



2nd Annual
Eastern Australia's Energy Markets Outlook Conference

The outlook for wind as a generator in Australia

24 October 2013

Agenda



- **About Infigen Energy**
- The outlook for wind as a generator in Australia

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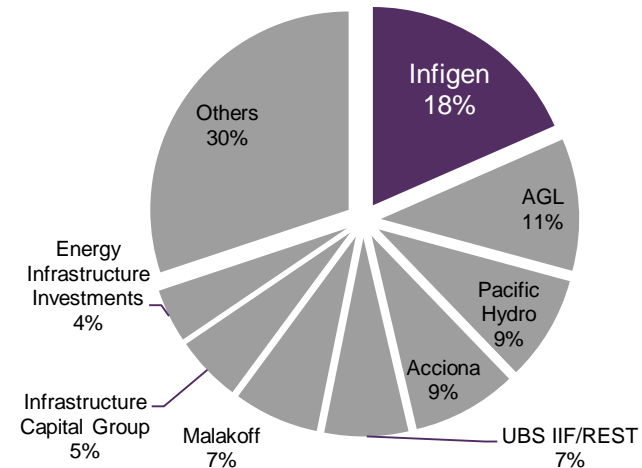


Infigen Energy Overview

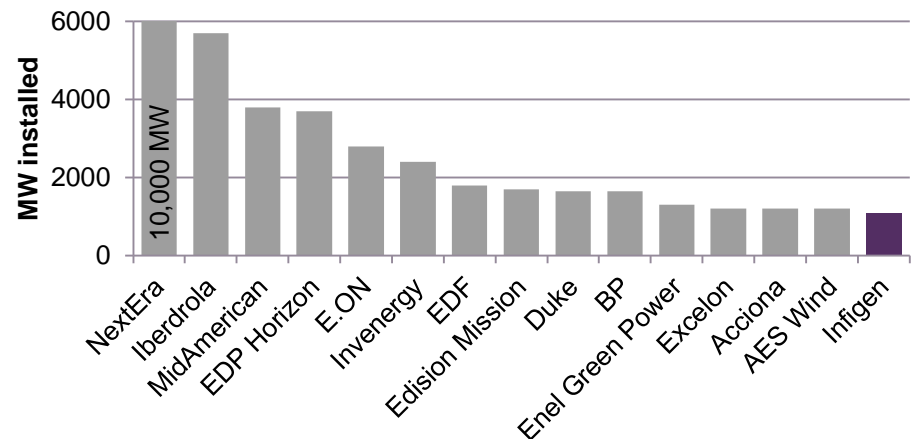
- Operate over 1,600MW of wind energy generation globally
- Significant development pipeline of wind and solar PV projects
- Development, asset management and energy markets capabilities
- Largest owner of wind energy capacity in Australia
- Own and operate a substantial business in US wind energy industry
- Sydney HQ; ASX listed (ASX:IFN)

