

Review of the Future Security of the National Electricity Market

Submission

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February 2017

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INTRODUCTION

The Australia Institute welcomes the opportunity to make a submission to the Finkel Review. With the current state public discussion around energy issues, this review has the potential to steer Australia back towards a policy path that looks after the interests of energy consumers and the environment.

Australia's energy future should centre on renewable energy and storage of renewable energy. Debate around energy should be on the real policy and engineering challenges of how to make this transition, rather than on whether it should happen. There is no "investment appetite" for more coal-fired generation, nor is there any for nuclear generation.¹ Current interest in these technologies is pushed by self-interested lobby groups rather than investors and consumers.

The reality is that renewable energy is competitively priced and storage technologies are evolving rapidly. Australia's energy problems are chiefly around peaks in demand and price, issues that renewables and storage are well placed to meet. When managed properly renewable energy can enhance the stability of electricity grids.

Gas-fired electricity is less emissions intensive than coal, as long as fugitive methane emissions from gas extraction are ignored, but is not likely to be competitive for anything other than peak generation. Because east coast gas prices are now linked to Asian prices, they will stay high regardless of expansion of Australian supplies. Importantly, gas-fired power is still emissions intensive and extraction of gas results in fugitive and migratory emissions that are poorly measured and accounted for in Australia. We expand on these points below.

RENEWABLE ENERGY PUSHES PRICES DOWN

Renewable energy provides cheap electricity generation, and brings down the wholesale electricity price.

Between 2010 and 2015 onshore wind generation costs fell on average 30%, and costs for utility scale solar PV installations fell by over 60%.² Records are being broken every

¹ Chambers (2017) *New coal-fired plants given the cold shoulder by the industry*, <http://www.theaustralian.com.au/business/mining-energy/new-coalfired-plants-given-the-cold-shoulder-by-the-industry/news-story/91aa02ac5f001d86766777e77686ba78>

² International Energy Agency, *Energy, Climate Change and Environment Insights 2016*, <http://www.iea.org/publications/freepublications/publication/ECCE2016.pdf>

year for low solar prices in India, with the first major auction for 2017 receiving initial bids of Rs3.59-3.64/kWh for a 750 kW project, down 16% from last year's record breaking low of Rs4.34/kWh.³

Cost of onshore wind is expected to drop a further 41% by 2040. Solar will drop 60% from \$74-\$220/MWh today to \$40/MWh in 2040. This leads to solar being the cheapest generation technology in most countries by 2030.⁴

Drops in prices are driving renewable energy investment and construction globally. In 2015, renewables accounted for over 50% of annual new generation capacity.⁵

When energy with storage is required, some solar thermal with storage and pumped hydro options are already competitive with gas turbines at under \$100 per kW/year for the best levelised cost of capacity projects. Importantly, solar thermal projects would produce additional energy in addition to contribution to storage capacity, further displacing emissions-intensive generation.⁶

Renewables also bring down the wholesale electricity price, by minimising price spikes during peak demand periods. This can even be seen in states with relatively little renewable generation, such as New South Wales. Figure 1 below shows the NEM spot price, demand, wind and coal generation and that of the Eraring power station in particular for October 2016:

