if we are not able to offer green gas products in the next 18 months to two years, then they will start to take definite steps to disconnect from our network and to electrify. We do not see that as being in the best interests of the community as a whole, necessarily, but also obviously something that as a network for New South Wales we are keen to keep our prices as low as we can by keeping a broad number of connections.

We have a pull from our customers. I think one thing that I am mindful of is, until recently the electricity sector with their large-scale generation certificates did have quite a significant incentive for people with renewable gas to turn that into electricity. As the values of those certificates fall within the Renewable Energy Target largely being fulfilled with a range of projects, we think that perhaps it is going to be easier to get those gas producers to send their gas instead to the gas network. I think that will take away what was perhaps a disincentive, but potentially some incentives of that nature might be helpful. Other things that could be very helpful would be if, for example, large consumers, such as government bodies, were to seek to create a pull for green gas for their load. I could see that would be very helpful.

Other things perhaps less in line of incentives, but more in terms of enabling factors, the work that we are already doing with renewable gas user groups to create I guess an accreditation system for green gas. It is going to be very important for our customers to know that if they do purchase green gas from us, that that green gas is credible, that there is not going to be a system that might come along later that sets up some criteria which the gas they have purchased does not qualify for. Certainly support from bodies such as the New South Wales government to support, to make credible those schemes, and we are already working with the departments in that regard. Those sorts of things would also be very helpful we believe.

The CHAIR: Mr Wilson, would you like to add anything?

Mr WILSON: Yes, thanks. I agree with everything that Ms Purdie said. I note on the certificates for green gas the National Hydrogen Strategy recommends a certificate of origin initiative around that, which I think will be a very useful thing. We are conscious that today the production costs of green hydrogen, and also biogas to a lesser extent, is at a premium to the price of natural gas. Therefore it would be helpful to have some kind of incentive or demand pull to get us across that period of time while the cost comes down. We have done quite a lot of analysis on this at Australian Gas Infrastructure Group and also through Energy Networks Australia, which is the electricity and gas networks trade body. We think that we could get from where we are today to 10 per cent blending by volume across the whole of eastern Australia by 2030 on a trajectory which adds no more than the price of a cup of coffee to the end user bill; that is $5 a year on the average bill. You do that by increasing the blending percentage as the cost premium comes down.

Today the cost premium is high, but if you go with a very low blending percentage, it has minimal impact and you ride that down. We think that a good way to start would be an obligation on the gas networks to source their unaccounted-for gas, so gas system use in the form of green gas. That is something that can be done internally by the gas networks, and it would be a good way to start that process. The arrangements are different in different states, so it might need to be specific in each state, but we think that is a really good way to adjust that demand fall for the gas networks. I think also we will keep trying to work with energy retailers to see if they believe that pull customers have an interest in a green gas product or a proportionately green gas product, which people might be prepared to pay a small premium to receive for green gas.

Ms FELICITY WILSON: Thank you for sharing all of those views on hydrogen, for instance. One of the proposals that you raised was around biomethane. I want to understand your approach to the challenges of looking at waste-to-energy. I know there are often objections to waste-to-energy plants. Is that something that you think factors into whether or not we could scale that as an option? Do you see it as viable?

Ms PURDIE: In terms of waste-to-energy there is a whole lot of different types of waste-to-energy, and some of the ones where I think there has been issues have been, perhaps, with the concepts of generalised household waste going to electricity. So, for example, I know that there has potentially been some concerns about plants of the nature of the Kwinana plant, and concerns about what might actually be in the incineration of that. This actually tends to be more, for example, organic waste of the sort that you might have in a sewerage treatment plant, or it tends to be food waste and it has been turned, through anaerobic digestion, into a biogas, which is then upgraded by removal of carbon dioxide to turn it into a biomethane product that actually aligns very closely—in fact completely—with the New South Wales gas specs.

So it is a different sort of process than the ones where I am aware there has been community concern. I think, potentially, there might still be some concern. For example, some of these generators would be things like abattoirs, piggeries and so on, so I think there could potentially be some community concern if those were located in close proximity to residential areas but, in a lot of cases, we would not be talking about doing that. We would

be talking about treating existing waste streams close to the point at which the waste streams arise, in that circular economy, and then injecting them into the grid.

I think one thing that we have been seeking to explain to people is our grid is kind of like a platform in the same way the electricity grid is. For people to take advantage of the benefits of green gas, there is actually no need for the biomethane facility to be proximate to their homes, any more than there is need for a utility-scale solar farm to be proximate to a residential area. It is the same concept of injecting the energy generation into the grid at a location proximate to where it is generated, and then people who are connected somewhere else in that grid but anywhere, really, in the state, could take advantage of that. So perhaps that helps with some of the concerns.

Ms FELICITY WILSON: In your opening statement you spoke about the level of imported gas. Obviously, we are focusing significantly on renewables in this conversation, but also we do have efforts underway to increase gas extraction in New South Wales. Do you see that as a necessity or do you think that the decarbonisation plans that are underway will provide the gas we need through renewable sources to meet your needs to supply the market in the medium to long term?

Ms PURDIE: We see the renewable gas that we believe we can inject into our network as being complementary to other gas sources, and we are seeking to be guided by our customers in terms of what is most important for them. There are some customers for whom price is the absolute most important thing, and there are others for whom it is really critical that we supply a green gas. So we are seeking to use our network as a platform and allow customers to get a solution that meets their needs. In terms of volumes, the New South Wales network, our customers use about 90 petajoules of gas a year. That is across the residential, small industrial, and large industrial sectors. We believe that about 30 petajoules, so about a third of that, could be generated from known biomethane sources that are proximate to our network. We can see a path to about a third of that being generated by renewable sources—just the biomethane—from the sources that we know about.

The work we are yet to do is the work that helps us understand the cost of each of those sources. So I would imagine we could develop over time some form of cost curve and, obviously, we would start to exploit the cheaper sources first and, over time, we would potentially find other lower-cost sources, or we might be able to find ways to bring the cost of the other sources down. But that 30 petajoules per year would be about the consumption that is required for our residential customers, so the families, the mums' and dads' hot water, cooking, and so on. So we can see a way to decarbonising a large percentage of our network from what we know about in our network at the moment. Bioenergy Australia estimates about, I think, 350 petajoules a year throughout Australia could be made available. So they see their way to a larger amount of generation. I do not have information about how much of that is proximate to networks.

Ms FELICITY WILSON: You mentioned that 30 petajoules would meet the residential market—I know you are not saying you are only going for the residential market, but I want to understand. You said you are making efforts to meet customer demand. Is the demand you are seeing across your customer base more in the residential space or the industrial space? Where is the biggest demand?

