

AGL Energy Limited 2017
Investor Day webcast transcript
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Richard: Sorry, I can't stand behind the lectern.

I'd also start with another apology. You were meant to be doing a tour this morning of the trading floor and the operational centre and we cancelled that because it's quite a hot day and there is quite a lot going on. We actually don't like our traders being disturbed as we're managing the market, be careful how I phrase that.

If I look stressed, rest assured it's not because something is going on downstairs. It's, first of all, I've got to follow Andy and Andy always sets a very high bar. Secondly, his ability to ask you questions on the spot makes you incredibly nervous, so the stress is more about being up here than what's happening on level 11, so quick start with apology.

I think most of you know me. I run the wholesale group for AGL, which is basically the procurements of power for our customers, and that's power and gas, and the renewables project and it's going to be a very diverse portfolio.

In this presentation I'm going to cover a few things. First of all, some of the design issues. We've gone from Andy's high level visions for AGL and the business, right down into some of the weeds of what's happening in our market live, but they're actually quite important instead of, one of the questions was, how do you invest given the level of uncertainty in the designer market. I'll cover off a couple of the key design factors that are going on there. Noticeably, the NEG and the five minute market, because I know there's been a fair discussion out there about that.

Then, about bringing on resupply. Andy's talked about the 90 day plan. In this we'll talk about our other investments we've committed to or are in the process of committing to, and hopefully, you can see why they make sense against some of those designs and some of the factors occurring in the market.

Then, Richard will try and do his version of a long term perspective not quite to the same standard as Andy but talk about what we see in the market developing and talk about bridge scale batteries as they come in. Also, the other factor, which is right at the [inaudible 00:01:57], which is what new energy and Melissa's team is also looking at is, what are our customers going through and how will that impact the type of wholesale investments AGL needs to be looking at. That's a brief overview.

To dive a little bit into the weeds, the NEG. The first thing about NEG, and this is the one that got it straight away when the announcement is we're going to impose a reliability standard on the market by 2019. That's actually a very fast time frame so the instant thing, oh can we supply to that reliability standard given our portfolio.

What I've put up here, first of all, is actually the market, so the total. Not AGL, the total market. The little pink dots at the top are actually saying what capacity is available within state to supply that market. What's dispatchable within the state? Not your renewables, not inter connectors, what's actually dispatched from the state.

The dark blue bar represents residential customer load on an extreme day. Think of the fourth month. Not quite this day but the 45 degree day, air-conditioning is on. What are our consumers consuming on that day?

The light blue bar is the business load on that day. That also has some swings on those extreme days but not as much as your residential load.

This is showing you how well each market is supplied. So New South Wales and Queensland, they've got adequate dispatchable load in their states to cover their load. You move to South Australia and Victoria and interestingly, everyone talks about South Australia, Victoria has actually got a bigger shortfall than South Australia for dispatchable load in the state.

Now before you walk out of here and panic because the lights are going off on those really hot days, that doesn't account for, the wind could be blowing, inter connectors flow and the reason Victoria has a lesser issue is because Victoria is a very well interconnected state so you got the flow from New South Wales, you've got 500 from Tasmania. He actually back flows from South Australia. On those really hot days what you tend to find, a really hot day in Victoria, the second day that's causing your problem, you've got this timing run why the cool change comes through Adelaide, so you actually end up with spare capacity in Adelaide that can actually flow back on some of those extreme days so it's a diversification management. That is really what the retailers have been asked to look at. How do you supply dispatchable load in the state for your portfolio?

That's the market. The question then, what is AGL's position? We've done exactly the same thing for AGL and put that together. New South Wales, we made no secret when we make the Micoriak Causation that ideally we probably just [inaudible 00:04:36] so that the biggest state government couldn't split it, so we bought the dell and we didn't need the whole of the dell and that sort of reflected in that chart there. We have more than adequate dispatchable generation in New South Wales to meet our customer commitments.