³ Sing, 2017, *Rewa solar project receives sub Rs4/unit bid*,

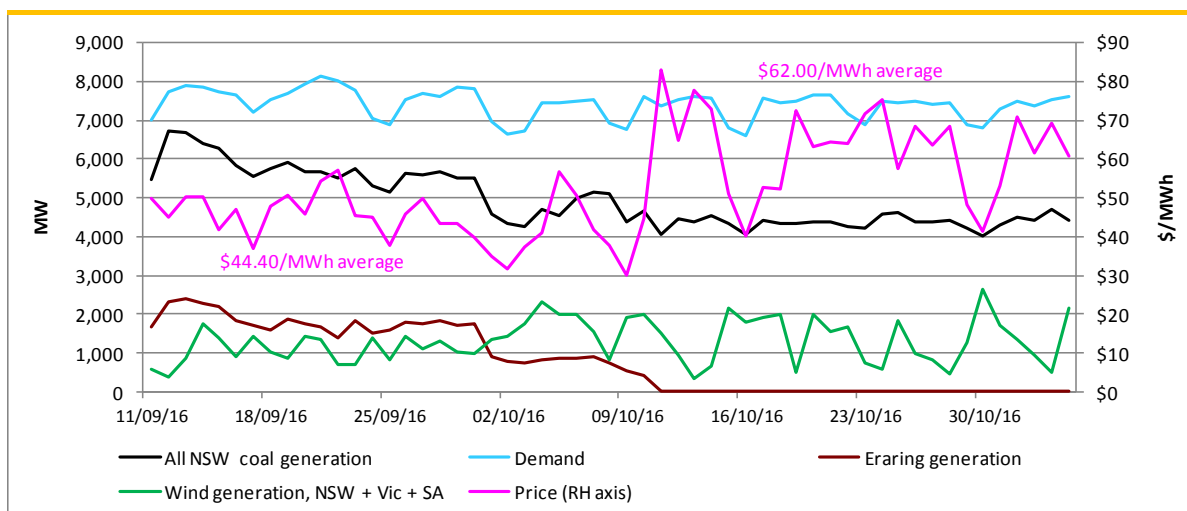
<http://economictimes.indiatimes.com/industry/energy/power/rewa-solar-project-receives-sub-rs-4/unit-bids/articleshow/57042825.cms>

⁴ Bloomberg New Energy Finance *New Energy Outlook 2016*

⁵ International Energy Agency, *Energy, Climate Change and Environment Insights 2016*,
<http://www.iea.org/publications/freepublications/publication/ECCE2016.pdf>

⁶ McConnell and Sandiford, 2016, *Winds of Change: An analysis of recent changes in the South Australia energy market*, Melbourne Energy Institute,
http://energy.unimelb.edu.au/_data/assets/pdf_file/0017/2054132/SA_PRICES_FINAL.pdf

Figure 1: Generation, demand and NEM spot price in NSW, October 2016



Source: Saddler (2016) Cedex November 2016,

Figure 1 shows that the NSW spot prices went up sharply on the day Eraring's last machine was shut down and stayed generally higher, averaging \$62/MWh compared to \$44 earlier in the month. Importantly, Figure 1 also shows the inverse relationship between NSW wholesale prices (in pink) and wind generation across the three mainland states in southern Australia (in green). Note the almost exact relationship in timing between changes in wind generation and changes in spot price. Even though wind generation is a small contributor to NSW supply, it has a large effect on wholesale prices, even in NSW, where at present wind generators supply less than 3% of total consumption within the state. This is the so-called merit order effect.

The ability of wind generation to reduce spot prices is undoubtedly a benefit to electricity consumers. In the longer run, however, this presents operational challenges to the NEM as presently designed. A new mix of generation types needs new technical requirements for the operation of the electricity supply system and new market instruments to ensure that those requirements are met in ways that continue to provide an economical and reliable supply of electricity to consumers.

RENEWABLE ENERGY CAN ENHANCE GRID STABILITY

As well as providing cheap electricity and bringing down wholesale prices, increased renewable energy generation can provide grid stability. As demonstrated by Montreal based Hydro-Quebec TransEnergie, who have mandated synthetic inertia in their wind turbines, wind turbine power inverters can be reprogrammed to combat volt sags in

power grids and avoid blackouts. By programming them to continue at a certain speed, wind turbine inverters can generate reactive power when power outages lead to AC levels dropping stopping blackouts.⁷

GAS PRICES CANNOT BE LOWERED BY MORE SUPPLY

Australia began exporting Liquefied Natural Gas (LNG) in early 2015, exposing our domestic gas market to international prices. Since then domestic prices have risen from an average of \$3-4/GJ to an average of \$6-7/GJ, peaking at \$14-20/GJ.⁸ On July 5th 2016, gas prices in Australia peaked at \$14.4/GJ. On the same day, the global average price was \$10.8/GJ, and \$7.23/GJ in Japan, our largest export partner.⁹