Ms PURDIE: There are probably two sources that I am very aware of, one being some industrial customers—not the very large industrial customers, but those who are making more products that are really closely connected to consumer markets, and who have a brand that is very much around environment sustainability and so on. They have certainly told us that it is very hard for them to electrify their energy, but they really do need a solution from us for green gas. The other source is very much the developers—people developing new housing developments and commercial developments in places like central Sydney, who are also saying to us, "It is very important to us that we go to zero emissions in quite a tight time frame".

They are talking in the next 10 years sort of time frame, and are wanting to know that we will have a solution for them before they plan to connect to our systems. Having said that, we also see the likes of the City of Sydney with tight trajectories to get to their emissions, and they are also part of our renewable gas users group—very keen to see tight time frames to get green gas into their communities. So I think, from that, there will be a large number of users in some of those demographics that would want to use this product. But we have not got that feedback from the residential customers and individuals as yet.

Ms FELICITY WILSON: You said you would have work underway on the cost curve over time. Have you done any preliminary work that looks into that cost differential in the marketplace, and at whether or not you expect it to come down over time? What prospect is there for biomethane or green hydrogen to be cost-competitive?

Ms PURDIE: What I can say is that we are working hard to have a biomethane project that we can announce in coming months. I am hopeful that we will have an announcement well before the end of the year as

to a project that we committed to in the Sydney region. Once we have got that project up, we have got our hydrogen project up, we are working also very hard on the commercial frameworks to enable what we are calling a renewable gas power purchase agreement [PPA], which comes from a certification scheme that is credible, enabling people to buy a renewable gas product in the same way as they can buy a renewable electricity product through our network. Then once we have got those proof points in place, then we will be working much harder on the biomethane project. I think Mr Wilson also had a comment he wanted to make in that regard. He may have some more information than I do from the various areas that he is involved with.

Mr WILSON: Thanks. Just to add to that, we have recently undertaken a market-sounding exercise along with Jemena and also AusNet, which is the other distributor in Melbourne, on what price point could be achieved if we did move to system-scale hydrogen blending, say 10 per cent hydrogen blending, across eastern Australia. We went out to the global supply chain on that, and the feedback that we got from the supply chain is that it is possible to achieve that level of 10 per cent hydrogen by volume in eastern Australia by 2030—or, in fact, before 2030; around 2028 is what most people are assuming.

That rollout would start at the 5 to 10 megawatts scale electrolysers and build up by the end of the rollout being at the 50 megawatt type scale. That scale would be hitting the 'H2 under 2', so that is, the hydrogen under A$2 a kilogram target, which is the government's target, that they set in the technology investment program. That is still at a premium, just about, to natural gas, which is about A$14 per gigajoule. Recently, natural gas prices have been at that level, and right now they are below that level, but I think it is important to remember that the wholesale price of natural gas is actually not a major problem until we get right to the very end. At that kind of level, we think that that is then at a level that is getting quite competitive, and then further build-up can go from there.

Mr JAMES GRIFFIN: I have a question from one of the comments earlier: Do you think it is a price point issue for the very heavy industry customers in not choosing to go to green gas, versus them not having a consumer base or brand in what is affirming their decision-making? Would it essentially be a pricing issue for them, as opposed to other examples, such as with Dexus and City of Sydney, that have brands to consider, so to speak?

Ms PURDIE: I could answer that. When I have spoken to customers about this—particularly in the last 12 months, less so in the last six months when prices have come down, but certainly 12 months ago, with where gas prices were at that time—they were very price conscious. They felt that gas prices at that time were unsustainably high for their businesses, and therefore any suggestion of anything that might push the prices higher was of great concern to them. That was their overriding concern at the time, price. Mr Wilson's points are well made that, for domestic customers, the actual gas price component of their bill is a smaller component, but for demand customers, who pay a lower price point, but for whom price is absolutely critical, it is a much higher component. Certainly, the feedback I had at that time was that any increased price would be quite unwelcome. Having said that, I do think that if we could offer them something that was competitive in price, they would be very happy to have it. But it is just that concern that it might be priced up that was their comment to me at that time.

Mr WILSON: I agree with that. Certainly, small and medium-sized commercial and industrial customers, that typically would be connected to gas distribution networks, are very price sensitive. They have no choice but to be that. In Western Australia we run a transmission network, so if I think about the very large players that are connected to transmission networks, run by global companies, a lot of those have a decarbonisation agenda. They are looking at how they can decarbonise almost as a matter of corporate policy. Those companies typically are very interested in things like hydrogen, because high-intensity heat is very difficult to achieve for electrification, for example.

Mr JAMES GRIFFIN: Thank you for that.

Mr NATHANIEL SMITH: We have spoken about biomethane, hydrogen and other forms of blending in the gas line to bring down emissions. From a customer point of view, firstly, what sort of price difference would there be to the current price of natural gas compared with renewable gas? Secondly, would there have to be any rectifications to appliances in a household or in a commercial area? Some people may not be aware, but most residential properties in New South Wales and regional New South Wales are either on natural gas or LPG. LPG is a lot heavier than natural gas, so therefore appliances would need different orifice sizes at the appliance. If you change from LPG to natural gas you would have to use a conversion kit. Would any of that be needed for these blended gases or biomethane at the point of the consumer appliance in the home?

Mr WILSON: I am happy to speak on that. I think that the biomethane [inaudible] permanent biomethane because Jemena has more access, but I think that the basic form is that it goes into the network at the natural gas specification, and that would have no impact on appliances. For hydrogen it is about the blend, so the

idea of getting up to about 10 per cent hydrogen means, at that level, the stock of existing appliances should function in the normal way, so there should be no impact on appliances. If we then go above that level then various different appliances will start to need modifying in the way that you talk about. More than having to keep doing it at 20 per cent, 40 per cent, 60 per cent and so on, the working assumption is that once we have reached about 10 per cent of blending, the next stage would be to go to 100 per cent hydrogen conversion, or possibly majority hydrogen and minority biomethane, for example, as another end state, so you do it only once.

You would need appliance conversion at that point, and what we think would be a very good idea would be some regulations, as soon as possible, to say that gas appliances sold need to be so-called 'hydrogen ready'—that is, they need to be able to be modified in the way that you describe, rather than having to replace the entire appliance, for example. If we did that fairly soon, by the time we get to full conversion—which is, let us say, in 15 years from now plus—by then, the stock of appliances overwhelmingly would be hydrogen ready, and then that would be much cheaper than replacing with new gas appliances, or even a complete refit and putting in electrical appliances.

Mr NATHANIEL SMITH: Obviously, we are getting through COVID-19 with construction, with large infrastructure projects to be the thing that will create jobs and keep people employed. In my area of Wollondilly and just outside of that—and the member for Macquarie Fields has a lot of it as well—we have a lot of growth in south-west Sydney. Within the plans and the build of these large new suburbs and towns, are they consulting with you about putting these sorts of appliances in, or looking at having more biomethane, because when you have new cities and new towns, you have new sewage treatment plants and therefore that would mean greater access to biomethane?

