

## **Energy in 2014: More mines than field**

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**Speakers:** Tony Wood, Grattan Institute  
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CHRIS GREIG: Welcome everyone to this event, which is hosted by the Grattan Institute, UQ Energy Initiative and the International Energy Centre and the Young Energy Professionals. The topic of tonight's talk is *Energy in 2014: More Mines than Field*. Largely we're focused on electricity, so we're not here to talk about fracking or transport fuels, but about electricity and the minefields that we face with investment. I'm Chris Greg, as Director of the UQ Energy Initiative I'm moderating tonight, but with us is Tony Wood, Director of Energy for the Grattan Institute, Mike Swanston from Energex, Paul Simshauser from AGL and Cameron O'Reilly from the Energy Retailers Association of Australia. In the flyer you've seen their CVs, but before they speak they'll give a quick snapshot on where they're from, what they do and why they are qualified to be addressing us here tonight. So without any further ado, I'm going to hand over to Tony Wood to give us his views on where we face investment in the energy sector.

TONY WOOD: My background is I got into the energy sector in the late '90s in Brisbane and ran what used to be called the Gas Corporation of Queensland and, for my sins, ended up moving to Victoria when the large privatisation took place down there and ended up in the end with what became eventually Origin Energy, and then spent the last four or five years working with the Quinton Foundation on clean energy projects in the Asia Pacific region generally and the last two years with Grattan. Grattan is, I guess, what people would describe and it's sometimes self-described as a public policy think-tank, it does a lot of work in looking at public policies across the full range of things that are important for Australians, and we certainly believe that energy is one of those things that became and remains particularly important for many Australians. We are in our economy, in our lives, seriously we use energy in ways that are fundamental and so reliable, affordable and arguably now sustainable energy supply is a critical issue for us. So that's how we come at this and I'm particularly interested in the way in which energy policy and energy investment occurs, and many of you would be aware that historically there's a strong link, particularly if only because state governments have historically owned most of the assets.

So, let's get into some of the issues, why do we have this, what we've described as, a minefield of issues if you're trying to seriously think about investment in the energy sector? There are significant pressures, some of them are external, some of them are internal. We are seeing electricity prices have been going up, we may be seeing some amelioration of the increases we've seen. We've seen what's loosely called unconventional gas around the world creating some serious challenges, both positive and negative, and Australia now is not immune to those challenges. In our view, the failure to complete the National Reform Agenda which started in August 1993 with the publication of the Hillman Review, we never finished that journey even though we started it with great enthusiasm after Fred Hillman produced his report. And we've also got what is, certainly in my mind, the most significant challenge ahead of investors in the energy sector, and that is the unpredictable and

changing climate change policy. And that comment doesn't reflect necessarily on either side of politics, but it applies equally to both.

We have got this year a quite complex agenda of things which are going to impact on energy. There's an energy white paper, we had one in 2012, we're having one in 2014. We are seeing potentially the repeal of what's called the Carbon Tax, replaced with a different form of action to try and address greenhouse gas reductions. We've got a review of the Renewable Energy Target, that's become an incredibly poisoned debate remembering that when people announced that we're going to have a fixed target the idea was to create investor certainty and what it did in fact, if anything, it created more uncertainty in renewable energy and those who invest in other things. And we've also got a lot of debate around domestic gas policy and, finally, we've got the processes behind all this run by the Australian Energy Market Commission & Regulator are actually quite slow in responding to the sort of changes we're talking about. The processes they have and that allow them to make changes in the way our energy sector is regulated are very slow indeed.

So, let me quickly just re-emphasise some of these things. Electricity prices have moved up dramatically, well outpacing anything anyone's seen and you'll see included in there towards the right-hand side a small upward shift, that's when we saw the introduction of the carbon price back in July 2012 and there's quite a considerable debate now as to whether you'll see a similar drop sometime in the latter half of this year if the government does manage to repeal the carbon price, which is now \$24 a ton. But of course, lots of other things have changed since then which might mean that people won't see quite the same drop in energy prices as they saw increases. We should see some reduction in that rate of increase because the Australian regulator should be getting on top of some of the issues that caused this to get fundamentally out of control, and you can argue whether we saw too much investment, whether we were seeing a catch-up of investment, whether we've seen a far too generous rate of return allowed for the businesses, and however you view that, in our view you should be seeing at the very least a flattening of that curve, if not even a downward position in that curve.

The second thing, which is really quite weird in a way, is that energy consumption has been falling. Now when I say weird, that isn't by itself necessarily weird because there's lots of good explanations for it, but what's interesting is no-one saw this coming. The dotted line you can see there was a forecast or a projection that was made in 2005/6 by the Australian Energy Market Operator, generally considered to be the experts on what our energy demand is looking like. But they were wrong. They've got it wrong every year since 2006 and, most recently, talking to some of their senior people, their objective this year is to get it less wrong. So there's an interesting challenge as to how they'll go this year. But if this was the sort of result you got from your sales manager you'd be seriously concerned, or he or she should be seriously concerned about their future in the job I would suggest. But what's happening as a result of this, not only are you seeing serious pressure on generators – and Paul may have something to say about that – but you're also seeing some interesting changes in relation to what it means for the regulated network business because, largely speaking, they are a fixed cost business and they invested on the basis of that dotted line. So if you're seeing the solid line, then what does that mean for them?

This slide shows you one of the drivers behind one of the other highly politicised issues in Australia at the moment, and that is gas. You saw a large separation I think a few years ago in gas prices around the world, driven partly by Asia, particularly the withdrawal of capacity in Japan of their nuclear power stations. Then we saw the major uptake in gas, in shale gas, what's called unconventional gas in the

United States, and driven partly if not completely by the very high prices that people were paying for gas in the United States. And what you've seen more recently is a small uptick in gas prices and a small downward movement in gas prices in Asia. Now the big question is whether or not those prices can stay separated for as much as they have done or whether, as the infrastructure gets built, we'll see some downward pressure on gas prices in this part of the world.

What you will see is some really nasty political shocks because just when we might be seeing a reduction in the rate of increase of electricity prices, we've already seen only a few weeks ago an increase of 20% in gas prices in New South Wales and in Victoria it's going to be even more significant. If you're using gas for heating your home in Victoria and you look at the sort of wholesale gas price increases we've seen in New South Wales, you're going to see an increase in your home energy bill of something close to \$500 a year. This is a big number and it's going to get politician's attention and, at the same time, anyone who read today's financial review will have seen what the major industrial users of gas are saying about what that means for them. This is what's driving it, basically at least partly is the big sucking engine in the top right-hand side of this chart which is the export of gas from Queensland. At a previous event here we spent a lot of time on gas so I'm not intending to develop on it, but simply to say this is putting significant pressure on the energy system on the east coast of Australia and, particularly, on New South Wales.

And there are other things occurring. We've seen a substantial uptake in solar PV for a range of reasons, partly driven by policy, very generous feed-in tariffs in most states which are currently being unwound, but the penetration of solar has been dramatic. You only have to go around the newer suburbs of Brisbane or Adelaide or Melbourne and it looks like every second house has got solar PV on the roof. Whether that's a good or bad thing from a policy perspective is one question, but what's interesting is what this means in relation to the way in which those consumers who have adopted PV are interacting with the network and the way the network is going to interact with such a large component of energy coming from intermittent sources.

So, finally, what I think to me is one of the biggest issues in the situation for energy policy and making investments in energy in Australia, and that is climate change policy. We, at least in theory, have bipartisan support for a 2020 target and a two degree global objective, that is to avoid more than two degrees increase in average temperatures between now and ever. Some of us might think that that two degrees has already gone, but it's interesting, they're the two things that the two parties in Australia have agreed upon. There's overwhelming focus right now on what the target should be for 2020, the repeal of the Carbon Tax, the elimination of many of the entities that were put in place by the Labor government is currently part of the agenda for the current Coalition government. They are intending to introduce something called the direct action with an emissions reduction fund and we've also seen, as I said before, the review of the Renewable Energy Target, one that was supposed to have certainly, as I said before, but, if anything, we have more uncertainty than ever.

So, again, some serious questions and for us that means one of two things only, and that is that change and adjustment to change are now a permanent feature of the landscape for investment in energy. Everybody on both sides of the debate, whether it's investors, whether it's owners of assets, whether it's environmentalists, are calling for governments to do something. They've all got a vested interest in the outcome and the challenge for governments is to rightly listen to all of these and make some pretty tough calls. We think there seriously needs to be several things. One is to reinvigorate the National Reform Agenda which got stuck somewhere in the early part of this century and really does need to be driven very strongly, if only by but certainly it has to be by the Ministerial Council on

Energy or the COAG Energy Council. We do need to seriously make sure that governments only intervene in markets where it's appropriate, that doesn't mean it's always inappropriate but the way governments intervene has to be much better thought through than I think it has been, particularly in relation to the way they respond to things like the upward kick-up in gas prices. And, finally and most importantly, this is something that industry cannot do by itself. We have to see a credible bipartisan approach to climate change however that begins, because without that I would suggest that investment in the sector is going to be seriously challenged as we go into the next couple of decades of this century.