This price rise was caused by Australia's east coast gas market being linked to Asian markets via LNG terminals in Gladstone, Queensland.¹⁰ Domestic price rises were the stated intention of some gas producers, with Santos specifically claiming:

[Our] aim in GLNG was always as much about raising the domestic gas price, and therefore re-rating large parts of the portfolio outside of GLNG, as it was about the project.¹¹

These price rises have also been linked to cartel like behaviour by gas generators.¹²

Now that Australia's gas prices are linked to world gas prices, expansions in supply will not decrease price for domestic users. Removing moratoria on gas development in Victoria and elsewhere will not reduce domestic prices, as the proposals are not large enough to force down world prices. Unconventional gas projects will bring minimal

⁷ Fairley, 2016, *Can synthetic inertia from wind power stabilise grids?*, IEEE Spectrum

<http://spectrum.ieee.org/energywise/energy/renewables/can-synthetic-inertia-stabilize-power-grids>

⁸ Morgan, 2016, *Gas Prices in Australia double those of exports*, <http://www.abc.net.au/news/2016-08-01/gas-prices-higher-in-australia-than-in-export-destinations/7680106>

⁹ Robertson, 2016, *Australian gas is a bargain... if you're Japanese*, <http://www.michaelwest.com.au/its-a-gas-australian-gas-prices-are-a-bargain-in-japan/>

¹⁰ Grudnoff (2013) *Cooking up a price rise: Will CSG exports push up the price of gas?*,

<http://www.tai.org.au/sites/default/files/PB%2053%20Cooking%20up%20a%20price%20rise.pdf>

¹¹ Credit Suisse (2014) *Santos: The seven-year itch?*, http://www.gabpg.org.au/wp-content/uploads/2014/06/Credit_suisse_report110314.pdf

¹² See Robertson, 2016, *Australian gas is a bargain... if you're Japanese*,

<http://www.michaelwest.com.au/its-a-gas-australian-gas-prices-are-a-bargain-in-japan/> and

McConnell and Sandiford, 2016, *Winds of Change: An analysis of recent changes in the South Australia energy market*, Melbourne Energy Institute,

http://energy.unimelb.edu.au/data/assets/pdf_file/0017/2054132/SA_PRICES_FINAL.pdf

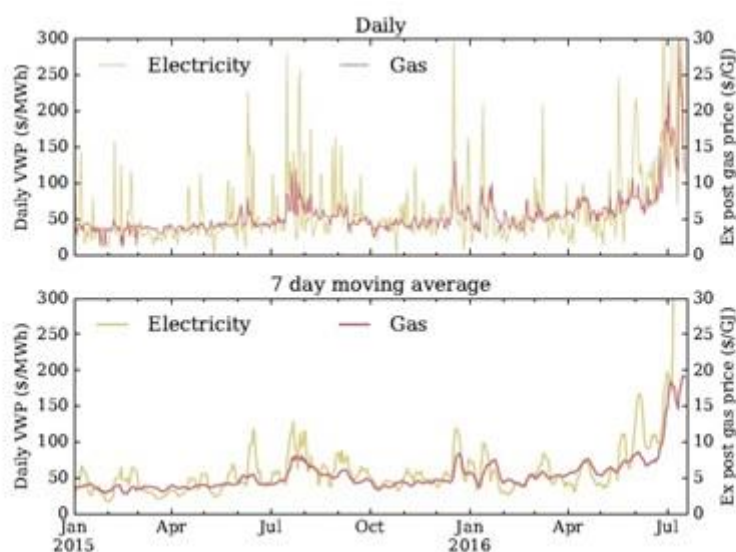
benefit to Australian gas consumers, while inflicting potential environmental and social damage on local communities. The only policy that could reduce domestic gas prices is a domestic reservation policy.

HIGH GAS PRICES DRIVE UP ELECTRICITY PRICES

Overreliance on gas powered generation leads to high gas prices driving up electricity prices. This is a result of existing gas supply contracts expiring and new contracts being exposed to high gas prices, and the remaining non-contracted supply being sourced from the Short Term Trading Market spot price, which represents the opportunity cost of exporting the gas.¹³

The Melbourne Energy Institute Report *Winds of Change* provides a case study of rising gas prices and the impact on rising electricity prices in South Australia (Figure 2 below).¹⁴ It finds strong correlation between the South Australia electricity price and the gas Short Term Trading Market.

