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## ASX release

### **Briefing on Renewable Energy, Warnambool**

**8 November 2012**

Later today, a presentation will be made to analysts and fund managers about the Renewable Energy Target and AGL's pipeline of renewable energy generation projects.

A copy of that presentation is attached.



Paul McWilliams  
Company Secretary

#### **About AGL**

AGL is one of Australia's leading integrated renewable energy companies and is taking action toward creating a sustainable energy future for our investors, communities and customers. Drawing on 175 years of experience, AGL operates retail and merchant energy businesses, power generation assets and an upstream gas portfolio. AGL has one of Australia's largest retail energy and dual fuel customer bases. AGL has a diverse power generation portfolio including base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources including hydro, wind, landfill gas and biomass. AGL is Australia's largest private owner and operator of renewable energy assets and is looking to further expand this position by exploring a suite of low emission and renewable energy generation development opportunities.





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## Achieving the RET by 2020

Anthony Fowler, Group General Manager, Merchant Energy  
Simon Camroux, Manager Regulation & Market Development  
November 2012 | AGL External

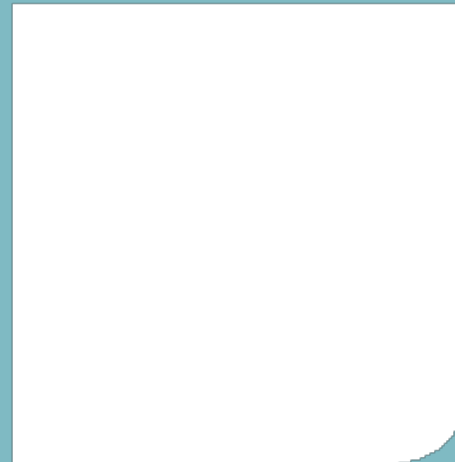
# Presentation focus

- › A global renewable energy perspective
  - » International policy settings
  - » Delivered global investment
- › Delivered large scale renewable investment: Australia
- › Evolution of the Renewable Energy Target (RET)
  - » Climate Change Authority (CCA) Discussion paper
- › AGL's path to achieving the RET target

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A global perspective



# Global renewable investment

## Policy settings:

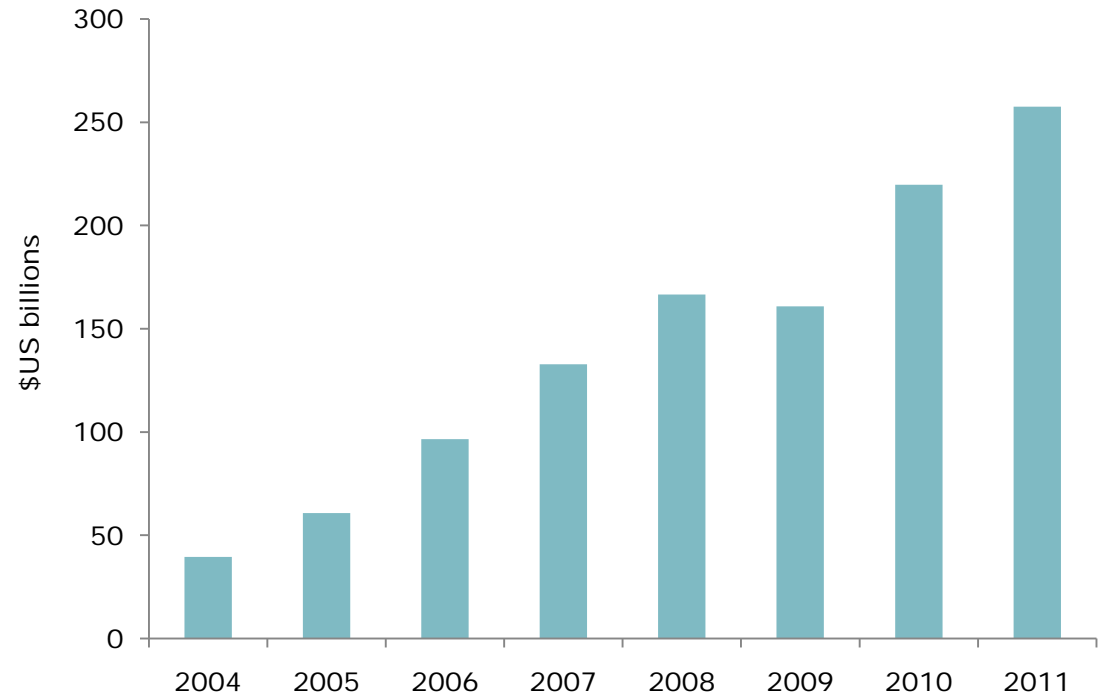
- > 118 countries have adopted renewable energy targets
- > Developed and developing countries
- > Large number also have feed in tariffs
- > Mixed policy signals
  - » US policy changes
  - » Spanish/German target reductions

Country/State	Renewable Mandate (by 2020)
China	15% renewable
UK	15% renewable
Europe	20% renewable
US (e.g. California, Texas)	33% renewable
Israel	10% renewable
Kuwait	5% renewable

# Global renewable investment

## Total global renewable energy investment

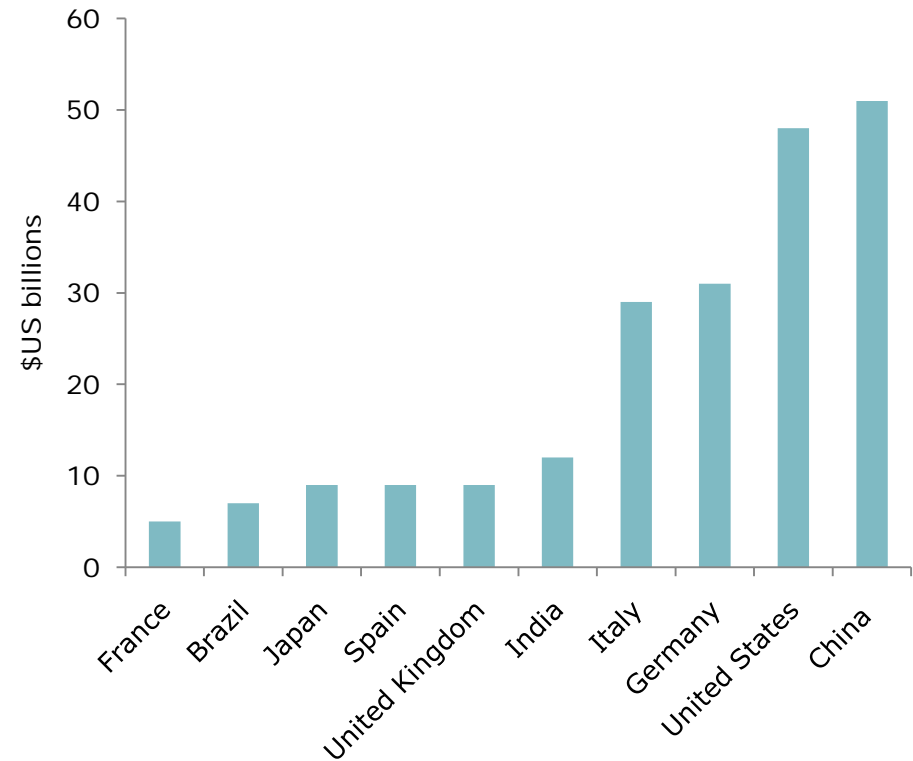
- > Global investment in renewables continues to grow strongly
- > In 2011, global investment was US\$257 billion
  - » 6 times more than in 2004
  - » 94 percent more than 2007
- > Investment in 2011
  - » Solar PV US\$147 billion
  - » Wind US\$84 billion