Ms PURDIE: I could perhaps comment that certainly in terms of the western Sydney area and the new aerotropolis and so on, we are in discussions there. We have, as part of our access arrangement, talked about ensuring gas supply to those areas, and also potentially doing some work around a biomethane plant that takes advantage of the sewage treatment plant, exactly as you say. That is certainly something that is top of mind for us. As has been said, if we are able to supply biomethane there is no difference in gas specs, so the appliances would not need to be hydrogen ready for that. But certainly the point made is well made, that that would be a sensible thing for appliance manufacturers to consider. It is not something that we have talked about at this point, but it is certainly something for us to consider.

Mr ANOULACK CHANTHIVONG: Ms Purdie, in your first sentence you say you import 90 per cent of your gas from interstate. Why is that? Do we not have adequate supply in New South Wales?

Ms PURDIE: That is essentially because the two sources of natural gas for New South Wales come through the Moomba to Sydney pipeline, so that is essentially from South Australia. Some of that still comes via the eastern gas pipeline through Victoria and, of course, we are getting some now from Queensland. It just relates to where the supply is.

Mr ANOULACK CHANTHIVONG: Do we not have enough gas within New South Wales? Is that right, or is it just not available as a natural resource? Or are we not extracting enough gas?

Ms PURDIE: I am not close to that supply picture, other than to say that, obviously, the Narrabri project has been in the media recently, and that is one that I am aware of in New South Wales. But I am just not aware of other gas fields that are productive. That is not the sector of the industry that I work in.

Mr ANOULACK CHANTHIVONG: In terms of the gas grid scalability, if we were to inject more hydrogen or biomethane gas into the grid, does the grid require an increased level of investment, to be able to accommodate that upscale of supply?

Ms PURDIE: For biomethane?

Mr ANOULACK CHANTHIVONG: For any gas.

Ms PURDIE: It depends. There is some devil in the detail here, and we are working with the Future Fuels Cooperative Research Centre to understand where the limitations might be. For much of our network the materials are such that biomethane hydrogen and so on could all be transported safely, we believe. We will continue to study that to make sure we understand any safety issues and any asset longevity issues thoroughly. We believe that in some of the higher pressure transmission pipelines, with increased level of hydrogen there will be some challenges. So we are doing research to understand that, but it depends exactly where you inject it and, certainly, for the distribution network the issues are largely manageable, we believe.

Mr ANOULACK CHANTHIVONG: In terms of the hydrogen injection, for example, do we have an estimate of how much that would actually cost, or the investment required into the grid? I am thinking of your

base price that consumers will have to pay if there is an increase in investment in the grid. I am trying to get an idea of that.

Ms PURDIE: I will make a comment and then I will pass to Mr Wilson, who has information in this sector. Certainly, that is one of the aims of the work we are doing in our upcoming Western Sydney Green Gas Project—to understand how we blend, and if there are any constraints that we are not aware of in that regard. We believe that with low levels of blending there will be no significant additional expenditure required beyond the injection points, but that is something we are exploring and seeking to understand better. I will hand over to Mr Wilson.

Mr WILSON: Thank you. If we think about blending, the best information we have at the moment on the cost of the hydrogen is what I talked about earlier—so the under $2 per kilogram, fourteen dollars per gigajoule, within this decade. In a blending scenario, the investment on the network should be very minimal, because there is very little impact at the 10 per cent blending, and really no impact on appliances. If we think about 100 per cent conversion to hydrogen and biomethane, by the time we get to that point I think it is reasonable to assume that the price of the product is then very close and very competitive to natural gas. In terms of work on the network, there will be reinforcement to the network, and, of course, that will also be the appliance issue that we talked about before. The counterfactual is electrification, let's say, and the evidence that we have seen—the study work we have seen—suggests that would be much more expensive.

One of the reasons for that is—and it is often not well appreciated—the scale of gas in energy terms. I apologise, I will just talk about Victoria for a moment, which is our largest distribution market, and the one that I am most familiar with. In Victoria the gas distribution network delivers three times as much energy—three times as many joules—to the electricity network. If we were to electrify that load, even with the extra efficiency of reverse cycle air conditioning compared to combustion heating, you would need to double the size of the capacity of the electricity networks to deliver that load, than you would via gas networks. It would be very expensive to do that reinforcement. Also, in an all-electric scenario you have a real problem with storage. Green gas storage—that is, inter-seasonal storage, weekday to weekend and so on, is very difficult to achieve in all-electric scenario. So, we believe there are costs with a full conversion but we believe they would be lower than counterfactual.

Mr ANOULACK CHANTHIVONG: I am interested in biomethane gas production. Compared to the base case of getting natural gas, are the emissions more or less than the current production of gas?

Ms PURDIE: I would say that the biomethane product is actually the same chemical formula, or very close to the same chemical formula—it meets the New South Wales gas specifications. Therefore, when you are thinking about burning a unit of biomethane versus a unit of natural gas methane, it would be essentially the same. However, the point I also make is that if you are burning that methane, rather than perhaps allowing it to be generated and released into the atmosphere by a sewage plant, or an abattoir, or wherever that base might normally be, degrading naturally and emitting its products to the environment, you are taking that methane and you are turning it into carbon dioxide. We know that carbon dioxide is a greenhouse gas, but so is methane, and the estimates are that the global greenhouse gas warming potential of methane is about 30 times that of carbon dioxide. So you could consider that, by converting what would normally just go into the atmosphere as methane into carbon dioxide, you are having a positive impact overall. But the actual gas product itself is the same.

The CHAIR: I thank all the witnesses for appearing before us today. We may send some further questions in writing and your replies will form part of your evidence and be made public. Would you be happy to provide a written reply to any further questions?

Ms PURDIE: Yes.

Mr WILSON: Yes.

The CHAIR: Thank you for your contributions this afternoon and your submissions to the inquiry. It is appreciated and helps inform our processes here.

(The witnesses withdrew.)

(Short adjournment)

NATALIE LINDSAY, Head of Regulatory Affairs, Essential Energy, before the Committee via videoconference, affirmed and examined

ANTHONY CALLAN, Executive Manager Marketing, Delta Electricity, affirmed and examined

GREG EVERETT, Managing Director, Delta Electricity, affirmed and examined

SEÁN McGOLDRICK, Executive Manager, Major Projects, TransGrid, affirmed and examined

The CHAIR: Thank you for joining us this afternoon. We will begin by allowing each of the organisations to make a brief opening statement. Ms Lindsay, would you like to make any opening remarks?

Ms LINDSAY: Yes, please. Thank you for the opportunity to speak today. Essential Energy's core business is building, operating, and maintaining one of Australia's largest electricity distribution networks. We provide essential services for approximately 865,000 customers across 95 per cent of the state. We are a key enabler of economic activity in regional, rural, and remote New South Wales. Compared to other distribution networks operating in the national electricity market, we have the lowest number of customers connected to each powerline. Essential Energy has 38 per cent of the total distribution powerline link, but only 10 per cent of the customers. This means that it is more costly to provide each customer with access to our network. A safe, reliable and affordable electricity supply is a critical enabler of an economic development in rural New South Wales.