CHRIS GREIG: Thanks Tony. So the approach we're going to take is from the academic perspective to the generator who does a bit of retailing as well, to the distribution and transmission to a retailer. So, over to you Paul.

PAUL SIMHSHAUSER: So I guess from standing back and looking at our market at the moment more mines than field, I certainly feel like there's a lot more mines than there are field. One of the things that Tony touched on was that contraction in demand and the fact that we missed it all, and I think that's right. I know from my perspective, I got used to demand growth, positive growth getting smaller, and that's what this chart basically shows you.

So this is the east coast of Australia. On the bottom axis is the annual growth rate of the east coast power system, on the right axis it tells you how many years, the frequency of that growth rate. And you can see that blue line on the left-hand side there, so between 1956 and 1969 you can see that on average the power system was growing at about 10% year on year. As a separate aside, as an investor, if you can't make money in that sort of market you're a lunatic. So it's easy to make money when you've got a market growing at 10% year on year. You can see in the '70s, 80s and '90s that it's contracted down to about 6%, you can see the 1990 to 2009 period it's now starting to look at 2%, 3%, 4%, and then the 2010/2020 forecast was more like a 1% growth environment, with a bit of help from the GFC, a high exchange rate and a pretty inflexible labour market. Of course, what has been happening is negative growth and I certainly didn't see that one coming. I've now seen it happen for the year on year for four or so years in a row and I'm wondering when it's going to hit rock bottom, and unfortunately I don't have an answer for you.

So, there's the demand side. On the wholesale part of the marketplace, energy-only markets are a pretty tough environment, that's the design we've got. So we have a mandatory gross pool and the price is formed on a uniform first price auction, which is a very complicated way of saying that the highest accepted bid sets the price for everyone. And they're really brutal environments. They were designed back in the 1980s by a bunch of clever people and in theory they worked really well. There was some really elegant electrical engineering and economics that got blended together and they came up with an answer. But the implementation had problems. First of all, there were price caps, the price didn't just go to whatever number it was. Secondly, most economists are pretty good at thinking about the cost but they usually get the corporate finance part of it wrong and that was completely overlooked. It was sort of by implication almost an equity-funded fleet of power stations able to withstand years of drought before you finally have the prices going up and make all your money in an afternoon and go on a starvation strike again for the next five years until it happens next.

So what happens when you model our system? So this is the chart I did back in 2006 and it's still relevant today. The numbers will no doubt be different if we ran them, but this is the cost of running a wholesale market in those states, so Queensland, New South Wales, Victoria/South Australia which

we model as one, and then NEM combined. So you can see that the cost back in the day, so this is when lots of cheap coal and cheap gas, capital costs were pretty good, project finance was still roughly, well, probably starting to frazzle up, but if you're thinking about when you would have built the supply this period of time you were probably still able to raise pretty cheap money, and that's what would happen in the spot market if the market sort of did what it was designed to do with a \$10,000 volt price.

So these simulated results have actually optimised the number of blackouts. So this assumes that you are actually getting blackouts and you are actually getting \$10,000 price spikes, but you can see that there's a really big gap and it's sort of called dismissing money in wholesale market design. So then, to enhance matters, we then brought in renewables and subsidised them, and gas-fired generation and subsidised it, and they of course go at the bottom of the merit order. So, at least in theory, that exacerbates not helps this situation. Things get worse, not better. It sort of reminds me of that quip by Ronald Coase and I'll just modify it a little bit: if you torture a market long enough it will confess. And I think that's what happened to our market, it's being tortured and it's at the point of confession right now.

Let me just show you what happened in construction of plant. So when our market was originally designed and formed, so call that the 1993/4 period, implemented gradually and progressively across the states 1994/5/6/7, and then eventually the flag fall in 1998 when we synchronised systems. So 1998 through to 2002 you had pretty much a pure market environment. Left-hand side there you can see the plant that was built in response to a market signal or, in some cases, a perceived market signal, but investors don't always get it right as you know so there's lots of probably misguided investment. But you can see the overwhelming majority of investment, 6,000MW, probably the better part of \$6billion worth of hard money was put on the ground in response to security of supply and price-related signals and you can see very, very small amounts of policy-induced plant.

Around about 2003/4/5 was when the markets for project finance probably did start to implode, certainly by 2005 the party was over and life became far more difficult to put new plant into a system, whether it was here in Australia, in the United States or over in England or Europe. And just to give you some parameters on this, so between 1997 and about 2004, in the US alone 230,000MW of plant was built and financed under a project finance regime. In 2005, 110,000MW of that plant was bankrupt or capitally restructured or taken out before it fell into insolvency. So, generally it's the case when a bank puts their hand on a hotplate they do it once and once only. So that was their hotplate moment and project financing changed forever. So that's why you see virtually no merchant plant thereafter. It was sort of unachievable and the one or two that did get away was really quite clever, the developers themselves should be given a medal for doing so.

Thereafter, everything else that came in was policy-induced. A liability was placed on a retailer and if they didn't achieve the objective function they were penalised, so they had this incentive to go and write these PPAs or invest in the plant and bring it in and there were these sort of penalties if you didn't do it, subsidy provided funded by the electricity consumer if they did. And you can see that what transpired is around about 11,000MW of gas and renewable generation has been facilitated in our market. Now, the interesting thing is at the moment on the east coast of Australia there's the better part of 50,000MW of PIP, a little bit more maybe, and there's roughly 11,000MW or 10,000MW of oversupply. If you actually pull all of those policy-induced machines out of our market, if you could magically do that, can you believe our market's roughly in balance? So the wholesale market at the moment is horrendously over-supplied, the wealth transfers are very hard to get your head around,

and this is in response to what I would consider each individual policy to be quite noble in its objective function, whether it was gas to facilitate the development of gas fields in Queensland or whether it was renewables to lower our greenhouse footprint or the NGAC scheme in New South Wales; each of these schemes had a perfectly sensible objective. But no-one actually sat back and thought, what happens when this actually collides with our very brutal energy-only market? And where we stand now is, would anyone invest in new kit? Well, there's certainly no signal to do so, but the sobering point – and Chris and I were talking about this earlier tonight – a little over 75% of plant in the National Electricity Market is actually beyond its design life. So we're now into Grandad Zach's territory and there's a point where in an environment where those assets are being sweated out, it's not going to be just a matter of replacing the handle because the handle probably won't be there.

If I just turn very quickly, that was the wholesale market, let me just touch on some issues relating to the midstream market or the networks. This is a graph of capital productivity of the Queensland network, so Ergon, Energex and Powerlink, and you can see that basically in 2005 versus 2012, if we used \$1billion to ship a megawatt or two or \$2.98million to ship a gigawatt hour, we're now using basically double that. So the productivity of the system has actually collapsed. So put another way, back in 2005 the assets on the ground were probably worth about \$7billion or \$8billion, now there's \$20billion worth and they're not really shipping much more power than they were back in 2005. And that's a big problem for the whole industry, because there are price elasticity effects in our industry and the labour productivity is not much better. So there are real problems in the midstream market as well as the upstream market.

And then, of course, you then get to that point of saying well okay, so we've got these broken components, we've had this misguided policy in the midstream markets applied unusually by a regulator, we're stuck with the outcome we've got. Wholesale market, retail market, renewables, all these different things need reform, but the electricity price is getting an awful lot of mentions in the media. So this is the number of times that electricity price has been mentioned in a newspaper, TV or radio article between the year 2007 and 2013. So in the year 2007 all up across the four states – New South Wales, Queensland, Victoria, South Australia – around about 800/900 stories. Dial out to 2012 and you're up around almost 10,000 stories. So the appetite for a politician to go and take on serious reform – reform always involves pain, there's no easy path to reform. If it was easy it would be done. So anything from hereon in is going to be painful in the process. With that sort of media, what's the appetite of our policy markets to actually do it? That's a bit of a problem in and of itself. Thank you.

CHRIS GREIG: That's terrific, thanks Paul. We'll go straight onto Mike.

MIKE SWANSTON: Mike Swanston is my name, I'm an engineer. I like long walks on the beach and pina coladas. I crossed over to the dark side, from engineering to customer services, around about seven years ago and my big fascination now is looking behind the story and not only looking at the data but saying, "So what? What does it mean to mum and what does it mean to our community?" and hence my fascination in prices and tariffs and renewable energy.