# Global renewable investment

- › China led global renewable investment in 2010 and 2011 –over US\$50 billion
- › US investment increased by 57% from 2010 to US\$50 billion
- › Germany – lead EU investor – third largest investor in renewable energy overall – US\$31 billion

Renewable energy investment by country



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Source: UNEP Collaborative Centre



# Global renewable investment

- › Total global installed renewable capacity of 1,360GW
- › Wind has historically dominated global renewable energy investment
  - » Solar PV ranked fourth
- › Technology costs fell significantly in 2011
  - » Photovoltaic module prices fell by close to 50%
  - » Wind turbine prices declined by between 5% and 10%

Total global renewable capacity by type	
Large scale hydro	795GW
Wind	239GW
Small-Hydro	184GW
Solar	73GW
Biomass and Waste-to-Energy	57GW
Geothermal	11GW
Marine	1GW
<b>Total</b>	<b>1,360GW</b>

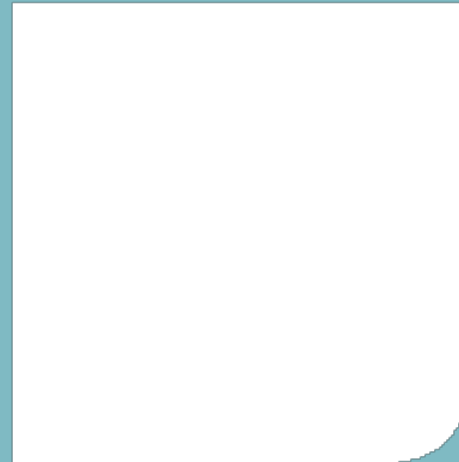
- » **Achieving RET by 2020**
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Source: The Pew Charitable Trust





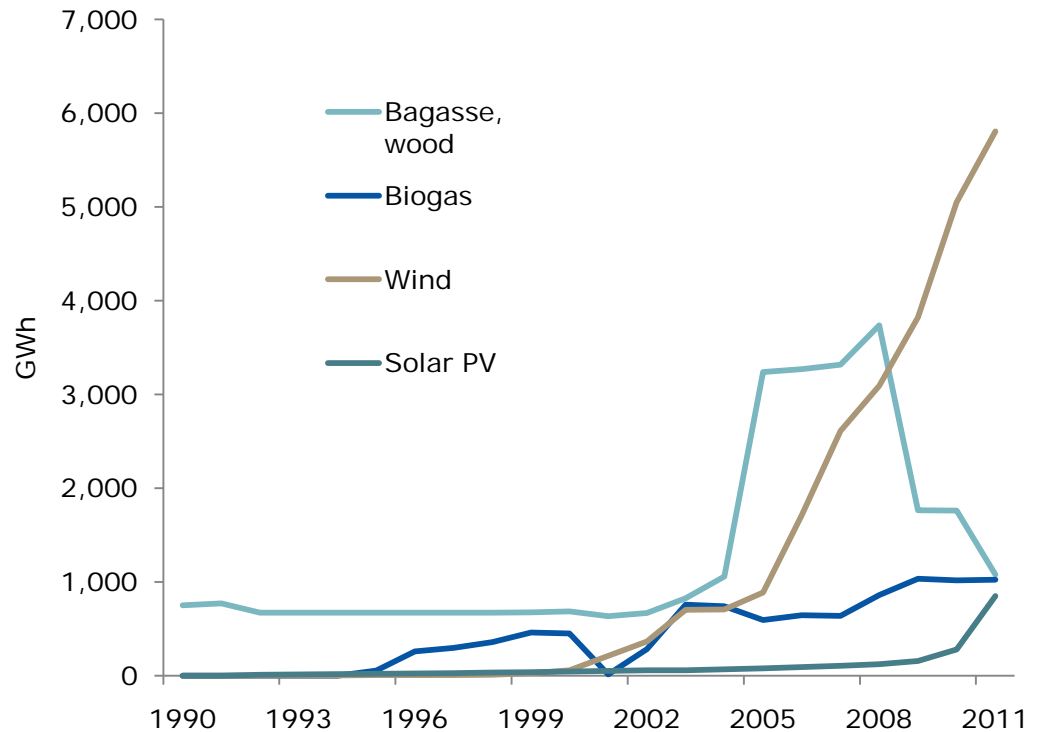
## Australia: Investment to date



# Domestic renewable investment

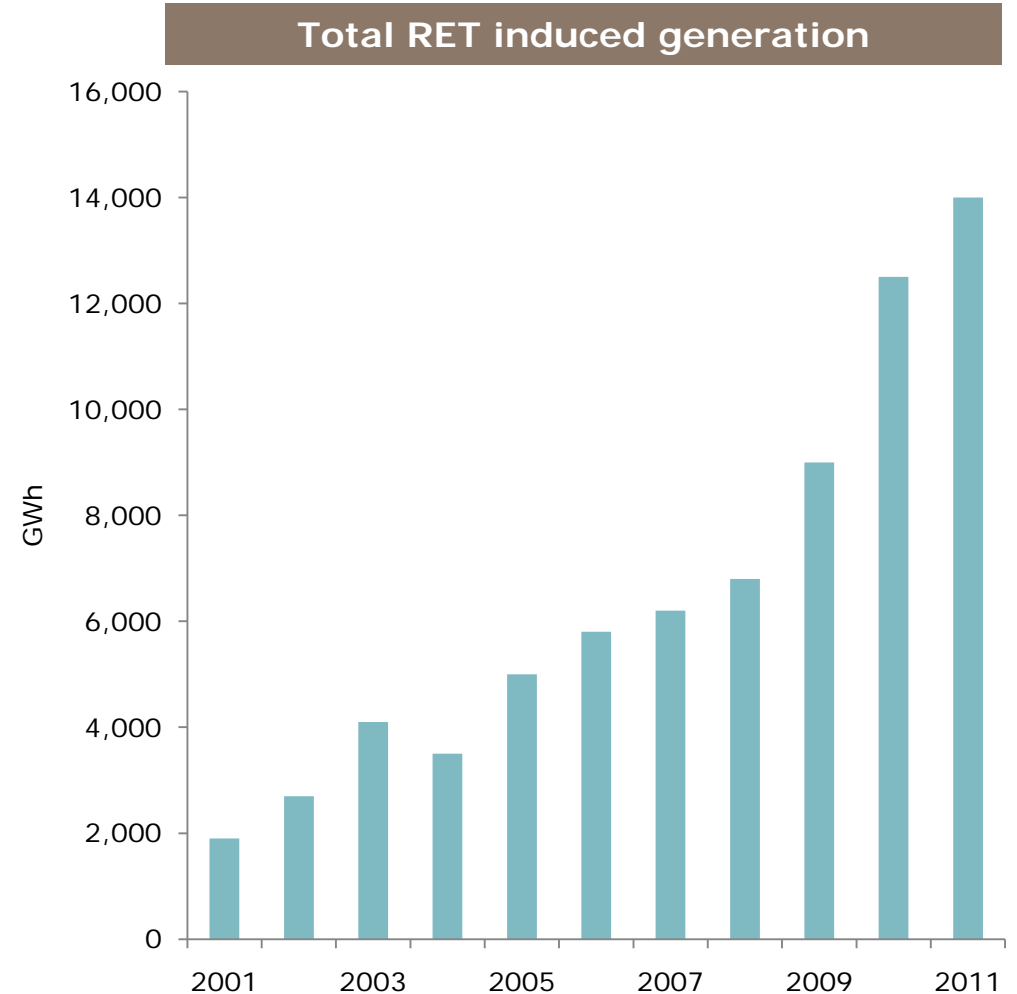
- > Installed renewable electricity capacity has more than doubled since the introduction of the MRET in 2001
- > Capacity increased from around 6,700MW in 2001 to around 13,500MW in 2012
- > Wind and solar PV generation investments capacity have accounted for the majority of this increase
- > Solar PV systems now provide approximately 2GW of generation capacity
  - » Driven by RET multiplier and feed-in tariffs (FiTs)