Queensland, the only asset we've had [inaudible 00:04:52] so far is the [inaudible 00:04:53] and that stands for the cell process now so we actually don't have any dispatchable generation in Queensland to meet our load requirements. Again, the assumption then will be, do I contract and before you panic and think oh we've got no

cover. We do have a deep liquid contracts book that manages commercially those risks and one of the interesting things introduced in the NEG will be how you translate those into demonstrating do you have actually have dispatchable capacity supporting those contracts. So the book is managed, but in terms of assets AGL has, we don't have any assets in Queensland. Now the potential opportunity depending on what happens in the Queensland market for AGL going forward.

Then we get to the states where you don't have that spare dispatchable capacity in the marketplace. You see with that said, we actually do have spare within our portfolio for 2019 into the book. Bear in mind, that's very line bulk for our actual customer load. The bulk of our customer load now is residential load so it's actually quite tight so when people talk about contracting from AGL, for AGL in South Australia, when we look at the commercial industrial space we're actually more of a net buyer for using our own portfolio because that's not adequate to grow into commercial industrial space so we are a buyer of contracts in South Australia probably more than a seller only.

Then in Victoria, again the state that short, this is the opportunity to providing value in the bulk, here and now because we have plenty of spare dispatchable capacity in the Victorian marketplace, which is covering our portfolio. The interesting thing for us for the developments of the NEG is how contract bulk is then translated to show dispatchable generation is one of the key questions and how you define those reliability standards, which is one thing that Tim will be working on through the process and plenty of people on the team will be working on, is how it has defined reliability. We can actually use it and provide value to this in the bulk, because that will be the key to making those investments in dispatchable generation.

The other one is environmental standards and how you set your mission's targets through the NEG. We don't have any great inside information, other than what's in the public domain on how the NEG works so if you want more detail you probably can find this all out yourself but we've tried to translate our portfolio again for the customers we've actually committed to sell to. If you look at the NEG that's proposed at the moment, they're setting a reliability standard if you don't meet, the penalty is the loss of your retail license, which is a pretty odd penalty to use. I think it stems from a lack of desire to put a penalty price for carbon on that. But if you actually look at ... These bars are here representing the actual bar at the top is what we're committed ...

Thank you, Regina. Do you get heckled from your own team?

The bars here represent out of the load we've actually committed to for 2019, so we're actually contracted for in terms of [inaudible 00:07:59]. The bulk of that is mass market so we've taken out the C&R load to show that's our long term commitment that we have to supply renewable energy certificates too, or energy efficiency too.

We then try to stack against our renewables portfolio to say if we have to use all our renewables portfolio to back the mass market what was our carbon intensity before

that portfolio. We've done it, basically we don't know if it's going to be a state based scheme or a national scheme. On the far right hand side it turns to a national scheme.

The pink dots are actually your carbon intensity that you supply that domestic base at. Although, we've got a large coal portfolio, we've actually got a large renewables portfolio and if they're allocated to our residential customers, we can easily manage those targets leaving the carbon portfolio to be sold into the marketplace, but we still have to work out how this scheme is going to work and how we again translate the contracts that we've sold into efficiencies on those contracts and against customers. The interesting thing in discussion with one of the regulators, AGL when it contracts actually contracts with AGL Hydro Partnership so we might have just double sold all our environmentally clean through the Hydro Partnership on those contracts so we've actually got to work out how you source what you sell back to a generational facility.

That's the NEG. The other market change is the change to a five minute marketplace. I'm sure you're all familiar but I'll go through it anyway. The market currently settles on a half hourly basis. So even though you dispatch to the power stations on a five minute basis, you average out to the half hour to get the settlement price for a half hour. This has created a huge concern in the market about what they call disorderly bidding. Classic case that was picked on this year, was in Queensland where a generator would drop its load dramatically in the first five minutes, the price will go to \$14,000, then they'd ramp up the generation for the rest of the half hour, push the price down incredibly negative to about minus \$1,000, but you still get an average price at \$2,500 for the half hour and they've got the generational way. It's called disorderly bidding.

