AUSTRALIA'S POWER GENERATION SECTOR AT THE CROSSROADS

CLEAN ENERGY COUNCIL

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SUMMARY

Australia's stationary energy industry is in transition. More than a decade of energy policy has delivered new renewable energy generation at a time of unprecedented reduction in demand for electricity. Australia can now move toward the second phase of this transition and the closure of Australia's most marginal and old electricity generation.

However, recent energy and climate policy uncertainty combined with barriers to exit for Australia's ageing coal fired power fleet has resulted in these assets continuing to operate beyond their operational life, resulting in surplus capacity that is stifling signals for new investment in the energy supply sector.

Ensuring a smooth transition to a low-carbon future for Australia's electricity sector requires that clean energy generation must be in place before the most inefficient and polluting generation can be phased out. This is not a new concept: one of the primary objectives of the National Electricity Market is to ensure supply in excess of demand to limit the chance of rationing and blackouts. Moreover, the express purpose of the Renewable Energy Target (RET), legislated in 2000 and again in 2009, was to encourage the introduction of new clean technologies to transform Australia's energy generation into one less reliant on fossil fuels. Unfortunately, substantial energy policy uncertainty and barriers to exit (both real and perceived) mean the permanent closure of Australia's oldest and most greenhouse-intensive power stations has not yet occurred as many had previously expected.

On the positive side, the surplus generation resulting from this scenario is providing lower wholesale prices which are benefiting electricity consumers. However, the level of generation reserves in the market are now high, and against this background, some stakeholders have called for the RET to be cut or removed.

While a solution to the current challenges in electricity markets is inherently complex, it is clear that reducing the deployment of renewable energy is not the answer and instead would have a number of unfortunate effects. It would:

- Stall and reverse the long-term policy intent to transform the Australian energy sector.
- Negatively impact the renewable energy industry and the billions of dollars of investment and over 20,000 jobs currently in the sector.
- Result in higher power prices for consumers, as wholesale prices would increase by a greater amount than any savings on reduced costs of renewable energy certificates.
- Act against the long-term need to reduce carbon emissions in the electricity generation sector – ultimately requiring greater action through other policies.
- Be contrary to the views of the Australian public, the overwhelming majority of whom want to see more renewable energy, not less.

This paper explores the issues associated with the current surplus of generation in the Australian energy market.

INTRODUCTION

Declining demand, extended operation of aged generation assets and the steady legislated increase in renewable energy generation has led to a surplus of generating capacity in the National Electricity Market (NEM) and Western Australia's Wholesale Electricity Market. The Australian Energy Market Operator (AEMO) in its most recent forecasts has concluded that no new generation is needed in the next 10 years to meet projected demand.[1] The Independent Market Operator in Western Australia has issued similar statements, declaring that "no new capacity will be required in the SWIS (South West Interconnected System) until 2023-24[2]".

A surplus of generation capacity has a range of effects. It results in old generators with high operating costs due to high fuel costs or low efficiency not being dispatched. It also leads to a suppression of wholesale electricity prices, which has flow-on benefits for consumers in retail electricity prices. But those same lower wholesale prices reduce revenue for incumbent generators and undermine the business case for further investment in renewable energy.

A surplus of generation capacity in itself is not evidence of a policy failure. Firstly, electricity demand is extremely difficult to forecast accurately. Electricity demand across the NEM in 2013 was almost 8 terawatt hours (TWh), or 4.3 per cent lower than in the peak year of 2009[3]. Prior to 2008 it was assumed that economic growth (GDP) and electricity demand would move together, and that therefore electricity demand in Australia would grow by at least 2 per cent in a year of GDP growth. Australia's GDP has risen every year since 2008, but electricity demand growth has declined.

The decoupling of growth in GDP and growth in electricity demand is caused by a wide range of factors, such as the impact of the Australian dollar and the cost-competitiveness of our major competitors on export industries; changes in technology, such as through regulated Minimum Energy Performance Standards in major appliances; and the uptake of solar PV and other energy efficiency improvements.