Australian renewable generation output since 1990



# Domestic renewable energy production

- > Significant ramp up in renewable generation investment since RET expansion
- > Currently have 14,000GWh of RET induced output with almost 70 million certificates created
- > Domestic solar PV grew strongly but separation into SRES and lower FiTs has reduced growth



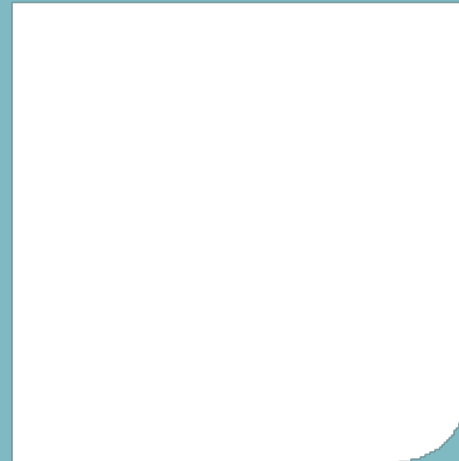
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Source: Climate Change Authority



# Renewable policy evolution



# History of the RET

- › 2001 – Mandatory Renewable Energy Target (MRET) introduced
- › 2003 – Tambling Review of the MRET – no policy changes
- › 2007 - Election
  - › Howard Government 15% Clean Energy Target (incl. capacity with CCS)
  - › Rudd 20% Renewable Energy Target
- › 2009 – 20% Renewable Energy Target legislated
- › 2010 – Split of the RET (small and large scale)
  - › 41,850 GWh Large Scale Renewable Energy Target
  - › \$40 fixed price Small Scale Renewable Energy Scheme
- › 2012 – CCA RET Review
- › 2016 – Next review of RET proposed

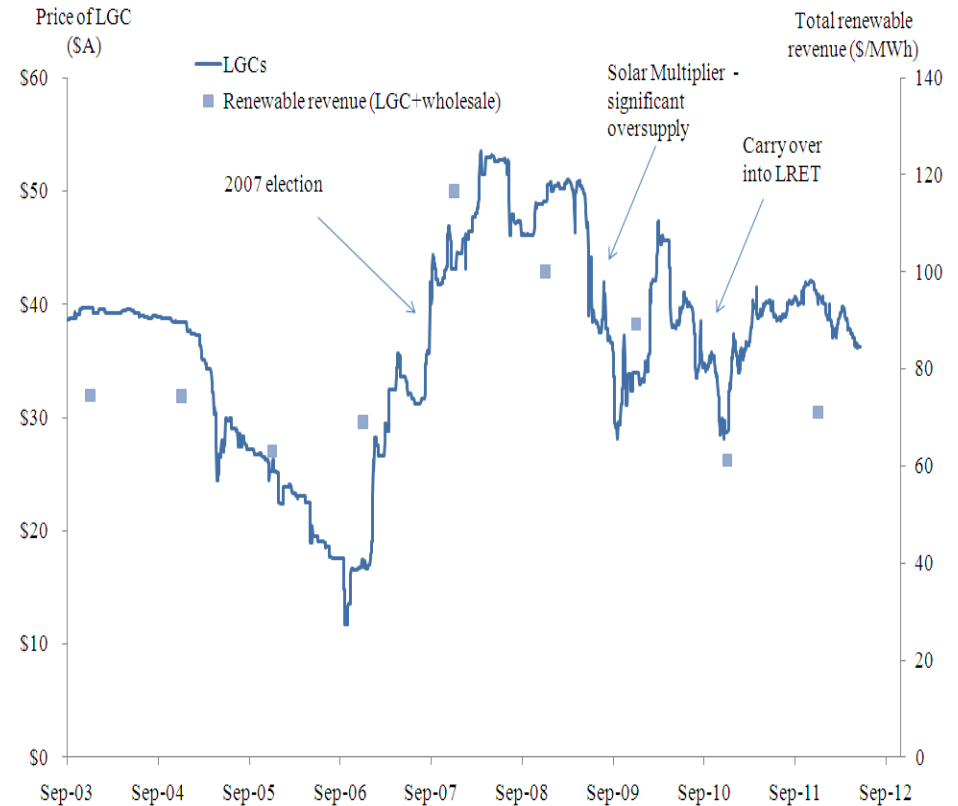
- 
- › **Achieving RET by 2020**
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# Historical impacts of RET policy changes

- > Significant fluctuations in LGC value and project revenue following policy announcements
- > Created significant peaks and troughs in the market
- > Investor confidence directly affected by policy announcements

