Sydney – Energy Futures Seminar: Chief Scientist Alan Finkel's Review of the Security of the National Electricity Market

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Australia's energy sector faces major challenges in the shift towards a low emissions future. In the wake of several electricity system disruptions, and particularly the South Australian state-wide blackout in 2016, Australia's Chief Scientist Dr Alan Finkel has chaired the Independent Review into the Future Security of the National Electricity Market. The breadth of submissions to the Finkel Review, and the ongoing public debate, both mark the community's determination to help shape the future of our electricity sector.

This *Forward Thinking* event followed the release of the Final Report of the Finkel Review. Dr Finkel and a panel of experts discussed how Australia can respond to challenges that our electricity system faces. Dr Finkel outlined his blueprint for reform of the National Electricity Market, including recommended changes to policy, governance and market rules. This was followed by a discussion between our panel of experts and questions from the audience.

Moderator: Fran Kelly, ABC Radio National Breakfast

Speakers: Dr Alan Finkel, Australia's Chief Scientist
Marianne Lourey, Executive Director, ACIL Allen Consulting's Sydney Office
Tony Wood, Energy Program Director, Grattan Institute

FRAN KELLY: Hello, welcome and thank you for coming out on this chilly Sydney night. For those of you who aren't from Sydney, this is a chilly Sydney night. If you're in Melbourne, it's balmy. I'm Fran Kelly from ABC Radio National Breakfast, so you'll know I'm well past my bedtime already, but I really do appreciate and love the way citizens come out to talk, discuss and debate. More and more it happens across the country in cities around Australia. It's fantastic.

Tonight we're talking about *Forward Thinking*, but I'm going to go backwards for a minute. On the 28th of September last year, Australia was forced to admit we faced a national energy crisis. That was the day that the power went out across South Australia. An almighty storm with gale-force winds took out the powerlines, tripped transmission switches, triggered windfarms to cut their output, and ultimately forced the main interconnectors, the backup power supply from the National Grid, to shut down. There were 80,000 lightning strikes that day, two tornadoes, and winds which damaged 23 electricity transmission pylons. The lights went out across Adelaide and across the state and it was peak hour. Shocking. It was a once in 50 year event, but that didn't save the State Government from a bollocking from its citizens or from the Federal Government, which didn't skip a beat before it pointed the finger of blame at the Weatherill Labor Government and its ambitious Renewable Energy Target (RET). The political blame game, I'm sure you remember, was ferocious and it was transparent, and there's a fair bit of evidence I think to suggest that quite quickly the voters made it clear that they weren't buying it.

They knew in their bones that governments, state and federal, and the regulators had bungled energy policy which had led inexorably to higher electricity bills and blackouts. How else to explain that a country with some of the largest coal and gas reserves in the world, not to mention strong winds and blazing sun, couldn't cope, couldn't deliver reliable and affordable power?

Sensing the voter fury, the Prime Minister decided to act. Just nine days after the South Australian blackout the Prime Minister commissioned our Chief Scientist, Dr Alan Finkel, to run an independent review into energy security across the National Electricity Market (NEM). Eight months later, and almost three weeks ago, Alan Finkel delivered his Energy Security Blueprint which has unleashed a fresh round of arguments, suspicion, name-calling, political point-scoring and, it should be said and it must be said, a fair bit of applause and loud cheering from many quarters. But will it eventually deliver us better energy policy, more reliable, secure and sustainable power? I think the answer to that is yes, though for now it is in the hands of our political masters. But rather than wait around for them to ruin some good policy with bad politics, the Grattan Institute has decided to take matters into its own hands, which it does so well and so often, and to use this energy review to come up with some *Forward Thinking* on energy policy, bringing together this panel of experts tonight to help the country respond to the challenges our electricity system faces as we try and shift towards or need to shift towards a low emissions future.

Leading the discussion tonight I'm happy to say is the Chief Scientist himself. Dr Alan Finkel has had the job for 18 months. He comes to it, if you don't know already, with an extensive science background as an entrepreneur, engineer, neuroscientist and educator. Prior to becoming Australia's Chief Scientist, he was the eighth Chancellor of Monash University and the eighth President of the Australian Academy of Technology & Engineering. He has a PhD in electrical engineering, was a post-doctoral research fellow in neuroscience, was co-founder of Cosmos magazine, and he has a long, long commitment to fostering secondary school science. Joining Alan Finkel on our panel tonight is Marianne Lourey. She's the Executive Director of ACIL Allen Consulting's Sydney office. She's had more than 30 years of experience in the energy sector working in and consulting to regulators, industry and government. Prior to joining ACIL Allen in 2010, Marianne was the Executive Director responsible for providing advice to the Victorian Government on energy policy, including the States & Territories National Emission Trading Scheme, the very original Victorian RET Scheme, the Victorian Energy Efficiency Target Scheme, deregulating energy retail prices, the rollout of smart meters, feed-in tariffs and the transfer of state-based economic regulation to the national framework, so I think she'll just about do the trick for us tonight. Finally, Tony Wood, who is the Energy Program Director at Grattan and has been since 2011. Before that, Tony spent 14 years at Origin Energy in senior executive roles. Also, from 2009 to 2014 Tony was Program Director of clean energy projects at the Clinton Foundation in which he advised governments in the Asia-Pacific region on effective deployment of largescale low emission energy technologies. In 2008 he was seconded to provide an energy perspective to the first Garnaut Climate Change Review - remember that? How far we have not come.

So a panel of experts, all well-qualified absolutely to come up with some *Forward Thinking* tonight. We will hear from each of them individually, then we'll have a very short panel discussion here on stage, and then we will hand over to you, so there will be some time for questions at the end. To kick off this important discussion tonight and to speak directly to the findings of his Energy Security Review, could you please welcome Australia's Chief Scientist, Dr Alan Finkel.

ALAN FINKEL: Fran, thanks. That was a terrific overview when you talked about the storms on September the 28th. Storms come and go and now they're in national politics and still continuing. I'm going to give you a quick overview of the main things that were in our minds and that we recommended.

I want to start off by just painting what you probably know but let me paint it my own way, the traditional electricity generation system. Basically, you started off with centralised generation coal, gas, largescale hydro, going through the transmission network, the distribution network, through the retailer on its way to the consumer, whether it was a residential consumer or commercial or industrial consumer. That was the traditional system for which the NEM - maybe I'll call it NEM 1.0 - for which NEM 1.0 was designed and for a long time served us very well. But then along came disruption. You can't switch off disruption and there are many, many disruptive factors here, so let me go through a few. There's that traditional network. The first one is largescale solar and wind. Doesn't matter what you believe about climate change, they are here, they're lower cost than most other generation even at largescale and even if, to some extent, they're firmed up. It's really the investors' choice now. Then down the bottom right I'm showing solar and rooftops, we've got well in excess of 1.5 million solar microgenerators on peoples' houses, they're contributing and changing the dynamics of the system. Then you've got battery storage. On the bottom left-hand I'm showing battery storage for grids and hydro storage for the grid, but on the bottom right I'm showing batteries in homes, and this will completely change the load patterns in the electricity network. I've got some arrows going in the other direction. The system is becoming a two-way system. It wasn't designed that way, but it has to be because people are feeding the microgeneration off their rooftops back into the grid and that changes the way it operates. You can't reverse this. Then at the top right I'm showing like from The Matrix the little 1s and 0s, automation behind the meter. People can make their energy use more efficient through digital technologies and they can also - and there are trials beginning on this - consider peer-to-peer trading where the electricity flows from one house to a neighbours' house not by throwing a wire across the fence, you can't do that; the flow has to be through the distribution network.

