



Oakley Greenwood

# Finkel Review, 5 minute settlement in the NEM and the growth in renewables - Implications for the gas industry

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# Overview

- The 50 recommendations in the Finkel Review released in June 2017 looked to provide a credible way forward for a more stable National Electricity Market for consumers and investors.
- However, is the impact on both system security and energy prices of an enormous growth in variable renewable energy (VRE) generation well enough understood?
- The Finkel Review recognises the potentially important role of gas in providing firming capacity to back up VRE generation until batteries at scale become economic
- The Finkel Review recommendation to establish a Generator Reliability Obligation is a step in materialising the true cost in the National Electricity Market of when the wind does not blow or it's a cloudy day. The proposed National Energy Guarantee will extend this to existing renewables.
- However are there unintended consequences stemming from the proposed change in the National Electricity Market from 30 minute settlement to 5 minute settlement that may reduce the ability of gas fired generation to provide that firming capacity?

# Finkel Review Recommendations

- 50 recommendations:
  - 49 endorsed by Council of Australian Governments Energy Council
  - Clean Energy Target (CET) or Emissions Intensity Target the 50<sup>th</sup> recommendation. This has been rejected by the Commonwealth – the way forward is unclear
- Categories of recommendations are:
  - Preparing for next summer
  - Increased security
  - A reliable and low emissions future – the need for an orderly transition
  - More efficient gas markets
  - Improved system planning
  - Rewarding consumers
  - Stronger governance

## Finkel Review and Gas

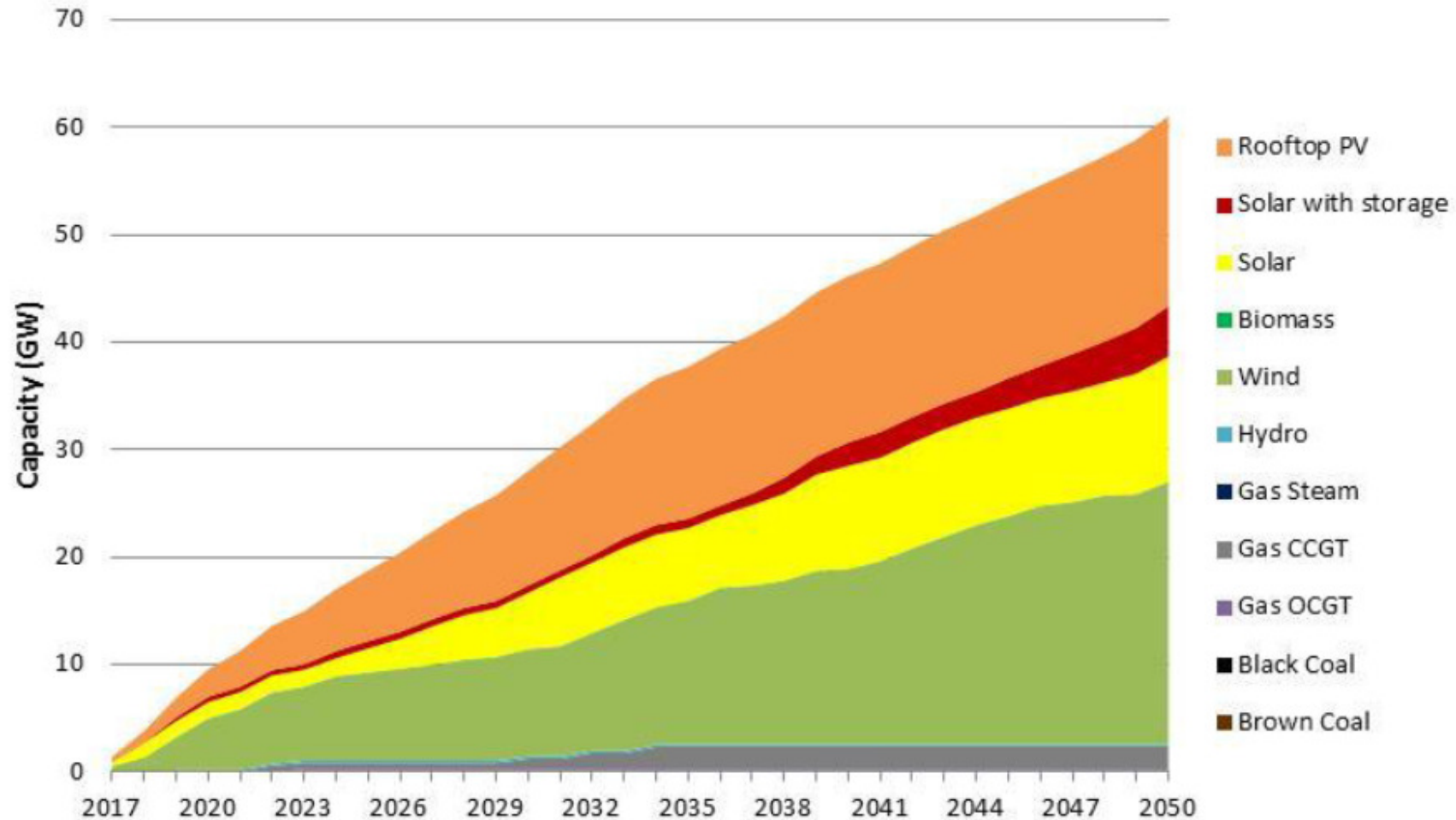
- While gas is not the focus of the recommendations there is already a substantial focus on gas stemming from:
  - COAG Energy Council Gas Supply Strategy and Gas Market Reforms; and
  - the role of the ACCC in monitoring the domestic marketing activities of the Qld LNG developers - Santos, Origin Energy and Shell.
- The share of gas fired generation in the NEM has reportedly increased significantly as coal begins to shut down - and the role of gas fired generation in setting electricity prices is of particular interest to Governments.
- The Finkel Review recognises:
  - the role played by gas generation in maintaining system security and possibly increased importance as coal plant retired
  - but, that the role played by short term trading markets could be limited in supplying gas when needed for gas plant to run, and similarly
- Concern expressed in Finkel Review about longer term viability of gas generation as gas supply contracts and electricity offtake agreements roll off