Actually, that was a very unique circumstance, a passing comment earlier on, if that's your strategy for gaining earnings it's not really an investment criteria is it, it's just a very one off opportunity behavior. But this creates a lot of concern in the market and also was a concern about, did it reward batteries that can provide that instantaneous response to a price signal? The decisions might be made by the AMC to move to a five minute market. They've given us three years and seven months to make that change, which actually ... Think about the settlement processes and all the things that have to change to meter and Sutherland, that time frame is required. It's actually a fairly big time frame.

But, one of the critical things is that this is all about managing volatility in the marketplace. Those price spikes, the bit that hurts businesses for not being set properly so when we looked at it, how does the market and how does AGL's portfolio respond to these price spikes, can we manage this change.

What we put up on the left hand side and I'll walk through the graph in a little bit detail is how various asset types respond to a price signal. The purple, actually they're all sort of purplish, the purplish on the left hand side, the battery can respond instantaneously to price events. It can dispatch straight away and get it there. That means it is excellent at responding to price events there, as soon as it occurs the battery's providing power into the marketplace, means it's excellent for this.

Though what we tend to find batteries ... The main problem with the economics of batteries is not so much the capacity it supplies to the market, that's not that expensive. It's the storage well behind it and how long can it sustain. So if you've got a short price spike at 10 minutes? Brilliant, the battery is superb. If you've got a sustained event over in a couple of hours, you drain your battery. What's worse than that, you drain your battery, you've got to recycle and refill before the next event.

Reciprocating engines, Barker Inlet. Why do we go for Barker Inlet? It was basically that ramp profile. Within five minutes, you're generating 60% of its capacity, within 10 minutes you're fully loaded. Not as good as a battery. Not as fast as a battery, but pretty damn fast. You're on to full load in ten minutes, which is useful.

Coal generation. For coal generation we also read thermal, so Torrens Island, as well. Thermal generation, it's [inaudible 00:12:39]. Now this does vary between units but it's that slower ramp over time. That's for a hot unit. A unit that's actually on, not at full load, how quickly it can pick up the generation. That's quite key, especially when you look at something like South Australia and Torrens Island. Great, if you're not fully running Torrens Island, you can ramp over time perhaps you don't capture everything but you can capture some of it. But if you've actually taken a unit off, and it's not running, 10 hour cold start. If you've got a price spike, you've missed the 10 hours. When you think about risk management in the portfolio when you have a unit you can't stop, that's not a very good risk management tool and stems through a lot of reasons why we run Torrens Island when it's probably not economic from a gas perspective to do that.

What we try to do is translate that into a five minute market because these assets are all there to buy risk instruments in the marketplace. Either we sell them to other wholesale market participants or we use them ourselves. Given those ramp profiles, if you have a price event in the market, how well do these assets cover those price events. We try to use a bit of history by looking at South Australia. We did all the different marketplaces and they weren't particularly different so we just picked on South Australia and said for each event using those ramp profiles, how well did those assets capture those price spikes?

Reciprocating engines, because they can come on quickly and stay on for a long time, captured the most. That means that the best assets providing insurance. It's actually pretty line bulk between thermal that is running and OCGT and is one of the reasons why when we looked at Barker's we moved away from the OCGT technology because it wasn't effective at capturing those price spikes.

These are box and whiskers diagrams if you understand but basically that square area is the percentage range of these prices that they manage to capture and you've got the tells on that.

The battery technology, which is a really interesting one for me, it looks like I'm very negative on battery because I'm saying it doesn't capture a hell of a lot. The only reason it doesn't capture a hell of a lot is because the volume of storage that sits behind the battery. If you build more storage, it just steps up and captures far more

and it will be the almost perfect thing for price spikes in the market, when you build large storage behind it because it can sustain supplies in market over a long term then. That then comes out to the cost of that storage, which is the expensive component of a battery. That's the interesting thing when we look to the future, how soon batteries become economic because it does provide that faster response but at the moment for the portfolio we're looking at reciprocating engines are the best technology to buy both a fast response and the sustaining supply to the portfolio to cover both sides and keep the capital costs down in those investments.