So, the system is being called on to do things that were never envisaged and it's like a bulldozer, you can't stop this disruption. But there's more disruption. Price increases and volatility. I don't have time to go through the why and the wherefore but, as you know, prices are more volatile and are higher than they were. There are external disruptions. We have national commitments to reducing our emissions. Some people are trying to suggest that they're not commitments, they're aspirations, but they are commitments that we've made nationally and they also have a disruptive impact on the operation of the NEM. Fran was talking about storms, 23 pylons went down and there's one of them. We've got disruption through storms, increasing heatwaves, and now we've got the brand new one that everybody is aware of now which is cyberattack and cyber threats. We're running an ever more sophisticated system and the more sophisticated it is, the more subject it is to disruption through external threats. So, what you've been seeing for years now is increasing tension. People have realised for several years now that the NEM needs a deep-dive review. There have been a lot of small focused reviews, but the tension was increasing and on September the 28th it literally got to breaking point, so the Prime Minister, the Federal Minister and the COAG Energy Council decided that they needed a major review into the future design of the NEM and through the COAG Energy Council they established the Independent Review into the Future Security of the NEM - try saying that ten times faster, it's not easy, so it's now known as the Finkel Review and the answer is yes, I'm used to it. We like to subtitle it as the "blueprint for the future".

So, a lot of people have asked how did we go about the process. It's worth talking about it. We really put a lot of effort into it; there's nothing in our report that is a thought bubble. Everything was considered at a panel and I've got two of my panel members here, Karen Moses and somewhere I saw Mary O'Kane come in. It was a panel of experts supported by a very talented taskforce from the Department of Environment & Energy. We sweated every single thought and we took a lot of input, had a lot of consultation: 120 meetings with stakeholders; numerous consultations around the country that 450 people attended; 390 submissions put to the review and some of those submissions, dozens of those submissions were 40 or 50 page documents that were worthy of being a review in and of themselves. The willingness, the enthusiasm across the country for people to see a resolution to the future security, stability and affordability of the NEM is just huge; everybody wants to see progress. We went on a trip around Europe to meet the operators and regulators in European countries and the American states to meet some of the large companies that are developing new technologies, and that was very informative. We commissioned a report from the International Energy Agency to look at world's best practice and give some consideration to the context for Australia of those practices. We contracted to a reputable economics company, Jacob's Group, to do policy scenario modelling, an Emissions intensity Scheme (EIS), a Clean Energy Target (CET), regulator closure, business as usual etc. and we got the Melbourne Energy Institute, which is a group of professional power systems engineering academics at the University of Melbourne Faculty of Engineering, to look at the results of our policy modelling and tell us whether we were meeting the security and reliability ambitions. And we were and we did. One of the overwhelming messages that would've come from 385 out of 390 submissions is that business as usual is not acceptable, it just cannot be sustained. We need to change, in the light of all these disruptions, the way we operate the NEM.

The last thing I'll mention on our approach is the methodology that we intellectually used in approaching this. We took an engineering approach where we said you can't pursue perfection. You can't afford to build a bridge like that if all you've got in mind is perfection, it's just too expensive, but you certainly cannot tolerate compromise if you're building a bridge because the consequences of failure from a compromise are severe. What you have to do is optimise the approach and I deeply believe that the package of 50 recommendations that we've put forward is an optimised package that does provide what we were asked to provide, which is the blueprint for NEM 2.0 or the future of the NEM. We focused on outcomes rather than inputs and outputs, and it's really a significant thing to keep in mind and I'll come back to that. We focused on four outcomes and we have three enabling pillars to ensure that we can achieve those outcomes. So the four outcomes are the ones that you've heard me talk about a lot and you'll see in the press and you'll hear the ministers talking about: security, reliability, affordability and lower emissions. The pillars that are supporting that are the orderly transition, system planning and stronger governance. Now, I've been told I'm not allowed to speak for two hours, so I cannot go through all of the details here, but what I'm going to do in the next few slides is give just a few examples of some of the outcome-oriented recommendations and a couple of the enabling pillars.

So if we talk about reliability, one of the significant recommendations that we've made is called the Generator Reliability Obligation (GRO) and what that's saying is that all new generation - and I emphasise new because we're not recommending that anything be retrospective - in order to be licensed to connect to the grid has to have a certain capability to dispatch electricity when needed. The level of that capability should be determined by the experts, AEMO (Australian Energy Market Operator) and AEMC (Australian Electricity Market Commission, the commission that make the rules) and they'll

look at the needs and economics on a per region basis. The needs of Queensland today are different to the needs of South Australia today and that should be kept in mind, but when they make the determination it has to be forward-looking. One way of doing that would be, for example, a windfarm to have battery backup so that if you're going into a hot summer day with extreme temperatures the operator can say to that company, "You have to enter the day with charged batteries, hold them in reserve and be available to deliver electricity at the end of the day, even if there's no wind blowing". It happens, it's a typical weather pattern in Victoria and South Australia that you get virtually no wind on those really hot days and at 4.30 in the afternoon, when the sun is so low that the fixed panels aren't generating anything, you need that energy. It doesn't have to be done with batteries. It can be done with onsite generators or offsite generators. It can be done with contracts between the windfarm or the solar farm and other new generation coming into the market. That's an important obligation that ensures that we can have the electricity when we need it, even from variable renewable energy.

Another outcome is to try to achieve lowest cost in the long term. We can't do anything overnight. One of the things we've recognised, out of many, is the important role of consumers in this equation. There's a lot of opportunity through what's called demand management to manage the power that residential, commercial and industrial consumers pull at the times of high national load to shift that so that you don't have to supply those peak currents or the peak power. Not everybody can participate. The ones who do participate, they need to be rewarded financially. The ones who don't participate, they will get rewarded because by managing that peak load you can avoid the need to invest in more expensive transmission and distribution assets. Everybody will benefit and you don't need quite as much generation if you're avoiding those peaks, so it can lower the cost for everybody. Another one is to lower the long term cost by providing policy certainty. What is concerning all of the investors in generation technology and anything in the NEM, even if it's behind the meter automation, is policy reversals, policy flip-flops; the complete uncertainty. The forward contracts that people write are at higher prices because of that uncertainty and, ultimately, that feeds through into the prices we pay. Investors understand they can't have investment certainty. They're asking for policy certainty so that they get predictability of their investment. They're willing to take a chance. If the market demand doesn't work out as they think, that's fine. What they don't want is policy reversals. Imagine you're Christopher Columbus: you want to know when you're sailing off that at least there's a prospect of land beyond the horizon, rather than a guarantee of nothing.