# Modelling prepared for Finkel Review

- The Finkel Review modelled a CET to achieve an emissions reduction target of 28% on 2005 levels by 2030. With a linear trajectory to zero emissions by 2070.
- Under CET and BAU residential electricity prices in the order of \$300 per MWh and industrial electricity prices in the order of \$100 per MWh.
- Prices under CET marginally lower than for BAU – this is attributed to lower level of risk for investment in generation that a CET achieves.
- Gas price assumptions in Brisbane and Melbourne:
  - \$8-9/GJ in 2030 (these are prices now in 2017); and
  - trending to \$9-10/GJ by 2050
- *Gas fired generation is relatively constant throughout the modelling period. In this scenario, because the operating lives of coal-fired plant are extended there is less need for new gas plant to meet demand in periods when renewable energy is not generating. This result would change if coal plants are retired earlier than suggested by the modelling.*

# Modelling prepared for Finkel Review – New Capacity

Figure 38: Cumulative new capacity by technology type, Clean Energy Target

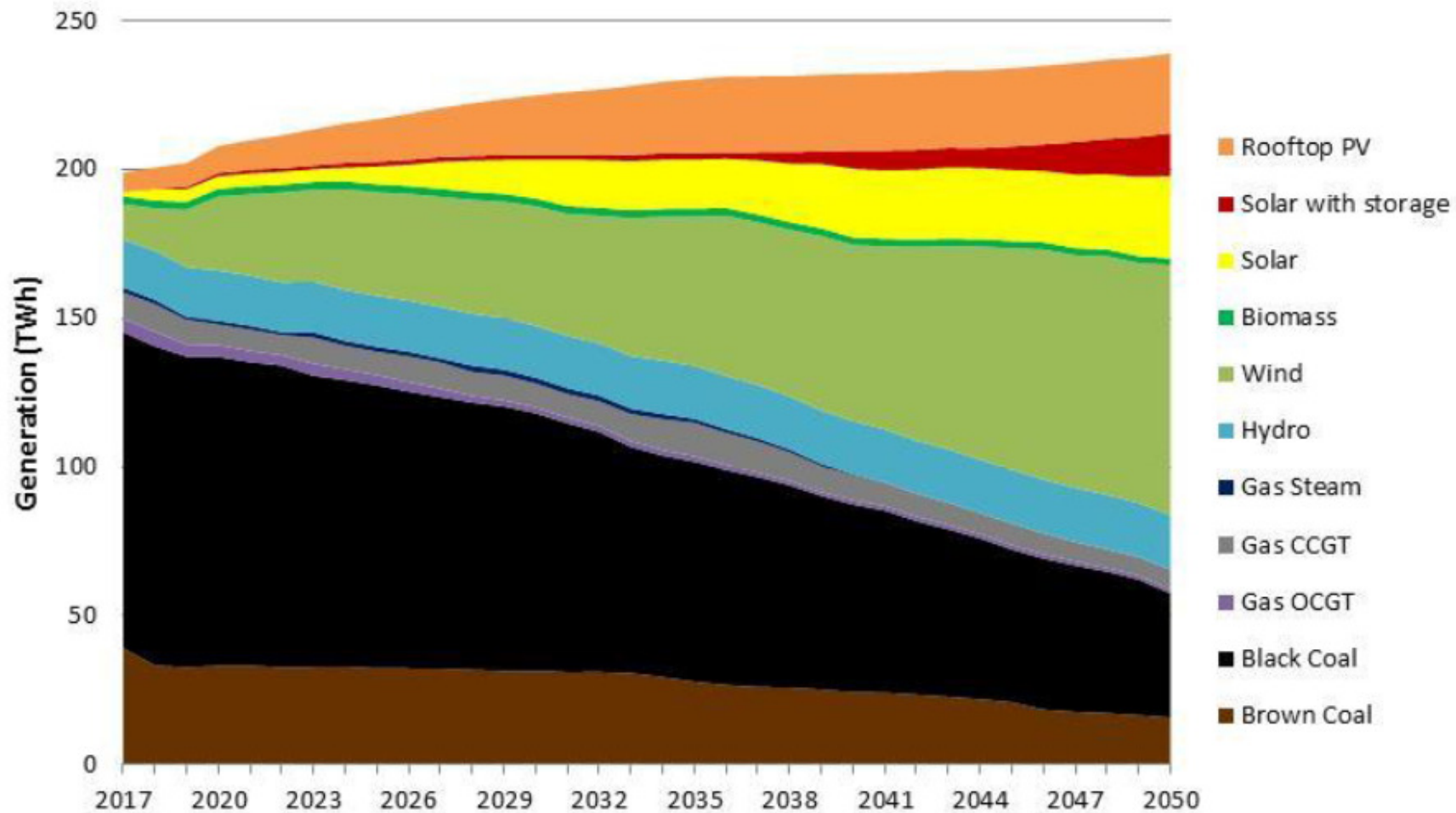


Source: Jacobs, *Report to Independent Review into the Future Security of the National Electricity Market*, 2017



# Modelling prepared for Finkel Review – Generation Mix

Figure 37: Generation mix, Clean Energy Target



Source: Jacobs, *Report to Independent Review into the Future Security of the National Electricity Market*, 2017

# Recommendations

- More Efficient Gas Markets
  - generators to provide AEMO information on their fuel resource adequacy and fuel supply contracts (R 4.1)
  - AEMO last resort power to procure or enter into arrangements to have gas-fired generators available to maintain reliability of electricity supply in emergencies (R 4.2)
  - Evidence based regulatory regimes to manage the risk of individual gas projects on a case-by-case basis and the means to ensure that landholders receive fair compensation. (R 4.3)