## LGC price and total renewable revenue



Source: AGL

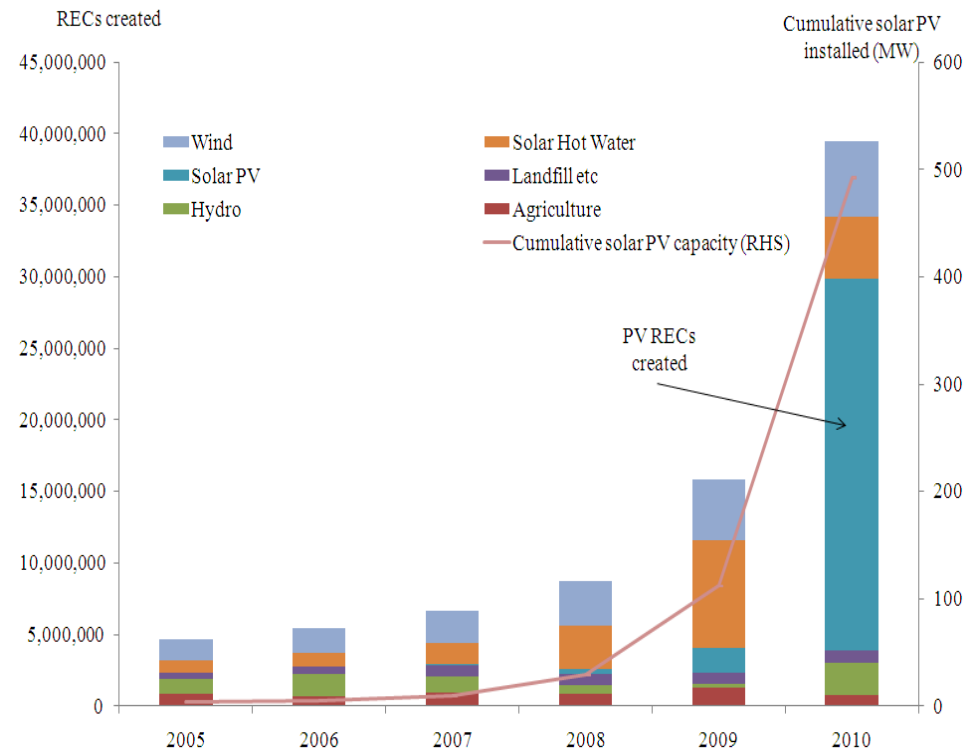
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# Historical impacts of RET policy changes

- > Significant growth in REC certificate creation in 2010
- > Driven by solar PV investment
  - » Current installed capacity estimated at 2GW ~ 850,000 homes
  - » Driven by RET multiplier and FiTs
- > Policy changes
  - » Removal of RET multiplier and FiT reduction
  - » Will significantly reduce solar PV installation

## Renewable Energy Certificates (RECs) created and cumulative solar PV installed



Source: AGL

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# CCA Review recommends minimal changes

- › CCA charged with reviewing RET legislation
- › Draft report released October 2012 recommends:
  - » No significant changes to scheme design
  - » Review every 4 years, instead of every 2 years
- › Some market participants sought a “real 20%” target
  - » CCA concluded would not provide certainty; and
  - » Would increase greenhouse gas emissions
- › All sides of politics committed to RET in current form
- › Modelling reveals minimal end user pricing impacts
  - » RET certificate costs are estimated to contribute 3.7 per cent of the total costs of electricity to 2030-31, or around \$68 per annum to the volume weighted average household bill
- › Final report due 31 December 2012
- › Federal Government must respond within 6 months

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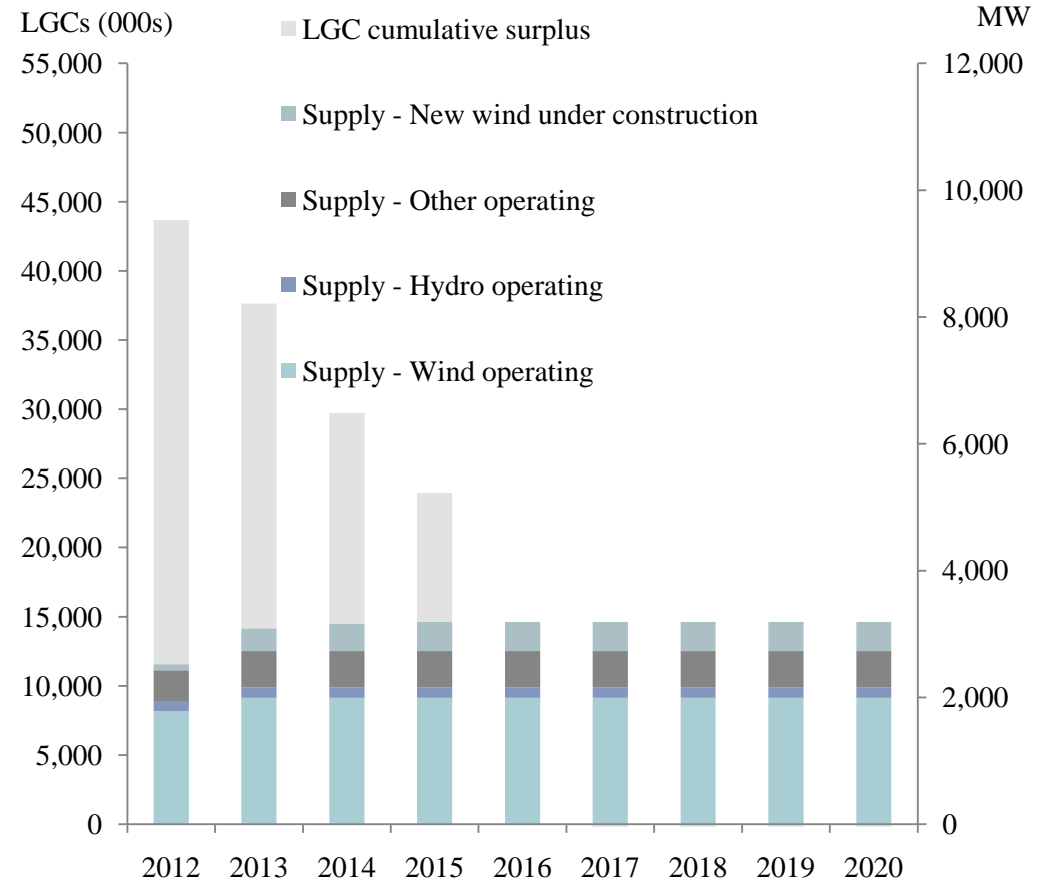
Need for new investment  
– 2015 onwards



# LGC Supply and Demand

- > Existing surplus of LGCs in 2012 is gradually absorbed
- > Limited new supply from committed projects