Another outcome that we modelled and have recommended is that the states, territories and the national government agree to an emissions reduction trajectory. On that graph I'm showing you, the blue line at the left the existing trajectory of emissions, the little bit of which is what we think might happen for the next three years, and then the brown line is the trajectory that we modelled. We didn't recommend it - it's up to governments to decide what to do. That's what we modelled going to 28%, which is a critical number for our Paris commitments across the whole economy, but we modelled it for the electricity sector down to zero in the second half of the century. The important thing is not the numbers, 28% or 2030, but that it's a smooth line. We need to move away from the idea of a 2030 target. You get there and you say, what next? Investors need to know that there's a process, a framework, an architecture in place into the future. On the key pillars, orderly transition. There are three elements to our orderly transition. The first is that there's a national agreement of states, territories and the Commonwealth Government to an emission reduction trajectory; the second is that there's a CET and mechanisms to ensure that we meet that trajectory; and the third is a three year notice of closure

obligation on large generators. It doesn't have to be coal, it could be hydro; anything where the removal from the network would have significant impact you need time for new generation to come in, you need a three year notice. Also, if it's a large coal generator which is going to have an impact on communities, you need time for local state and federal governments to work with the communities to deal with the disruption, the dislocation, the economic disruption of the removal of that big industry. Historically, in the last five or six years all the big coal generators were closed with one, three or five months' notice; it's very short.

Stronger governance. The current governance arrangement is COAG Energy Council, which should be very high level, directly having under its control the three energy market bodies: the operator, the rule-maker and the regulator. There's such a large difference between what they do and how they do it that's it not actually very efficient, so we've recommended that a new board, called an Energy Security Board (ESB), come along and exist by delegated authority from COAG Energy Council to have a number of responsibilities. The first is to deliver the blueprint. So if our blueprint is accepted, the ESB will ensure that it's delivered. They'll also provide co-ordination and an annual health check that will report on performance, opportunities and risks in the NEM to COAG. We've also made a number of specific suggestions about strengthening the individual bodies, and the government actually acted on one by giving more money to AER, the regulator, in its announcement last week. I mentioned before inputs and outputs versus outcomes. Most people look at the NEM and they think about things like lower wholesale price as being an important metric that we have to achieve, but no-one pays wholesale price; you pay an industrial retail price or a residential retail price. A lot of people talk about the generation mix - they hate coal or they love coal, they hate gas or they love gas, they love wind or they hate wind - but it's not important from the point of view of outcomes; it's an input to the system. What counts are the key outcomes, the increased security, the reliability, the emissions and the lowest cost; those are what we need to manage. How we do it, the mix of inputs and outputs, people need to get it out of their mind and focus on the outcomes, rather than the generation mix and other inputs and outputs.

We did modelling, as I mentioned. We modelled based on an outcome. Emissions are an outcome, but most people talk about targets based on renewable energy as a percentage of the generation mix, the gigawatt hours. I put it to you that's just an output, it's not the outcome, but it's important because it gets discussed a lot. So when we modelled the 28% emissions reduction in 2030, which is the right outcome to have in your mind, it corresponds to 42% renewables in 2030. In terms of costs, the modelling, the bottom line is the CET, the middle one is the EIS and the grey one at the top is business as usual, and what we're seeing is that either of these mechanisms, the EIS or the CET, do better than business as usual and the CET comes in a little bit lower in price. People say to me "models, it depends on the assumptions" and they're right. We can't say with the modelling what the price will be for sure in 2035, but we can be confident that the relative merits of one policy versus another is represented in the modelling. Finally, where are we, the situation today? I had the privilege of presenting to the COAG Energy Council on Friday June the 9th and just 11 days later, on Tuesday last week, the Federal Government, the Commonwealth, announced that they're accepting 49 of the 50 recommendations. I see that as a glass nearly full kind of scenario. Actually, in my mind it's full because they haven't rejected the 50th. The 50th is the big one. It's the orderly transmission, the emissions reduction trajectory and the mechanism. They're genuinely considering it. We don't know where they'll land. You might have noticed there's a lot of discussion about it at the moment. I don't know where it will land, but it's quite encouraging that 49 of the 50 have been accepted so far but, of course, we'd like to have all 50.

So the next step will be the COAG Energy Council meeting where they'll have a discussion, that's about two or three weeks from now, in the middle of July. So the 49 recommendations, when I say accepted, it really is that the Commonwealth Government has endorsed them and empowered the Minister, Joshua Frydenberg, to go to the COAG Energy Council and convey that endorsement to the ministers at the state and territory level, because ultimately electricity policy in this country is a state and territory, working with the Commonwealth Government, agreement. It's not federal constitutionally supported legislation. Pretty much that's it. The quote up there is something I mentioned at the National Press Club, it comes from a historical novel: everything must change so that everything can stay the same. If we want the NEM to stay the same in its ability to provide the outcomes - security, reliability, affordability and low emissions - we have to accept that the inputs, the outputs and the operation will all change. Thank you.

FRAN KELLY: The Chief Scientist, Dr Alan Finkel. Thank you very much, that was such a terrific journey through the Finkel Review. Thank you. I'd like now to introduce our other two panellists. First, welcome to the stage Marianne Lourey from ACIL Allen Consulting who is, as I mentioned, a three decade veteran of the energy sector from all its different vantage points. Please welcome Marianne.

MARIANNE LOUREY: Thank you Fran and thank you to the panel for producing the blueprint. I'd also like to thank Tony and the Grattan Institute for giving me the opportunity to participate in this panel today, but I must say that the views that I express today are mine and mine alone and do not represent the views of ACIL Allen Consulting.

South Australia's system blackout last year was a wakeup call and the only surprise about it was that it took so long to happen. For some time now we have needed to refocus on what we are trying to achieve with the NEM and the best practice ways of going about it. There are a lot of recommendations in the panel's report, many of which appear eminently sensible. There is plenty of work to be done to turn these recommendations into practical actions, but I want to step back from the specifics for a moment and talk about those broader objectives and what best practice should look like. So let's go back to first principles. Markets work, but there has never been an unregulated market in history; even open warfare has its rules. So the starting question is what level of government policy is appropriate to helping, rather than hindering, the electricity market to work best? That market is large and it's complicated. It provides a critical economic input. It serves a large number of consumers in different ways and across different locations. It involves real time and long term decision making and historically it has been neither significantly transparent, nor accessible to most of its customers. For these reasons it has been appropriate for the market to be more, rather than less, heavily regulated and what a lot of regulation we now have. On top of a core national set of rules designed to optimise the post-Hilmer supply chain, there is also a bewildering array of policies and prescriptions intended to address technology changes, jurisdictional issues and customer protections, and, as the electricity industry continues its paradigm-shifting transformation, the temptation is to pile on even more regulation.

Policymakers, not the markets, now have a significant say in how the trade-offs between security, reliability, affordability, sustainability and safety of the electricity supply are made, but it is not done consistently across the jurisdictions and it tends to focus on addressing short term challenges, rather than supporting the long term development of the market where suppliers and consumers are increasingly able to manage those trade-offs themselves. In short, it has become a costly and unwieldy

mess. No-one could put their hand on their heart and say that the current level of government intervention is efficient. To be clear, I agree that the nature of electricity services is such that regulation is needed and I'm also sympathetic to the view that government has a larger role to play during times of significant transition. However, the guiding principle should always be to have as little regulation as possible and for it to be as consistent as possible. As a transition approaches completion the transitional policy should be removed. As the combination of technology in policies enable greater participation in the NEM, government should step back and not continue to act as a proxy for those participants. It is entirely natural, indeed important, to focus on reliability and security of supply following system events such as last year's system blackout in Australia; on safety following the Victorian Black Saturday bushfires in 2009; on sustainability in the lead up to international agreements on climate change; and on affordability following price hikes. But any such policy changes should be placed within the context of supporting the development of a market that allows the participants to address those dimensions themselves as far as practical, with government setting boundaries, the mechanisms designed to signal them, only where necessary.