  - COAG Energy Council - relevant regulatory and scientific data on gas in an informative and easily accessible format. (R 4.4)
- Generator Reliability Obligation (R 3.3)



# More Efficient Gas Markets

Recommendation	Implications
<p>Generators to provide AEMO information on their fuel resource adequacy and fuel supply contracts</p>	<ul style="list-style-type: none"><li>• may present a challenge for vertically integrated producer/generators</li><li>• one benefit of producers owning generation is ability to arbitrage between electricity and domestic gas or LNG markets<ul style="list-style-type: none"><li>– with these options for arbitrage, will vertically integrated participants have committed from their portfolio specific volumes of gas for generation</li><li>– how is the reporting obligation to AEMO going to capture this</li></ul></li><li>• would need to recognise access to pipeline transport for a complete picture</li></ul>

# More Efficient Gas Markets

Recommendation	Implications
AEMO last resort power to procure or enter into arrangements to have gas-fired generators available to maintain reliability of electricity supply in emergencies	<ul style="list-style-type: none"><li>• how accurate will AEMO's forecasts be that underpin its analysis of the need for additional generation – implications for cost, policy triggers</li><li>• cost of returning mothballed plant into service</li><li>• how are the costs of these arrangements recovered – from retailers</li></ul>

- Last resort power may be similar to existing AEMO function of Reliability and Emergency Reserve Trader which is designed to maintain power system reliability and security using reserve contracts.
- Panel of suppliers can consist of:
  - Customer load that can be curtailed and restored on demand
  - Generation capacity that is not available to the market that can be brought online