That's something on the price changes on the market will changes. Then we come on to some of our investments. Andy talked about, before we put the 90 day plan up it wasn't like we weren't planning beforehand and if you actually step back to planning in terms of investment into the power market, the gas market is problematic and those problems are now flowing into the power markets and when you look at making investments in assets. One of the things when you're building a power station, you need to source fuel. Any investment in a gas fire power station, you wouldn't wish to do, unless you're more sure about your fuel sourcing. Underlying a lot of our power investments starts off with Crib Point. Why?

First of all, Victoria. You look at the demand supply balance in Victoria, it means BHP Exxon. The market needs it. Without BHP Exxon there isn't enough gas, even with flows down from Queensland. AGL's largest gas retail base is in Victoria, we rely on some BHP Exxon. Just a statement of facts. We can get competing supply in from other states. We can bring gas in from Queensland, but if you move to those markets that opens up three more producers I can buy from, into that marketplace. It also builds in a transport cost of shipping gas from Queensland across a network to bring it down.

[inaudible]

In terms of efficiency, trade between the two. Now if you've got a gas asset and you can see value in the power market, do you use your valuable gas or do you supply the gas into the gas market? Without a liquid deeper market for gas that's very hard to do and albatross, it's inefficient. It's not just inefficient for AGL. It's inefficient for Australia. It's a wasted opportunity to optimize between the different portfolios.

If you look at these investments, what we're trying to do with Crib Point is bring competing supply, first and foremost, into the marketplace. We talk about agile capital. The picture on there is the actual Crib Point jetty. When you think of the investments we need to make, to make Crib Point happen. We'll bring a boat down and we'll tie it up at this jetty. Not heavy capital, would probably end up leasing the boat and we'll just issue tenders for that approach. Maybe a 10 year lease, maybe a 15 year lease we'll wait on the commercials, but if the market changes it's a boat, it can float away. We can sublease that boat out. It's a light capital investment. Investments on this jetty, when we've finished the investment, it won't look hellishly different. There will be a few more pipelines that run along there. The major sunk investment actually on Crib Point is not the actual jetty or the port facilities, it's

actually the pipeline that will take the gas from Crib Point to Pakenham which will be a sunk investment.

If you actually think about an investment, the level of capital involved in that for actually fundamentally changing how a gas market works and getting away from this situation where it's a short term international gas prices high. That's what you pay as a buyer. If that goes down, then the long term international price for gas is high, that's what you pay as a customer. You get to break that. You actually get to create a gas market in Australia that is functioning. Not just for AGL. I have a little vision that come 2020 we will be providing prices for the market by a liquid deep trading market for gas, at least in Victoria. Hopefully, the other states, because that creates efficiency that drives value across AGL's portfolio, across the market, and eventually works for customers as well.

This is a reflection on the impact of that dysfunction in the gas market flowing and flowing into the power market. I've done this for every state but on the bottom the bars here are actually telling you how often gas sets price. You see it was declining for quite some time because gas was really cheap, low marginal cost, it was actually quite low down the [inaudible 00:21:17], but we had plenty of completing supply. As coal's disappeared you can see the number of times gas is setting price increasing quite dramatically but with that the actual price their setting at has risen. This high cost of gas and lack of supply is actually driving up, quite dramatically, the power market as well. That dysfunction has flowed very quickly into our power markets at the same time. Crib Point comes to assist in both of these in providing gas into the market place.