Like I say, I like looking behind the story. We've heard Tony mention and others about has the power come on like we expected it to? Now, for years we've been designing and building a network that we say righto, we've got to have these things called 50 POE or probability of exceedance security and 10 POE. That's the yellow and red lines. But look back, since 2009 in South East Queensland – I should preface this by saying even though I'm with Energex, these are not necessarily Energex's views. They could be mine, if they're not I'll deny everything, and I look at the number of people in the audience

and it worries me that I never let a good story get clouded by the facts. But still, you can see summer/winter, summer/winter, summer/winter for about the last five years and you can see we've never got anywhere. We've never been close to our, you know, you can temperature connect it and do all sorts of things or correct it, but really the demand that we've been forecasting and building network for in transmission and distribution for the last five years has never, ever tested the network.

What's even more interesting is the winter one, which is the shorter of each alternate bar, is dropping away and, of course, it used to be when we designed our network it was for adequate voltage at times of peak demand on a cold winter's night, but the thing is now that winter nights are now instead of bar radiators and oil heaters, are reverse cycle air conditioners. Much more efficient at warming houses and, of course, with price elasticity and price awareness, CFLs, plasma TVs, these sorts of things - we're moving away from plasma TVs to LCDs - night-time demand is nowhere near the problem it used to be. Our big headache now is two and three o'clock on a hot February afternoon. It really is changing. In fact, we talk about changes in appliances. A friend of my, Faroon, from the US showed me a graph the other day of refrigerators and it went to the size of refrigerators and compared refrigerators from 1960 to 2010. And the average size of a household refrigerator has increased three times, but the energy consumption by that refrigerator has dropped by three times and, interestingly enough, the price has halved. And that's the sort of things we're seeing in homes, so we're just not hitting the demand that we thought we always would.

Solar PV has been a big issue, and I normally put up a graph showing the growth of solar PV, but the interesting thing is in Queensland at the moment solar PV is the fifth largest generator in Queensland. That's rooftop solar, distributed solar, and that's Energex alone. Now, there's a mistake in there, the obvious mistake that I'd like to see you pick up, that 820MW or 820,000KW is just Energex. Tack in another 400MW means that puts it at the fourth largest generator in Queensland is rooftop solar PV. And by gee, has it changed the industry. It really has. And round about seven years ago, when I was lucky to be on a committee where we looked at the technical issues of embedded generation on the network and we all looked at voltage and all those sorts of things - Paul will remember it dearly - we sat there and discussed voltage rise and all these reverse power flows. But the sleeping giant in solar PV was the commercial impact on network distributors, on distributors. It just completely challenged the fundamental way that networks recovered their costs. So even though solar's been a big conversation, it's now a large generator in the state. The commercial impact is revolutionising the way we recover our costs in the distribution network.

This curve here is one that gets a bit of a run; in fact the Americans have a similar one. The Americans call it a duck curve, which says more about Americans than actually power consumption I think. But anyway, this is a feeder, Currimundi 3, it's up in the Sunshine Coast, it's a daily load curve. Just for the fun of it we pulled it out for the second Tuesday of every October for the last five years and the curious thing there is to watch the change in not only demand, but energy consumption. Currimundi 3, it's a residential feeder, it runs up the back of Caloundra somewhere, the demographic is one that's a high take-up of solar, so they're an older generation that tend to be putting their capital money, their savings into reducing their costs of operating. We call that demographic the "newlyweds and the nearly deads" but actually I think that's a big harsh. I actually heard someone describe it the other day as Australia's only above-ground cemetery. I thought that was a bit rude too, but anyway.

But being a duck curve, the interesting thing there is you can see early morning, not a lot has changed over four or five years. Each curve of these is five years starting at 2009 at the top, down to 2013. Peak demand, evening 6pm, not a lot's happening, hasn't moved much and, of course, our

demand management crew say what a great job you're doing. These bumps in the back are your night-time hot waters coming on, but have a look in the middle of the day to the point now where the demand on this feeder is down to 20amps against a peak of 160. Now, voltage management in that sort of title surge is a nightmare, but the big killer for us is that residential costs, which are 60% of the cost recovery of a distributor, or 66% actually, is in volume cents per KWh, which is the area under those curves.

Now the area under the grey curve compared to the dark blue is 18% less, so 18% less energy has flowed through that feeder on that Tuesday year on year. That's 18% less cost recovery. If you've got a toll bridge, you've got a fixed set of costs running your toll bridge, less cars going over it what do you do? Put up the toll. What happens when you put up the toll? Less cars go over it. What do you do? Put up the toll. Welcome to distribution engineering, it really is not a lot of fun, but that's the sort of thing that's happening. In fact, we've got around about 40 feeders in Energex where that curve now drops below zero. They're actually generators, they're actually sucking instead of blowing, which I was trying to get that conversation into my talk, but Tony won it with a big sucking machine. I can't quite get there, but anyway, this is a pretty interesting thing that's going on in the network and it's happening all over grids. And so the concept behind this, not only of the technical issue of voltage management but how the heck do we continue to recover the costs of running a network, less productive it as it may be Professor Simshauser, that how do we keep getting those costs back is getting to be a very tough gig and fundamentally challenging the way that we recover costs for our networks.

Similar sort of story here in this graph, this is average household consumption per year sort of rolling along. The green curve over the last five years is customers without solar PV, the blue is customers with solar PV. Now, there's a really interesting story underneath this. Customers with solar PV stumped up their \$5,000, life's beautiful, my bill's gone down by \$300 a quarter, I feel good, I'm getting feed-in tariff, I'm using less energy, I'm self-consuming. But the other four out of the five are going, "By jeez, this energy's expensive". They haven't stumped up for solar, they haven't put \$5,000 or \$7,000 or \$10,000 worth of kit on the roof, but what they're doing is they're getting up Johnny for having too long a shower, turn off the lights, I've changed my TV, I've put LED lighting in, I'm cooking on the barbecue. And, interestingly enough, even customers without solar have reduced their household energy consumption over the past five years by up to 16%.

The big difference is the blue people feel somewhat happen because they've had a cause and effect relationship: they've spent money, their bill's gone down. The green people are fairly unhappy people, but the reason the green people are cranky is they've done all these things to try and reduce their energy costs, they're turning off lights, doing things, reduced their consumption by X, but the price has increased by double that rate. So it's still costing them a truck load of money and so people are saying, "What am I doing?" This is where the angst we're finding amongst bills and a lot of people talk about electricity bills, the quantum, is it quarterly, it's on the credit card, it's behind, you're paying it after three months, it's a big shock, all this sort of stuff. But the other thing is, we've got four out of five customers who are seeing no cause and effect to their actions and they're not happy Vegemites one bit, as we're seeing.

We've got to change the way we recover our costs. Now, network bill is around about half. I think it's a big harsh, it's actually only 47%, but the network bill is really half the bill. Now of course, on the retail side, which Cameron will talk about, there are a lot of things going on about retail costs and wholesale costs and where Smart Meters and operational costs fit in there. But on the network side we've got an



interesting conversation. We've got to move away from how we charge by volume, particularly in the residential sector, which is a big sector. We can't keep charging cents per kWh. So the conversation I've been trying to foster is the idea of the size of your pipe. The story goes, you think about the pipe running into your house at the moment, it's this big. Why is it this big? Because tonight at six o'clock someone's going to be washing the potatoes in the sink, someone's going to flush the toilet, someone will be in the shower and you hope like heck it's more than just a trickle coming out of the shower. Even though you only use the size of that pipe for probably two hours in a 24 hour period, that's the only time you need the pipe that big.

The electricity is exactly the same. Why has everybody got an 80amp connection or a 60amp connection? Because one day sometime, maybe at their daughter's 21<sup>st</sup> birthday, they want to plug every party light known to mankind, a few urns, run the oven and a few other dodgy things on at the same time. But that's not what everyone needs. If we started looking at where technology is going – and bear in mind technology tends to lead our industry, regulatory or otherwise, by about five years – storage, renewables. The analogy is put a tank in your house, trickle feed that house with just a little tiny thin pipe 24 hours a day. If you need a lot of pressure at various times in the house you've got a pressure pump to do that. If you've got six kids, you need a bigger tank and you can top it up with your renewables and your rainwater on the roof. Now, that's fairly simplistic, you've got to do the numbers, but the idea is the small pipe model is where electricity pricing needs to move and that is you pay on the size of your demand, how much you're drawing out of the network or how big it is, not on how much you draw out. It's how much demand you can have.

Now, of course, we're hearing a lot of conversation of how great that is and the industry is all getting very excited and warm in their trousers about it. The tough part is how do you sell that to mum? How are you going to explain to the average customer, "Oh, I'm going to move you via time of use to an average consumption using an electronic or a Smart Meter that gives me half-hour readings, we'll average those over the shoulder period and that'll be your bill"? And the customer will go, "Yeah, right, just tell me it's cheaper to run my washing machine after eight o'clock at night please, that's what I can understand". So that's going to be the big challenge. It's not the technological; the technology, the engineering, the answers are there. The tough gig, and this is where it's turning this balance – and I think it was Paul's comment - you've got to join economists and you've got to join engineers together. Engineering ain't just engineering anymore; it's social engineering and by gee it's fun, but it keeps us all busy. Thanks for your time.

