



**Address to the Re-Powering New South Wales Conference 2016
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Good morning everyone. The massive transition going on in our energy systems occupies a lot of minds in the electricity sector. But consumers – both business and households - also have a deep interest in maintaining reliable, affordable energy services. Every business depends on access to energy, as we saw in the SA blackout last month. Meanwhile the cost of electricity is central to the competitiveness of many industrial consumers and to the financial health of many households.

It's not enough for our energy system to function in an engineering sense, or to support viable energy suppliers. It also has to function in the interest of consumers. Today I'm going to talk about challenges facing electricity users in NSW and across the whole national market.

Discussing the transition and the consumer interest can get very complicated very quickly. But I think I can set the scene with just three small numbers: two, zero and four.

<See Slide 2: Paris Agreement map>

Let's start with **two**. The Paris Agreement on climate change commits the world to an overarching goal of keeping climate change to well below two degrees centigrade. The Agreement has now been ratified by countries responsible for more than half of global greenhouse gas emissions, including China, the United States and India, and will come into force next Friday the 4th of November – less than a year after the Agreement was struck. Australia has signed up to Paris and all our major political parties are committed to the Agreement.

<See Slide 3: Carbon budget diagram>

Stabilising temperatures means stabilising the stock of greenhouse gases in the atmosphere, which in turn means bringing sources and sinks into global balance. This is our second number: global net **zero** emissions of greenhouse gases.

That is, to say the least, a tall order:

- The national targets that most countries have contributed so far are substantial, but they clearly fall short and are expected to be revised and deepened every few years.
- The international division of effort will be messy and Australian competitiveness will need careful safeguarding throughout.
- In some sectors, such as agriculture and aviation, it is not clear how emissions could be eliminated. In the absence of further advances these sectors may have significant residual emissions to be offset elsewhere.

The implications for our electricity system are tough. Over the next few decades it is going to be expected to cut emissions very sharply, even while other sectors like ground transport clean up by electrifying and increasing electricity demand. Offsets may be hard to come by, if the sector has access to them at all. And energy users of all stripes are going to expect all this to happen while the sector continues to provide reliable energy at a globally competitive price.

<See slide 4: Historical electricity price chart>

This brings us to our final number: **four**. As you can see from the slide, the wholesale electricity price in Australia's biggest market regions has for many years bounced around four cents per kilowatt hour. I don't mean to ignore the importance of energy networks, which play a critical role in the security of supply and its ultimate price. But a small population spread across vast distances is not going to have an advantage in network costs. To the extent that Australian industry has had a competitive advantage in electricity, it was four cent wholesale power.

Right now that advantage looks gone for all money.

Prices rose during the millennium drought, and fell back again as water constraints on generators eased.

They leapt and dropped sharply during the period of the carbon tax, but underlying prices remained weak in the face of excess supply and unprecedented falls in demand.

More recently prices have been rising again, driven by costly gas, risks in South Australia, and actual and potential withdrawals from the supply side. For what they're worth, the base futures contracts for electricity in NSW and Victoria have leapt to around six cents over the past year. SA has hit ten cents. Ai Group's members in South Australia are extremely distressed, not just about blackouts – a subject I'll return to – but also about the 50% to 120% price increases they are finding as they seek new electricity contracts.

In the longer term, prices in the National Electricity Market are going to have to reflect the expected cost of new electricity generation to replace and expand our fleet. So let's look past the immediate

state of the market. What is the cost of building new power plants in Australia? And how does the price level it implies compare to our four cent benchmark?

<See slide 5: Australian power cost projections>

Judging by the most recent and authoritative projections, the answers are “high” and “poorly”. But that is not the end of the story.

This slide depicts projections from the 2015 Australian Power Generation Technology Report, prepared for the CO2 CRC. Other projections tell a similar story. The blue bars show the levelised cost of power in 2015 for new builds under Australian conditions using several possible technologies. The red bar is the average wholesale price in 2014 – four cents per kilowatt hour.

You will immediately see that all of the blue bars are at least twice as high as the red bar. If these projections are on the money, four cent power is over once new builds set the price. The plausible technologies are all in a band of eight to twelve cents per kilowatt hour.

A quick sidebar on ‘plausibility’. Every one of these blue bars has issues:

- New coal plants without carbon capture and storage are not going to be built in this country again. They present far too high a commercial risk in an economy heading for two degrees and net zero emissions.
- Combined cycle gas looks cheapest, and plays a really useful stabilising role. But politics and tough times for gas producers make new fuel supply uncertain. And while gas plants have much lower emissions than coal, the window may be closing for new plants to recover their costs before emissions constraints grow too tight.
- Wind and solar are popular with most people, but they are also variable and intermittent. High penetration levels may also produce extreme supply and price volatility. Those issues can be solved, but not without a lot of effort. More on that later.
- Carbon capture and storage engineering works, but it’s hard to see how the economics ever will. Large capital intensive plants need to operate at high capacity for a long time to repay their costs. With wind and especially solar gobbling more and more of the daytime peak market, CCS would be a very big bet.
- And that goes double for nuclear, which has the same investment challenge and also faces a lot of residual community hostility.
- Solar thermal with storage offers dependable power – but at these projected prices, who would bother?