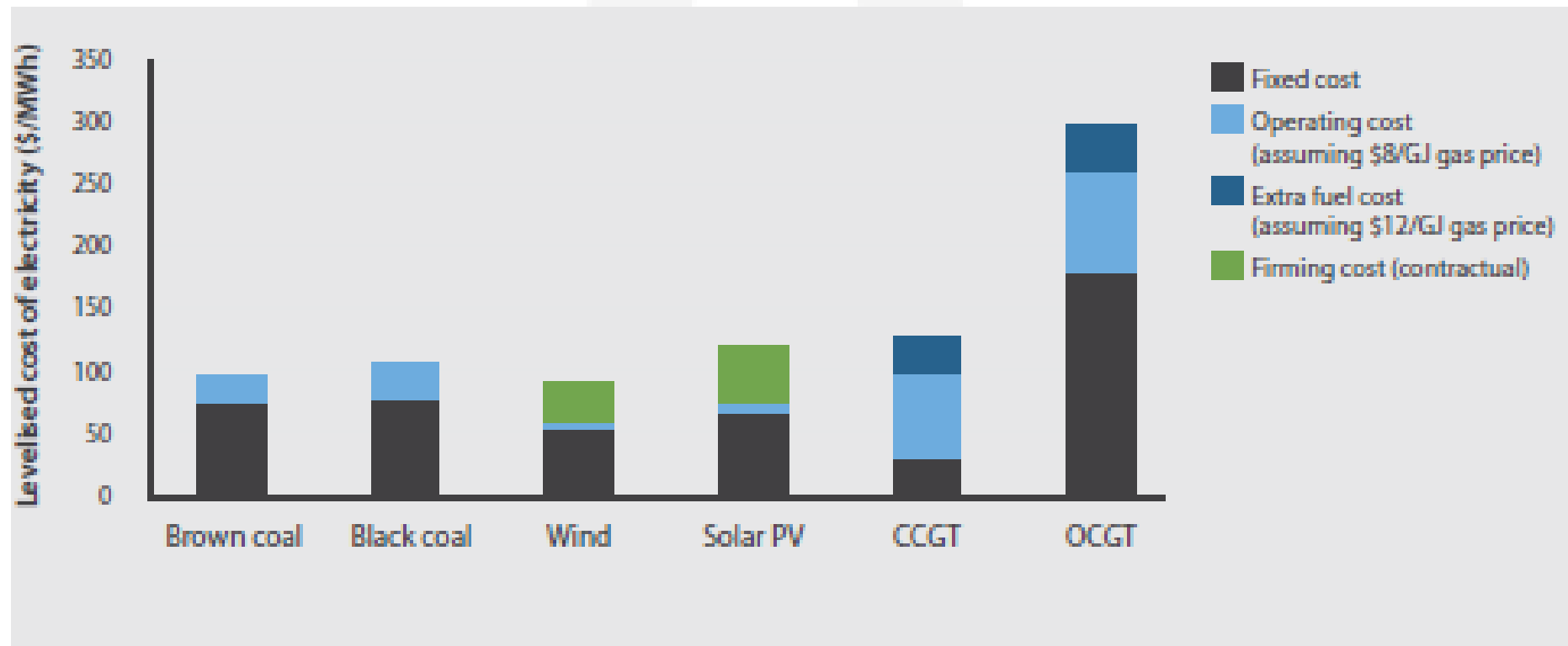
# More Efficient Gas Markets

Recommendation	Implications
<p>Evidence based regulatory regimes to manage the risk of individual gas projects on a case-by-case basis and the means to ensure that landholders receive fair compensation</p>	<ul style="list-style-type: none"><li>• changes to regulatory regimes and compensation arrangements requires the agreement of the States to implement;</li><li>• report does not seem to highlight that ownership of resources by the States (as compared to land holders e.g. in the US) is a constraint on development of the industry</li></ul>
<p>Relevant regulatory and scientific data on gas in an informative and easily accessible format</p>	<ul style="list-style-type: none"><li>• helpful where the reader is objective, but may struggle to overcome misinformation and confirmation bias inherent in social media</li></ul>

# Generator Reliability Obligation

Recommendation	Implications
<p>AEMC and AEMO to develop and implement a Generator Reliability Obligation</p> <ul style="list-style-type: none"><li>• An obligation on developers of VRE generation projects to ensure that dispatchable supply (batteries, thermal storage, hydro or gas generation) is jointly installed within a region</li></ul>	<ul style="list-style-type: none"><li>• What is the firming obligation. Is it for the hours in which solar plant could operate – e.g. daylight hours or the full 24 hour cycle</li><li>• The Finkel report contemplates a role for gas power generation to provide firming capacity</li><li>• However will gas fired generation be able to meet this need with a change to the NEM from 30 minute to 5 minute settlement</li><li>• Open cycle plant takes 20 minutes to ramp up to full load and unlikely to be able to take advantage of short duration opportunities</li><li>• This rule change may hasten the concern in the Finkel report that electricity offtake agreements rolling off would result in a decline in the longer term viability of gas power stations – more difficult for gas power stations to enter into electricity financial derivatives</li></ul>

# Generator Reliability Obligation – an opportunity for gas



- *AGL recently outlined its estimates for the cost of different fuels - this is reflected in the chart. AGL considers that a new wind farm supported by gas peaking generation (through the 'firming cost' – green section in above wind and solar PV columns) to now be cheaper than new CCGT at a \$8/GJ price. A new solar farm supported by gas peaking generation would also be cheaper than new CCGT at a gas price of \$12/GJ.*