CHRIS GREIG: Over to you Cameron.

CAMERON O'REILLY: Mike's always a hard act to follow, he gives engineers a good name and who says that they don't have a sense of humour? I'd also like to acknowledge Tony Wood who is one of the people who interviewed me eight years ago to take on the role of the CEO of Energy Retailers Association - and I'll be talking to you about that later - and my good friend Chris Greig who is a fellow devotee and friend of the University of Texas at Austin as well as obviously UQ.

I think that one of the things in terms of my background it's always important to say is I started in politics and realised it wasn't a profession that was for me, but I learnt a lot in that process. I was a policy advisor in the Keating government at the time the national competition policy agreements were discussed, implemented and signed, and that was back in the early to mid-1990s. And today I represent an industry that only exists because of those agreements, competitive energy retailing, and in terms of disclosure I guess I should say that a lot of my comments come from the perspective of

having been for the last eight years the CEO of the end of the value chain, the competitive energy retailers, the people who send the bills to you in electricity and gas. But in that process I suppose I do get a lot of perspective from different companies with different business models on what's happening at the consumer end and I get some insights because of the position of trust into how my member companies, who are natural competitors, are dealing with the challenges of the future.

And of course, low demand is a real challenge to the retailing model, but particularly to the gentailer model, because if you're getting hit with low wholesale prices at the generation end and the users are using less of your product then you're getting hit from both ends and having to deal with that through the integrated model is obviously a challenge. And that's why I think the existing large players, that market presents challenges that are going to foresee some of the innovations that a lot of people have said when are we going to get this innovation in the future from contestability, and we're going to see more and more players into the industry competing for customers. And I think the key to that reform has always been a price-based one and that is governments have got to learn that the answer is not controlling the price of the end product because that affects the whole value chain, and if we want to tackle the challenges of the future and we want to see more innovation for the customer's benefit and also from an industry point of view, then we have to learn to let go of the end price. We have to let proper price signals come in and we've got to have more innovation in pricing, whether it's at the network level or the customer level.

They're some of the members that I represent and some of these brands will not be so familiar to you in Queensland at the moment, but I heard that they will be in a couple of years' time when the government follows through with the current bill that they introduced to the parliament last week to introduce price monitoring or market monitoring into the retail market, at least in South East Queensland, from mid-2015, which would be following on from that decision in Victoria quite a long time ago, January 1 2009, and South Australia from early 2013. New South Wales has a bill to implement price monitoring and phase our retail price regulation in front of its parliament right now and its future lies in the hands of the Shooters and Christian Democrats in the upper house of the New South Wales parliament. One thing Queensland did well was get rid of an upper house many, many years ago.

But I think what flows from that, and I'll come to it, is if you really want to see the sort of innovation we want to see at the customer level then the companies need to have the confidence to invest and take risks to innovate. And they're only going to do that when you take away the regulatory risk of always having a hard government intervention, and that risk is fresh in the minds here in Queensland where the government that's currently in power came to power with the promise of a tariff freeze. And we're never going to take the politics out of energy. Everyone, every voter is a customer and therefore a voter, but we are going to have to recognise that the answer is not going to be that the government can protect us. It is going to be a lot of things, a lot of individual actions are going to make a difference to our future and our bills and the way we manage energy and the way we use energy in the future. And the industry would like to operate in that sort of environment and they're slowly getting there and I think it's going to be a lot more customer-driven environment coming forward.

Now, solar is a little bit of a reflection of that but, in truth, solar that we have today is so much a legacy today of very generous government incentives, government policy which was all done in isolation from various considerations of how it might affect the industry and a lot of the time the decisions weren't even taken by Energy Ministers and they were taken at a time, "This is the answer to climate change". But a lot of decisions taken in isolation created a lot of problems for the sector and we're still dealing

with those now. But I think, at the end of the day, when the consequences of policy come through then we start to go into a more rational type of setting, and now I think we have a future outlook at least where we can see that some of the network price increases we saw of recent times that we're seen to be perceived as some of the issues are around regulatory failure, but there is also a genuine issue if I go back to when I first came into this job and if I look at the topics that were being discussed there, and this was 2006/7.

Let's go back to then, what was I working on when I first came into this job? A Howard government considering then an emissions trading scheme in response to the pressure of public opinion and climate change. We had a sort of Nuclear inquiry, believe it or not, we were considering having a debate around nuclear generation in this country. At one stage in 2007 we were dealing with a very large wholesale energy spike that arose from the drought which had knocked out a lot of hydro generation, and here in Queensland, where the water situation was most acute, some coal-fired generators were told to cut their production to save water and the wholesale energy market spiked. And solar was not even on the radar at the time and, to be fair to the networks, peak demand was the number one topic across the industry and Smart Meters were seen as very much of an answer in that and Victoria charged ahead with that, and we know the consequences of that in terms of a consumer backlash. So we actually led what used to be a dull industry and what used to be an industry that never changed, it's subject to constant change and one of the things that has been constant has been constant policy change. And so if we want to deal with the future one of the things that we have to have is a little bit more consistency, and if we want to see a response to some of these demand conditions what we need to have is governments recognising that in the end the regulatory system can't move quickly enough and staying out of it, and allowing us to respond to the challenges that are coming forward has got to be recognised as the way forward.

And just one of the things I'll emphasise, that Victoria, as I said, has the longest history of a price-monitored market, where retailers get into that market, compete for customers without the risk of a heavy regulatory intervention or uneconomic pricing being imposed upon them. And as a result, Victoria has the least concentrated retail energy market; it has the most providers in the market. And it's a challenge for businesses like Paul because in the end they want to see, at AGL and the larger players, they do want to see that rational pricing but, of course, it needs a more competitive framework at a retail level for them. And just to say, some of the sort of things I'm beginning to see in the market are things like I've had retailers coming forward now that are focused particularly only on pool customers and their model is a pure retailer model, it's actually an aggregated demand response retail model.

And that sort of thing is going to occur in time and it's going to happen, but the bedrock of that is allowing us to have an industry in which price signals are economic and in which price signals are flexible and prices are allowed to reflect the challenges of lower usages and the cost to sustain the infrastructure that for the time a lot of us still depend on will have to be addressed. And one of the things I'll just leave you with, one thing we do know about Australians worldwide - and this is a measure of customers switching worldwide, and Victoria, as I said, is the most competitive market - but Australian markets are right up there in terms of customers switching. This is an industry in which consumers have learnt that, compared to a lot of the rest of the world, to at least make decisions about what company they want. Okay, the offers are more complex than a lot of people tend to take up, but we've just had the platform of flexible pricing introduced in Victoria, it's a slow start, but these are the sort of things that we've got to allow to develop much more in the future if we're going to deal with some of our energy challenges. Thank you.

CHRIS GREIG: So the plan from now is that we'll have a bit of a discussion here before we invite you to ask questions. I'm going to lead that off, I think we've all got the picture about how we got here and it's a bunch of policy issues and we didn't get the demand projection right. But as a fellow who lives in a house with just a son and spends \$1,600 a quarter on electricity, I want to know how we're going to get that under control. So is it about tariffs; is it about metering; is it about caning network operators? Tony, you can kick off, what have we got to do? I know we want policy stability, but obviously we need reform, what's got to happen next?

TONY WOOD: An anecdote I did some years ago I told at an investor conference about cap and trade emissions trading schemes and trying to explain to things to people how things worked, because people do respond in interesting ways to prices. And I had a situation at home where when I got up in the morning, if I didn't get up early enough my daughter got up before me and she had her shower and, similar to what Mike was talking about, it wasn't the water ran out, it was the hot water ran out because of the length of her shower. And I was trying to explain to my family the way a cap and trade emissions trading scheme should work. So what we discussed was okay, how about we do a deal here in which we all have a certain amount of electricity and you can work out how much you want to use? And she and her brother pretty well quickly worked out that she could actually have a longer shower if she watched less television and he could have more time on his television and playing his computer games if he didn't have a shower at all, you could actually do a pretty good deal. The problem for me was that's exactly what they did, the consequence unfortunately she still used all the hot water in the morning and I still got a cold shower. So sometimes policy makers need to be aware of unintended consequences is what I should leave you with there, because markets are very efficient at doing things that you don't anticipate.

So Chris, I think one of the things that I'd be looking to do is that governments need to seriously think about the sort of market we're trying to have here. I think Australia has been at the forefront of using the strength of market forces to cause things to happen and things do happen in response to price. That chart I showed you in terms of what happened in the United States when gas prices went very high, that stimulated a whole lot of activity and eventually produced more supply and prices came down. So the first thing is, I think is the primacy of markets and the point that Cameron was making is that we haven't yet finished the journey that we started, as I said before, in August of 1993 with the Hillman Review which was introduce much more competition, much less regulation into our market. So that does not mean unregulated. What it means is we need to make sure we regulate the things that need to be regulated and try and make sure we use the power of markets, and I think part of that future Chris is making sure that we do that.