As a business, we are focused on reducing network charges, and in the last seven years we have achieved reductions of more than 40 per cent whilst also improving reliability. A business wide transformation program is supporting a continued focus on efficiency, but is also delivering the capability required across technology, data, presence, and people to support the broader energy market transition. Our network is at the forefront of the energy transition, with over 800 megawatts of large-scale renewable generation connected, and over 1,600 megawatts between the connection enquiry and construction stage. We have almost 1,000 megawatts of small-scale renewable generation, which represents about 22 per cent of Essential Energy's customers.

To put these numbers into perspective, Essential Energy's all-time maximum demand is around 2,600 megawatts, with an average demand of around 1,500 megawatts. The transition raises a number of challenges and opportunities for the network and the communities we serve. One way that regional communities can be supported during the energy transition is through provision of energy through stand-alone power systems [SAPS], instead of through traditional poles and wires networks. Approximately half a per cent of Essential Energy's customers require 17 per cent of our network length to service their electrical needs. A larger-scale deployment of SAPS has potential to improve the reliability of supply to those customers that live with the grid, reduce the cost to maintain Essential Energy's vast network and, therefore, reduce network targets for all customers, and minimise bushfire risk and enhance resilience of the network. Regulatory and market frameworks should be reviewed so they better support alternative lower cost options such as SAPS when making their work investment decisions.

We note there is currently much focus on the function of the transmission network to facilitate the connection of large-scale generation in order to maintain system reliability. Whilst some transmission investment is undoubtedly required, we note there should be also consideration of measures that can be introduced to better utilise existing distribution network assets and distributed energy resources, such as rooftop solar. The creation of distribution level markets is another important way to enhance the resilience of the energy system. This is because these markets will help unlock the value of customer investments in rooftop solar, and allow for these resources to be put to their best use. More effective use of local resources located on the distribution network will reduce reliance on large-scale generation and transmission investment, and does have the potential to lower overall system costs while enhancing resilience. Again, further work is required in the regulatory and market framework to allow networks to facilitate the effective integration of distributed energy resources.

The 2019-20 bushfire crisis has highlighted the need to review how power supply is stored, but it is also an opportunity to consider network resilience in a practical manner. Regional communities are demanding more action to minimise the impact of bushfires and storms, but there are some regulatory barriers to enhancing the resilience of electricity networks in remote and regional areas. Essential Energy wants to avoid rebuilding lines and other infrastructure, which will be in place for many decades, when other technologies are available which are capable of delivering a more reliable and resilient supply of electricity. Not all of these technologies would currently be considered cost-effective, given the limited inclusion of future climate change risk in the current regulatory framework. Essential Energy encourages a broader discussion of community expectations and network resilience, and how climate change risk can be more holistically included in network planning and investment. We will continue to progress work across all these areas to deliver a safe, reliable, and affordable supply of electricity to the communities we serve.

The CHAIR: Mr Callan, would you like to make an opening note?

Mr CALLAN: Delta thanks the Committee for the opportunity to attend today. We would like to offer a few views, mainly on energy affordability, and also some on the implications of AEMO's recently released Integrated System Plan. We are a major independent generator in the national electricity market. We have 1,320 megawatts at Vales Point on the Central Coast, a 150-megawatt PPA with a large solar farm at Darlington Point, and another project underway for 25 megawatts of solar on the Central Coast at Vales Point. Like most electricity markets around the world, the National Electricity Market is faced with significant challenges as the

amount of variable renewable energy increases. That displaces conventional baseload generation, pushing the operation of the power system to its limits. The accelerated build of new renewable generation presented unanticipated issues for the operators and planners in South Australia. The consequences have been comparatively elevated prices, two major interruptions to supply, and significant interventions by the market operator.

This has been suboptimal, and New South Wales is well placed now to learn from some of those issues and mistakes, and chart a course that sees us achieving renewable energy targets in a way that keeps energy affordable and reliable. Delta's view is that this can be achieved by ensuring that the low-cost, reliable generation, like baseload coal-fired power, remains sustainable over the longer term, or until affordable replacement dispatchable power is available, and that there are adequate affordable power system support technologies to help integrate the renewable wind and solar energy. This may even mean extending the life of some of New South Wales' existing 660 megawatt operators that are required for system support and reliability services. Secondly, it can be achieved by ending unnecessary subsidies and support for new wind and solar, given that the energy sector is on track to meet or exceed Australia's Paris carbon emissions reduction targets, and wind and solar energy now on an energy basis is competitive on a cost basis.

Thirdly, it can achieved by ensuring that the high-cost and long-lived regulated transmission system investment is built only when there is a clear need, and after rigorous economic assessment as allowed for under the regulated investment test for transmission. The affordability of electricity is deteriorating—we all know that—mainly over the past ten years, and higher prices are adversely affecting households, according to the Australian Energy Regulator. Businesses are also reporting that the high cost of energy is driving operations overseas. For example, BlueScope Chief Executive Mark Vassella has labelled Australia's high energy costs "a tragedy" for local manufacturing as the steelmaker announced a $1 billion expansion in the United States. Manufacturing Australia Chief Executive Ben Eade has stated:

> High energy costs are the biggest risk to manufacturing in Australia. Our challenge is avoiding demand destruction and loss of key plants.

Whilst the headline energy cost of new wind and solar is competitive, there has been a lot of extensive modelling by companies like ANLEC R&D, identifying that the total system cost is the best way to establish what the true costs are for supply to the customer.

That includes network enhancements, wind and solar firming, and power system stability technology. That is the best measure when considering the impact on electricity prices as we move to very high levels of renewables. The modelling shows that, as the amount of renewable energy increases as a percentage of the total generation, costs can rise materially. We believe government assistance, perhaps in the form of underwriting, where justified, should be on a technology-neutral basis to minimise the impact on prices. In relation to the electricity sector, governments do look for guidance from AEMO's Integrated System Plan. The latest one has only just been released. The ISP is a roadmap for the National Electricity Market and provides guidance on potential transmission network development and new generation investment, but its guidance is limited. Even though AEMO is concerned about the impact on system security of large conventional power station closures, the ISP does not contemplate the potential for coal-fired life extensions.

The ISP models wind and solar output, and there is a view that there is geographic diversity, particularly in wind but also in solar, across the NEM, but the data does not support that case. There is a very close correlation between wind and solar right across the NEM at the same time. That has implications for consideration of new transmission links. Upgrading the links into the state may only support flows at the times when it is happening at the same time, so there is potentially a suboptimal outcome from an investment perspective, irrespective of who is paying for the upgrade. There is a bit of concern that the roadmap is highly reliant on new technology advances in power systems and investment for firming to ensure that there is power available for 24 hours per day as we need.