Modeled supply and demand of LGCs from 2012 to 2020



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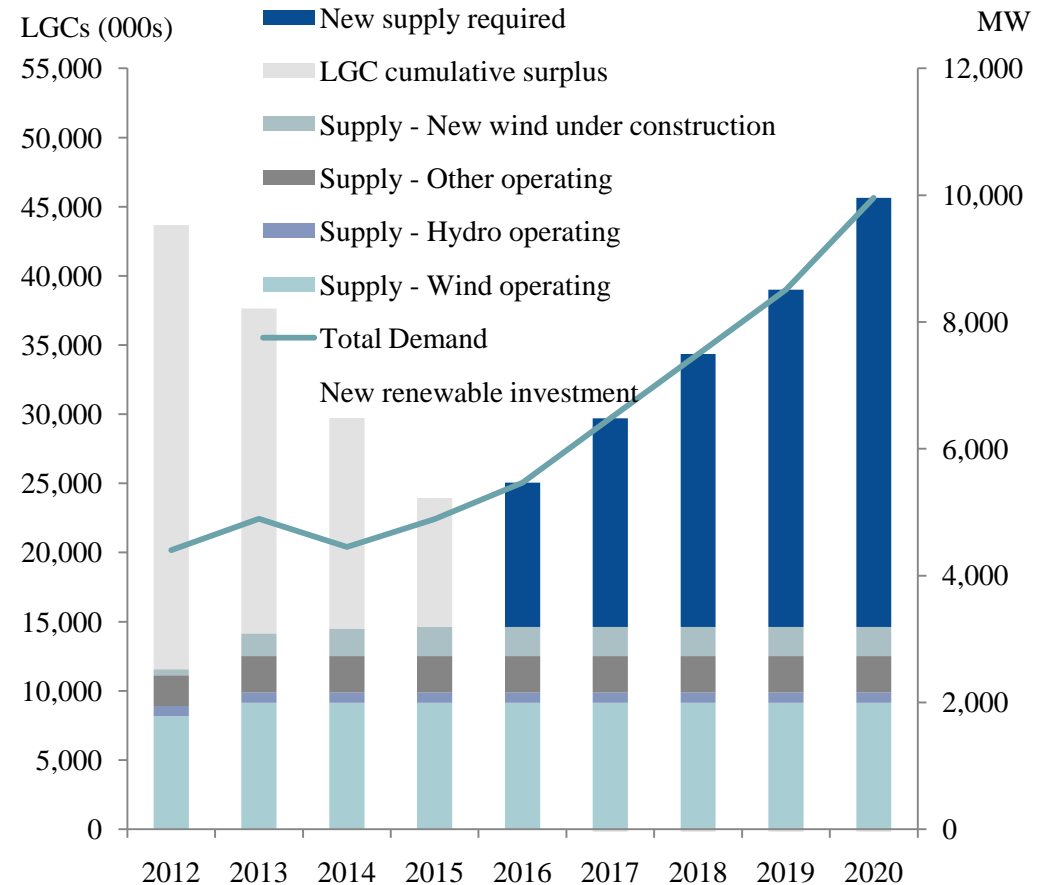
Source: AGL



# LGC Supply and Demand

- > Existing surplus of LGCs in 2012 is gradually absorbed
- > Limited new supply from committed projects
- > New LGC supply is not required until ~2016
- > Beyond 2016, the significant increase in legislated targets under LRET results in rapidly increasing new build requirements

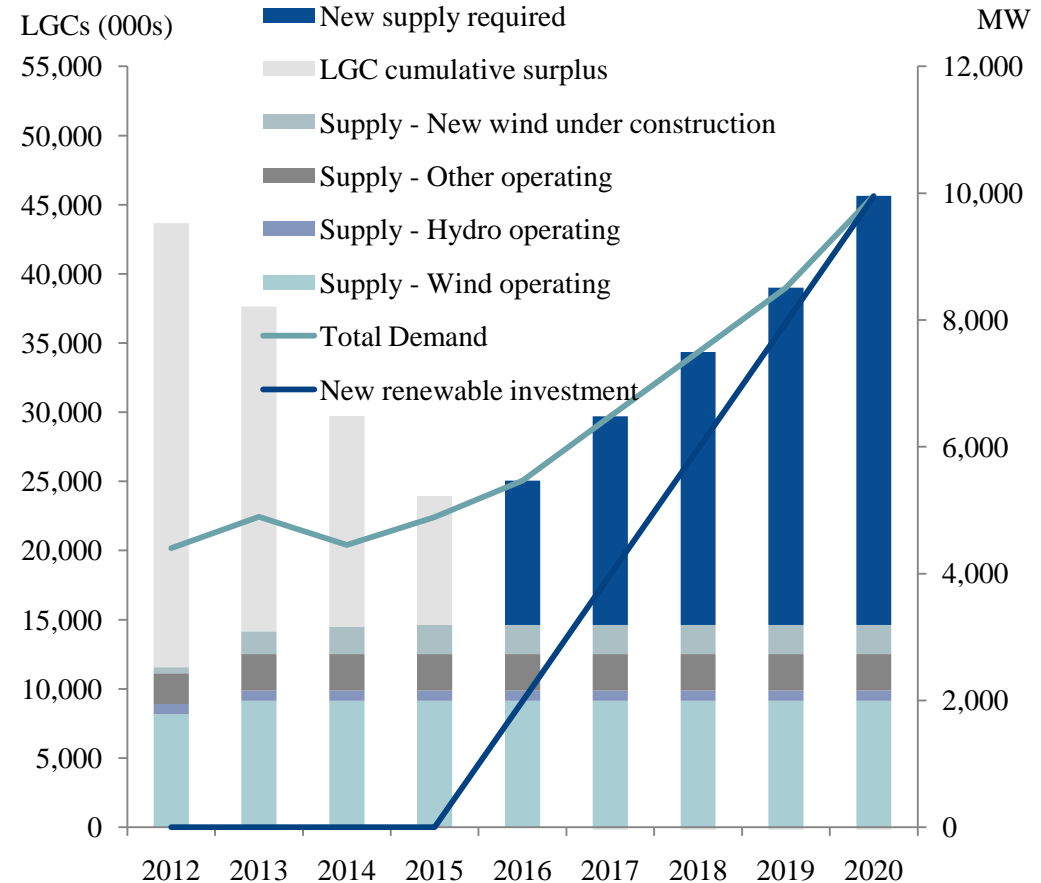
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- > Over the 5 years between 2016 and 2020 (inclusive), implied annual new investment is ~1,900MW (~\$4 billion)
- > LGC prices expected to rise significantly