MIKE SWANSTON: The other thing I'd suggest Chris is have a look at those three 15amp leads that are going over the back fence to the neighbours. I'd probably be pulling those plugs out too.

CHRIS GREIG: I think the neighbours are coming into my place probably.

PAUL SIMSHAUSER: Look, I think Tony's right. The thing that I would like to see fixed first and foremost is actually the network tariffs. I think the problems facing the network businesses, and Mike's given a terrific explanation of the duck curve as the Americans call it, that's a big problem because every time that keeps happening you're going up in a price spiral. So apart from putting to one side the explicit subsidies and then the feed-in tariff subsidies and all that sort of stuff, there's a hidden subsidy when you're using volumetric tariffs to recover a network cost. So if we don't fix that problem well you're going to continue to see these price spirals and you know where that's going to land. So

that's a really unhelpful development. And the wholesale market, you've really got to go back to first principles I think and start all over again. You've got way too many overlapping policies that are actually, again, individually each of them in their own right is all good; put them altogether you create a Frankenstein in market terms and that's not a good look.

CHRIS GREIG: Before I let you talk, I'm just going to address that. That business about 75% of our generation assets being beyond their use-by date, how serious a problem is this? I mean, from a resilience perspective, on the one hand all the investments that have come into the system are not only oversupply, but they're all intermittent and the base load is all old largely.

PAUL SIMSHAUSER: So Chris, there's no short term issue, so don't worry. Your lights are going to go on next week, next month, next year and several years to come, but if you have a market environment where the wholesale prices are sitting where they are it ends up taking an impact. And I know it wasn't that long ago in a former or slightly different role as Chairman of Loy Yang power station, I cancelled an overhaul. It was a statutory. I've never seen that done in my working career, but this was a simple choice: we cancel the overhaul or we go into financial lockup with the banks and we hand the keys to the car over to the bank. So this was really binary, it was that simple. So we cancelled the overhaul, then a whole bunch of price spikes happened, we made a lot of money, went and did the overhaul. But it was luck, it was luck.

And if you think about the current environment, I know talking to the guys at AEMO right now they're spooked because they're looking at the market, they're seeing hot days and they're not seeing any price spikes and they know what that means. They know that maintenance is going to start getting cut back at all of these grand addax power stations right across the country, and sooner or later that's going to have a consequence. It won't be this year or next, but it will end up having a consequence in the system. And if you have enough of them occurring at once then you're going to start to see this quite awkward situation where there's not necessarily the sort of price signals you want to get new bits of kit in or, to the extent that you do, it won't be the kit that you need. And that seems to me to be quite clear.

And the problem with something like this is if you wait for the event to actually happen, I mean, you're talking about, in my mind, a two to three year reform process of trying to work out what it is you want to replace it with, and then in my opinion, I think – with my former trading hat on – you need at least three, probably five years to cleanse as much of the market as possible shifting from one design to another. You can't just strand a whole bunch of legal contracts, the cost consequences of that, I mean, you talk about investor, sort of.

CHRIS GREIG: So just while you're on this new generation fleet that we're going to have to invest in eventually, can it all be renewables or do we need base load? Or do you think storage is going to solve the problem?

PAUL SIMSHAUSER: I am aware of scenarios where it's the 100% renewables, I've seen them and technically it's possible. I think if we're comfortable with no manufacturing, no industry, I mean, these are just basic policy choices. So if you're comfortable with no manufacturing then that's a path that our country could go down. I'm not sure how politicians would go with that sort of future, especially if you're a politician in Western Sydney, in fact, mark my words, it won't happen, not any time soon.

So then that leads you to other forms of generation and look, the coal-fired machines that we've got at the moment, perhaps the one sitting on the base of all of that, maybe you can string them out well into

the future, but sooner or later they're going to need replacing as well. And inevitably that's going to lead you back to other forms of generation and probably back to the conventionals. Hopefully by that time we'll have a few more options up our sleeve when it comes to gas with the price spike and down the other side, fingers crossed, and maybe we've had enough time with some of the steady state renewables or low emission technologies. In-between, we've got an awful lot of work to get there though.

CHRIS GRIEG: I just want to give Cameron a shot. You talk about the need to innovate within the retail sector and deregulate that sector but, at the end of the day, the whole model seems to be a bit broken. I mean, these guys are not doing any good, the retailers or generators are not doing any good. How do you see the price structure being formed in the future?

CAMERON O'REILLY: Well, in relation to retail energy prices, we have got to a stage where the wholesale energy costs ex-carbon has been very stable for a long time and it's down to 30% of your bills. So the problem of Australia is not the price of electricity that leaves our conventional generators. For various reasons it's been debated, and this is not a go at Mike, but the network is 50% of the bill in New South Wales, so there's no question. At the point of generation with conventional generators, they're challenged but they're still well competitive in Australia and electricity prices at the point of generation. It's not at the point of retailing. So something happens along the way.

As you know, I spent some time in the US and sometimes you get a bit of a perspective on your own country when you're away from it. And one of the common reactions I got from people in the US was, "Now let me understand this. You are 80%+ coal, you're introducing a 20% renewable energy target which will largely be intermittent wind. You have gas, but it's going to be export parity price gas, and you have a policy against nuclear and you're going to price carbon" and they said, "Why? What are you doing to yourself?"

So, I think one of the things that we do have to have is someone who's not a climate change sceptic when they question the merit of particular policies done in the name of climate change and there's been a whole gaggle of things that have been done in the last five or six years that have distorted our energy markets quite badly and they have no particular end public policy merit. And sometimes I reflect on the fact that when it comes to carbon pricing, ironically we would have been better off if Howard had won the 2007 election because he would have been more able to implement and it would have been in place now. So it's been a pretty poor era of policy and so say that is not, as I said, to be sceptical about climate change.

CHRIS GREIG: So one other question that came from some of the audience is there's this view that we've got to take things out of the hands of government – I don't know who wants to answer this one – but does that really solve the problem?

TONY WOOD: I used to work for an energy company, as I said, and certainly of the four speakers who doesn't represent an energy company or an energy interest today – Cameron obviously represents a range of companies – I have trouble really with my crocodile tears hearing what Paul, Cameron and, to some extent, Mike have been saying. I think the role of government in energy policy is going to be with us for a long time and so therefore to some extent it's unavoidable, it's just too politically fraught for governments not to get involved. I certainly think we need to finish the journey of deregulation, for example, in New South Wales recently when gas prices were put up, the regulator effectively was having to decide how much East Coast, AGL, a couple of other companies, were

allowed to spend on advertising. That seems an extraordinarily peculiar thing, and the fact they called it “regulated competition” seems to me a complete contradiction in terms.

So, that idea we need to get away from. I think governments often get spooked by concerns that people have about competition. They see, as I said before, unintended consequences of policies and therefore what they do, rather than say, “Well, should we have had that policy in the first place?” they actually put another policy in to try and fix the thing that’s gone wrong, and that inevitably causes other unintended consequences, and they try and fix that and so on and so forth. And if there’s one area that’s been absolutely replete with that sort of thing it’s climate change. You don’t have to come from any particular position in relation to the science of climate change to observe the constant government fiddling with policies and changing them every little while is absolutely poisonous for an investment. And it also means not only are you uncertain and unclear about what sort of investment you make on anything with fossil fuels as an emitter, but also non-fossil fuels. It doesn’t matter, either way you just can’t invest with confidence. The only thing that’s saving us at the moment is we don’t need anything because of the way, you’ve already heard from others, as to what’s happened with consumption.

So I think that issue of climate change policy and the constant change is fundamentally important. On the regulated assets side, the government involvement is a necessity almost. Sorry, one thing I should say on climate change is there is only one entity that can actually put in place the cost of the climate. Because what we’re doing today is subsidising fossil fuels. People talk about subsidising renewable energy, but right now we are not pricing or putting a cost on the environmental damage that’s caused by the emissions of greenhouse gas. Until you do that, you’ll never get the cost right. There is a cost we are ignoring, and you can debate what that cost is and there are lots of very clever economists who’ll tell you what it might be, somewhere between \$40 and \$100 a ton maybe, I’ve got no idea. But until you do that, you won’t get it right, so governments have to be involved in pricing emissions. What they need to do is think about how they do it very carefully because what we’ve got today in Australia is a complete dog’s breakfast of climate change policies.