The business case for this investment currently requires support as it presents a fairly risky proposition for investors in terms of the network supports, technologies, and storage. Moreover, the current energy market does not support stored energy, as the increase in demand actually lifts the price when it is pumping or storing, and the extra supply at the release of that energy actually suppresses price. The business case is basically eaten as more and more storage comes into the market. Without the knowledge of a supporting market model, and a proven business case for new dispatchable plants, the ISP should not be taken as an incremental, implementable plan for the future. To do so may result in substantially lower investment in high-cost, long-lived assets.

New South Wales risks losing some of its current-generation self-sufficiency with a large future build of interconnections. Transmission investment is not no-regrets investment if the state has to subsequently build local generation for New South Wales, which is a cost to consumers. Summing up, there needs to be consideration of variations to the current envisaged renewable energy future. As part of those considerations, there should be an

assessment of New South Wales' internal energy security, compared with the state's current and historical position. As a related issue, there is extensive reliance on transmission infrastructure in the future plan. The risks and obligations being placed on New South Wales consumers must be recognised. There must also be recognition of the extent to which this will go beyond no-regrets investment, if the assets become stranded or under-utilised because of domestic security concerns or an alternative technology future.

The CHAIR: Thank you. Mr McGoldrick, would you like to make any opening statements?

Mr McGOLDRICK: TransGrid is the operator and manager of the high-voltage transmission network connecting electricity generators, distributors, and major end users in New South Wales and the Australian Capital Territory. Our network is at the centre of the National Electricity Market. Greater interconnection is critical to providing reliability and a trading platform for competition to keep wholesale prices down. As you have already heard today, the energy system is undergoing a once-in-a-lifetime transition away from coal generation to low-cost new-generation sources of solar, wind, and hydro. Coal and gas generation is on the decline. TransGrid is at the forefront of this transition. We are connecting record levels of renewable generation in New South Wales, and the level of interest in connecting to the network shows no signs of abating. Ongoing investment in the transmission network will play a vital role to ensure that we have a safe, reliable and low-cost energy future.

The energy transition is being driven by community expectations and commercial realities. Firmed renewables are the lowest cost way forward. Solar and wind provide the least cost energy in dollars per megawatt hour. Renewables need to be firmed and there are a number of ways this can be done. The most cost-effective ways of doing this are simply through the geographic diversity made possible through greater interconnection and through storage—typically pumped hydro and batteries. Other dispatchable forms of electricity have their place but are more expensive, in particular, peaking gas plants. Gas is expensive and forecasts show that it is set to remain so. TransGrid is working closely with the New South Wales government and AEMO to plan and deliver our future energy system. We have four major interconnector projects in development: EnergyConnect, an interconnector with South Australia; QNI, the upgrade of the existing Queensland-New South Wales Interconnector; VNI, the upgrade of the existing Victoria to New South Wales Interconnector; and HumeLink, which strengthens our southern network and brings power up towards major load centres such as Sydney.

In addition, we are working closely with the New South Wales government to deliver Renewable Energy Zones, starting with the pilot project in Central-West Orana. We strongly support the development of Energy Zones as a way of co-locating areas with rich resources of renewable generation with new transmission investment. The change in the energy sector is happening quickly, and our regulatory system is struggling to keep up. We commend the efforts of the government through its NSW Electricity Strategy, which seeks to address some of these issues. Other barriers remain and TransGrid is working through these with the Australian Energy Regulator and others.

I also want to commend the Committee for investigating how the transition can help the New South Wales economy recover after COVID-19. TransGrid will be significant investors and employers in regional areas of New South Wales over the next decade. We believe our pipeline of investment will create at least 7,000 construction jobs and $25 billion in wider economic benefits for the community. While there are opportunities for regional communities, we acknowledge that this needs to be done sensitively, and are committed to extensive and genuine consultation with communities. I look forward to discussing these issues with the Committee in greater detail.

The CHAIR: Thank you very much. We will now begin with questions. I might start with you, Ms Lindsay. You spoke about, and your submission writes about, the stand-alone power systems and the suggested need to roll them out further. How does that rollout happen? Where does that investment come from? What does that process look like?

Ms LINDSAY: Effectively, we have a very large network, and the replacement needs of that network are going to be enormous as the future rolls out. Stand-alone power systems are best deployed in the frontier parts of the network—that is, customers who have dedicated assets of several kilometres or more are prime candidates for a stand-alone power system. It is basically the displacement of future replacement expenditure that will fund a stand-alone power system from our perspective. There are other factors, such as areas that might have high vegetation management expenditure. It is about deferring the spend that you would normally spend on a network over a year or into the future. The business case does stack up for quite a number of customers within the network at the moment.

The CHAIR: Can I ask about priorities with investment in transmission infrastructure, potentially to Delta Energy first, in terms of the impacts on the affordability of electricity? What sort of investment do you feel

is required? And then to TransGrid: How is that process going with the new renewable Energy Zones? That work has begun; what lessons are there? What further investment is needed in transmission infrastructure?

Mr EVERETT: Delta Electricity is of the view that we are in the earlier cycle of the transformation of the energy sector. Investment where it is mostly in renewables is somewhat no-regrets. Certainly the cost of stand-alone energy on wind and solar has become very low, so that is an easier thing to do. We are at the point now where we are considering the cost of firming for that solar. As technology costs for some firming come down, we are able to augment some renewables with small storage, and move some of the production an hour one way or another. The bigger obstacle is when you lose baseload plant and you have to replace that with a plant that needs to operate for eight, 10, or 24 hours. That is a significant obstacle.

One of the things that stands in the way at the moment is the form of energy market that we have. As my companion here said, energy-only market requires a low price to pump or charge a battery. As you add that demand, you naturally push the price up, so you frustrate your own business case. Then when you discharge, of course, that is extra supply, and you push the price down. Yes, some of these technologies for firming are helpful for frequency control, but that is a very small market. Ultimately, you need to get to the point where they are living off an energy arbitrage. The form of market that we have at the moment does not support that; in fact, it absolutely frustrates that type of investment. So the Energy Security Board has a charter to review what form of market we need. We think it is critical that that is embarked upon quite early, because it influences what you would have in an ISP, and what sort of transmission you need. It takes us to our second concern, which is, in New South Wales, what is our local domestic energy security?

Previously, we were able to supply New South Wales' maximum demands within New South Wales; we are no longer able to do that. So when we have seen maximum demands in New South Wales, in January, the in-state capacity was about 2,000 megawatts short. In those particular circumstances, particularly as we got towards the end of those events and solar started to roll off but the wind was very low, we were completely reliant on interstate transfers. We also then need to think about circumstances where our nearby states have the same level of stress, and to what extent is the sharing going to be happening. We think that New South Wales needs to be very careful about leaving the energy security that we currently enjoy to move to one which is potentially less secure, and certainly in terms of domestic capability, less secure.