Barker Inlet Power Station. It's been announced for some time. We will hopefully be building fairly soon into the new year, which is excellent. If you actually look back at the slides and what we've been talking about and why we've been looking at these investments. First of all, it's not a large scale investment. It's not a 3 billion new power station. It's a \$295 million new power station. Exceptionally flexible. Fast start, responds well in a five minute market, but particularly responds well in a market that is heavy with renewables and if we had taken you downstairs, some of my guys would have talked about the challenges of a portfolio with a high level of wind in it and insurance because when you have a thermal asset that takes 10 hours to restart, you have to leave those assets running in case the wind drops away. If you can start the power station within 10 minutes, you can forecast wind drops and you can have this up and running in response to, very quickly, which means you don't have to have thermal plant running, burning gas at a loss, to provide risky insurance in your portfolio.

Fuel sourcing. Why diesel as well as gas? We've seen the volatility in the gas market. Now, over the winter period we've seen prices well in the excess of \$20 a gigajoule. If you actually look at the cost of diesel, it will cap that out between \$16 and \$18 a gigajoule. Still, incredibly high, but it allows you to take a few more risks on your fuel sourcing strategy because you know you capped at diesel, you won't be left stranded by a marketplace and the risks we faced this winter where we actually even couldn't source the molecules, which actually limited our ability to contract gas in the gas

market but actually contract Torrens as well because we couldn't source gas. You know you've got a fallback and you know you won't have to pay those prices.

Also, with a [inaudible 00:23:45] one of the main things about these new power stations are actually the fixed costs you take on. The storage facilities you need to store gas to be used in those periods, but the haulage when you can [inaudible 00:23:55] fuel to [inaudible 00:23:56] you actually don't need to commit to large haulage petitions, because if you can't access haulage, it's not available, you can fall back to diesel, again reducing the cost, meaning greater flexibility.

The reciprocating technology that faster speed I talked about it in the five minutes the ability to capture spikes for insurance is critical for managing the portfolio. Now, someone asked the question about investment in the changing markets. Our customers will have peak load on a hot day. Our wind portfolio will vary. These assets add up to make sense to those regardless of the market rules that sit between us and our customers and they stack based on the flexibility that we build into the portfolio.

When we're looking at those portfolios and how we build the portfolio, we have a lot of conversation about firming costs and before I start out there in the public you get a lot of conversations, oh it's not base load therefore it's not as good. If you think about AGL's retail book, our customers for some reason go to sleep overnight so you consume less power overnight and for some reason they put the air conditioning on in the middle of the day in peak demand in the middle of the day. That isn't base load power. If you're thinking about supplying residential customers at the very least, base load power doesn't cut it. Base load power needs something else as well. You either need to overbuild it so it can manage the peaks and then run it down overnight, which is increased capital costs, or you need generation as well to stack on the top.

When people talk about base load power that means, I don't want to call it firming costs, you need shaping costs on top of money, needing that as well. Please bear in mind when you look at like for like in this situation because you're not trying to get it to base load. You're trying to get it to a product you can supply your customer, which is critical, but when we look at our portfolio and how we firm renewables within that portfolio.

The first starting point is diversity. Now Australia's got difficulties because it is a very long, skinny network and if you compare it to somewhere like Europe, that's a very mesh network, it's easier to build up diversity of renewables in there, but we do still have diversity in our renewables portfolio and that's what we look at when we look at renewable sites. I've got an automatic no if someone asked me to build a solar project in Queensland. I've got an automatic no if someone says oh you need wind in South Australia. Wind in Queensland. Haven't got much at that. Diversifies the portfolio, diversifies the risk. Wind in South Australia, in New South Wales, there has been wind built there but it's not high penetration level. AGL doesn't have much, diversifies away. Solar, New South Wales, still low penetration in solar. Solar and fixed are low penetration. Wind in Victoria a bit line bulk, will really depend on the cost of the site. But that diversification isn't just at cost, it's that risk management.

The more diverse those fuels are in your portfolio, the better the portfolios and the more reliable it is. That's a starting point but that's also linked to penetration of those assets in each state. As I said, solar in Queensland, it just doesn't work now. It's a waste product until you get storage to go with it. Equally, wind in South Australia. There's no point in building more wind in South Australia unless you can store it because it will go to waste. You actually have to look at the penetration of each renewable in each state and decide where you're going to put your renewables portfolio to get the best out of it.