The other side where governments have to be involved is in the regulated network business, because they are effectively an actual monopoly. They were the original natural monopoly. I mean, there are lots of textbooks that talk about the history of competition policy in the world and I’d recommend, if you want to read it, *The Quest* or *The Prize* by a guy called Daniel Yergin, two books about that thick. One of the more interesting pieces is what happened in the 1920s when electricity systems were first being introduced and the whole concept of natural monopolies came from that point and the whole issue of how you price these things becomes very important. So inevitably, it’s going to be involved, we’re going to have government involvement there and we’re going to have to think about how we do that more effectively.

So I don’t think getting governments out of the pool is the right answer, the question is make sure that they are in the pool, they’re not biting everybody else.

CHRIS GREIG: Yes, I wasn’t really referring to their role in policy but their role in ownership of assets. What do you say Mike?

MIKE SWANSTON: Tell us what you really think Tony, it’s fine, yes. I spent a number of years with Power Corp down in Victoria who were privatised and I think my first contract was signed up with DB number two, then we were bought by the Americans, then the Scottish, then the Chinese, it was a bit

interesting. But as an engineer working in that company I noticed two fundamental differences in my mind that existing between working in a privatised distribution utility and coming back to Queensland. And the two are firstly a privatised industry tends to value the dollar a lot more than a state-owned utility does, far sharper commercial focus. There's a very much – and whether that's the whole commercial arrangement of hiring and firing; there was a whole bunch of people when we were being run by the Americans who were put on to like the old 402Ks or the share ownership, so everyone knew exactly what the share price was, far more fascinated in efficiencies. So there was far greater value. A dollar mattered a lot more in my mind in a privatised utility than it does in a far more blanchmange-type area, such as a government-owned corporation.

The second thing that was different was the definition of value or good. It seems that when you're government-owned the government feels they have a right to get you to be a tool of social justice a lot more because you're right there, you're on your hand. And I suppose maybe to extend it a fair bit, the Queensland solar bonus scheme might actually be an example of where it was easy for the government to implement at the time, to implement solar bonus and, "Oh, we'll get Energex and Ergon to pay". So because they're your shareholder, issues of social justice, running power lines where it may not be that necessarily strong a business case but because it feeds jobs and trade costs or something like that, the government can give you a little nudge in the right direction. Now, I wouldn't say that overtly and I wouldn't say it in front of the Minister too often, but that certainly is a separate thing that I tend to see is that you tend to be more of a tool of social policy.

Now, whether that's a good thing or a bad thing is a different conversation, but that's how they seem to look under public versus private ownership, in my view.

TONY WOOD: And we ran the numbers, Chris, a couple of years ago now and the numbers are very clear, and I didn't even believe some of this when we first looked at it. The numbers are very clear that when you compare the government-owned companies versus the privately owned companies, the government-owned companies are considerably more expensive in their operating costs and they spend more capital per any other unit you can think of, even when you correct for number of customers per kilometre of line, customer density, everything else, it is very clear. And behind that can only be the sort of anecdotal issues that Mike's talking about.

CHRIS GRIEG: Do you gentlemen have a view about this or it's the same view?

CAMERON O'REILLY: I think Victoria and South Australia have been privatised long enough to know that the service will continue to be delivered. Mike's got the perspective of having been inside both, but I've observed at various times that I think if the service continues to be delivered the onus then is on the same regulatory framework to ensure that the consumers are not getting done over by the natural monopoly. So I think that case has established this service can be easily delivered by the private sector. The one thing you've got to take into account I think sometimes is, as I said, you can never take the politics out of energy and a Minister who owns a state-owned network gets a lot more pressure from his back bench to do things that may be sub-economic or uneconomic than he or she would if the network was privately owned. So there's probably likely to be more political distortions in government ownership in terms of the industry behaviour.

PAUL SIMSHAUSER: I've had the benefit of working in an electricity commission owned by the state; a state-owned generator which was a government-owned corporation; I've worked in private equity; and I've worked in two ASX listed utilities. All of them have their pros and cons, but the lesser of them



all is the government-owned corporation, they've got real problems for all the reasons that have been said. And I've been in executive roles, not so much in the commission but in all those other businesses, in executive roles and I can tell you what's tolerated in a government corporation would under no circumstances be tolerated in an ASX or a private equity firm. You'll lose your job – and I can speak from experience – you will lose your job long before it gets to that point when you're in an ASX listed or private equity firm, because you're dealing with the owners. You walk, you're sitting there with a bunch of institutional investors and there's thumping the table saying, "If you don't fix this we're going to agitate your board and get you removed" and they're really simple conversations. It's amazing how that turns the mind to the problem.

MIKE SWANSTON: In fact, I was having that conversation with my colleagues over our two-hour lunch yesterday. We were talking about that, yes. But one of the things I've observed in Queensland over the last probably 10 or 15 year is I believe our industry is an unstable system. It's an oscillatory reaction, you know, I suppose I'll go and play engineer for a while, but it's not metastable, it's unstable. If you want to do it as a clock and you look at Queensland. We've been through the cycle probably about four times in the last probably 20 years I'd say where firstly it's all about the network. You've got people running the place that are very engineering focused, we talked about reliability and security of supply, everything's great, good and strong, and very, very technically focused. But then of course somebody wakes up and says, "Gee, this is costing us a lot of money". Your tariffs and the prices are getting high, your capital productivity's low. We're all feeling lovely and warm but by gee, it's not a very good commercial position. So then you start tightening, that's where you start winding back your security standards, you start winding back your capital investment, you start pulling back on your labour resources, these sorts of things. But then inevitably something breaks.

Most recently it happened on the last week of January 2004, we had five storms in seven days and then record hot weather on the 22<sup>nd</sup> February and everyone said, "Where the hell did all those air conditioners come from?" We were blowing fuses on fine sunny days and then, of course, the government suddenly up comes the knee, well, a reaction. Again, it depends on which way you lean whether it's a good thing or a bad thing, I'm not saying either, but just physically what happens is suddenly there's this great reaction, we had the Somerville Review in Queensland, we had more money than you could spend, that you could swim in. It was truly a beautiful thing. But it was incredible and we were just instructed, "Fix it, stop the lights from going out" and our number one capital investment indicator was spend rate. Oh, I loved it! And we used to talk about how many millions could we spend, but of course suddenly you get back to the top of the clock, which is roughly where we are now, we're at a \$5billion investment in South East Queensland and we're going jeez, it's expensive. And here we go around and we go round the cycle again until we'll tighten, we'll tighten 'til something happens and round we go again.

CHRIS GREIG: So to move from your two-hour state-funded lunches and before you go to your corporate box at the rugby league, we might open this up to questions from the audience.

MIKE SWANSTON: We had a release of a 30KW connection standard to the solar industry in South East Queensland and here it was, and what blew me away was without feed-in tariff – feed-in tariff's just about dead, the rush is over – there were 130 people in the room. And so solar ain't dead, it really is still going. A lot of those people are now turning their mind and of course their business model to batteries and storage, and batteries is a huge conversation now but where it sits. Paul's done some numbers that say batteries are still a few years away yet to actually make the numbers stack up, but we're certainly getting into the early adopter stage.

If we bring in demand pricing, that I believe will give batteries a kick along because then you start getting, if there's true and serious pricing in networks that honestly reflect what it costs, then it's going to be quite beneficial for people to start putting storage in, bearing in mind storage doesn't have to be batteries. It can be thermal storage in hot water, it can be chemical storage, it can even be turn your air conditioner on a couple of hours early and avoid the three o'clock peak and let your air conditioning start cycling through when the power's a bit cheaper. But that sort of demand pricing is going to give storage a kick along I believe and, with the ecosystem that we live in, I probably give it about three years, that's where I think it'll fit.

It's amazing what we're seeing behind the network now. You see, one of the big gaps is we have no jurisdiction behind the meter and you should see some of the stuff that's coming up now when people are saying, "This is how I'm wiring up my house, it's got off-peak charging of batteries to an essential bus and a changeover switch back to Tariff 11 after the sun goes down" and all these sorts of things, and people are just having a whale of a time with that now. And the numbers are actually starting to feel reasonable, particularly if you're maximising your 44c feed-in tariff. And so the economics are there soon, and so I only give it a couple of years until we start seeing some very tricky and clever household demand management installations.

AUDIENCE: I saw some encouraging graphs there on the screen, particularly the energy consumption per home was dropping. If you're really concerned about climate change, then you would argue that that is reducing the consumption of fossil fuel and helping to defer that climate change. Secondly, the energy generated from PV, we can forget about the argument that many of those systems perhaps aren't generating optimally, but at least that generation is actually saving on fossil fuels as well.

What I would like to ask the panel perhaps is what are we doing beyond the box, looking outside the box to say how can we fill those valleys during the day when we do have, as on the Currimundi 3a feeder, we have a situation where we have under-utilised capacity? What efforts are being made to look at new sources of energy consumption that are wholesome? Things like electric vehicles that would displace the consumption of fossil fuels which we're importing from unstable areas such as the Middle East.

MIKE SWANSTON: The first thing we can do is clone Chris' son at \$1,700 a quarter and we can start sharing him around.