1. Ecogeneration and company Websites.
2. IHS (2013) North America Wind Plant Ownership Rankings 2012

Australian Wind Farm Owners (operating MW)¹

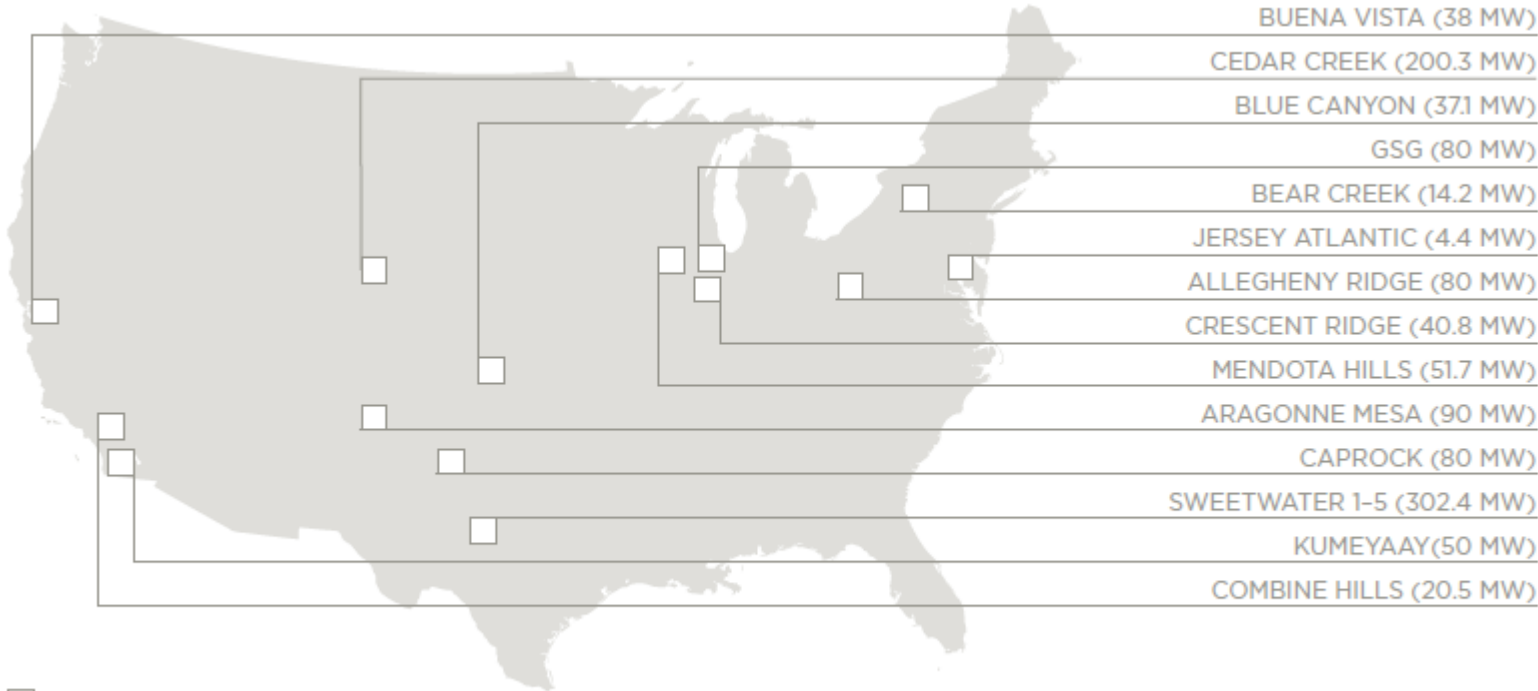


US – Top 15 wind farm owners by installed capacity (MW)²



Operating United States Assets

18 wind farms




□ OPERATIONAL ASSETS (CAPACITY)

Operating Australian Assets

Largest owner of installed wind energy capacity in Australia


ALINTA, WA

Installed Capacity	89.1 MW
Capacity Factor	44%
Completed	Jan 06



LAKE BONNEY, SA

LB1	Installed Capacity	80.5 MW
	Capacity Factor	28%
	Completed	Mar 05
LB2	Installed Capacity	159.0 MW
	Capacity Factor	30%
	Completed	Sep 08
LB3	Installed Capacity	39.0 MW
	Capacity Factor	31%
	Completed	Jun 10