So let's look at some current policy examples. Many of the policies introduced by government since the start of the NEM have facilitated the reform of the market. Others have been fit for purpose tools for delivering environmental and safety outcomes. However, others have had adverse impacts. We have had jurisdictions introduce policy initiatives with no regard to the impact they have on other jurisdictions. Policy decisions have been made to increase jobs in a particular sector with no understanding of the impact of that on the energy markets and their flow-on impacts to the broader economy. We have had policy decisions made that have a positive impact in the short term, with little consideration of the longer term impacts. One of the attractions of the policy initiatives that drive more supply into the market than is required is the initial decrease in prices, but prices inevitably increase again as either demand increases or supply decreases. And we have policy initiatives that have outlived their use by date. Policy initiatives have been designed to facilitate learnings in the market or to drive down the cost of new technologies but these remain, which only increases the cost to consumers. I've already noted that governments have a role to protect the interests of consumers, particularly vulnerable consumers. We cannot forget that ultimately it is generally electricity customers that pay the price for the energy policy decisions that are made by governments, but we are also in a world where policy decisions cannot be made unless no customer is worse off. However, if some customers are subsidising others then those that are being subsidised will, by definition, be worse off if cross-subsidies are removed, but is it both efficient and fair that these customers continue to not pay for the costs of supplying them with electricity and, in doing so, pay their fair share? Should the majority of customers, including vulnerable customers, continue to pay more so that the minority that are subsidised do not have to pay more?

The concessions regime is the means to protect the most vulnerable customers. If some customers will be worse off by a policy decision, then concessions can be used to mitigate the adverse impact for them. However, the vast majority of customers are in a position to pay efficient prices and their fair share. The concessions are currently paid to a relatively large proportion of customers - certainly in Victoria, where I know the figures more, it's in the order of 30% - and because it's paid to so many, the amount that is paid is relatively small for those that are the most vulnerable in our society. Ultimately, without the appropriate level of support by governments this small proportion of customers is cross-subsidised by other electricity customers, including low income but not vulnerable customers, and in the absence of appropriate supports for the most vulnerable customers, suboptimal energy policy

decisions are often made. But now returning to the panel's blueprint. As we've been advised, the Commonwealth responded quickly, agreeing to all but one of the recommendations. As I noted earlier and given the strength of the response to the blueprint, there is significant work remaining to actually implement these recommendations, particularly for the jurisdictions to agree on a clear way forward to reduce emissions and provide the investment certainty that is required - or I should say policy certainty, based on our previous presentation. Bold decision making is required to adopt a truly national approach to the energy market, to introduce new markets for services that have previously been taken for granted, such as inertia, to remove policy initiatives that have outlived their use by date, and to make decisions that deliver the greatest public benefit, while appropriately protecting the most vulnerable in our society.

As discussed earlier, there is a diverse range of views on the appropriate balance of the characteristics of the energy supply: reliability, security, affordability, sustainability and safety. We're told the outcomes that everyone wants are the same, but the balance between each of those will vary with each individual. I could almost guarantee that everybody in this room would probably agree with the four outcomes, but their balance of those four outcomes is going to vary enormously. So given the diverse range of views, it is not surprising that it is difficult to get agreement within governments on energy policy issues, as we've seen with the Commonwealth Government, and even more difficult getting agreement across the jurisdictions. So our energy policy is now at a crossroads. Will governments draw on the skills and experience that is required to assist them to appropriately implement the recommendations in the blueprint, or will they continue to respond to vested interests and intervene in the market, adversely impacting on the reliability, security and affordability of energy while not appropriately protecting the interests of the most vulnerable customers in our society? Thank you.

FRAN KELLY: Well, I think you nailed the big question there Marianne and we wait with bated breath. Marianne Lourey, thank you. Could you please now welcome our third panellist this evening. Tony Wood is the Energy Program Director for the Grattan Institute and he'll share his thoughts on the Finkel Review and the way forward. Thank you, Tony.

TONY WOOD: Thanks Fran and I should also mention that I'd like to thank the State Library, who partner with us in running these events. It just so happens that this room seems to have shrunk slightly since the last time, given the number of people here tonight.

I made a comment in a piece I wrote in the last few days that the battlefield of climate policy is littered with the dead bodies of political leaders and the question it seems to me was whether this time around it will be Malcolm Turnbull's second death, as someone who's tried to lead a changing climate policy. It remains to be seen whether that's the case, but I think it's certainly set up in a way that's more than challenging. Of course, that comment was made in the context when the other side of the issue, energy policy, was reasonably plain sailing. Back in 2007/8, when a lot of the debate took place around the first attempt to get a climate policy in place, the rest of it seemed to be going okay. From then on it didn't go so okay. We've seen a lot of challenges and now we see a situation in which those things that should be going up, mainly reliability, seem to be going the other way and those things that should be going down, mainly prices, seem to be going the other way, and so how this plays out is very challenging for governments. Alan showed on one of his slides there a square-masted sailing ship sailing into the sunrise, or sunset maybe. I'm not entirely sure that was the ship before he got hold of it or after he finished with it, but I'd like to think that it's the latter. I suspect that actually with the ship that he's

designed, he's certainly refitted, refurbished and reengineered the ship of energy of climate policy, I just wonder whether or not the 50th recommendation might be the navigator that the ship might still need before it can actually sail into the future we're looking for.

What I was going to do was just make a few comments on a couple of elements that I found from a policy perspective some of the more interesting of the review, some of which Alan's referred to and a couple he hasn't emphasised in the same way. The first thing is that in some ways it seems to me the climate policy element was both the most important, but also the least important. The reason I say that is because there are many different climate policies that one could use that would work with the energy market, pretty much except the ones we've tried so far, and eventually we might get around to realising that. So our view when we looked at some of this was there's this group of policies over here and you can call them the ETS, baseline and credit schemes, EIS - just pick one and let's get on with it. On the basis of Alan and the panel's work, they've recommended a particular one. That's resulted in the furious debate we know about and that was always going to be the case, but it is now going to be important how do we avoid making too many compromises to get this particular element, the 50th recommendation, actually afloat before we find that we've done it all again and we're back where we were a little while ago and making no progress on the issues?

Some of the elements in the report have challenged a lot of people and certainly the way the government has moved even since Alan's report. One of the things that is clear, it seems to me, is there has been a shift in what Alan's recommending or the panel's recommending from largely a system which was more market-based to one that has more central planning involved. I think anyone who saw Q&A would have heard Alan talk about wouldn't it be good to have a plan? Well that seems like a good idea, until someone says, "Yes, but wait a second: if that plan involves government doing all the planning and doing all the investing, what's the role of the market?" So there is going to be a tension there. This is not a criticism of where Alan's landed; this is saying there is a real tension and how that's resolved and how the market operating organisations, particularly AEMO, deal with that tension will determine largely whether or not we go down the path of the UK approach, which is fully centrally planned and regulated with all the risk taken by the government on behalf of the consumers and not the investors, or whether we do end up with a balance in which the investors can see the market operator as being more like the Reserve Bank, when everybody knows governments can intervene, but because we have a history of stable operation they don't need to intervene and you do see confidence in the investors. That's where that tension will play out. I think there are going to be some very significant challenges when the recommendations are debated at the COAG Energy Council.