AEMO's most recent 10-year forecast for electricity consumption attempts to factor in all these potential domestic and international variables, leading to a difference between its low and high demand scenarios for 2020 of around 20 per cent (200,000GWh or 245,000GWh).[4] This variation has a very significant impact on defining the extent of the surplus (all other things being equal) now and into the future. However, electricity demand has increased in the past two months[5], so perhaps this trend may be changing; it's impossible to know for sure.

The other reason why the current surplus in electricity generation capacity is not in itself evidence of a policy failure is that the purpose of the RET is to progressively transition Australia to higher levels of renewable energy generation. While building new clean energy generation is a part of that process, the progressive withdrawal of fossil fuel plants is the corollary.

[1] AEMO, No New Power Generation Needed for next 10 Years, Media Release, 8/8/14
[2] SWIS Electricity Demand Outlook 2014, http://www.imowa.com.au/reserve-capacity/electricity-statement-of-opportunities-(esoo)
[3] Hugh Saddler, Why is electricity consumption decreasing in Australia?, *The Conversation*, 2/1/14
[4] AEMO, National Electricity Forecast Report 2013, p.vii
[5] See latest CEDEX report: http://www.pittsh.com.au/latest-news/cedex/

In order to ensure a secure electricity supply – a fundamental objective of Australian energy policy and the energy market – and avoid interruptions to power supply for consumers, the withdrawal of more polluting forms of electricity generation must be preceded by the deployment of renewable energy.

Therefore, the key issue is not the current surplus of electricity generation capacity, because that is a necessary stage in the transformation of the energy system. Instead, the key issue is ensuring that energy market transformation doesn't stall at this point in the process. We now have the conditions necessary to facilitate an orderly and permanent withdrawal of fossil fuel generation capacity. There are however serious policy and political challenges to achieving this outcome.

PREDICTED WITHDRAWAL OF GENERATION CAPACITY HASN'T HAPPENED

Recently, critics of the RET have been increasingly depending on the erroneous argument that the RET was not expected to displace market share of existing coal-fired generators. They argue that the RET was intended to meet planned increases in demand, and that the market for coal-fired power would remain largely unaffected. Instead we've seen falling demand, record low wholesale electricity prices and some fossil fuel generation put into mothballs. Therefore, critics argue, the solution to the surplus of generation should entail choking off new investments in renewable energy until electricity demand recovers.

That version of events is convenient for some owners of fossil fuel generators, but is fundamentally incorrect.

If we look at information that was available to the market in 2009 when the expanded RET was legislated, and the subsequent behaviour of the owners of fossil fuel generators, we find that the market was expecting that the increase in renewable energy generation would lead to the removal of fossil fuel generation.

Analysis for the Australian Energy Market Commission (AEMC) from consultants MMA in late 2008 on the combined effects of a carbon price and the RET on the electricity sector predicted **1600MW of fossil fuel power plants would be retired, alongside an expansion of renewable energy generation.**[6]

Further modelling a month later by MMA for the Federal Government to inform the design of the expanded RET also anticipated a decline in wholesale electricity prices such as we are experiencing today. MMA concluded that reductions in wholesale prices would be off-set when **"additional renewable generation is matched by deferment of fossil fuel generation capacity and some additional retirement of existing plant".**[7]

[6] "An initial survey of market issues arising from the carbon pollution reduction scheme and renewable energy target", MMA report for AEMC, December 2008. www.aemc.gov.au/getattachment/c43c79f4-6080-4e2e-9c7d-070f2534fb35/An-initial-survey-of-market-issues-arising-from-th.aspx

[7] MMA RET report for the Department of Climate Change, January 2009, available online.