WOODLAWN, NSW

Installed Capacity	48.3 MW
Capacity Factor	39%
Completed	Oct 11



CAPITAL, NSW

Installed Capacity	140.7 MW
Capacity Factor	30%
Completed	Nov 09



Agenda



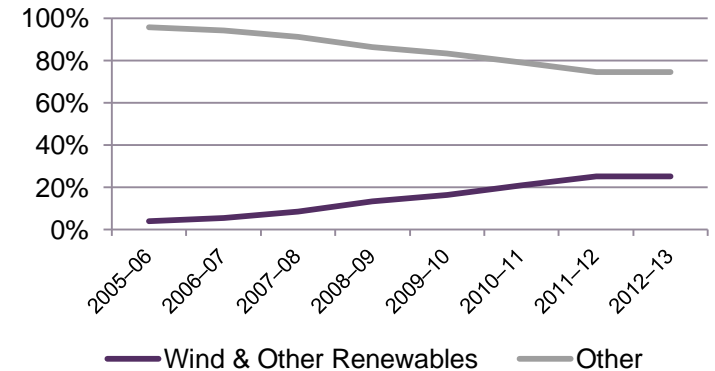
- About Infigen Energy
- **The outlook for wind as a generator in Australia**

We will see increasing wind generation capacity in the NEM

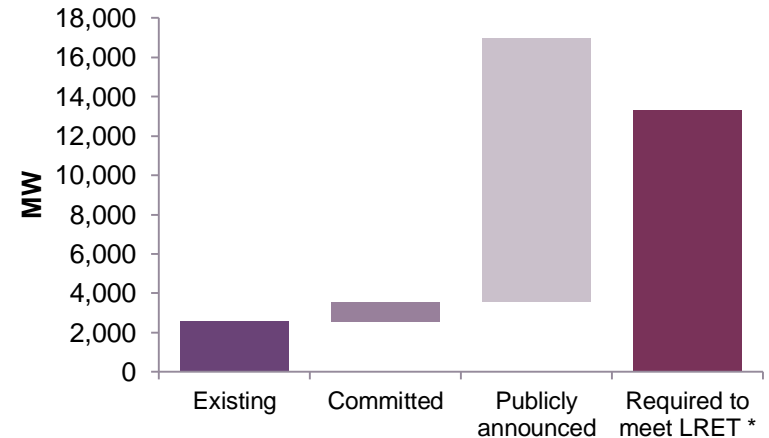
Regulatory settings will determine how much new generation and by when

- Wind capacity in the NEM has grown significantly over the last decade with over 2,500 MW installed, 954 MW committed and over 13,000 MW publicly announced
- Initial growth of wind energy driven by
 - Effective Renewable Energy Target legislation
 - Debt and equity support underwritten by bankable offtake commitments
 - Well established and cost competitive technology with improving scale efficiency
 - A strong and abundant wind resource
- In contrast fossil fuel technologies have been challenged by
 - Negative externalities – CO2 and other emissions
 - Escalating fuel costs – competing global markets
 - Mature technology with limited cost improvements
 - Limited capital providers to fund new development
- The RET review in 2012 concluded that the scheme was operating effectively in delivering the policy objectives, and that biennial reviews were damaging investor confidence in the sector
- We will see increasing wind generation capacity in the NEM
 - the timing and level will be determined by regulatory settings with predictability and stability needed to underpin investor confidence and reduce costs

Percentage of generation in South Australia



Wind Capacity in the NEM



* Assuming all wind generation and 35% average capacity factor

Hurdles to overcome to develop further wind resources

Regulatory predictability is critical

Policy

- The RET enjoys support of the Government, the Opposition and the Greens yet investment has stalled
- Reviews intended to assess the efficacy of the scheme in achieving its policy objectives have been used by opponents to propose dismantling the scheme or weakening the policy objectives
- Regular reviews of the RET undermine investor confidence

Technology/Integration

- Wind technology is relatively mature, but
 - Larger blades are enhancing efficiency at poorer sites
 - Transmission design / development can improve loss factors
 - Integrated wind/solar/battery storage now showing future promise

Social – dispelling myths

- A small but vociferous anti-wind lobby has been effective in having adverse health claims linked to wind turbines
 - No credible evidence to support claims
 - Improved community engagement should allay concerns
 - Carbon emitting electricity generation technologies have less onerous planning restrictions