I should note that it's been reported that many of the people who've criticised the Finkel Blueprint haven't read it. My suspicion is that they may not have read the 49 they've recommended either, because what worries me is there are a few in there which I think it's quite interesting that they've gone through so easily for the Federal Government, for example, recommendation 3.1 which is that we shall have, by 2020, an economy-wide emission reduction strategy for 2050. Now, I'm not trying to spook anybody by hoping someone goes running around saying, "Oh my God, have we really agreed to that?" and we'll now go back to 48, but it seems to me that it's quite remarkable and therefore I'll take that as a badge of courage, as Alan has done, or a positive sign that things are actually moving forward, that it's not as though we should be bemoaning the fact that one of the recommendations, an important one, is still sitting there, but actually there has been some real progress. I think the ESB, which sounds a little like

a benign extra piece of regulatory structure, could still be challenging because in the blueprint there have been some criticisms made of some particular elements of State Government activity in this sector. For example, state-based climate change policies or RETs. For example, state-based moratorium and bans on unconventional gas development. Now, the Review has been very careful not to suggest that Sovereign Governments can't or shouldn't make decisions, but one of the other recommendations is to have a new national energy market agreement. The implication is that everyone agrees to play together. I'm still concerned that as they get together everyone will agree that of course we should all play together; we should just the play game according to my rules. We've seen that in the energy market before and that will be one of the tensions that play out because many of the recommendations in the Review, as has been pointed out already, don't actually require legislation by the Federal Government; Alan made the point that many of them require changes in the way the states and territories implement energy policy.

Turning back to the central issue for climate policy, when you look at it it's certainly not what we would have said was the best policy, but the time that we've lost when we had the opportunity put in place what we would have argued was a better policy makes the difference irrelevant in the context of things. You can argue a lot about the finer points of this. There are economists who you can hire depending upon your view to prove that the numbers in Alan's modelling or the Finkel Review modelling are wrong, but the difference is within the accuracy of the assumptions they've made to produce the result they want. It's almost irrelevant and that's one of the reasons why in a piece I wrote recently I reminded people that it was the famous economist Galbraith who said that the only role of economic modelling is to make astrology look good, because it informs decisions in terms of risk assessment but it shouldn't drive decisions. We've all seen in Australia how making policy on the basis of economic modelling, on a forecast, goes horribly wrong. The RET suffered from that. The Carbon Tax in 2012/14 suffered from exactly that. Don't base your policy on the modelling, but use the modelling to inform it. That's where I think you'll see these tools being misused.

I think that industry needs to be a lot more vocal than it has been. You are hearing noise from industry generally very supportive of this package. Everybody will find bits, I suspect, that they don't like and everybody, as Marianne said, will have different priorities, but it's the overall approach. There is lots of detail that the Finkel Review hasn't specified that will be important. It's also going to be a real challenge, as we now know, on the way this is going to unfold and not just within the very far-right of the government. I did an interview the other morning. I was sitting in a property in northeast Victoria, it was -3 degrees at eight o'clock in the morning and I was doing an interview on AM with Sabra Lane. It was supposed to be at eight o'clock but was delayed to five past eight and the reason for that was because she was interviewing Senator Malcolm Roberts. Now, some of you may be aware of the views that Malcolm Roberts has on climate change and the Finkel Review. They're probably printable, but they're very strong. That is the more extreme end of the positions held in the government, but there are others that, I would argue, are asking far more reasonable questions, sometimes, I would suggest, in an unreasonable way. Some of them would like to go back to what the world used to look like in the square-masted sailing ship and suggest we should have a policy based on when the sea was flat and the waters were calm and we didn't have to make any changes, but that's not the world we live in, that's not the world that Alan's describing, the world we're in today. So it seems to me the message we have to think about is there are many uncertainties in this, many uncertainties. The real trick is that we don't use nostalgia or astrology to make our decisions.

Thank you.

FRAN KELLY: Thank you Tony. That's right, as Alan said, business as usual is just not possible anymore and I would suggest, and perhaps we'll get to this in the questions, that neither is deciding to look at the notion of a CET or an EIS or whatever and then deciding no, we won't move again, we will do nothing again this time. So on that note, I'd like to invite the panellists onto the stage and we'll begin the Q&A session. Thank you.

Alan, I'll start with you, it's your blueprint. Congratulations, 49 out of 50 in such record time is, I think, an incredible achievement given the attitudes and the vibe, if you like, in the Coalition party room. But the Federal Government clearly has some way to go on the 50th and if you've been listening to political debate in the last week I think you couldn't help but think things are going backwards on that level. Compromises can be made on the CET, the threshold for credits and the role of new coal plants. How far can the CET be compromised before it becomes ineffective?

ALAN FINKEL: From a technical point of view, it can probably be visibly compromised and still remain effective. So I'm guessing, Fran, the main number you've got in mind is the so-called threshold?

FRAN KELLY: Yes.

ALAN FINKEL: The CET, just to remind everybody, is a threshold is set in terms of emissions. We modelled 0.6 tons of CO_2 per megawatt hour of electricity. A generator that operates below that threshold gets a fraction of a certificate. If it's operating all the way below, like zero emissions, wind and solar, they get a whole certificate per megawatt hour. A really good, modern gas generator would get about half a certificate per megawatt hour and open-cycle gas would get less. If you change that 0.6 to 0.7 it doesn't change the outcome very much at all. It means that the gas generator will get 60% of a certificate per megawatt hour instead of 50%. It doesn't make a change whatsoever for the solar and the wind. If you make it 0.75 you suddenly get a psychological shift, not a modelling shift because the model is quite insensitive to that number. Modern ultra-supercritical coal generators operate at about 0.74 of a ton of CO2 per megawatt hour, so they just squeak in below a threshold of 0.75. So it's got no economic benefit of significance because you'd have to generate 60 or 70 megawatt hours with such a small proportion of a certificate to get a whole certificate. So it's not an economic driver, it's a psychological one in that you get the stamp of approval, you get the badge that says you're under the threshold in the CET target mechanism. So the models themselves are not very sensitive, but the political sensitivity is huge around that number.

FRAN KELLY: As we've seen. So as the Chief Scientist and the architect of this report, you'd be happy enough if the government settled on that 0.75, which would allow the clean coal to squeak in, as you say, onto the certificate?

ALAN FINKEL: It's completely up to the government. I don't think it makes an actual substantial difference to how the market will operate in practice, but the political ramifications are potentially quite significant.

FRAN KELLY: Let me invite the other two panellists to comment on the notion that I feel, that after a pretty positive start to the Finkel Reviews and the CET - and there was a lot of endorsement from major

sectors, major industries, energy guzzlers and energy providers, they were right on board - what seems to have happened in the last week and the last couple of days in particular is we've entered some kind of culture war and on the one hand is the CET and the other hand seems to be coal. Now, given what you've said about the inputs not really being the issue, I'll invite the other two panellists to comment first on this but Alan please come in too, is that where you think we're at at the moment and how do we get out of that position? Because that is a recipe for inaction, isn't it?