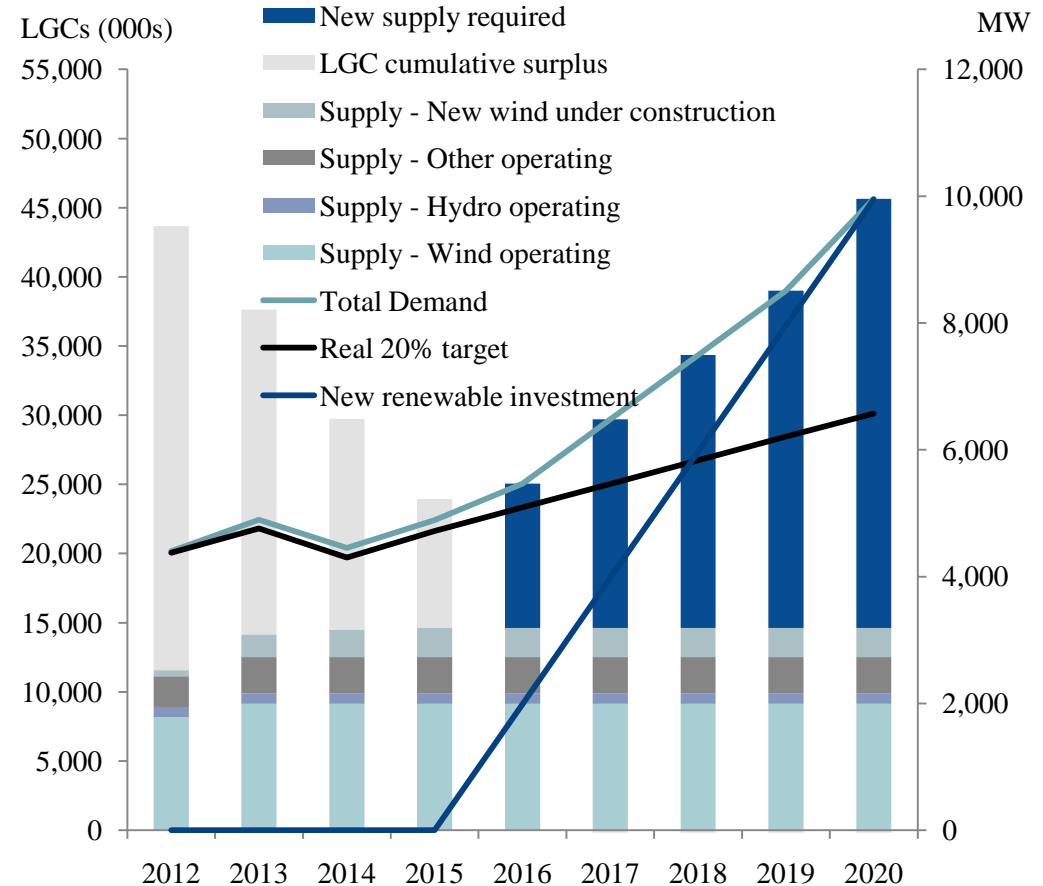
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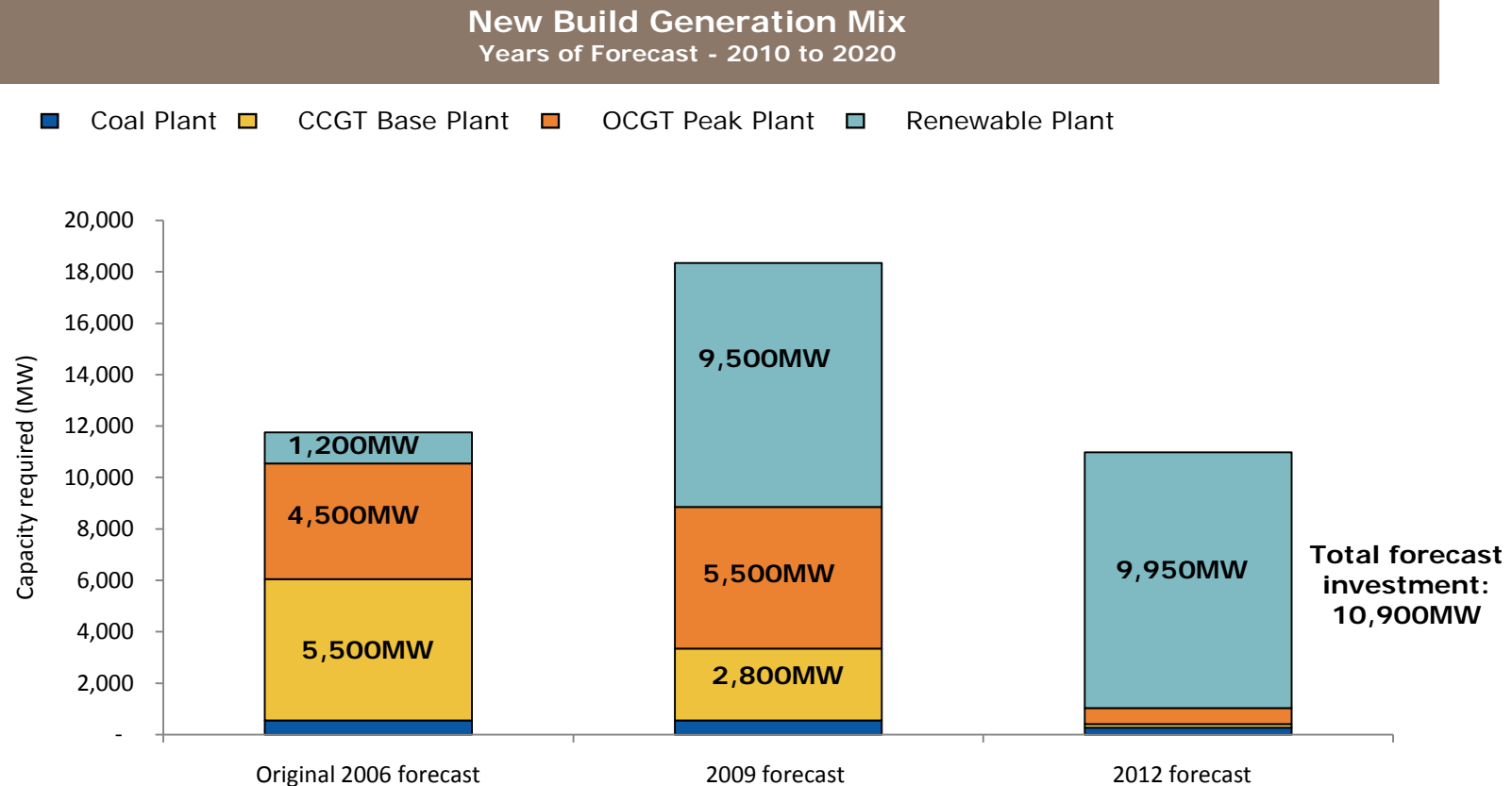
- » November 2012
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Source: AGL



# Impact of Renewable Policy Setting

Fundamental changes required to generation mix.



- » Achieving RET by 2020
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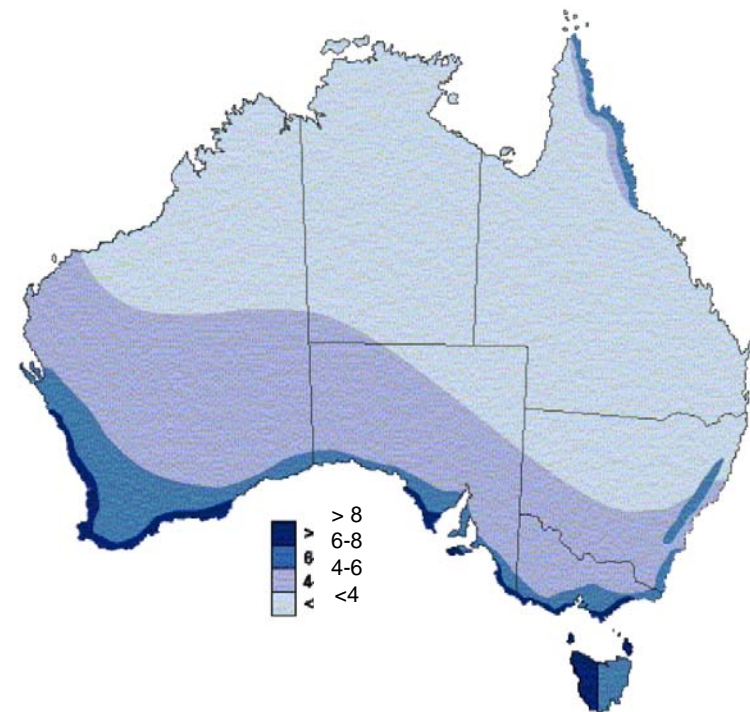
Source: AGL Greenhouse modeling