Source: Finkel Review

# The outlook for solar generation – an opportunity for gas

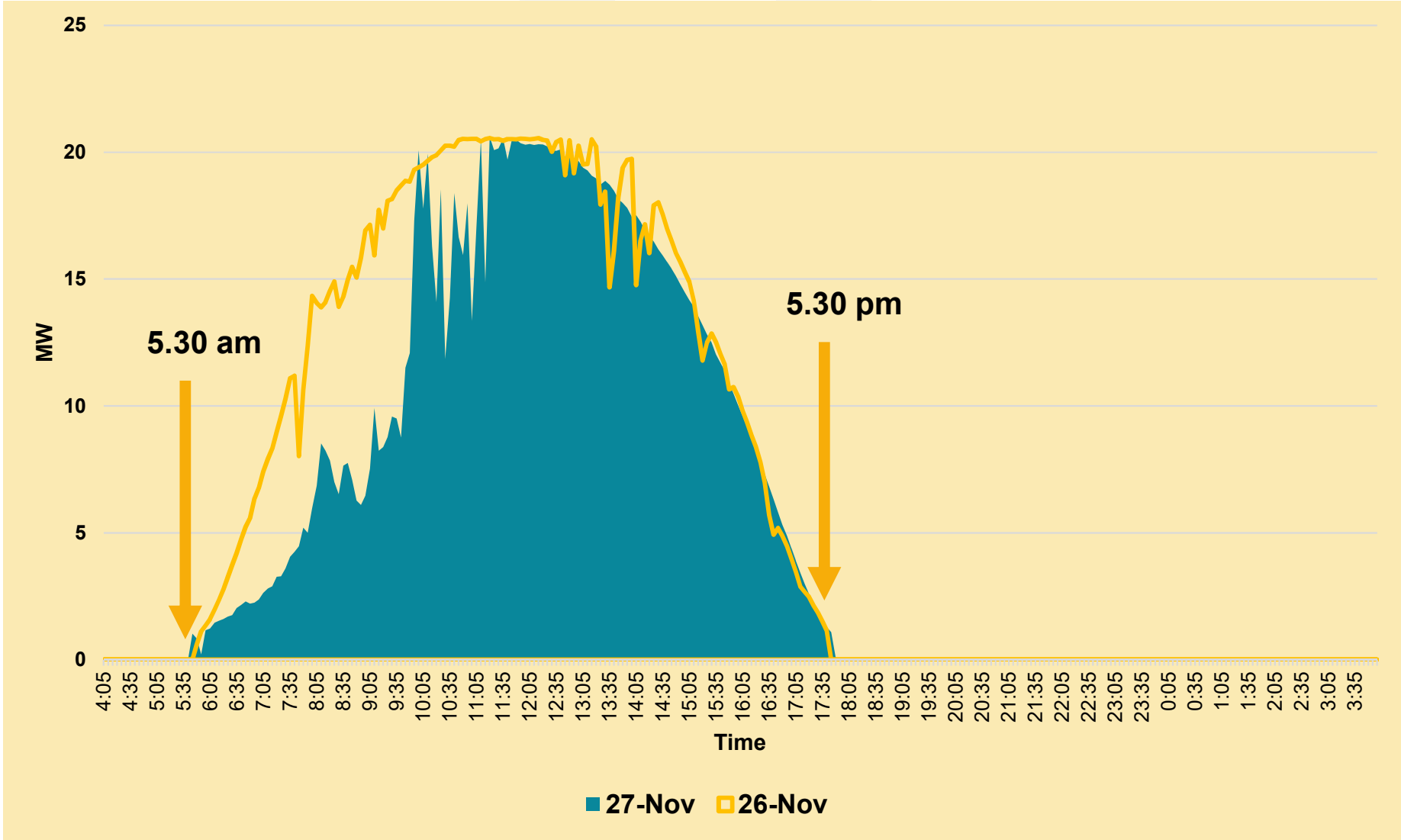
- Interest in solar development slowed in 2015 due to uncertainty about the future of the RET, but has picked up
- Buying output from renewable projects was once a demand side duopoly consisting of 2 or 3 retailers. These companies had the ability to spread the cost of higher priced solar across their electricity purchase portfolios.
- The capital cost of solar plant has been falling and consequently the cost of electricity from solar plants has been declining compared to coal and gas plant
- Lower prices for electricity from solar plants has resulted in demand for output from solar projects being more diversified with large scale electricity end users entering the market in addition to retailers
- Solar plant developers are staking out sites with low or no contributions to electricity network owners to connect to the grid – how long will such sites remain available is the question
- Network constraints may restrict growth or place upwards pressure on renewable project costs



## Why is there an opportunity for gas – a case study

- Output of Royalla 1 - a 20 MW solar plant south of Canberra – is shown in the following chart
- Green section of chart is generation on 27 Nov 2016
- Yellow line is generation on 27 Nov 2016. Presumably it was cloudy that morning. The gap on the left of the chart between the green shaded area and the yellow line is an opportunity for gas generation and potentially the area to the right after 5.30 pm
- The Generator Reliability Obligation makes securing generation to fill this gap the responsibility of renewable proponents
- With significantly greater capacity in solar likely to be installed in the coming decade this highlights the type of shortfall in supply that gas power generation could be best placed to fill under the Generator Reliability Obligation