TONY WOOD: I think there is spectrum of positions within the Coalition. My observation - and I haven't sat in the party room by any means, although I was surprised to hear the Minerals Council did, which may be a concern - is the spectrum is this: there are people within that government whose objective is one of two things - and probably both - to use the Paris Agreement to bring down Malcolm Turnbull. Where he finishes on that is an extraordinarily interesting political tale and it will go down in history, whichever way it plays out.

FRAN KELLY: That's more to do with internal division over direction of the party than energy policy?

TONY WOOD: Yes. It's not a token by any means, but it's certainly the battlefield on which this is being played and it's been done before very successfully. The Minerals Council may very well have been trying to make a constructive input to the debate, but there is a history I think of damning things with faint praise. So what you do is you say, "I think the Finkel Review is fabulous, except for the following three things..." and then you use those three things to gradually deal away. So I think they will use that and that will be picked up by people who are far more reasonable than the aggressive end of the Coalition but those who will listen to that, because that will raise their concerns about oh my goodness, we're going to run out of electricity or coal or continuous dispatchable power, whatever it might be.

FRAN KELLY: I want to come to that in a moment before I handover to you with questions, but Marianne, did you want to contribute here?

MARIANNE LOUREY: I suppose we've been trying to exercise our minds as to whether any policy initiative is required to get the desired outcome. Will coal come in in the foreseeable future because the costs of all the other technologies have come down, it's very, very difficult to get financing and a lot of the banks will just not finance coal anymore. So potentially we're going to get the same outcome whether we do or do not have the CET, but what is needed is certainty in terms of that emissions trajectory, in terms of the level of emissions we'll have in the future, and if there is that acceptance of the recommendation of having a clear emission trajectory through to 2050, then the clear signals are there that unless we get carbon capture and storage, the costs of which just keep going up and up and up, then coal is highly unlikely to come into the mix.

FRAN KELLY: Alan, do you want to come in on this one?

ALAN FINKEL: Certainly from our discussions with the practitioners in the sector, the market participants, there was no indication that new coal would be coming in in the foreseeable future, but anything is possible especially if the government wants to support it. But without government support, if you go out to the market it's going to be expensive to raise the money to build a coal generator. We've been accused in the press of using Third World interest rates for the coal generators in the modelling.

FRAN KELLY: This is challenges to your assumptions?

ALAN FINKEL: Challenging the assumption of, say, 14% interest rates to build a new coal generator, but when you speak to people they say you'd be lucky to get the money you need at just 14% because there's such uncertainty in the finance community for a big project like that in Australia. Another comment I wanted to make was that, Fran, you were talking about what's been happening in the news in the last couple of days, but we've got to take the long term view. This is a very fractious field, the discussion is shifting every day, and until final decisions are made I think we're right to be hopeful and optimistic that through the process that the Prime Minister and the Minister working with the party that they've initiated, which is saying that the Minister will go to COAG with that endorsement of 49 out of 50 and with the message that the government has not rejected the trajectory and the CET but is still working on it, analysing it and modelling it, I think we're in a fairly good position. The last thing I wanted to say was I don't want anybody to think that we have made a single recommendation around climate policy. What we've done is recommend a mechanism to implement existing national government policy, which is reduce emissions across the economy at a certain rate, and we said if we adopted those figures just for the electricity sector then this is the most cost effective, secure and reliable way of doing it.

We haven't recommended climate policy. I hope that no-one in government suffers a fate worse than death as a result of anything we've recommended, but it won't be because we've stepped over the line and recommended climate policy. We took on board the terms of reference which were to look at security, reliability and affordability in the context or with consideration of the national emission reduction.

FRAN KELLY: The trilemma to which you've added another one, which has just confused me.

ALAN FINKEL: Correct.

FRAN KELLY: One last one from me before I hand over to the audience. Last week the Prime Minister came up with three announcements in the energy area and one of them was announcing a task for AEMO to assess whether more continuous dispatchable baseload power is needed - this is with some of the coal generation plants coming offline because they're ageing - how best to provide it optimising affordability and security for consumers, what new investment is required to provide it and whether government support may be needed in that investment. I'm wondering if by him doing that, does this suggest that the key aspects of your blueprint are either inadequate or already in trouble, because wasn't that your task?

ALAN FINKEL: The Prime Minister doing that is totally consistent with what's in our blueprint, which is saying here's how things should work and the market should operate, but if the market is failing to deliver then AEMO, the operator, should have reserve authority to procure generation to make sure that ultimately security and reliability are preserved. You would hope that that generation would be kept outside of the market and only be used in the case where the system just fails to deliver. So the Prime Minister is taking that and going a little bit further, given that we're in a transition. If we're in NEM 1.0 at the moment and we're going to NEM 2.0, the transition is difficult. The government have a right to step in when, as a result of a transition, things aren't working out as you would like. So I think it's an important right. Can I just say one more thing on that? The Prime Minister didn't translate that necessarily into a

coal-powered station. He was challenged to convert it into that statement, but he said it could be a gas generator that fulfils the need.

FRAN KELLY: Yes, but then at what point does the investment into something like a mega clean coal-fired plant or even a gas plant become such a presence that it does distort the market or a white elephant, like we've got desalination plants that never get used?

TONY WOOD: Already we've seen South Australia announce building gas-fired power stations and Queensland are talking about the way they're going to run it and how wonderful it is they own their power stations. In one report we wrote recently we talked about it's a stampeding herd of white elephants the way this is all going. The trick here is how we navigate what I was describing as this tension, because there's no way known a government isn't going to intervene if there's a problem of the sort we've already had.

FRAN KELLY: And everyone wants it.

TONY WOOD: However, what I think was being done, and again I'm speculating, is that you've got a situation where people seriously are worried about if we don't have coal-fired power stations or continuous power we're going to have a problem, so how do you satisfy that? One answer is you ask the people with the most information, the people best equipped to do that, to assess whether that would be necessary and you describe how they would do that. The potential there is the very fact you've said that's what they will do should be enough to satisfy those who are concerned that okay. Now we've got an answer, if it turns out that we need more whatever you want to describe, continuous, dispatchable baseload as - I think they're all contradictory terms, by the way, but that's what the Prime Minister said - then that may very well be the answer. When AEMO actually does that evaluation you've got about four of five more steps before anyone would actually have a government building one of these things. Now, the Prime Minister didn't rule it out. That did not mean he ruled it in. So I can still see this as a reasonably well-structured strategic approach to dealing with the political challenge to navigate the Finkel Blueprint through these very choppy waters.

FRAN KELLY: Yes, I mean, you can't expect to get from A to Z overnight. Okay, your turn. Does anyone have a question for the panel?

AUDIENCE: Dr Finkel, you're the Chief Scientist, not the Chief Economist. If this blueprint was followed and other countries did a similar amount of reduction, would my grandchildren be safe? In other words, is this enough to avert the climate problems?