But we don't instantly look at a renewables project and say we need to build something to support them. We've got an existing portfolio of assets. We'll leverage off those assets to actually manage that firming cost and that includes our coal assets and our gas assets and our hydro assets.

Even then, we don't instantly go now we need to build on it because there's other assets in the marketplace. We have contracts with practically every player in this market who is a generator for various services, including insurance and firming products in those marketplaces. You go to that first, and then you get to the cost of actually building new generation assets. The interesting thing will be for this is that declining cost for batteries over the years to provide the extra storage that means the best wind resource in Australia, which is South Australia, can be better utilized because you can store the energy.

Which goes on to this slide, which is batteries. Batteries are the big changes that are coming but are not there yet. We just put an example up, it's a fairly obvious example of the North Barn Hill Wind Farm. The wind resource there is shown in blue, but the pink line is actually showing what we can physically get out onto the system due to constraints. That is wasted energy. That is energy that is going to be replaced by something else, probably gas that's highly valuable and this is the opportunity for batteries to kind of provide that storage of that waste energy and provide it back in the market when the market needs it. It's also that peak, past the insurance that you can see from the fast start of batteries that's coming. Grid scale batteries can respond to that market at speed. Frequency control provide by existing thermal plants. Synthetic frequency control from battery, that's technology that can find we have to build markets for.

The price arbitrage. When North Barn Hill is constrained like that the energy at that is zero value. Shifting that to a period that is seeing \$100 price, a \$200 price, or even a \$14,000 price provides the opportunity for overcharge. Batteries are superb for this market, it's a matter of cost and what we're seeing at the moment with battery technology is that the batteries are all getting installed are all subsidized from other means to get them into the marketplace. That will change and it will be a game changer that is probably not built out of requirements for the energy markets so much as these actually reduces cost for battery technology and actually gets the volume storage behind them, economic to build at scale, but it's coming.

Then finally the other component that's also going to be changing AGL's wholesale portfolio as we look forward and it goes onto the new energy and the personalized

retailer space is how the customer's invest in their assets in their home and how do we utilize them? We've already had peer to peer trading, we've got virtual solar. That concept we get from the virtual power station where Andy's customers are investing in assets in their home. They're installing batteries, they're installing solar panels. We need the smarts, because that capital is wasted if it's just supplying the home. The opportunity to provide grid services is huge so how do we get that smarts into the home and it gets to that point Andy's making about customer efficacy. To actually get customers to concede control to a company like AGL.

Yes, it's going to an economic equation, how much do we pay them for those services but do they trust us to manage their energy assets for them and provide services to their household, for their neighbours, but also to the broader grid and if you look what we're trying to do with the virtual power station in South Australia is a battery project to store that waste, renewables project that's not just coming from the solar panel on the roof but it's also coming from the grid. But then provide those services back to the market on days like this when it's 40 degrees in Adelaide and the market is crying out from its air conditioning load. This technology will be driven through those automatization and that's going to be critical how we orchestrate those assets with our larger portfolio and bringing them in and it's colouring our view of how we invest and what we invest in, in the wholesale portfolio because these changes are coming.

If you actually look at ... To conclude with this, a portfolio is actually well positioned for the market rule changes that we're seeing. We see the NEG is an opportunity to get stability in the policy space and we're very supportive of getting the NEG in. We need to work on the design of the NEG to make sure it works with our market structures but there's a consultation process going on and we believe that can be achieved. The projects we're investing in are those agile capital projects. What are the projects we need that are critical to support the portfolio without over investing and are they backed by our customers? Do they support what we're trying to do on our customer front? All those projects do.

But also, in looking at those investments, what happens if the market changes? What happens when batteries do drop in cost, and they will. We don't want to install 2,000 megawatts of new thermal power stations all of a sudden to discover, batteries are the latest, greatest thing and widen the economic services, making sure the investments fit our portfolio but we're not overextending in those spaces so our portfolio's prepared for long term.