Stringent Environmental Noise Guidelines

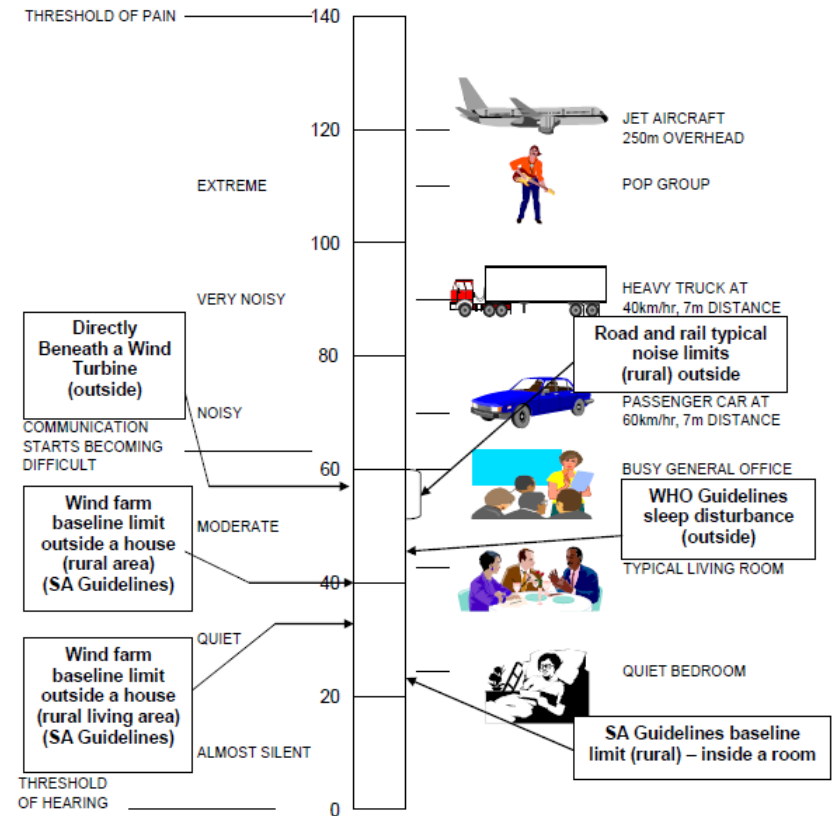


Figure 3 – Subjective Comparison of Noise Levels

Source: Sonus – Wind Farm Technical Paper (Nov 2011)

Hurdles to overcome to develop further wind resources

Regulatory predictability is the key hurdle that needs to be addressed

Affordability

- Opponents misrepresent RET costs & benefits
- Residential consumers don't get a breakdown of the RET component of their electricity bill
- The carbon price, energy efficiency schemes and the RET have been conflated under the banner of 'green schemes'
- RET intended to support the development of a local renewables industry and deliver emissions reductions
- IPART determined that the LRET monthly cost is only \$3.33/household (June 2013)
 - This was the highest determination of any State Regulator
 - LGC price of over \$51/LGC assumed in the determination (current price ~\$35)

RET 'is the real power driving energy price rises'

ANNABEL HEPWORTH
NATIONAL BUSINESS
CORRESPONDENT

The Australian

Wind sending price of power sky high

exclusive

Geoff Chambers

ELECTRICITY prices could surge again as power companies sling customers to help bankroll wind farm projects being built across the state.

GoSwitch.com.au founder Ben Freund, whose site offers energy deal comparisons, said customers were being slugged to cover renewable projects.

Companies behind major projects include Origin Energy, AGL, Transfield Services and Eparon.

The renewable energy grid

comparing the current long-run marginal costs for power generators revealed the difference between coal and wind energy. The 2008 report showed that by this year, wind energy projects would cost the equivalent of \$97.62 per megawatt hour (MWh) compared with \$45.99 for black coal.

ment of Resources, Energy and Tourism released estimates of the levelised costs of existing and new electricity generation technologies.