# Australia: World-class wind resource

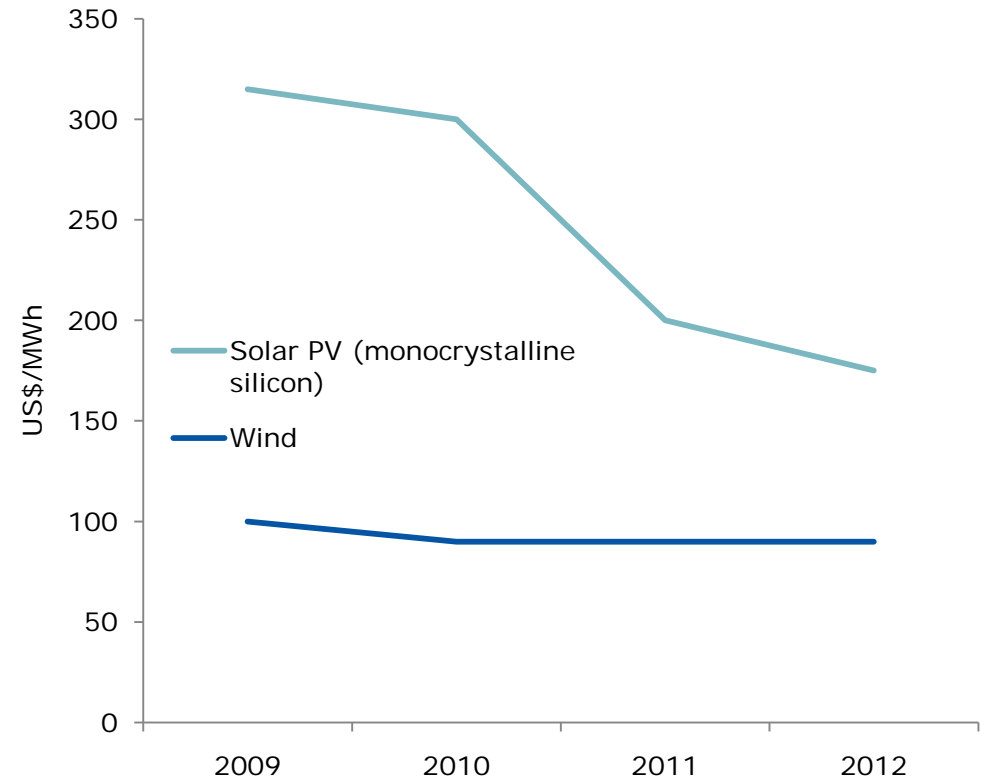
## Average wind speeds (metres per second)

- > Wind resource is best in Tasmania and areas in Western Australia, South Australia and Victoria
- > Queensland and the Northern Territory have limited large scale wind potential
- > The best development sites are already being taken in Tasmania, South Australia and Western Australia



## Global levelised cost of energy – solar & wind

- > RET target dominated by wind and solar energy generation capacity
- > Significant global reduction in solar PV costs
- > Wind costs also decreased but not as significantly as solar PV
- > Value gap between wind and solar PV capacity is closing
- > Cost reductions make solar increasingly attractive but still not competitive with wind
  - » Solar has a better correlation with peak demand

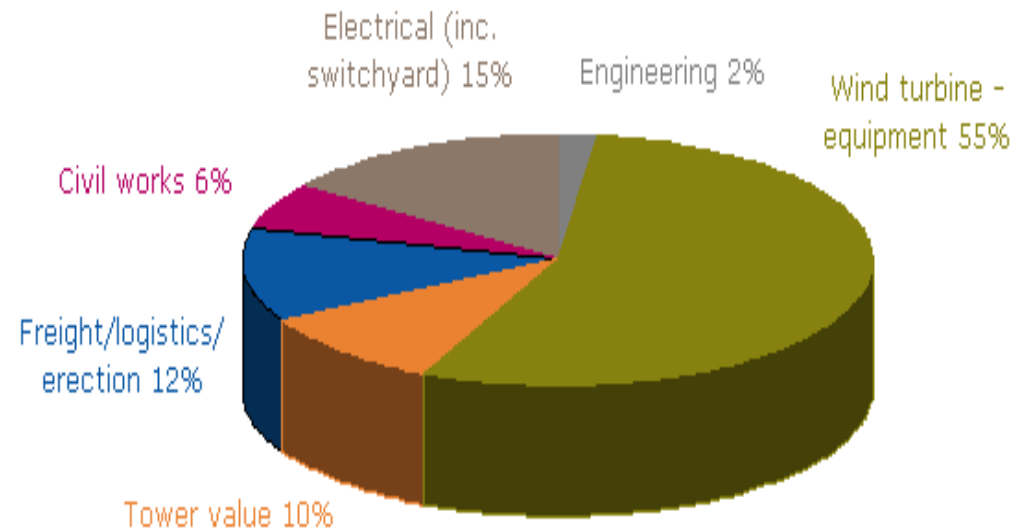




# Technology gains to have limited impact

- › Wind turbines represent ~55% of installed capex
- › Limited scope for reduction in non turbine costs
- › Rate of development of longer bladed turbines slowing
- › Potential move from turbines with gears to no gears
  - › Increased cost
  - › Reliability issues
- › Lower wind speed sites adopting larger blades
  - › Vestas 112 metre rotors