And on that, I'll wrap up and over to the floor for questions.

Nick Burns: Good morning. Richard, it's Nick Burns from UBS. I just had a question on the economics of Crib Point. A couple of data points out at the moment seeing spike energy prices in Asia, pretty high, all prices have rallied, so I guess the inference there is that bringing in energy may not be that cheap. We've also seen today I think we'll actually see a report talking about recent offerings to customers in \$8 to \$12 a gigajoule range. I guess a two part question first of all, how confident are you that the economics of Crib Point will actually stack up when you bring it online and secondly,

have you looked to mitigate your exposure there by introducing partners or other off takers into that project?

Richard: Okay, the project is still going for feasibility. We've launched a tender to see gas supply contracts. The actual flexibility of that project, if you just ran gas all the time, I mean looking at Phaedra here so she's gonna do the if I'm wrong, 150 petajoules per annum, if you just run boats constantly through it. 140. Round down to scenarios with 50 petajoules per annum, which would probably be a winter loading. Some of the economics around Crib Point, not just the pure gas price, but the arbitrage between northern hemisphere summers versus our winters and bringing gas through. Building flexibility into the contracts.

We have been very active in the market and talking to other participants about the economics of that and working through it. Between now and when we actually come to FID on that project, the oil price will move. I struggle to predict the power prices and that's meant to be my expertise, so I'm not going to start predicting oil prices. We will see through the tender process how they stack. We're still reasonably confident of the economics and how we can utilize that within the portfolio because I keep on going back to that composition in the marketplace because it's actually quite critical. Just because people can see that you can get gas out of the ground in Queensland that's some \$12 a gigajoule, probably \$7, \$8 a gigajoule. You've still got to transport it to Victoria. You've still got to shape it for customers because that's a production well and then you still gotta negotiate with one of the lovely suppliers in Australia. All those things add to cost.

The other side on the ACCC report. I do struggle with some of the prices that are put in there. I find it very hard to believe that prices that they think in that back would actually encourage anyone to drill a well in Queensland. I just think they're fundamentally too low from where we're seeing. It's an unusual number, so I don't [inaudible 00:36:25] from their dollars per gigajoule. Definitely, when we're looking at the actual cost of drilling wells, especially as we move forward, and the actual genuine shortage of economic reserves in Australia to be brought on as we pose for 2020. This is as much about insurance in the portfolio as anything as well. We look at the tightening reserves, unless more reserves are brought on, and we've seen at least, the Shell announcement and obviously Exxon managed to find some reserves, which we all knew about it, but chose a particular time to announce it. Those are all things designed to color investment decisions. We still think it's there.

Oh I'm sorry.

[inaudible 00:37:16]

Speaker 3: Just a couple of questions. In terms ,of very briefly, the technology costs of the five minute switchover. How much are you guys going to have to spend to actually do it because I presume you're not going to get really any return on it?

Richard: Can I not quote a number? I know we put it in one of our submissions, it is serious. It's a large investment.

Speaker 3: I'd do anything else from processes to when you have to do this to get some value?

Richard: It will be a cost borne all market participants and it's not a smaller cost. The value of incumbency, you've got a large base to spread that over. I personally don't believe that was a necessary market rule change. [inaudible 00:38:03] was a little bit ambivalent to it because it supports battery technology coming in, which is great, but it devalues a lot of the OCGT aspects in investing in the marketplace so when they talk about greater efficiency in the market you're talking about very long range for what is actually quite an expensive process to go through. But it's here with [inaudible 00:38:27] Is it a game changer for [inaudible 00:38:30]? No. It might make some of the smaller guys find it more difficult to manage their books, which is not good, but somehow they'll manage. I know we did put in one of the papers what we thought it would cost but I can't remember the number off the top of my head and I don't want to make it up.

Speaker 4: Just a couple about South Australia. You talk about Torrens and the Barker Inlet. The open question is, given you were talking about synchronous generation or this is, why haven't you shut down the whole of Torrens Island because you describe it as a very old lady and you expand that even further.