Over 20,000 MW of fossil fuel generation capacity across the NEM has been sold to new owners or built since 2009 when the RET was expanded. These new owners would have made these purchases in the full knowledge that the market was expecting more renewable energy to be deployed, at levels expressly stated on an annual basis within legislation.[8]

Therefore, if information was available before the expanded RET even came into effect that wholesale electricity prices would likely decline, and that substantial fossil fuel generation capacity would have to be permanently retired, **it is erroneous and indeed disingenuous for the owners of fossil fuel generators to now argue that the RET has impacted their businesses in ways that were not anticipated.** Renewable energy is impacting on the electricity market more or less exactly as it was predicted to. **It is clear that the problem in the NEM is too much fossil fuel generation capacity, not too much renewable energy capacity.**

This assessment is supported by recent comments from AGL Energy CEO Michael Fraser, who points to baseload coal plants as being the superfluous element in the wholesale electricity market:

> *"There is too much baseload relative to where demand has got to … and that has impacted on the economics of coal-fired generators."*[9]

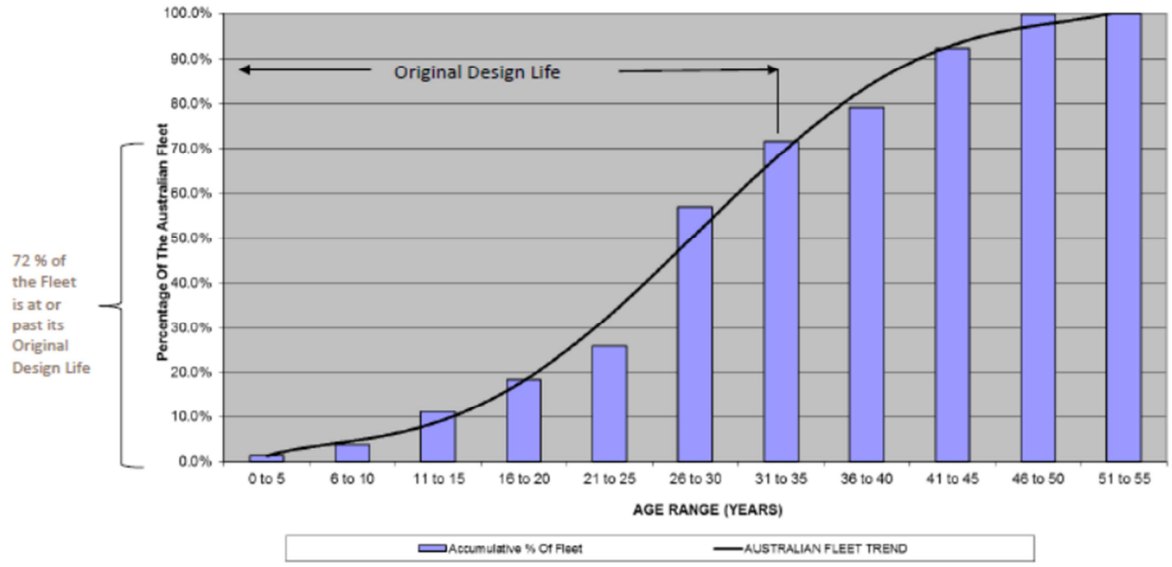
This problem has become acute, Fraser says, because "older emission intensive generation is not permanently exiting the market despite declining demand and increased supply...".[10]

The then CEO of Energy Australia, Richard McIndoe, spoke earlier this year about the surplus generation capacity in the wholesale electricity market, saying:

> *"It may take some years for the supply and demand situation to return to balance and this will require the closure of older, less competitive generation facilities."*[11]

Not only is this a barrier to new investment in more efficient – and lower carbon-intensive – electricity generation infrastructure, but it has left Australia with a situation where around three-quarters of the national generation fleet is operating beyond its original design life (see chart below)[12].

[8] Tristan Edis, The $30 billion government bail-out for power, Climate Spectator, 3/7/14
[9] Giles Parkinson, "AGL says 9GW of baseload fossil fuels no longer needed", Renew Economy, 1/8/13.
[10] AGL Submission to the 2014 Review of the Renewable Energy Target, May 16, 2014.
[11] Giles Parkinson, "Massive losses hit EnergyAustralia as demand falls, solar soars", Renew Economy, 28/1/14.
[12] The community of practice for Coal Utilisation, "2014 plant database", Brisbane, March 2014.