CHRIS GREIG: I'm happy to lend him to you!

TONY WOOD: Firstly, what you want to make sure is that the regulatory and policy structure does not impede the introduction of any of these technologies, whether they be behind the meter, the sort of stuff Mike's talking about, whether they be various models to electric vehicles and so forth. Because in my view there are two things that are impossible to predict, one is what will happen in technology and how quickly and where it will happen. Do not believe anyone's forecasts about where technology is going to go. The second thing you can't predict I would suggest is the international politics of issues like climate change, and so what you don't want to do is have a situation in which your policy framework is dependent upon a particular view of the future, because it will be wrong, the question is how wrong it will be and you only have to look at the forecast or predictions of demand to know how wrong you can get it. And if you base your policy, as we did with the renewable energy target, on a

forecast of demand the consequences can be very serious indeed because you can get it badly wrong.

In relation to our energy system, we don't, as far as I'm aware, import the fundamental fuel from unstable areas of the world. In fact, I was almost going to say we import too much electricity from the unstable state of Victoria in a sense because one of the peculiarities of this country in the world is we actually have probably amongst the greatest choice of fundamental energy sources of anybody. Which is actually a problem in one sense; we're almost spoiled for it. We don't have any more high mountains to dam for hydro and we've chosen not to use nuclear, but otherwise we are pretty well blessed.

We do have a challenge with transport fuels because we're not self-sufficient in transport fuels and that's an interesting issue from an energy security perspective. But when you have a conversation with, like now, as you would know, people are having a conversation about energy security in other parts of the world, they mean getting gas from Russia through the Ukraine into Western Europe; the Americans mean what's going to happen about energy security and they're dependent upon their system introducing oil and gas from unstable parts of the world. In our part of the world, when we talk about energy security we normally mean the other states of Australia, depending on where we are in.

So I don't think we have that challenge, but I do think we have an issue in relation to the way we approach the question of climate change as a serious one in relation to do not put your policy in a place where it depends on a forecast because it will be wrong.

CHRIS GREIG: I think your point was really about the dependence on imported liquid fuels and the role electric vehicles can make, both resolving that and as storage.

TONY WOOD: That's a good point. I mean, I think there's some interesting work being done on gas for transport fuels in addition to the way in which electricity might work. But I think there are some challenges with gas, for example, in many parts of the US now they're looking to use LNG for trucks and they're also looking – because of the low price of gas – to use the gas and transport that into liquids, so what they call gas to liquids. And there are some really interesting things that could be done there and arguably, with a low gas price and a high oil price, that could be very favourable for Australia with a very large gas resource. Shell were looking to do that up and down the Hume Highway and Shell globally is in some difficulty, as you may know, so they've canned that project. But there are some interesting things that we could do with our energy to reduce our dependence on that particular area, if that's what you're getting at, the imported fuels from oil. I'm not sure that we have a real issue at the moment with reliability of supply, but I do think that it would be wise to think about that security question.

PAUL SIMSHAUSER: I think the first answer is that it's very hard to see those sort of technologies coming in if you've got uniform variable pricing because there's no arbitrage. So I think most people in our industry accept that the current way we price, particularly the midstream part of it, is just all wrong and I think if you see a change to, the sort of changes that Mike was talking about, you're actually going to start to create an arbitrage that can be arbitrage by technology. And batteries will be one of those logical technologies and I can tell you right now, Bosch are back and they've got a pretty clever control panel that does it all for you. I'm not sure what the cost of it is at the moment, but it's a bit expensive now, but give them time I'm sure. And with the electric vehicles again it's the same thing,

you really want to see that differential in the price so that you've got something to arbitrage and switch to.

Right now all the research tells you that I guess the lithium ion and the small mass pack or whatever they call it, so the connection costs, is making the batteries a bit expensive and out of the range of, whatever it is, 100km, maybe 300km if you can stump up for a Tesla. But the next generation of lithium batteries, lithium air or something like that, anyway, whatever the next iteration will be, they're in the labs right now and they unfortunately haven't got the charging right, but they're probably capable of about 1,000km of range. So give that five or seven years and you could buy a Volkswagen Golf with a 1,000km range of electric. I'd be up for one of those, I've got to tell you, and if I can get a timer use tariff out of my retailer or demand charge and arbitrage the bejesus out of the electricity market, I'll do it.

CAMRON O'REILLY: Sorry to be a sceptic, but we've got a Federal parliament struggling to implement an increase in fuel taxation right now, so I'm not holding my breath on a will to do much about transport fuels. But when it comes to the electricity system, I think a lot will depend in the future on much more digital technology and storage which we hope will enable us to align load the generation and demand generation more effectively in the future. So, somewhere along the line we're slowly building much more of a case for a smarter grid in Australia. And I think that the other thing is that we see in a lot of other industries that when they have excess capacity, let's just take an example, if the airlines are finding there's low-load factors they will start to discount seats. We do have to start to get the mentalities of other industries and have a regulatory framework and a pricing system that allows us to do that.

AUDIENCE: A question for Paul, let's go back to a system with no manufacturing or industry. What's your basis for that? It seems that we've got studies for international and in Australia coming from the market operator showing that both base load and peak demand could be met by renewables and then, I guess, longer term what's your alternative? We have to reduce emissions from the electricity sector, how do you see that happening?

PAUL SIMSHAUSER: So, like everything, you need to do it progressively. So where am I coming from? Well, why don't I use gas as an analogy? So right now in New South Wales you'd be aware that gas prices are making their way north and they're making their way north pretty quickly. And a glass manufacturer employing 300 people, the gas price is at \$8, \$9, \$10 a gigajoule, it's just too much for them so they're closing. So if you think about a world where a lot of these manufacturers are export-oriented businesses with a high Aussie dollar and a fairly inflexible labour market, and then you go and increase the price of electricity from it's current, call it, \$40 basis and then go to a pure renewable system which – I'm just having a stab in the dark – and say it's going to have three digits in it. I'd be surprised if it was anything less than that. You have to think that there's going to be a few manufacturers falling along the way. I mean, they're struggling enough as it is right now just with the network price increases and keep in mind you're going to layer these on top of what's already a doubling in network prices.

So I don't think it's contentious to say that if you want to start to double or treble the cost of the system you do so very quickly, that you're not going to have casualties along the way. I just don't think it's realistic to think that way.

AUDIENCE: But more of a cost argument rather than technical, so if gas prices go up there'll be the same sort of issues?

PAUL SIMSHAUSER: Look, absolutely. I mean, if you were reliant completely on gas to fire the power system here and you actually had a situation where let's say the gas prices stuck to \$10 a gigajoule, and you had gas-fired generators dominating the supply side, both in the semi-base and the peak market, you're going to have the same outcome. Absolutely you are. This is a pure cost issue and it's got nothing to do with the technology. If we got to a situation, for example, where imagine we as an industry got hit around the backside with a rainbow and we managed to crack the geothermal really elegantly, we were getting flow rates of say 120L/second, well that's probably going to deliver you a \$60MWh emission-free generator. Okay, there's a problem with the transmission line, but you'd solve that I'm sure. Under those conditions you could see that actually we would have a pretty interesting sort of future for a low emission, low cost in relative terms, low cost of the system. Absolutely doable under those conditions.

CHRIS GREIG: A question I always ask, if we do introduce high cost renewables and we pull off manufacturing, which we'll potentially kill off permanently not temporarily, where does it go? If it ends up in a high fossil fuel country, have we not just exported the emissions? We haven't really solved climate change at all, so it's a balancing act.

PAUL SIMSHAUSER: I can't talk to where plants would go, I'm not an expert in all the industries that you could be talking about, but what I can tell you is when we stand back and look at our CNI book and we look at the heavy manufacturing plants, the majority of those factories have been built in the '60s and the '70s and these aren't the sort of things you mothball. If you close, you close, you close them then. That's what happened with that glass factory I was referring to before in Western Sydney, it's gone and they'll basically tear it down and the real estate's probably worth a fortune, they'll turn it into apartments or whatever, they'll do something with it. But that factory's not coming back.

TONY WOOD: You've got to remember three things in relation to energy policy. One is reliability, one is affordability and arguably one is sustainability, and what you have to remember are they come in that order. And Mike was talking about it in some ways before, whilst ever you haven't got reliable energy that is the biggest issue. You've got to have the stuff and many people on this planet don't have the stuff, which is why they're happy to continue to burn more and more coal. Secondly, once you've got reliability, that's when price becomes important, as Mike described quite nicely, and that's where we are at the moment, we're much more concerned about price. But it's only when you've got those two things under control then people will seriously engage on the third element, and that's sustainability.