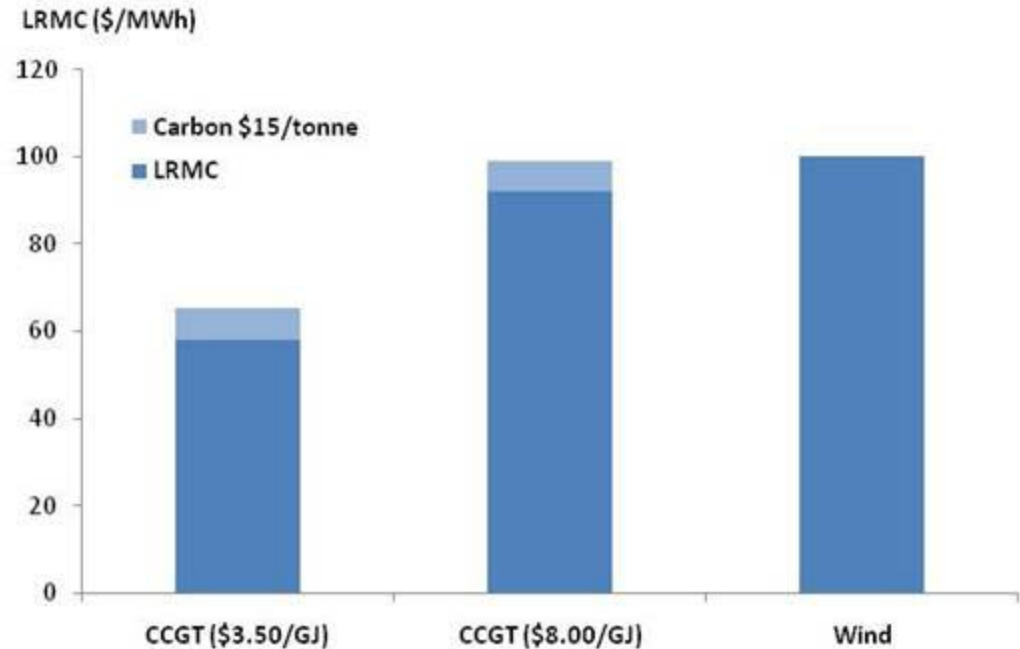
Breakdown of wind farm capex



# CCGT attractiveness

- > The price of gas and the carbon price have a significant impact on the overall cost of CCGT capacity on a \$/MWh basis
- > The higher the gas price/carbon price the closer in cost CCGT capacity is to the current wind price and vice versa
- > If gas prices and the carbon price continued to rise – and new renewables continue on their current trajectory – it may lead to a greater shift towards renewables capacity

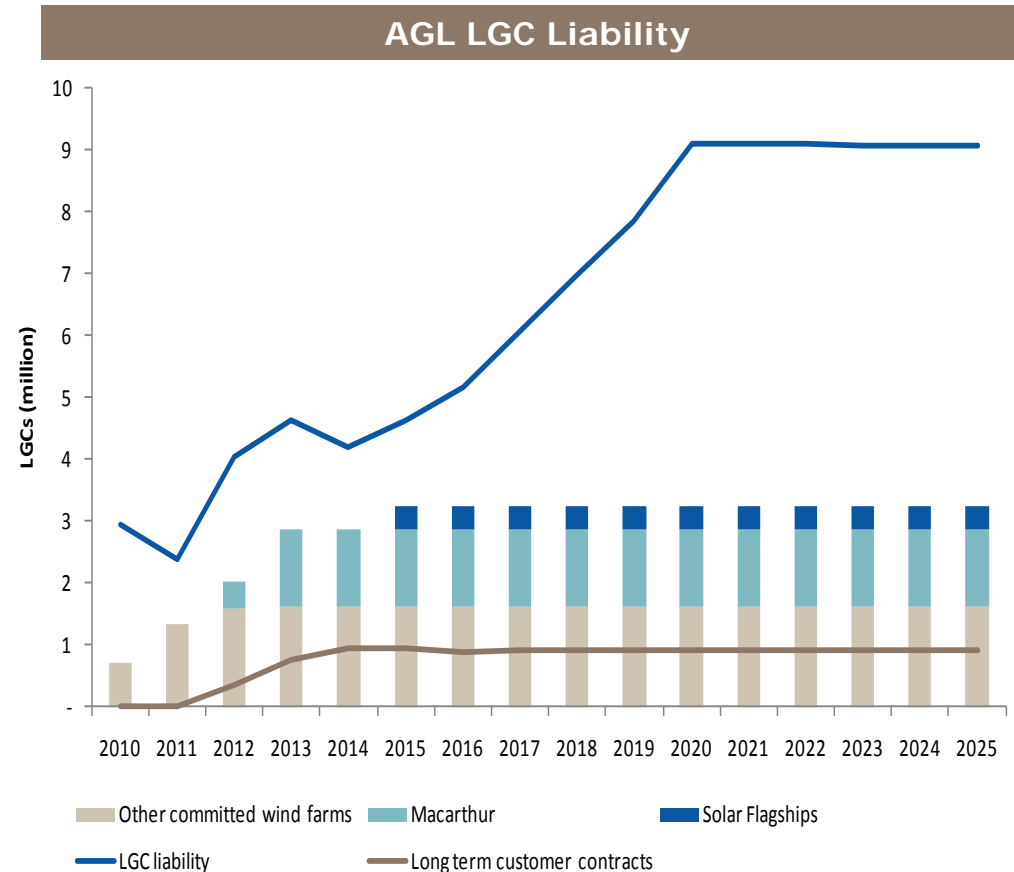
## Technology cost differentials



# New investment requirements

AGL ~2,000 MW of additional renewable capacity by 2020

- > By 2020, AGL will need to generate an additional 6 million LGCs
- > Equates to ~2,000MW of new wind capacity<sup>1</sup>
- > Capex of ~\$4.5 billion
- > AGL still committed to a mixture of PPAs and developing own projects



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1. Assumes average capacity factor of 35%



# AGL's renewable portfolio and growth pipeline

## Strong pipeline of high capacity factor sites

Power Station	State	Status	Name Plate Capacity (MW)	Capacity Factor (%)
Southern Hydro	VIC	Operating	656	N/A
Bogong	VIC	Operating	140	N/A
Oaklands Hill Wind Farm	VIC	Operating	67	37%
Wattle Point	SA	Operating	91	34%
Hallett 1 Wind Farm	SA	Operating	95	40%
Hallett 2 Wind Farm	SA	Operating	71	41%
Hallett 4 Wind Farm	SA	Operating	132	40%
Hallett 5 Wind Farm	SA	Operating	53	36%
<b>Total Renewable Operating Capacity</b>			<b>1,304</b>	
Macarthur Wind Farm	VIC	Committed - in construction	420	35%
Option 1 developments	VIC		200	Various
Solar Flagships	NSW	In development	159	27%
Silverton wind farm	NSW	In development	230	40%
Ben Lomond wind farm	NSW	Site under option, permitting ongoing	200	35%
Coopers Gap wind farm	QLD	In development	290	39%
Crows Nest wind farm	QLD	Site under option, permitting ongoing	200	35%
Hallett 3 wind farm	SA	Suspended	90	41%
Barn Hill wind farm	SA	Suspended	186	38%
Option 2 developments	WA		320	Various
<b>Total Renewable Pipeline Capacity</b>			<b>2,295</b>	

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# Performance of AGL Projects

- AGL has a history of developing high performing projects



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Source: AEMO



# Unsustainable regulatory decisions in Qld & SA

- › Recent State-based retail pricing determinations are incompatible with achieving the Federal RET
- › QCA and ESCOSA move away from LPMC for setting regulated prices threatens any new investment in generation
- › By definition long-term PPAs are written at or above LPMC
- › Investors must have confidence around achieving LPMC to invest

# Summary

- > RET target of 41,850 GWh by 2020 expected to remain in place
- > Achieving this target will be challenging for industry
- > AGL is well-positioned given existing renewable energy portfolio
- > AGL has a strong pipeline of projects
  - » Moved early to secure sites with high capacity factors
  - » Still committed to developing 60-80% of projects to meet RET target
- > Large scale solar is expected to become competitive with wind toward the end of the decade
- > Continuation of current approach to regulatory pricing by QCA and ESCOSA threatens investment in any new generation projects