Much of this ageing generation infrastructure is also highly emissions-intensive. If high-emissions plant cannot efficiently exit the market, it creates a significant impediment to reducing emissions in the electricity generation sector.

Importantly, the ageing fossil fuel generators in Australia are also increasingly unreliable. During the heat wave in Victoria and South Australia in January this year, when daytime temperatures reached 44degC during significant periods across the week, demand for electricity skyrocketed. Over that same period three different units across two coal-fired power plants and one unit of a gas-fired plant failed for between one and three days, for a total loss of 1,200MW.

Generator outages in the week commencing 13 January 2014[13].

ASSET	OUTAGE DURATION	CAUSE	IMPLICATIONS
Loy Lang A3 (Vic)	14/1 13:45 to 16/1 8:45	Auxiliary supply problems	Loss of 560MW
Loy Lang B1 & B2 (Vic)	14/1 to 17/1 inclusive	Cooling problems	Output reduced from 1120MW to 680MW
Torrens Island B3 (SA)	14/1 18:35 to 15/1 15:40	Boiler issues	Loss of 200MW

[13] SKM MMA, "Impact of Wind Generation on Prices", paper for Meridan Energy, p.2 http://blog.powershop.com.au/wp-content/uploads/2014/02/2014-02-SKM-MMA-Heatwave-Report-final.pdf

Analysis from SKM MMA indicates that the combined wind energy capacity in Victoria and South Australia reduced wholesale electricity prices by around 40 per cent during that same period.[14]

Discussion within the energy industry is growing regarding the potential for government intervention to facilitate the orderly exit of incumbents, to reduce the current excess generation and ensure that wholesale market prices remain at levels necessary to ensure continued investment in more efficient and low-emission technologies.[15] However, it is important to note that it was never the intention of the RET scheme to 'fix' the issue of declining electricity demand which has led to an apparent surplus of generation. The issue of low electricity demand will remain whether the RET is ended, maintained or increased.

BARRIERS TO EXIT

A range of reasons have been suggested as to why some of the most economically marginal fossil fuel-fired plant has not been retired. These so-called 'barriers to exit' include:

- Policy uncertainty about future constraints on carbon emissions and the form of any price signal.
- Remediation costs which might include full mine remediation, onsite asbestos issues and remediation activities outlined in licence conditions.
- Below-market fuel supply contracts which result in artificially low short run marginal costs.
- Complex financial structures and debt levels which affect commercial and operational decisions.
- The so-called 'first mover disadvantage' which means that the first major thermal plant to close in a region will raise wholesale electricity prices in that region, and thereby the profits for their competitors, creating a strong disincentive to close.
- The potential for future increases in wholesale energy prices as result of the RET being cut – as called for by many owners of coal-fired generators.

Collectively, these factors are considered to be acting as a disincentive or barrier to exit for many generators. They are also likely to result in generation being mothballed rather than completely closed and exited from the market.

WHY MOTHBALLING ISN'T ENOUGH

The response of owners of thermal generation to the decline in demand has primarily been to mothball generation assets: essentially suspend their operations, either permanently or for