The CHAIR: Mr McGoldrick, to give certainty to that energy security in New South Wales, what is the strategy that should be adopted when it comes to transmission infrastructure? Where are the gaps? What needs to happen next?

Mr McGOLDRICK: I think it is very important to realise the scale of the issue that we are dealing with. I am going to start off by giving some numbers to the Committee. In the financial year 2020 TransGrid connected 633 megawatts of wind and solar, bringing the total installed capacity of wind and solar on our network in New South Wales to 2,801 megawatts. At the moment we have an additional 6,358 megawatts in our connection pipeline. Those are developers that have actually gone through a formal application. In terms of overall interest, we have referred to the 48,000, but they are somewhat more speculative. But we have serious proposals, as you can see, on scale for renewable energy. That is because it is a commercially viable cost-efficient technology and the resource is rich, especially in certain areas of New South Wales.

In order to make sure that we mine that resource and bring the necessary resource in the future to our load centres, we must improve our transmission connection. We must also make sure that we connect intrastate, so that we can make the best use of diversity of different resources on the east coast of Australia. So, it is the combination of finding the correct way to co-locate, in those remote areas, renewables from our own sources, and make a transmission connection efficiently into the main core of the transmission system. It is also a question of improving the rather weak interconnections that exist on the east coast of Australia, particularly into and out of New South Wales. We have very limited capacity, which has been recognised in the ISP, already mentioned by my colleagues.

The role of the ISP is to look into the future, to see what needs to happen on the power system as a whole. They have pointed out that we need to improve interconnection both north-south, but especially east-west where there is extremely limited capacity. So it is a combination of these things. The Integrated System Plan is very foresight-ful and it allows us, as the jurisdictional planner in New South Wales working cooperatively with the AEMO, to take those projects through a rigorous economic assessment, which is sometimes known as the RIT-T process, which I am sure you have heard of. That process is governed by the Australian Energy Regulator [AER], and they will determine the economic benefits versus the costs, and make a decision to bring a project forward or not, and we will then construct it. That process is very rigorous. It can be a tad pedestrian at times, but it is lock step in making sure that value for money is presented. But there is no question, given the number of applications

we are seeing, that firm renewables are competing on a commercial basis right now with other forms of technology.

The CHAIR: Great. Thank you. Ms Lindsay, do you wish to make some comments in this regard?

Ms LINDSAY: No, thanks.

Mr JAMES GRIFFIN: Earlier today, we heard from a number of witnesses around their concerns about basically two things. There seemed to be a theme around capacity of the network generally, and the second one was related to storage. Each of you has touched on it somewhat but the overarching concern or viewpoint was that the network is stretched, and that there is a minuscule amount of capacity left, as far as I understand it from one of the witnesses, despite having a lot of proposed new generation from renewables that have been suggested will come online soon. I understand that there is a lot of work going on with the Hume and the Indicators and others. My question is: Is the investment in the network happening in a time frame that will satisfy what we have just heard from Delta and TransGrid—that this issue and concern around baseload is driving concern around prices?

Mr EVERETT: I am happy to take that on first. I guess I should say at first that we are not anti-transmission in anything we say here. We agree that transmission is an entirely valid investment, provided it goes through the rigorous RIT-T, but we would point out that, to the extent that you become more and more reliant on transmission to transfer generation from other states, you are less capable on your own domestic generation. We think that that, despite there being a NEM, remains a concern. We should be worried about our own energy security. I think the other point that we would make is we think the RIT-T is the appropriate test. We think that the test needs to be absolutely rigorous, because ultimately the risk for that transmission investment is borne by consumers.

We went through the mid-nineties where we moved away from central planning, and the main purpose of that was that there was a concern that there was overinvestment by the utilities, and that there had been gold-plating, and consumers bore that. So we moved to a market, and the idea was that investors would bear the risk of their investment. As we move more and more away from generation investments and more into regulated assets, we are moving the risk back towards consumers. For that reason, the test needs to be very rigorous, and we need to be very careful about making that commitment and what we are leaving in terms of our domestic generation security.

Mr McGOLDRICK: I will add further comment. I support everything that has just been said there. To put a little bit more colour on it, there is no doubt that the supply-demand balance is becoming tighter. I would encourage the Committee to have a look at our Transmission Annual Planning Report, just published at the end of last month, that highlights that situation and provide some viewing for the future. We have had a number of loss-of-reserve events that have been increasing over the last few years, and in my mind, the way to address these is of course to bring along good, local, firm renewable energy capacity through Renewable Energy Zones—something which the New South Wales government, I commend, is bringing forward right now as we speak. To me, developing mining—this wonderful resource here locally—will provide many, many benefits. There will be a need also for intrastate transmission, to make sure that we make the best of the flexible power system into the future, where our mix will change.

Mixes on power systems of different generational technology always change. New technology, despite rumours, is always coming along in our sector, and we have learned to cope with it. Worldwide, the wave of renewable energy has resulted in new thinking about how to firm this plant, but also on how to make the best use of transmission interconnection between different regions, both nationally and internationally. To my mind, it is a combination of bringing forward greater areas of renewable energy quickly, firming those Renewable Energy Zones, and making sure that we have sufficient transmission capacity to transfer around the east coast for the entire NEM.

Ms LINDSAY: I think there has been a lot of discussion around the transmission network and the centralised nature of large-scale renewable generation, but I encourage the Committee to think about the distribution-level network. Essential Energy's network is over 180,000 kilometres within New South Wales. It stretches out to far-reaching parts of the state, and there are multiple opportunities for the connection of large-scale generation there, but also distributed energy resources [DER] or rooftop solar. That is happening daily. The growth in those systems has been consistent for the past 10 years: A total of 22 per cent of Essential Energy's customers have those systems now, and that growth is not slowing down; it is consistent each month. We expect to hit 1,000 megawatts in the next month or so, and there are no signs of that slowing down.

As a network, we need to start considering how big that DER needs to get before we start to see challenges and issues on the network. In my opening statement I was talking about distribution-level markets, and the need to have some coordination to optimise those resources on the network, so that the customers who install those

resources get paid adequately for them, that they are put to their best use in terms of making sure the network is behaving as best as it can, and that more customers can connect these systems in the future. That growth is not going to slow down; it will continue. There are no signs of that abating.

Mr ANOULACK CHANTHIVONG: I am interested in the network charges that are outlined in Essential Energy's submission. It states that there has been a disproportionate impact on people who do not have solar. What does the tariff reform look like compared with the status quo?

Ms LINDSAY: That is a really excellent question. There is a lot of work happening in that space at the moment. We are about to undertake engagement for our upcoming tariff trials to test this very problem. What we want to do is make sure that we design our network charges to solve the problems that our network experiences. Saturation of rooftop solar is one of those things we want to test and implement into the future, so that we are in a space where we can connect as much of these systems as possible, and so that customers are contributing their fair share for the use of the network, but being rewarded for using the network at the same time. I think tariff reform, more generally, is absolutely required when the network pricing will be implemented. They were written for a different problem, which is basically peak demand being driven by air-conditioning growth. The world has moved on substantially and so do network charges, and there is a very large piece of work that needs to happen around that space.