"These estimates ... indicate that without a carbon price the estimated levelised cost per unit of electricity for a new, coal-fired power station

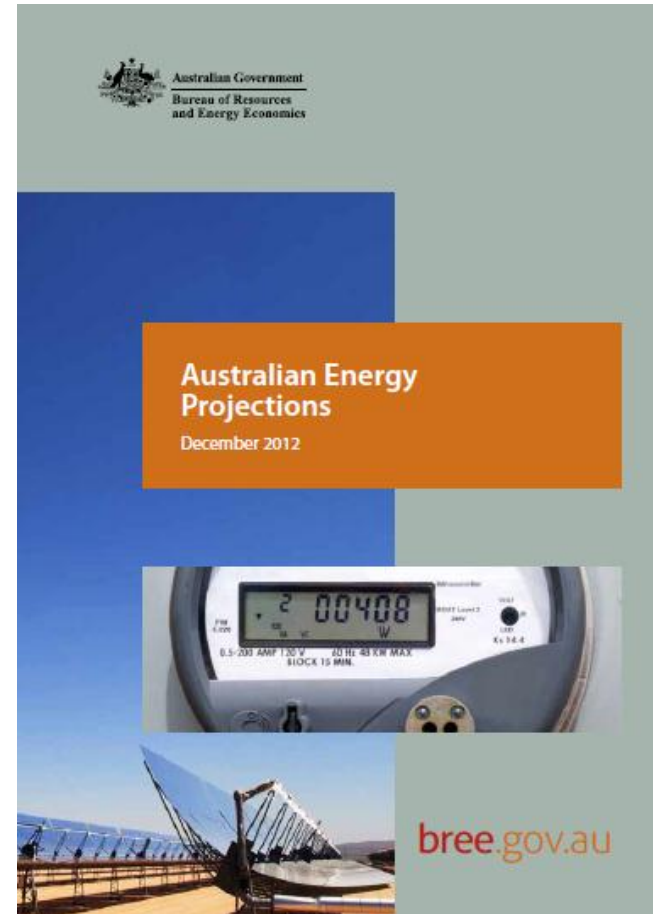
Daily Telegraph



Moving from a fixed 41 TWh to a 'floating' 20% target

The concept of a 'floating' target has been considered on previous reviews and rejected each time

- Certainty of a fixed target is desirable to the industry and investment community – it is difficult and ultimately more costly when attempting to plan to meet a moving target
- The notion of a 'floating' target is really a veiled attempt by opponents to publicly "support" the RET at the same time as effectively weakening it. The same opponents previously supported a fixed target when it suited.
- This is further evidenced in opponents' calculations of the forecast percentage – e.g. off grid renewable supply is counted in the numerator but eliminated from the denominator
- The Bureau of Resources and Energy Economics estimates that the percentage of renewable energy across Australia will be 22% in 2020 under the existing RET
- Forecasting electricity demand one year ahead is very difficult – let alone forecasting 2020 demand