Secondly, you showed us slides on wind farms and you're saying energy's wasted or energy's a waste product, how far away is the economics of battery that you're North Bluff Wind Farm actually out there to make sense. What sort of price decline of batteries before they become real alternatives decisions.

Richard: Okay, just to clarify, Andy was old lady. Doug was retirement home. I never said a word. So it was those two.

Torrens A has still got good shelf life left and the market in South Australia needs Torrens A. Barker Inlet economics stood, not on the power market but on the gas market. It's about getting greater efficiencies in our portfolios so we burn less. So yes it will earn cap premium and energy premium but it was reducing the cost of burning gas through Torrens. Not necessarily, Torrens A, but Torrens B as well. We sit there on a very windy day with probably two Torrens B and it's running on 40 megawatts because of their minimum load because we don't want to take them off because if we take them off, it's a long time to start. That's probably the most flexible plan in South Australia. The thing I find amusing with South Australia is the old lady, quite a term, is actually far more flexible than the Pelican Point that has to turn down to about 120 megawatts so we can actually turn down Torrens very low and have that insurance our portfolio to ramp up which minimizes our gas burn.

Barker just takes that to the next level because we can actually take units off, keep them hot, start Barker Inlet, bring a Torrens B unit on, that takes the slack, manages it through so it's a very flexible plan so what we actually see is we'll be running Barker ahead of Torrens B units as well. It will see a drop down in generation for B, however, having said that, B is needed for system security issues in South Australia, inertia issues, faulty support issues, so taking B totally offline is not tenable at the moment

as we see batteries come in, providing some of those services then you'll see B use less and less in the marketplace. It will be a long while before there's enough [inaudible 00:41:25] in South Australia to remove B from the market, but it's coming. I mean the pricing while the investments are being made, that's competition working because that will be what's driving B slowly out of the market and getting replaced in the marketplace over time.

As for a battery ... When battery technologies are economic? That's ... Is it five years or is it 10 years and that's the critical question of the market. I actually don't know the answer, we see a lot of information come through and I do actually think it's not the power industry that will actually drive that, it will be the EV industry because that's driving the innovation and the cost in those marketplaces. They are not economic yet, and we notice in the 90 day plan we put that battery at the back end of phase three because that's when we feel that that's when the most potential of becoming truly economic, in that time frame, but it's still an open question as to when they actually get the economics right and they're not quite there yet but they're coming.

John Hardy: John Hardy, Deutsche Bank. Richard, back on Crib Point again if I could, how are you thinking about the inventory levels with volatility of the oil and you'll have gas come in and you have some in storage presumably. How are you thinking about the value of that because it could affect your P&L quite dramatically if the oil price moves very significantly.

Richard: Yes, I'm getting used to this oil market slowly but surely. That's one area of expertise we're growing quite significantly with in my team to get their heads around how we manage that.

First phase is get the tender process, the longer Tim quotes for gas to come into the portfolio, but very critical in that tender is the flexibility we're trying to build into those contracts. The ability to take cargo, trade cargoes, move cargoes around so we're taking a very flexible approach to supply into that. Bring it into Crib Point with storage being able to hold at Crib Point, but then push to [inaudible 00:43:19] as well, means we can take that opportunity of low points in the market when we perhaps don't need it but can store it and bring it back. We do see quite a bit of value in that.

It's quite critical in the view of carrying inventories on that in the value of the project but before we can really drive the economics of that and also before we start talking to other parties about off takes for that, is actually getting that first stage of tenders through support for it so we know the type of things we're looking for in the contracts and we can achieve into the portfolio. It is a very flexible asset. I keep on saying the word flexible. It is absolutely critical in this market. The volatility in the gas market, the volatility in the power market, and great we're taking volatility in the oil market but it provides opportunity to play between all of those fuels and actually drive value into the portfolio because I think very much in Australia we have a lot of missing value but a lack of liquidity, definitely in the gas market and that's what this can bring through.