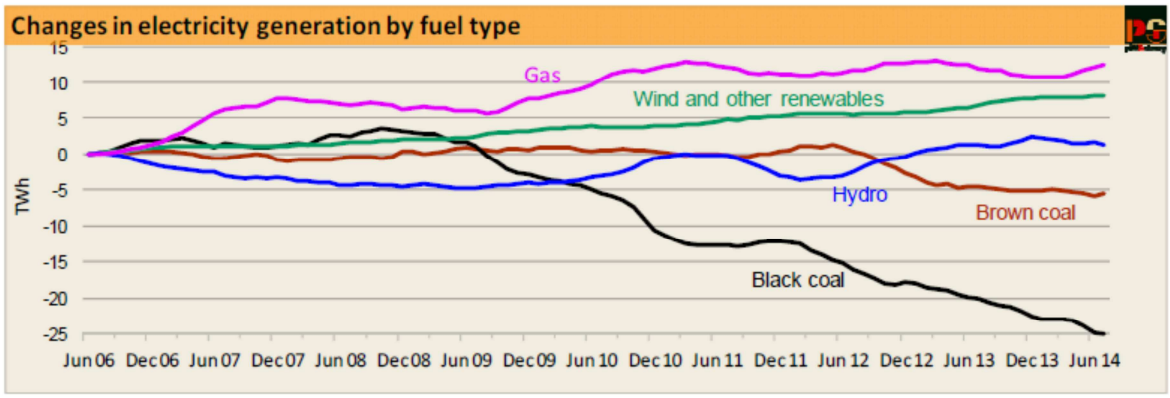
[14] SKM MMA, "Impact of Wind Generation on Prices", paper for Meridian Energy, p.2 http://blog.powershop.com.au/wp-content/uploads/2014/02/2014-02-SKM-MMA-Heatwave-Report-final.pdf

[15] Dr Jenny Riesz, Ben Noone, Assoc. Prof. Iain MacGill, Payments for Closure: Should Direct Action include payments for closure of high emission coal-fired power plants?, Centre for Energy and Environmental Markets, University of NSW, CEEM Working Paper, October 2013, p.3.

months at a time, but not formally decommission the plant. The list of mothballed or withdrawn plants is increasing.

> *[1GW of] Wallerawang [power plant in NSW] is one of a number of coal-fired power stations that have been withdrawn permanently from service or mothballed. These include the Collinsville facility in Queensland, and two units from Tarong, along with the EnergyBrix facility in Victoria, Munmorah in NSW and the Playford B coal fired generator in South Australia. Its neighbouring Northern coal generator is operating only on a seasonal basis.*[16]

As the chart below shows[17], the black coal sector has seen the largest decline in output over recent years, although significant volumes of brown coal generation have been removed from the market as well. But overwhelmingly this capacity has simply been mothballed rather than permanently withdrawn from the market.



From the perspective of investing in new generation assets, a material difference exists between mothballing and withdrawing or decommissioning. Until a plant is decommissioned the assumption has to be made that those plants would, or at least can, re-enter the market at any time of temporary high demand and/or lower supply (peak demand periods or outages by competitors). This undermines investor confidence in the business case for new investment and prevents cleaner or more efficient generation assets from entering the market.

Without a clear and transparent process that signals the exit of generation in a timely manner, and allows the market to respond, there is the risk of disorderly withdrawal where a plant defaults and exits the market suddenly and unexpectedly. This is likely to lead to increased electricity prices as the market moves quickly to respond to the unexpected exit.

POTENTIAL POLICY RESPONSES

The current situation and the material barriers to exit are putting pressure on the Australian energy market. It remains unclear how the market will respond to this effect in the medium and long term. A number of potential policy responses are available to address the current surplus generation in the energy market, each with their strengths and weakness with regard to their

[16] Giles Parkinson, "Lights out at 1GW Wallerawang coal-fired power station", Renew Economy, 1/4/14.
[17] Pitt and Sherry, CEDEX Electricity Update August 2014, figure 4, p.2

political palatability, policy simplicity, effectiveness and ultimately the extent to which they will deliver an agreed outcome. These incorporate both market and direct regulatory approaches, providing either incentives or punitive-based measures.

A variety of international examples exist of how to approach this issue.

In the United States, the Congress first attempted to introduce an emissions trading scheme, and when that failed President Obama announced an initiative to directly regulate greenhouse gas emissions from coal-fired power plants via the Environmental Protection Agency[18].