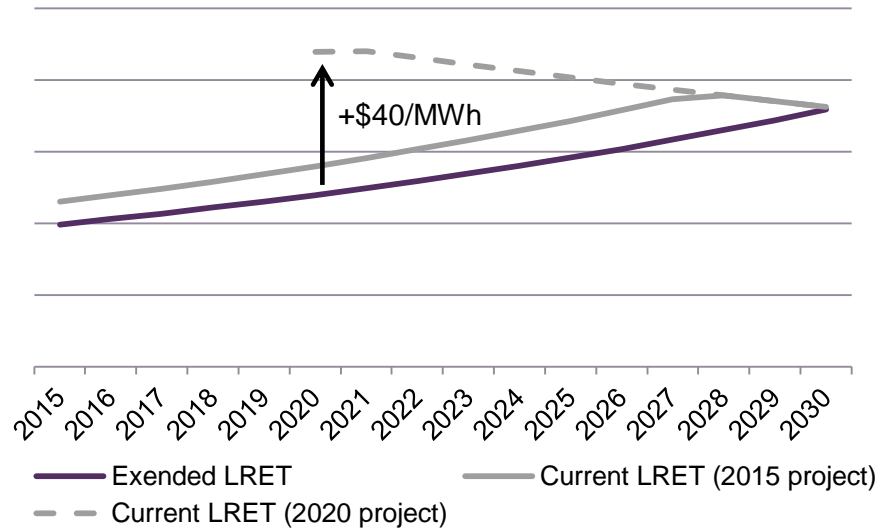


Moving from a fixed 41 TWh to a ‘floating’ 20% target

The real challenge that needs to be addressed is the target ‘cliff edge’ at 2030

- Large-scale generation certificate (LGC) surplus and resultant price signals meant few new projects were sanctioned since 2011
- Increasing demand and a diminishing timeframe to earn a return from the LGC revenue stream will push LGC prices towards the ‘shortfall’ rate
- The existing target continues to increase to 2020, with the timeframe to achieve fair returns diminishing each year
- The ‘cliff edge’ could result in the target not being achieved irrespective of whether it is the current target, or a revised assessment of 20%
- The scheme was designed with an assumed carbon price that was intended to avoid the ‘cliff edge’ issue
- The scheme needs to be extended to ensure the cost to consumers is minimised, and to compensate for investment delays caused by the surplus

Bundled Electricity and LGC prices required (\$/MWh)



Because the LRET scheme has a 2030 end date, bundled prices for new renewable projects must escalate with each passing year to achieve the same required revenue NPV outcome.

A project that commences in 2020 would be \$40/MWh (real) less expensive if the LRET scheme is extended.

Source: Infigen estimates.

Key Outcomes of the LRET

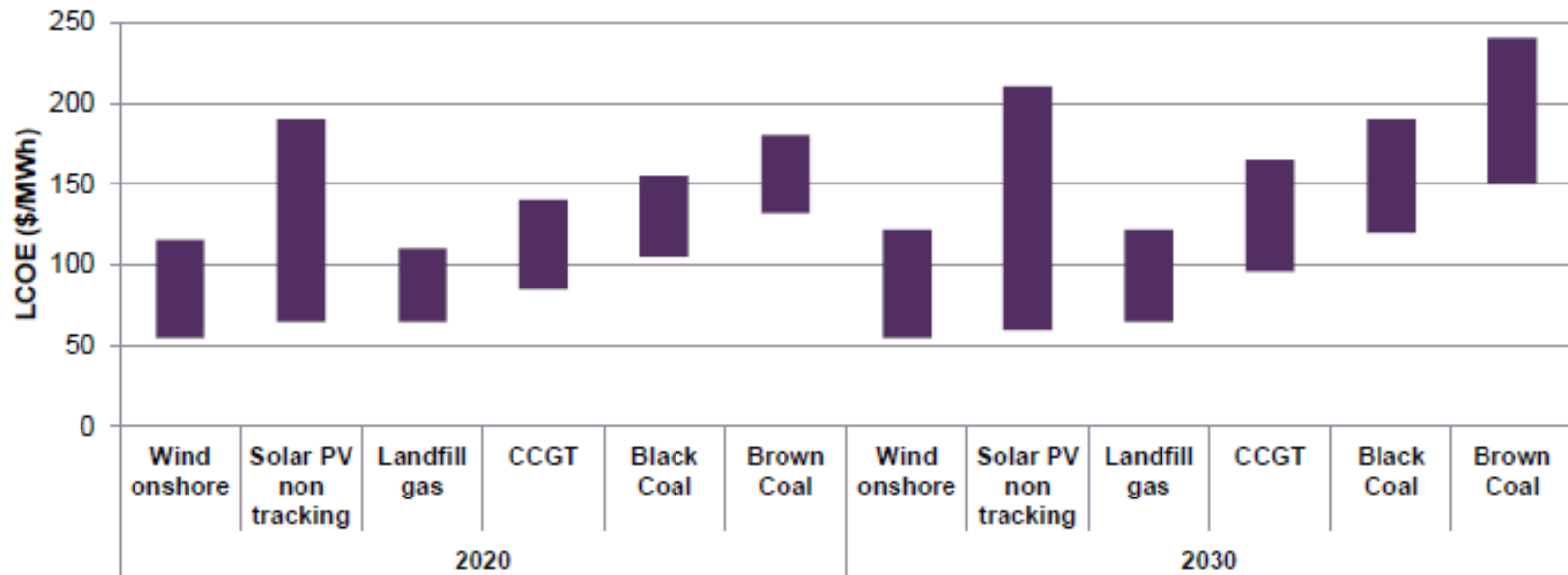
Educating the broader community that the RET is achieving its intended outcomes for a modest cost while delivering greater benefits is the key challenge for the industry