# Why is there an opportunity for gas – a case study

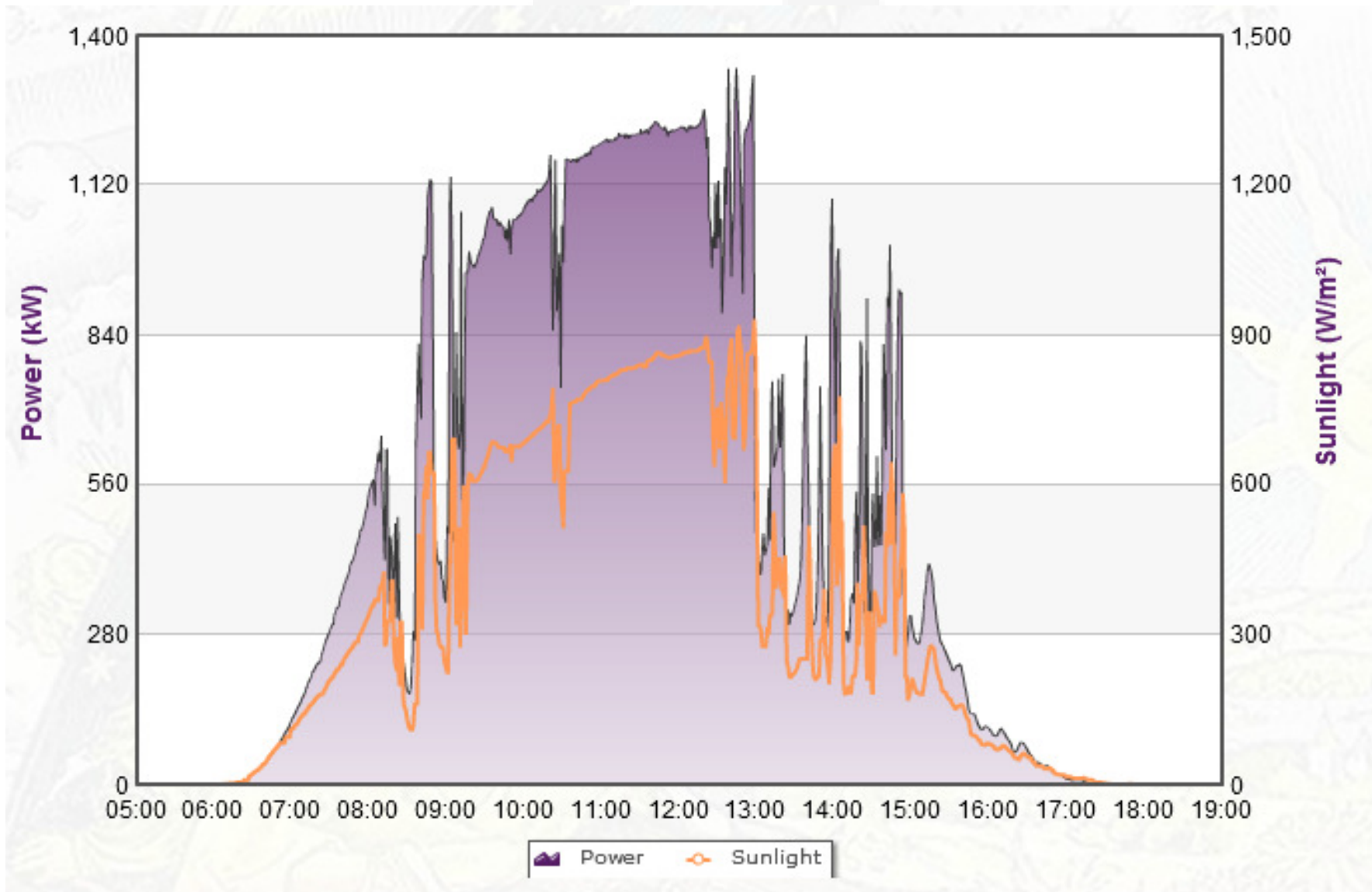


Source: AEMO

# Why is there an opportunity for gas – a case study

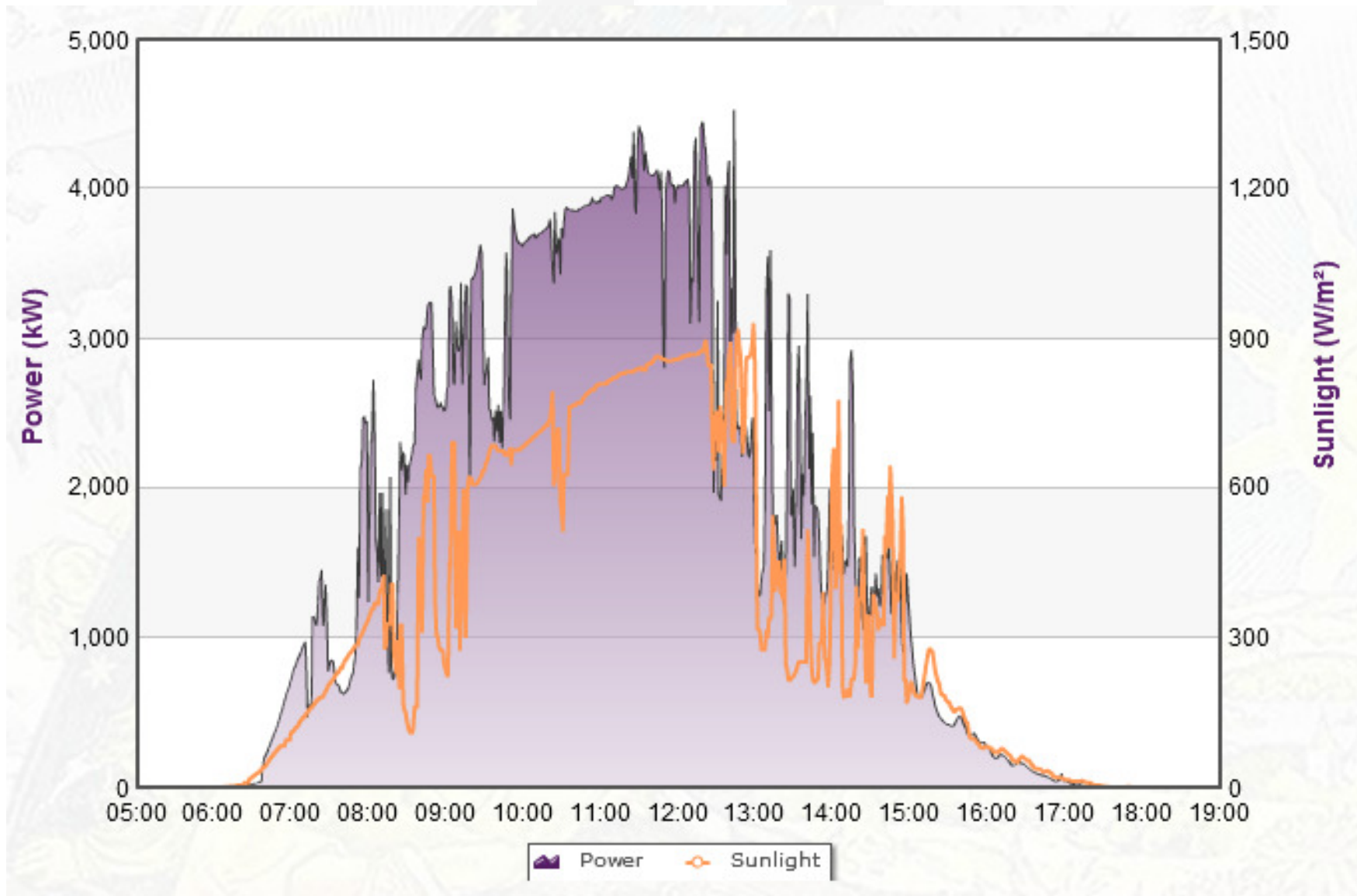
- A regional view is required – the following charts illustrate output from University of Queensland solar technology demonstration sites:
  - firstly in Brisbane; and
  - secondly in Brisbane, Gatton and near Gladstone
- The key message is that on this day there was no benefit from diversity by having plants across a region.
- Despite the multiple generation sites across the region output still included a similar level of variability to the single Brisbane site.
- Research needs to be undertaken to analyse whether there is a lack of diversity due to regional weather systems and the impact of this on solar generation output