China is experimenting with different mechanisms simultaneously, including pilot emissions trading schemes and forced closures of coal-fired plants. Europe has focused on carbon pricing approaches through its emissions trading scheme. Europe has also used direct regulation to remove the oldest and most polluting generation plant through the Large Combustion Plant Directive. This sets limits on the emission levels of various pollutants (but not carbon) from power stations.

Options available to Australia include:

- Leaving the market to respond, on the basis that an enduring surplus of capacity and low wholesale energy prices will eventually result in the permanent closure of the most economically marginal plant. However, as discussed earlier in this paper, this approach has not worked so far and numerous barriers exist to it working in the future.
- Commonwealth or state governments using a variety of regulatory tools to progressively wind back the level of capacity.
- A market-based approach to regulation – for example carbon pricing, such as an emissions trading scheme. This would eventually push the most polluting coal-fired plants out of the market, although given the current low carbon price internationally this would be a slow mechanism for addressing the issue.
- Setting greenhouse gas emissions limits (total for the facility or emissions intensity). This is similar to the approach recently announced in the United States. This mechanism would give the government significant control over the timetable for withdrawal of capacity which would give the market confidence about the future supply/demand balance.
- State governments committing to not extending the operating licence of existing thermal generators. This would be a slower process as many plants have licences to operate beyond 2020. As this period spans a number of state and federal elections, investors would experience lower levels of certainty until closer to the expiry date.
- Providing direct financial incentive or a 'contracts-for-closure' scheme. This could be managed in a variety of ways, either running an auction for the lowest cost per MW retired, or targeting the most emissions-intense generation. Equally, contracts could focus on whole plants or partial decommissioning of multiple plants to prevent windfall gains by remaining generators. This could become part of the Commonwealth's Direct Action Plan through the Emissions Reduction Fund (ERF). However, while significant funds are allocated to the ERF, the amounts available in any given year, and competition from other abatement reduction projects, could prevent it from being used to address this issue.

[18] Carbon Pollution Standards, United States Environmental Protection Agency, www2.epa.gov/carbon-pollution-standards

- On a variation of the above model, introducing a closure levy or other revenue-raising instrument via the electricity market, to avoid the need to fund this measure from the Federal Budget. This could be delivered in a number of ways without impacting on electricity prices.

CONCLUSION

This paper has sought to put the issue of surplus electricity generation capacity into its proper context. A decrease in electricity demand was predicted before the expanded RET was introduced, and in the period since then almost all of Australia's coal-fired generators have been on-sold to owners that were already aware of the reality of falling demand and the legislated annual targets for new renewable energy generation.

Moreover, the emergence of a surplus of generation capacity is understood – even by owners of large coal-fired plants – as a failure of aged fossil fuel generation to exit the market now that significant volumes of that generation are no longer required.

Since the purpose of the RET is to begin the process of transitioning Australia to cleaner energy sources, it should be obvious that a surplus of capacity has to be built in advance of the retirement of some ageing and marginal generation.

Using the existence of a surplus of generation capacity as a rationale for reducing support for renewable energy would be perverse. Instead, the policy debate needs to focus on resolving the issue by overcoming the barriers to exit and facilitating the orderly withdrawal of redundant, economically marginal and ageing fossil fuel generation. A variety of different mechanisms could be employed for assisting with an orderly withdrawal of fossil fuel capacity. Failure to address this issue could result in a disorderly withdrawal of capacity when particular power plants become insolvent, with unpredictable consequences for wholesale and retail power prices and energy security.

Attempting to halt the deployment of renewable energy will not address the issue of surplus capacity and will instead seriously damage an industry that is employing 21,000 Australians and bringing in billions of dollars of investment in new, clean electricity generation.

If the renewable energy industry does stall it will simply increase the future costs of adopting clean energy technologies at a later date when domestic and international policies make coal-fired power too costly to operate. We will have also lost the opportunity to build a strong local renewable energy industry, critical to the achieving the clean, low-cost, low-emissions energy system we need for the long term.