- An effective piece of legislation first introduced by the Howard Government and expanded with bipartisan support.
- RET has from 2001 to date resulted in the addition of over 5,000 MW of renewable energy capacity for a modest cost.
- **The current cost of the large scale scheme (LRET) to households is approx \$3 per month.**
- Independent modelling has shown that **wholesale and retail electricity prices will increase if the LRET is lowered.**
- **The LRET has the greater benefit of reducing overall wholesale electricity prices.** This will be muted if the target is lowered.
- **South Australian consumers have benefited from lower wholesale electricity prices** as a result of 25% renewable penetration. Other states will lose out if the LRET is reduced.
- Poor administration of the small scale scheme has resulted in higher than expected costs to consumers, and has also been to the detriment of the large scale industry. This has now largely been resolved.
- Australia needs a balanced portfolio of electricity generation to future-proof its global competitiveness. The LRET will contribute to this objective.

Wind generation deployment to continue post LRET

Renewables are expected to be amongst the lowest cost electricity technologies by 2030

Australian Energy Technology Assessment (AETA) 2012 - Levelised cost of electricity (LCOE)



Source: Bureau of Resources and Energy Economics (2012)

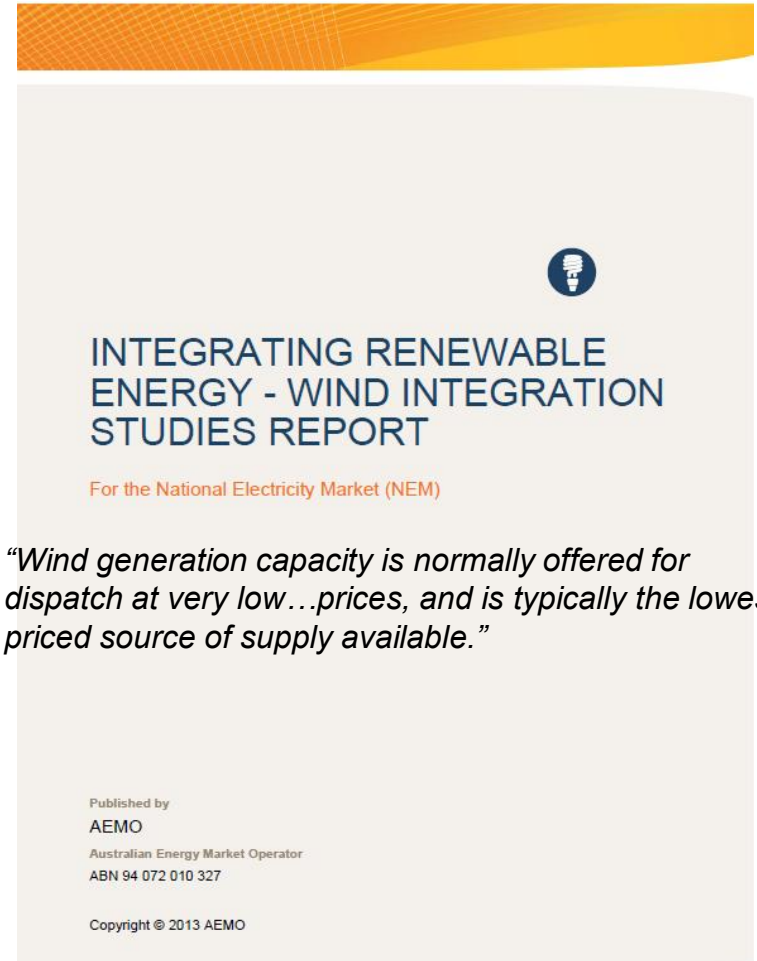
Comments

- Renewable technologies are expected to be the cost leaders within a decade
- The AETA cost estimates suggest that Australia's electricity generation mix out to 2050 is likely to be very different to the current technology mix
- LCOE includes where relevant allowance for: carbon price, CO2 transport and sequestration cost, plant capital cost (EPC basis) within battery limits, owners costs excluding interest during construction, fixed and variable operating costs, fuel costs and economic escalation factors