If the projections on this slide are right, we could still push these high prices back. Reducing electricity demand through greater efficiency and productivity could mean it takes longer before we need market-driven new builds. And it would also leave electricity users less vulnerable when prices do rise. Energy productivity is clearly a strategic imperative. But it would also merely delay the apparently inevitable: much higher prices.

This all sounds pretty downbeat: authoritative projections seem to say “everything is awful, and also very expensive”. For those of us who pay a fair amount of attention to energy issues, and who have internalised these sorts of projections, it may be hard to get up in the morning. Ai Group’s membership includes many energy intensive manufacturers. If this slide represents the future, why would they ever reinvest in Australia?

There are at least three possible answers to that.

One is that everybody may be in the same boat. If this is what it costs to produce low- or zero-carbon energy, and the world is moving in that direction, then the high cost of new energy in Australia might not mean a competitive disadvantage – assuming the countries that matter are moving at roughly the same time.

A second answer is that the projections may be wrong. We could be pleasantly surprised by technological and commercial innovations that means new energy turns out to be cheaper than we thought.

And thirdly, the projections may be right but not inevitable. Maybe there are steps we could take to cut the cost of new energy.

Each of those could be a reason for hope for energy intensive industries. But does any of them actually stand up? The next slide presents tentative evidence that the answer is yes.

<See slide 6: Comparing Australian projections with overseas actuals>

This slide compares Australian cost projections with actual costs from recent Australian and international projects:

- The Australian projections are some of the same ones we just looked at, now in green and gold stripes.
- The Australian actuals are in solid green, and represent the outcomes of the ACT wind auction and the ARENA large scale solar round.
- The international actuals are in solid blue, and represent contract prices for the winning bidders in a wide range of auctions and procurement processes.
- For good measure, recent Australian wholesale prices and price futures are depicted at the far left.

I want to emphasise that this is early work and there is more data to be gathered and crunched.

That said, there are a few things that stand out in this data.

For every technology, Australian projected costs are higher than overseas actuals.

- This is particularly obvious for wind and solar, where there is a yawning gap. Competitive wind projects in the United States, Mexico and Chile are being built for four to six cents a kilowatt hour. That's four to five cents less than the Australian projection. The cheapest solar projects in the Middle East and Latin America are being built for three to four cents a kilowatt hour. That is nine to ten cents cheaper than the Australian projection.
- A smaller but still substantial gap exists for other technologies. Dubai can contract new coal power for one cent less than the Australian projection, despite importing all their coal.
- The United Kingdom's Hinckley Point nuclear plant is hardly cheap, but still two cents below the Australian projection.

Another point is that Australian actuals are below Australian projections too. We have fewer data points to go on, and individual projects may have better sites and resources than the generic assumption. But the ACT wind auction cleared around eight cents a kilowatt hour, two cents below the projection. And the implicit full cost of the solar projects that ARENA recently funded was eleven cents a kilowatt hour, also two cents below the projection.

A third point may be hard to make out without squinting: costs are dropping fast for wind and solar.

- In 2015, Dubai contracted for 200 megawatts of solar capacity at eight cents per kilowatt hour. In 2016, they contracted for four times the capacity at half the price, just four cents per kilowatt hour.
- In March this year, Mexico auctioned contracts for 1.7 gigawatts of wind and solar at an average of six cents a kilowatt hour. By September, when they held a second auction for another 1.5 gigawatts, the average price had fallen by a quarter to four and a half cents.

Finally, solar is becoming genuinely cheap. This year large scale solar projects have been contracted in Abu Dhabi, Chile and Dubai for three to four Australian cents per kilowatt hour. That is at or below our own historical benchmark for cheap power. Even keeping the on-costs of networks and reliability in mind, these prices are extraordinary – and they keep happening, with new record lows reached every few months in 2016.

All this leads to some big questions.

Why are Australian projections so much higher than actual costs?

- Maybe the projections are simply wrong. They seem particularly far behind the times on wind and solar.
- Maybe we're misunderstanding actual costs overseas. While the chart depicts full project costs as far as we know, and converts Australian dollars at 75 US cents, international comparisons are inherently tough.
- Or maybe there is a real cost premium to building in Australia.

If there is a cost premium in Australia – and most people we speak to think there is – what drives it? People we've spoken with so far point to two factors above all:

- Construction sector costs, productivity and industrial relations are a plausible factor. We've seen cost escalation on all sorts of major projects in recent years, from LNG terminals to desalination plants.
- Finance costs are also a likely contributor. While risk-free debt is currently cheap worldwide, investors' expectations for returns, appetite for risk and assessment of risk may be different in Australia. Certainly we have had energy and climate policies that are both very unstable and place nearly all risk with investors. Meanwhile, the overseas projects we've charted almost all involve twenty-year power purchase agreements backed by governments or monopoly utilities.