ALAN FINKEL: I agree with you, I'm not the Chief Economist. I have spent six months as the Chief Electrician, but I'm going to hang up that moniker too. The answer is they would be safer. We would be making more progress than if we don't do anything at all and what we've recommended is a trajectory and a mechanism that can at least get us started on the journey that climate science would indicate that you have to follow. If you think about the Paris Accord, it says that every five years governments from countries around the world have to re-evaluate their commitments with a view to tightening them, but never with any allowance for loosening them. We have recommended an architecture, it's a framework that can be used by future governments if they wish to approach a steeper trajectory, but I would certainly recommend to any future government that you don't do things overnight.

You need to let things play out and I think that what we've recommended is a reasonable trajectory for now.

AUDIENCE: Alan, this question is addressed to you and, of course, you know exactly what it's going to be, but nevertheless I would like to hear your answer. May I applaud you, as an engineer, on the blueprint, you've dealt so importantly with the issues of policy, as Tony has rightly pointed out, and it is up to the market and the technologists to decide what technology to use. In your rather pleasingly entitled chapter eight "Beyond the Blueprint" - I like that because it is, you've made that very clear and you've got a number of technologies there - you do point out that nuclear power for many countries provides a secure, affordable and zero emissions electricity supply. In other words, it meets the four outcomes that you say policy should seek. Nevertheless, nuclear power in this country, although we supply uranium to those who use it, is illegal; there are two Commonwealth Acts and three State Acts. I would have loved to have seen your report, but you told me you were going to stop short of this, recommend that that legislation at the very least be subsumed, cancelled as a recommendation as a first step along the road to a technologically neutral agnostic approach to the secure market we need in 10, 15, 20 years' time. Thank you.

FRAN KELLY: So I guess the question is why didn't it do that?

ALAN FINKEL: It's correct that if you're looking for what is a continuous reliable baseload power that happens to also be low emissions then nuclear can deliver, but our report is truly technology neutral. It's up to investors and governments to decide what's allowable. I would love to see a lot more catchment hydro. Hydro is also wonderful in terms of being synchronous generation, low emissions, dispatchable, all the things you could ever want. It's not going to happen in Australia. There are still places where you could build more dams with catchment areas, but it's not going to happen; the community doesn't have the appetite for that. The community has indicated again and again and again it has no appetite for nuclear. Things might change in the future. In that chapter called "Beyond the Blueprint" we talked about the fact that there is a new generation of SMR (small modular reactors) in the licensing process in America and you could imagine that in five or ten years from now, if they're proven to work in America, they could be adopted much easier than the current generation of nuclear, but it's not going to help our current problems. It's not worth spending time on, in my opinion, at the moment and there is another consideration.

The economics of nuclear are changing around the world. In America, nuclear applications are being withdrawn and it's not because of local objections, it's because they can't compete with the cost of gas-fired electricity because gas has become so cheap in America. You're potentially going to see the same thing in California where they'll close down nuclear partly because of objections, but partly because they can't compete economically with wind and solar. So by the time nuclear SMRs get proven they might not be necessary or might not have much to offer beyond the firmed up wind, solar and other variable renewable energies.

FRAN KELLY: And the economics, as you say, are what should drive the investment to some extent and it seems to be changing so quickly. I mean, we had Andy Vesey from AGL saying in their view the continuous dispatchable, the economics of that are all around at the moment solar and wind and battery. So you're going to follow the money, I guess.

ALAN FINKEL: When Andy Vesey is talking he's talking typically about solar and wind and gas generation. That mix is also incredibly powerful and quite economic.

FRAN KELLY: Yes.

AUDIENCE: It's sadly predictable that the policy debate from this review has collapsed into people pushing it as a vehicle for their ideologies on climate change and not very much else, and that's not a bad thing because, in my view, climate change is the key element of energy security in the country. But in all of the submissions you received and all of the consultations you undertook, what were the weightings of the other three factors, security, reliability and affordability? I was intrigued by your pricing chart showing actually little or no difference between the various scenarios out to 2030 on pricing, so how important were the non-climate change elements of your review?

ALAN FINKEL: Starting with the last comment, I only showed you one chart which was the pricing for residential and there are so many things that contribute to that. The price difference was around about 10% going forward, but for industrial, which is a lower price base, it gets more towards 15% and 20% but, as I said, it's only relative. In terms of how important were climate change and the other outcomes, nearly everybody was requesting a complete change towards integrating an emissions reduction policy with energy. Many of them didn't talk about climate change. You know what, it doesn't matter. The world that we live in has made a commitment to operate at a lower carbon emissions level and that's the approach that most people are taking. We were not asked to look at climate science per se and the vast majority of people said just come up with a long term emissions reduction policy integrated with the energy policies. Probably the second-highest would have been price, especially from the industrial users. Their businesses are under serious threat because of the high price not only of electricity, which is at the moment really priced to a very high level because of gas, but also the direct use of gas either as a feedstock or for direct combustion, so cost was a huge issue. Security and reliability comes up again and again and again, but I think that if you asked what people were prepared to trade-off - and I think Marianne, you were talking about the balance and that everybody here would have a different opinion about balancing those four - it's probably security and reliability. Even though people say it's essential, they'd be prepared to trade that a little for lower costs, given where costs have gone to.

FRAN KELLY: And just to remind people where costs have gone to, I learnt tonight from Tony that Adelaide on the 1st of July, when the prices are going to go up everywhere, will have the highest cost of electricity in the world. Unbelievable.

AUDIENCE: Dr Finkel, when you were appointed as Chief Scientist you're quoted as saying "my vision is for a country, society and world where we don't use any coal, oil or natural gas, where we have zero emissions electricity". I hope that wasn't fake news! Is that still your vision and how does your report get us closer to your vision?

ALAN FINKEL: I did say that and it is my vision, but I didn't put a timeframe on it. There are a lot of reasons why you'd imagine a world that's running on electricity with almost no fossil fuels, because electricity is magic, it's just wonderful what you can do. You can use electricity to pump heat from the cold air outside into your house to warm your home more efficiently than directly burning gas. You can use electricity more efficiently and more pleasantly and more powerfully to drive your transport system.

Electricity is extraordinary, but we can't get there rapidly. The current NEM and the electricity grids around the world, they're giant physical machines and you can't change them in a few years; you need to think many, many decades.

When we were travelling overseas I asked a number of the energy operators what their vision is for 30 or 40 years out and actually I was surprised that most of them didn't yet have a vision. They're more comfortable than we are because in Europe and America they have these interconnected regions. Denmark is the classic case where they can get nearly all of their electricity from wind, but if the wind's not blowing then they can get over 90% of their needs from interconnectors from Norway, Germany and the Netherlands from hydroelectricity, from nuclear fuel, brown coal and black coal. They've got this incredible diversity, so they're undergoing their transition quite strategically at the moment without worrying too much about exactly what the mix will be 30 years from now. But in Australia, if we deny ourselves nuclear, deny ourselves coal, deny ourselves gas - which I think is a mistake – and new catchment hydro, we are denying ourselves biomass as well, we have to start thinking about how we will run our system. And we can do it if we take the time and do it methodically with wind, solar, intelligent grids and storage, and there might be - it's hard to say - an ongoing role for gas for many, many, many decades because you've always got those terrible once in a hundred year events which, by the way, happen a couple of times a year. You can prove it mathematically with probability theory, it's how you ask the question, but once in a hundred year events just keep happening again and again and again.

So it's hard to get to that vision of what I called an electric planet with no gas at all. Gosh, you can get close, but it's going to take a long time and if you rush it you risk security, you risk reliability and you certainly risk having affordability.