Figure 2: Relationship between South Australian electricity and gas prices



Source: Melbourne Energy Institute 2016. Note electricity prices are daily volume weighted prices, gas prices are daily spot prices (ex-post acrshortstm)

¹³ McConnell and Sandiford, 2016, *Winds of Change: An analysis of recent changes in the South Australia energy market*, Melbourne Energy Institute, http://energy.unimelb.edu.au/_data/assets/pdf_file/0017/2054132/SA_PRICES_FINAL.pdf

¹⁴ McConnell and Sandiford, 2016, *Winds of Change: An analysis of recent changes in the South Australia energy market*, Melbourne Energy Institute, http://energy.unimelb.edu.au/_data/assets/pdf_file/0017/2054132/SA_PRICES_FINAL.pdf

GREENHOUSE GAS EMISSIONS FROM GAS POWERED GENERATION

Methane emissions from unconventional gas extraction have been severely underestimated. Increasing supply to meet a 30% gas by 2030 scenario will require significant development of unconventional gas resources, causing incalculable rises in Australia's methane emissions.

The current methodology for measuring greenhouse gas emissions from unconventional gas extraction is based on assumed and outdated methane emissions factors, rather than direct measurement. The factor used by the Australian Government (0.0058% of production) is based on a historic US emissions factor designed for measuring conventional gas emissions and has since been discarded. Actual measurements by 16 peer reviewed research projects, using improved technology to take direct measurements from gas fields in the US, have ranged from 2-17% of production.¹⁵

The impact of these unaccounted-for methane emissions is seen in recent research showing that US methane emissions have risen 30% in the last decade. The study used evidence from atmospheric observations to trace the largest rise of these emissions to the central part of the US, where oil and gas extraction has expanded dramatically over the same time period.¹⁶

As well as the obvious implications to meeting our Paris climate commitments, there are also cost implications. At double current levels of production, assuming a 6% methane emissions of production and a \$25 carbon price, costs would increase by \$2.2 billion per year in foregone revenue and \$2.8-7 billion per year in carbon pricing.

¹⁵ Lafleur et al, 2016, *A review of current and future methane emissions from Australian unconventional oil and gas production*, Melbourne University Melbourne Energy Institute, <http://energy.unimelb.edu.au/library/a-review-of-current-and-future-methane-emissions>

¹⁶ Turner et al, 2016, *A large increase in U.S. methane emissions over the past decade inferred from satellite data and surface observation*, *Geophysical Research Letters*, Volume 43, Issue 5, 16 March 2016, p 2218-2224

CONCLUSION

Australia must rapidly direct its energy policy towards a low-emissions and affordable future and away from the current unproductive debate. Renewables will be at the centre of Australian electricity generation which will require changes to policy and market settings and of course investment in infrastructure.

Several desirable changes are being proposed already. The proposal for 5 minute settlement in the NEM would facilitate demand management and the rollout of battery storage.¹⁷ Unfortunately, consideration of this proposal is continually delayed by the Australian Energy Market Commission.¹⁸

Other existing policies such as the Large-scale Renewable Energy Target (RET) should be extended. With political stability and support the RET can rapidly increase investment in renewables and aid a transition to a low-emissions energy system.

We hope the Finkel review can provide firm direction towards a renewable future for Australia's energy systems.

¹⁷ Campbell and Saddler (2016) *Submission to the Australian Energy Market Commission (AEMC) on the proposed 5 Minute Settlement Rule Change*, <http://www.tai.org.au/sites/default/files/P268%20Submission%20to%20AEMC%205%20min%20settlement%20FINAL.pdf>

¹⁸ AEMC (2017) *Five minute settlement: Extension of time for draft rule determination*, <http://www.aemc.gov.au/getattachment/4659b7aa-3659-42f0-a37c-e423cc5785ae/Information-sheet-extension-of-time-for-draft-rule.aspx>