If there is a real cost gap and we can identify the causes, what can we do about them?

- On construction sector costs, we currently have a debate narrowly focussed on unlawful behaviour in the construction industry. Ai Group strongly supports the return of the Australian Building and Construction Commission. In the energy sector, as in every other part of the Australian economy, it is consumers who ultimately pay for the higher construction costs imposed by unlawful and often criminal union behaviour. But we also need a broader debate about reducing the cost and increasing the efficiency of major projects. Industrial relations is part of this, but so is technology, project selection, tendering practices, and downstream management. Our future energy system is going to be heavy on capex and low on opex. If we can't get project costs down we are locking in high costs for decades.
- On finance costs we may have several options to cut risks or shift them to those best placed to bear them. Stable and bipartisan policy on energy and climate would have a very real payoff in lower risk premiums. And the twenty-year price contracts likely to be offered under State reverse auction schemes could enable much cheaper finance - though a coherent national approach would be vastly preferable to a patchwork of clashing state policies.

These questions are vital to pursue. Earlier I raised the possibility that high future power costs might not matter if our international competitors were also acting on climate change and pursuing clean energy. That looks dangerously wrong – because while action towards the Paris Agreement is widespread, other countries are achieving much lower costs for clean energy than we have so far. Australia may or may not be able to replicate the costs achieved in Dubai, Chile and even the United States. But that is what our energy intensive industries will be competing with.

I've spent a lot of time on the cost of new generation. But I want to pick up a thread from earlier – the challenge of integrating renewable energy into a reliable grid.

<See slide 7: SA fallen tower>

There is an intense focus on energy security right now in the aftermath of South Australia's blackout. This is understandable, though the rush to the trenches on who or what to blame has been unfortunate. Were wind turbines at fault, for being too vulnerable to high winds or too quick to shut down in

response to grid faults? Were transmission towers poorly built or poorly maintained? Or should the blame rest with someone else entirely?

Here's a theory AEMO needs to look into.

But seriously, the extraordinary storm that hit South Australia might as well have been Godzilla, looking at the devastation it left behind. It is hard to believe that any centralised system could have stood up to the hammer blow the transmission network suffered, no matter what the generation mix. The blackout investigation should continue, and hopefully we will learn from it. Whatever the outcome, however, we already know we have a much larger and broader challenge with energy security and price stability. The reality is that when South Australian businesses are resorting to the third world solution of installing diesel generators to power their operations because of concerns over energy costs and reliability you know we face a diabolical problem. This impacts not only on businesses in South Australia but those who would consider investing in the state.

Ageing assets and climate policy imply we are going to replace our electricity system. Wind and solar are looking cheap enough to dominate new builds and create a market in which coal can't compete, and still less so CCS and nuclear. Even gas may struggle. But as we've already noted, wind and solar are variable and intermittent. How is our energy system going to digest and integrate all the wind and solar that on the way? How are we going to achieve reliability and keep the lights on when the sun's down and the wind is still?

That is the core problem that the recently announced Finkel Energy Systems Review has to grapple with. There is no doubt that it is solvable. But it is equally clear that it will not be solved automatically, whatever the outcome of policy debates over emissions safeguards or renewable targets. We are going to need a comprehensive strategy from COAG on:

- demand side flexibility, so that low-value usage drops away when generation dips;
- inter-regional integration and diverse generation, so that the grid is resilient to challenges for one region or technology; and
- energy storage, which can provide a range of services to stabilise supply and prices.

Delivering each part of that strategy is going to require a mixture of market reforms, standards, infrastructure and investment. There is much to be done, and little of it will be as easy and popular as announcing big new renewables targets. But to shirk it would be to court disaster.

Let's sum up.

- Australia has signed up to a challenging goal – to keep climate change to well below 2 degrees centigrade – that implies our economy will eventually have to hit net zero emissions. That in turn means replacing much of our electricity system.
- We used to enjoy cheap four-cent electricity, but prices are rising and have seemed destined to rise much further because of the cost of building new generation.

- We need to rethink our cost expectations. New-build costs may have been overestimated in Australia, and they appear to be dramatically lower overseas. These costs are not set in stone but are impacted by rapid technological change and policy choices.
- Energy security is a critical priority given the likely growth in renewables, and we will only get it with concerted national action.

We need to get on top of this to safeguard energy user interests. Announced and potential power plant retirements are tightening up our electricity market. State governments are eager to one-up each other with ambitious targets. And the enormous challenge of our Paris climate commitments looms over us. It is urgent that we make progress in understanding and reducing the cost of new power in Australia.

Thank you.