Mr ANOULACK CHANTHIVONG: When is that analysis or estimation likely to be finalised?

Ms LINDSAY: Our piece of work will lead into our next tariff structure statement, which is part of our registry proposal to the Australian Energy Regulator. That will be submitted in about three years time. In terms of the trials we will need at least a year or two of evidence or outcomes from those trials before we can feed that in. Unfortunately, these things do not happen quickly. What we can do quickly is trial the tariff, but in terms of implementation, it does need to be accepted by the regulator, which is at least four years away.

Mr ANOULACK CHANTHIVONG: If the problem that needs to be addressed is the disproportionate financial impact on people who do not have solar or renewables, and who then have to pay a greater portion to maintain the network, does that then mean that people who do have solar or renewables will inevitably be charged more to access the network? Is that the trajectory?

Ms LINDSAY: I think at the moment, if nothing changes, it is beneficial for someone to have solar for the purposes of avoiding charges from the network. I am absolutely sure that is a key driver for some systems. There are some more changes lodged with the Australian Energy Market Commission at the moment that are seeking to change how costs are recovered from those sorts of systems. That process is underway, and we will likely be putting in a submission to that, but our tariffs will not necessarily focus on charging people for exploiting the network. What it will focus on is making sure our pricing is alright. At the moment, in the middle of the day in some areas there is too much energy firing through the network for customers to consume it. We need to start looking at things like SA Power Networks' solar sponge tariff, which will price that period of the day quite low, so that the incentive is there for customers to use it. I think you could say it is almost becoming the new off-peak period, instead of overnight: in the middle of the day, or on a very hot day, when there is quite a lot of energy flying and not enough people consuming.

Mr ANOULACK CHANTHIVONG: Does that mean our grid was invested in and developed for a different energy mix? If we are to have more renewables, what is going to be the investment required to make our grid scalable and adaptable to the new energy form mix? How does that flow on to pricing for the consumer and households?

Ms LINDSAY: It is true that the network is designed for a very different era. It is designed for a one-way flow of energy. There will be an investment required to enable more distributed energy resources on the network. I am sure Energy Networks Australia will talk more about this tomorrow, but there has been a body of work within the industry to look at a distribution system operator. It will attempt to optimise how these systems are connected and orchestrated much better, so we do not have these issues in the middle of the day, where there is not enough energy being used and too much flying through the network. There is still quite a body of work. We are working on what we call no-regret actions, where we will seek to implement things like increasing the visibility of our low-voltage network. At the moment we do not have a lot of visibility, and as a no-regret action, it is critically important to understand where these systems are, what they are doing at any point in time, and what the voltage fluctuations look like on the network, which is a really important foundation for future markets and processes to be built upon.

Mr McGOLDRICK: In general, it is not so much a grid or distribution issue; it is a power system issue. There are challenges from renewable energy at the distribution system level. There are challenges from renewable energy at scale in areas where we do not have an existing grid at a higher voltage level. Overall the power system

is going to have to innovate to accept this wonderful new form of energy that is now very commercially available to us. In order to make the most of it we are going to have to make investments—there is no question about it—but those investments are value for money, because you get a really great source of energy that we can all share when we firm it up and interconnect appropriately. There are investments needed, and innovation is also going to be required. One innovation, which my colleague mentioned, is the distribution system operator, and the enhanced communication systems and visibility, at lower voltage levels than we could ever imagine. There have to be faster systems in terms of communication between our different control centres. All of those things are required, but you are seeing an industry that has been disrupted, and that is now rising to that challenge and is innovating. That is what we are doing.

Mr CALLAN: Certainly, there will be changes in transmission and distribution to accommodate this changing mix of generation over time. It is happening. There is EnergyConnect, which will run from South Australia to New South Wales. It has not been approved by the regulator, but it is close. That is happening, and AEMO is looking at HumeLink. I think it is important, though, for the Committee to understand, that the technology is there, and we know what might be required by way of firming but, at least for the medium term—for the next 10 years—the bulk of energy in New South Wales is still going to be supplied by the existing power fleet, except for Liddell, which includes coal-fired and gas-fired and Snowy. So there are changes to the market design that is needed to accommodate that. The risk, though, could be a rise in prices, because there are costs associated with firming, and with actually connecting to the grid with new transmission. That is why our position is that so long as that is understood—the implications of this roadmap from AEMO, and the implications on the costs to consumers—then the plan will be fairer in the long term in relation to what consumers pay and also what businesses pay, not only in New South Wales.

Mr ANOULACK CHANTHIVONG: How do microgrids impact the network in terms of pricing?

Ms LINDSAY: We see microgrids as a really big version of a stand-alone power system, so, provided that the microgrid is in the right location, and it does not maintain its connection to the network, there will be benefits that can be seen. At this stage we have not identified any economic microgrids but, as time moves on and technology improves and equipment becomes cheaper, that will change. The other benefit of microgrids, though, is having long powerlines exposed to the elements, be it storms or bushfires, these events are likely to increase in the future, and so there are network resilience benefits from microgrids as well, and that is something that we have not yet captured in an economic sense or a cost avoidance sense, and that is part of the changes that need to be made to the regulatory framework and also how network planning and investment decisions are undertaken—that that risk is actually valued in a cost benefit calculation.

Mr McGOLDRICK: If I could just add: As the transmission planner for New South Wales, we are very keen to find ways to accommodate new technologies in a cost-effective way. Very recently we have identified that Broken Hill—one really great community that we serve, but at the end of a tremendously long transmission line which needs significant upgrading—it is much better for us to develop, with the renewable energy sources in Broken Hill, in microgrid, so that when the existing line fails to work, microgrid, with renewable energy and storage, can set together with a little heartbeat from the community, and work until we can repair that line. That is a very cost-effective way. Rather than spending an awful lot of money rebuilding that line, we can work with its existing reliability, as it degrades, by investing in a microgrid. So that is a very sensible thing to do.

Just in terms of the overall economics, the Integrated System Plan that AEMO develops is a whole-of-system plan, and it does take into account the use of the significant existing fossil-fuel fleet in New South Wales and its continuation, its eventual retirement, and then renewable energy, with investments in the backbone grid, and in firming through batteries and other forms of storage. It does take that into account to get the best deal, while still keeping the power system reliable and safe. That is its whole raison d'être—it is there to give us a view into the future that is economically viable.

Mr ANOULACK CHANTHIVONG: So it is more complementary, rather than competitive? Is that right?

Mr McGOLDRICK: Correct. We need all forms of energy. We need an appropriate mix. We need to make sure that, on a whole-of-system-plan basis, we get the best deal for the consumers of New South Wales.