TONY WOOD: Alan, this trilemma thing, it was interesting that the Prime Minster actually called it a trifecta. I'm not sure what he meant by that, but if you go and look up the two -

FRAN KELLY: Because if we get it all right we're winners.

TONY WOOD: That's right.

ALAN FINKEL: Yes.

TONY WOOD: But for me, winning on all three - they're not equal and they're not even equal amongst people, as Marianne said, but also even the time. The way we think about these things is quite complex. We're only concerned about security if we had a blackout recently and we just had to throw away all the contents of our fridge. These days that's not the most significant disruption we have our world, if the electricity goes out for a few hours. So I think it's a very interesting dynamic, the way we think about these things very differently and at times there will be much more emphasis on one rather than the others. So it's really challenging for someone to say, "Well, we're going to, as a government, rank these in the following way" because the chances are they'll get that wrong too.

FRAN KELLY: Yes, it's interesting because, as you say, they're not equal or this is the least prioritised one. For me, I had the opposite reaction. I would've thought the reliability was the most important. So there you go, we've proved Marianne's theory.

ALAN FINKEL: It's worth mentioning, it was reliability and security probably when we started, but as the prices have gone up and up and up I'd say price on average is the most serious concern people have.

FRAN KELLY: Marianne?

MARIANNE LOUREY: We've done quite a lot of analysis around this over the years. It does vary significantly from location to location and if you do a survey just after prices have increased you'll get a very different response. You referred to the desalination plant and the white elephants before and I didn't get a chance to interrupt there, but if you look at the Victorian situation before the Wonthaggi desalination plant was built. The government felt that it had to invest to get the security of the water supply and then, of course, it wasn't needed and now everybody complains about the price increases that happened as a result. Potentially, we have a risk with this as well in that we have a whole lot of initiatives, they increase the price and people forget about the system blackout event, it's in the dim dark past, and all they then do is complain about the increase in prices.

FRAN KELLY: Complain, complain, complain! We probably have time for one more question if there is one?

AUDIENCE: My question is around the consumer end of the spectrum. We've talked about security and a lot of the conversations are around the centralised components of the NEM. What view did you form on the risk to the NEM of consumer end or behind the meter generation disrupting the overall marketplace due to the rapid increase in the viability of solar and storage at the household and small industry level?

ALAN FINKEL: We did discuss that a lot at panel. There is a concern about the so-called death spiral where people start generating their own electricity with solar panels, storing it with batteries that are getting cheaper and cheaper and cheaper, and eventually disconnect themselves. You can't actually prevent that, if people want to do that they'll do it, but it's a bad thing in the sense that it puts the burden of carrying the costs of the static system on everybody who remains. So you certainly want to minimise it and the only way you can minimise it if you can't minimise it by law is by offering a better competitive product from the NEM itself. So we need in the long term to get the prices down at the same time as we're meeting all the other outcomes. That disconnection issue is going to be driven by price. We looked at price improvements that will come through providing predictability and that's important. We commented on the long term price trajectory of the transmission distribution, poles and wires, through some comments on planning and the Limited Merits Review, and the government is talking about that a lot. That needs ongoing attention and I think the ESB working with the market bodies and the Energy Council will be able to help on that.

When it came to the third big component, which is retail, we certainly have a big chapter on that and we make some recommendations, but to a large extent we defer to the ACCC review that is taking place at the moment and the Victorian Government review that is taking place for Victoria at the moment. I think there's a lot that has to be looked at there. I don't think that anybody is cheating or gouging per se, but the retail system is complex, there are a lot of hands touching every electron and therefore there's a lot of money being spent on things that don't necessarily efficiently translate into the delivery of electricity. Those all have to be looked at, but we need to solve the current challenge around

emissions reductions policy and investor certainty to give ourselves some breathing space around those other opportunities to look at costs.

FRAN KELLY: Can I hog the last question to come back to the title of this session, which is *Forward Thinking*. Obviously that's what the blueprint is for short term forward and long term forward, but Tony and Marianne, let me bring you in on this one too, because I guess now the Chief Scientist is allowed to go back to his day job. What happens next, Tony, because, as we've said a number of times tonight, we can't afford to go nowhere on this?

TONY WOOD: I don't think Alan used the word "certainty", he used "predictability" and most people can make money if they can invest in a system that's predictable and in the way even it's flexible. You want predictable flexibility almost, which is an interesting concept. The things that happen next, well things will happen now. Firstly, I hear that the states have been very supportive of the Finkel Review, the blueprint, but there'll be elements in there which can only be tested in the detail design. So the best outcome from that would be if the states would agree in principal to the recommendations, but they will reserve their judgement until they see exactly how some of that detail plays out because some of it, as I said before, does absolutely run in to challenge some of the state-based policies. Rather than them being rejected outright, one would hope that they will at least give it a chance, that we'll actually see some constructive, you know, let it run, see how it goes. It will come back to COAG over and over again, so it's not as though this will be their one and only opportunity. So that will be some part of it.

The other part, I remain cautiously optimistic that enough compromise of the details of the CET can be made, including that conversation we had before about the reserve powers of AEMO can satisfy enough of the members of the current government that they can find a way to support that. That's still going to play out over the Climate Policy Review, which is now taking place federally, because they made it very clear that the Finkel Blueprint will feed into that review in terms of the actual broader climate policy to meet our 2030 objective. So that's how that's going to go. If this government is unsuccessful, if either Turnbull says, "Guess what, we either stick with Paris and do this or I'm out of here" then that could be an interesting debate. We'll see. Alternatively, if there's a change of government, and it's pretty clear if they stuck to their current policy where the Labor Party would go. They would either implement their EIS, which is not that much different from what the Finkel Review has proposed, or they'll take what the current government puts in place and, as Mark Butler said on Q&A, "we'll just fix it". He'll increase it, he'll turn the dials, but the blueprint has been designed so future engineers or operators can turn the dials.

So there is a way forward here which isn't catastrophic to energy and climate policy. There are deep chasms either side of this precipice and we'll see if the governments can find their way to stay on top of that.

FRAN KELLY: Marianne, do you have thoughts on how the governments can skip over the chasms?

MARIANNE LOUREY: It's a huge, huge challenge and I suppose we were in this space probably a decade ago where the governments were fairly close to getting agreement and then basically we walked away from it and we are where we are. Unfortunately, what we often hear in the media are the extreme views only and it's almost that we need to band together as a society to get the middle view heard far

more frequently so that the extreme views become what they are - they are the extreme views - and so that potentially provides a government with more confidence about taking that middle ground.

FRAN KELLY: Alan, we're terribly lucky to have you here tonight because I can't get you on my radio show. I know you're choosing to do a few appearances around the country, which is great, so we really appreciate your presence tonight and your contribution. Is there any final thing you would like to say about the way forward after you've gone back to being the Chief Scientist, not the Chief Energy?

ALAN FINKEL: I'll make one very brief comment, and as a Chief Scientist I shouldn't, but for me it's fingers crossed.

FRAN KELLY: Hashtag "fingers crossed". Alan Finkel, Marianne Lourey and Tony Wood, thank you very much for joining us tonight and thank you everybody for coming out.

TONY WOOD: Also, thank you to Fran Kelly.

END OF RECORDING