So one of the biggest challenges we do have, and until we can find a way of embracing that we're going to be stuck. And I was at a G20 meeting in Sydney today and the reality of this situation is that if we're seriously going to constrain climate change in this planet – and we're nowhere near doing it because we haven't solved the conundrum. There's a conundrum, no-one is going to go to the electorate saying we're going to put up electricity prices by 50%. It's just not going to happen, at least unless we get a very different outcome in terms of the boiling frog problem of climate change. Unless we saw a dramatic El Nino, which we might even see sometime in the next three or four years, but it isn't going to happen. So that's the reality we have and the problem I think is that we haven't yet either had a way of solving the conundrum or we haven't had political leaders who have been

prepared to explain the choices we have because at the moment, on the basis of the information I see, we are not making the right choices today.

PAUL SIMSHAUSER: It's a really important point about the durability of a policy. So just to be really clear, I'm not a climate sceptic at all, I absolutely buy into the science and love to see anything we can do to actually start edging our way towards it. But for an organisation that's funded by mum and dad and institutional shareholders, for you to make commitments that once sunk are going to run for the better part of 25, maybe 30 years, you need to be convinced that the policy you're doing it under is durable and sustainable. And we've got to that point in our organisation where we're looking and we're just shaking our head saying, "We're not sure this is durable or sustainable". We're not getting the right signals from all parts of, whether it's the industrial part of the world on the cost of electricity, whether it's the newspapers which drive our politicians, and the politicians themselves and their commitment to the policies. We're just not seeing enough consistency out there in the broader market for us to actually sit there and put our hand on our heart and say, "Yeah, let's go and raise the next \$billion and do some more".

AUDIENCE: One question was the challenge opportunity for community-based load smoothing storage and redistribution, discuss. Other question was specifically to Paul, if there are old generators and demand is falling, is there or is there not an opportunity for the government to quietly retire at least some of those generation plants?

PAUL SIMSHAUSER: Look, that's a good question and the answer to it is not an easy one, in fact it's extremely vexed. So, two things. First of all, if you're talking about a government owning generation plant well, as a shareholder they've obviously got a decision to make. The other alternative, should governments with their direct action fund spend their money taking out the old plants that are sort of a million more than they should and use that as a way to clear up the market? Look, ordinarily you shouldn't have to do that in a market. Governments aren't there to cut big corporate welfare cheques and bail organisations out, but on the flipside of that too neither has a market been tortured as much as our national electricity market. And as I mentioned, all those overlapping policies individually are all terribly noble in their objective, but there's been some pretty sizeable wealth transfers in it and the difficulty is none of the policies that do exist are sustainably durable.

So if you think about someone who owns one of those rickety old power stations in the market place and they're staring down the gun barrel of the following proposition: I can keep running my plant and at least pay the wages bill and probably not much more and it's starting to look slim; what I can do is mothball it or I can spend \$300million and close it down and rehabilitate the site. So the rational part of that organisation being profit maximising says, "Let's just mothball it". Then you think about the players out there who are thinking about in a handful of years' time, gee, it's starting to look interesting again, granted out there in 1920 whenever the year is that we've got that first speck of a risk of that occurring. But they look at the mothballed plant and they say, "Gee, for us to come on, we've got our full costs". Their variable costs of production is this much and they're sunk. So I've sort of got this big problem in the market place and I'm not sure how I solve it.

So I think in our mind, there's a certain group of us inside AGL, we look at this and we kind of think maybe if you've got the right incentives and the right will on all sides with a direct action fund, maybe some of the best emission abatement we'll do is actually take out some of these plants permanently. The difficulty then becomes though on the grounds of public policy, what have we missed? And I'm sure there's something, it'll be the guise of corporate welfare and that's obviously not a good or a

popular thing at the moment and not the right message to be sending. And the second issue is how can you be convinced that the party on the other side is actually going to pony up with the right number? And unfortunately the evidence so far has been, Martin Ferguson, the previous Energy Minister, had a really good crack at this and I think that the generators on the other side misread the moment. I think they thought they were going to get a pay cheque so they could go and drink pina coladas rather than hit the safety eject button and get out safely and it was misjudged.

AUDIENCE: I have a question to the panel members and this is in regards to the electricity tariff increase in the last several years, which to my understanding is most caused by the need for refurbishment of the network. Taking into account that we have an ancient fleet with the same capital which is completely paid off capital, but you can't run these plants forever. In probably the next five to ten years you'll start replacing the fleet with newer power plants. What sort of further spike do you expect in energy tariffs do you expect to be caused by basically replacing the generation fleet? What are the options to smooth this down or decrease this spike?

PAUL SIMSHAUSER: My intuition is that yes, the generation fleet is aging, but you've also got a huge amount of oversupply out there. So the good news is you don't have to sweat this one anytime soon. We're going to have a lot of time to solve this problem. But when it does come obviously it's going to be a bit tricky, but you wouldn't under any circumstances expect to see the sort of impact that we've had relative to the last five years. I mean, they have pretty much been unprecedented. You've had electricity prices double in the space of eight years. The last time we doubled the electricity price it took 23 years in a high inflation environment, I might add. So what you've seen is a little bit unprecedented and I wouldn't expect that - if you're an industrial manufacturing load plugged into the high voltage network that's a bit different, but if you're a mum and dad and you're talking about the cost of replacing the generation fleet I'd be fairly comfortable. You might see a 5% movement a couple of years in a row and then back to CPI thereafter. You're not going to see this doubling of price again, not unless we do something really crazy.

CHRIS GREIG: Has anyone got anything contrary to say?

CAMERON O'REILLY: I'll just add that, as I said, I wouldn't have envisaged where we were five years ago and therefore I'm not prepared to say with any certainty what the future will hold. No-one's at the moment looking at any great rebound in demand and looking at the factors that have seen that dropped, you can't see them changing for some time. But you've always got to remember that this is an industry that's run on a reliability test and will have to meet extreme conditions.

So we should always be mindful, and we haven't faced a situation where say there is an aging plant that goes out unexpectedly, say it's during a severe drought when say we're water challenged and therefore some of the generators are challenged and the hydro is not available. Say we get a really, really intense summer with peaks right through all of the east coast states. You can bet your life if there are problems in that situation then the governments will be asking very quickly, you know, won't be talking about gold plating or saying we've overbuilt or anything. At the end of the day, this will always be politicised and the number one test will always be reliability, and therefore I'm not prepared to say that they're currently circumstances in the next five years that have been envisaged that won't see a whole changing of the game.

MIKE SWANSTON: Briefly on the network charges, it's a similar sort of thing that Cameron was just saying, after 2004, 10 year ago there was an imperative to spend a hell of a lot of network money and

it was all driven by security, reliability, peak demand, air conditioners, this sort of stuff, plus duplication of assets. The instruction was don't let the lights go out again. So there was about \$5 billion got spent in South East Queensland on duplication of assets, upgrading transformers, all this sort of stuff. Interestingly, how that hits the price line is price actually fairly simply is costs divided by volume.

On the cost side, all those network investments, it's really just interest on borrowings, but where it hit was the increase in the asset value. The asset value increased from about \$8 billion to \$12 billion and, of course, with the AER giving its allowable return on that investment. That was a serious increase in the amount of money we were allowed to recover. Also in that top cost line is efficiency of our businesses and of course that hasn't been really crash hot lately either. So that's all the things that were adding to the cost, was the significant increase in the value of the assets. What might happen in that space is where we talk about the whack or what the AER is going to do in 12 months' time, whether they'll reduce the allowable return on that value of assets will reduce the top line, the numerator. The denominator of course, which is the bit we took our eye off, was the reduction in volume, 18% reduction in volume. When the denominator gets smaller, the number gets bigger and that's largely what's happening. So we've got to watch both the numerator and the denominator to keep costs under control over the next five years.

TONY WOOD: I could give you an economic model which would show you, based upon a whole range of assumptions, the sort of technology mix we could expect to see and what it might cost. Someone much cleverer than I once said the main purpose of economic modelling is to give astrology a good name, right? So, all I'm suggesting is that it wasn't that many years ago that BHP Billiton was looking to build a facility to export LNG from Australia to the United States, and that was six or seven years ago. Now we're seeing exports from the United States into Asia. I'm not saying what will happen; I can tell you what you've got to make sure is that governments make sure that what they don't do is impede the innovation, the entrepreneurship and the activity that the market can deliver, but they've got to get some of the signals right, they've got to have consistency with climate change in particular. But if you stand back from that then I think the industry itself can deliver at the most cost effective way we want, the affordable, reliable and sustainable energy that we should have in the future.

CHRIS GREIG: Okay, I'm going to wrap it up now. I guess there's a path forward, there's some hope. There's a Federal election in another of couple of years, there's a state election next year, so it'll be interesting to see how stable our policies are. And that scenario Cameron scared me with about droughts and power stations being unavailable sounds awfully like a scenario associated with climate change. So I think we have a rough ride ahead still. I think the panel's been fantastic. I'd like everyone to thank them.

END OF RECORDING