# Cloudy days affect regions – UQ Brisbane Sites



Source: <http://solar.uq.edu.au/>

# Cloudy days affect regions – UQ all SE QLD Sites



Source: <http://solar.uq.edu.au/>

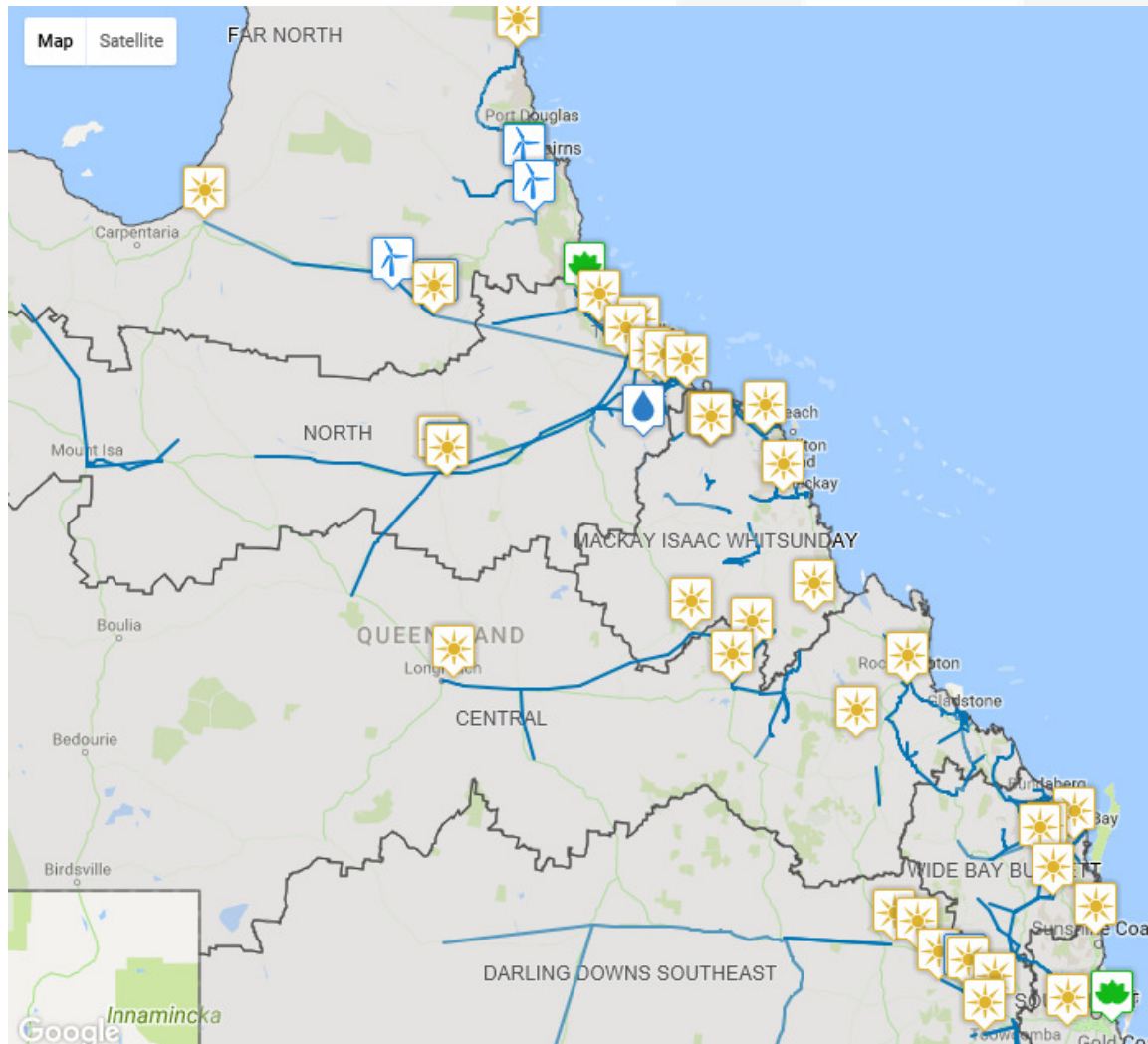
## Renewables in the NEM – MW Capacity of existing and proposed projects

	QLD	NSW	VIC	SA	TAS
<b>Installed Renewables</b>	1127	3785	3704	1617	2849
<b>Proposed</b>					
Solar	4166	982	1130	1515	0
Other Renewable	1391	4403	3262	3431	333

Source: <http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information>



# Solar in QLD



- 20-30 MW of large scale solar operational
- 280 MW being commissioned for summer 2017/18
- QLD Government target of 50% renewable generation by 2030
- Government forecasts an extra 4000 MW rooftop PV and 13 400 MW large scale renewable

Source: <https://maps.dnrm.qld.gov.au/electricity-generation-map/#>

Qld Government, *Credible pathways to a 50% renewable energy target for Queensland*, Nov 2016

# A road map for the gas industry - Risk and Timetable

- What are the implications for gas fired generation of the following.
- The potential for growth in renewables given the Commonwealth's commitment to the Paris Climate Accord but with Renewable Energy Target closing for new projects in 2020.
- The introduction of a National Energy Guarantee.

Recommendation	Timing
Generator fuel resource adequacy and contracts reporting	End 2017
AEMO last resort power (Reserve Trader)	Mid 2018
Generator Reliability Obligation	Mid 2018
Accessible regulatory and scientific data	Mid 2019
Evidence based regulation of projects & fair compensation of landholders	?

# Understanding the impact on a market that over time could be dominated by renewables

- Improved climate reporting data would be beneficial in analysing the variability in solar generation.
- Finkel states that *The Generator Reliability Obligation should include undertaking a forward looking regional reliability assessment, taking into account emerging system needs, to inform requirements on new generators to ensure adequate dispatchable capacity is present in each region*
- There are several policy initiatives that are or will come into play:
  - Clean Energy Target
  - 5 minute settlement
  - Generator Reliability Obligation
  - Australian Domestic Gas Security Mechanism
- There is a need for industry and policy makers to have a better understanding of the implications for the electricity and gas markets of the above initiatives.

# A road map for the gas industry in a market that over time could be dominated by renewables

Issue	Next Step
Generator Reliability Obligation	Influence design as gas is seen as the support for renewables
AEMO last resort power (Reserve Trader)	Influence design
AEMO has a significant role over next two years	Build on industry/AEMO relationship
AEMO forecasting accuracy	Need to be sure that this is robust, fit for purpose – triggers major policy matters
Generator fuel resource adequacy and contracts reporting	Influence reporting requirements