Wind generation deployment to continue post LRET

High gas prices and difficulty in financing coal assets expected to make renewables competitive

- The risk (and therefore cost) associated with financing new 'dirty' power stations and the ongoing fuel cost uncertainty make them costlier than wind in the long term.
- Global action on climate change may result in a carbon price that renders fossil fuels uncompetitive in providing the vast majority of our energy needs
- In some regions of the United States wind generation is already more competitive than fossil fuel generation (even with low gas prices)



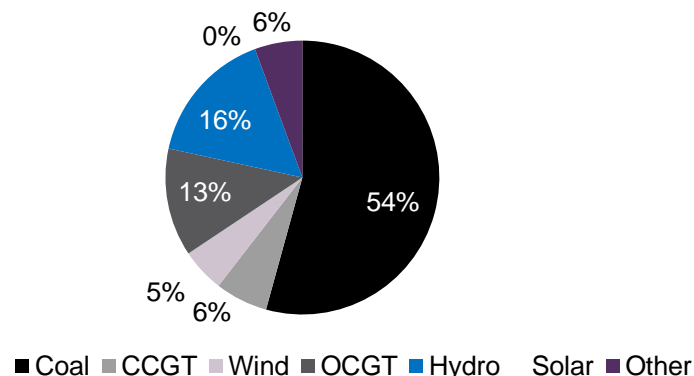
“Wind generation capacity is normally offered for dispatch at very low...prices, and is typically the lowest-priced source of supply available.”

Technological developments

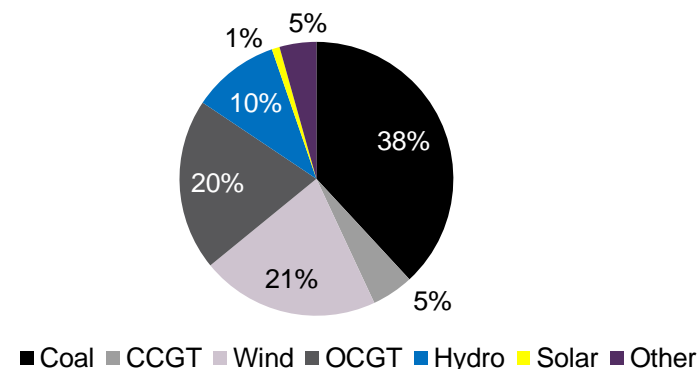
Wind is effective in delivering low cost renewable energy

- Australia has sufficient base load generation today; there is no need for more
- The viability of a different technology should not be assessed against existing technologies – the electricity supply system isn't being built from scratch
- There is plenty of dispatchable generation to accommodate a much higher penetration of renewables than exists today
- Wind can provide plentiful low cost renewable energy; other technologies will be used to provide capacity
- People don't use electricity in a base load fashion
- As time of use metering becomes commonplace there will also be remarkable opportunities available for the free market to encourage cost-effective use of available generation (meaning base load won't be required)
- Storage technologies won't differentiate between the electron providers

National Electricity Market - Existing



National Electricity Market - Existing and Announced



Source: AEMO Electricity Statement of Opportunities 2013

Questions



Our generation, your future



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