Mr ANOULACK CHANTHIVONG: That is all from me.

Mr NATHANIEL SMITH: Thank you, all, for joining us today. I am the one regional MP on this Committee. The bushfires really affected my region through November and December and, especially, a couple of days before Christmas, as I explained earlier to a former witness—especially in that Buxton, Balmoral, Hill Top area where we had a lot of power poles go down due to bushfire. Not only did it affect those who actually lost their homes or equipment on their property, but also people who did not lose their home were without

electricity for a number of days. Obviously, being only a couple days before Christmas, everyone had their fridges full for a family lunch or Christmas festivities. What sort of strategies are you looking at in the future if events like that do happen—they will happen again in different remote areas that are affected by bushfires—to try to get power on as quickly as possible, using renewables or other sources or battery technology? What sort of strategies do you have in line for that?

Ms LINDSAY: We have had an enormous bushfire season. It is the worst we have ever experienced, starting from October last year, through to the early months of this year. We lost approximately 3,200 poles that needed to be replaced, and we have also learned a lot from that experience. It was a massive effort from Essential Energy crews to get those powerlines restored. But what we found is: There are other ways to restore power and a key method is, obviously, stand-alone power systems. So we deployed a few units around the South Coast area to some residential customers, but also some communication towers. Those stand-alone power systems are still there today, whilst we determine what the more permanent solution is. But they are going to be critical units that we will roll out in a natural disaster event, whether it be a storm or a bushfire. We are also looking at other technologies, such as composite poles, which are literally indestructible and fireproof. We had a couple on a trial basis in the Snowy Mountains and they survived the fire, whilst all other poles around them were actually burned to nothing. So there are a few things that we are looking at. Stand-alone power systems are absolutely critical, but there are some other components of the network that we can look at to make those lines more resilient also.

Mr McGOLDRICK: Just a comment from me from the transmission end of the spectrum: A very significant bushfire season. The community out there, which I regularly visit, particularly in the Snowys and the Blue Mountains, they are still recovering. You can see it. The trauma is still there when you go and talk to people. So it is uppermost in our mind, particularly when we are in those communities looking to develop new assets. But just to give you a flavour of the damage of the bushfire, to date I have spent $9 million replacing equipment that was damaged during that bushfire, and I have less urgent equipment that I have to replace, that is damaged but is still operational, of probably another $11 million. So it was quite a significant season.

Thankfully, despite many consumers being out, the power system was actually quite resilient, and it stayed together. In an event of that scale, it held together. There were some communities that were off for several days, indeed, but the core of it held together, and we did not suffer a wide blackout, which we could have in such a severe situation. So this speaks to the resilience of the power system, and it speaks to investment in it. In terms of what we are doing to make sure that if it happens, when it happens again, that we are equally resilient. We are examining all of our bushfire policies. We are making sure our easements are properly cleared. We are making sure that our assets are robust, and this is what a good infrastructure developer should do.

Mr NATHANIEL SMITH: Not every resident has a couple of diesel generators in the shed to keep the power going. In future where areas are affected by bushfire, if things like this happen again, there should be more of a push in the building standards for solar and other power generation on-site. It is complex.

Mr EVERETT: I think we would just make one observation, which is the more that you have domestic generation in New South Wales and the more that that is disbursed, it is inherently more secure than being reliant on long-distance transmission.

The CHAIR: Do you have any additional questions, Mr Smith?

Mr NATHANIEL SMITH: No.

The CHAIR: Ms Wilson, do wish to ask any more questions?

Ms FELICITY WILSON: No. Thank you, Chair.

The CHAIR: One final question from me to all of you. Today we have heard a great mixture of evidence about the challenges of the changes in innovation and energy supply in New South Wales. We have heard examples of solid government strategy, particularly around the Renewable Zones. We have heard also that further work needs to be done. In terms of a touchpoint within government to support the sector through the challenges and changes which we are facing, there have been a variety of recommendations, including transition authorities, as has happened in the La Trobe Valley, government agencies or entities tasked with looking at energy supply, but also looking at the impacts that changes of that have to workforces and communities and local economies. Do any of you have thoughts about this, about what is working well in terms of the New South Wales government in future planning, and what work needs to be done to give greater certainty to communities and to the energy supply?

Mr EVERETT: I will offer something up, which is I believe that the principal long term, greatest benefit would come from New South Wales working with other jurisdictions and federal government and all of the market bodies to determine what the future form of market will be, because that is the basis for investment. As we go through a transformation, if we need to move away from the current dispatchable plant that we have, we need to

be very confident that we are moving to something that is going to give us energy security. And in order to bring on that investment, you need to know what sort of market you are investing in. It has been set for 2025, but it seems to be a more pressing need than that.

Mr McGOLDRICK: While there undoubtedly is a need for market reform, in a certain fashion I think we just have to get on and do what we need to do. The technology is not perfect, we have challenges, but we have good, capable people, both in our government, in our bureaucracy, and in our engineering cohort that we can fling at this problem. It is a technology that has rapidly developed, that has significant potential for regional investment. We are talking billions of dollars going into the local economies, regional economies, which quite frankly have been battered over the last couple of years, between droughts, bushfires, COVID-19, very significant and detrimental economic impacts out there.

There is an opportunity to pour money into those regional economies to build new power plants, to build connections for those new power plants. I think that is something that—we have to grasp this moment in time and just go for it, because that will ensure our energy future. We have a road map very capably laid out by AEMO in the Integrated System Plan. We have a commercial technology now. It does not need support from grants. We have innovative capability, and I think we just have to plough on now and invest.

Ms LINDSAY: For Essential Energy, we would welcome working with the New South Wales government on how to better utilise the distribution network in the energy transition. But I suppose something more front and centre is a potential large-scale rollout of stand-alone power systems, which have the potential to improve services for those customers but also save significant future expenditure for the rest of the customer base, given our network is [inaudible] priced. There is a role for the New South Wales government to assist in the regulatory changes needed for the deployment of SAPS, and in the future that will be microgrids as well. But from our perspective, we would absolutely love to work with the New South Wales government on how better our network can help facilitate the transition to the future.

The CHAIR: Thank you all very much for appearing before us this afternoon and for the time taken to engage with the inquiry and provide submissions to us. We may send you further questions in writing. Your replies will form part of your evidence and may be made public. Would everybody be happy to provide a written reply to any further questions we may ask?

Mr McGOLDRICK: Yes.

Mr EVERETT: Yes.

Ms LINDSAY: Yes.

The CHAIR: We greatly appreciate your time this afternoon and wish you a good afternoon. That concludes our public hearing for today. I thank all the witnesses who appeared, the Committee members, Hansard and the staff at the Department of Parliamentary Services and Committee staff for their assistance throughout the day.

(The witnesses withdrew.)

The Committee adjourned at 16:30.