



# Infigen Energy

## Energy 2013 conference

Renewable Energy – Helping Electricity Customers Regain Some Control

20 March 2013

# Agenda



- **Infigen Overview**
- The Importance of the RET
- Market Drivers and Consumer Choice
- Questions

## **Presenters:**

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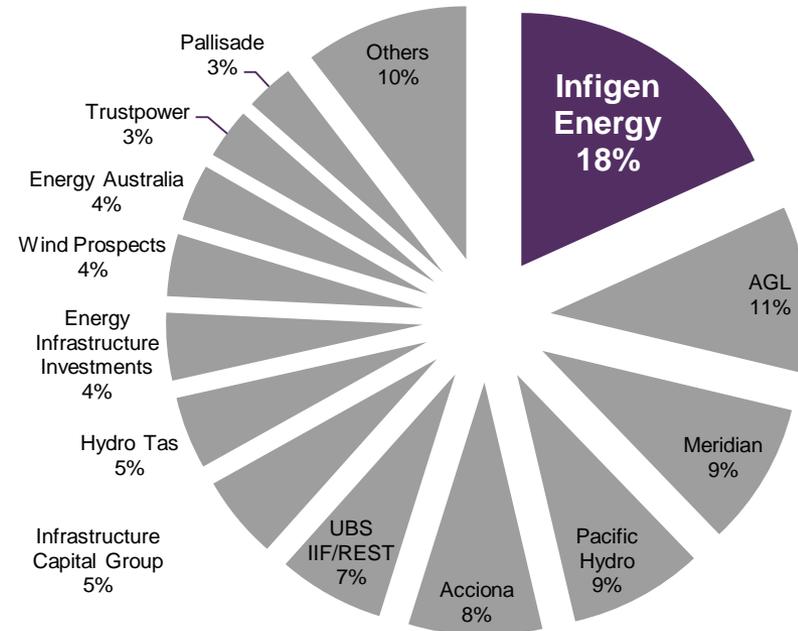


# Infigen Energy Overview

An established renewable energy developer, owner-operator in the United States and Australia

- Sydney HQ; ASX listed (ASX:IFN)
- Operate over 1,600 MW of wind energy generation across the US and Australia
- Own and operate > 1 GW wind energy business in the United States
- Largest owner of installed wind energy capacity in Australia and licensed retailer of electricity
- Active developer of utility-scale solar PV in Australia and the US
- Solar PV and energy storage demonstration plant under development at Bungendore, NSW
- Substantial and advanced project development pipeline

% Installed Capacity Ownership – Australia



Source: AEMO and Company websites

# Operating United States Assets

18 wind farms – the US’s 5th largest wind energy business independent of an integrated utility



# Operating Australian Assets

Largest owner of installed wind energy capacity in Australia

**ALINTA, WA**

Installed Capacity	<b>89.1 MW</b>
Capacity Factor	<b>44%</b>
Completed	<b>Jan 06</b>



**LAKE BONNEY, SA**

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



**WOODLAWN, NSW**

Installed Capacity	<b>48.3 MW</b>
Capacity Factor	<b>39%</b>
Completed	<b>Oct 11</b>



**CAPITAL, NSW**

Installed Capacity	<b>140.7 MW</b>
Capacity Factor	<b>30%</b>
Completed	<b>Nov 09</b>



# Development Pipeline Summary

Well positioned to capitalise on expected solar PV and wind opportunities in the US and Australia

Wind Farm	Location	Capacity (MW)	Planning Status	Connection Status
Bodangora	NSW	90-100	Public display complete	Advanced
Capital 2	NSW	90-100	Approved	Advanced
Cherry Tree	VIC	35-40	DA lodged	Intermediate
Flyers Creek	NSW	100-115	Public display complete	Intermediate
Forsayth	QLD	60-70	DA lodged	Intermediate
Walkaway 2&3*	WA	~400	Approved	Intermediate
Woakwine	SA	~450	Approved	Intermediate
<b>Total</b>		<b>1,225 – 1,275</b>		

Solar Farm	Location	Capacity (MW)	Planning Status	Connection Status
Capital#	NSW	50	Approved	Advanced
Capital East	NSW	1	Approved	Advanced
Cloncurry	QLD	6	Early	Early
Manildra#	NSW	50	Approved	Advanced
Moree	NSW	60	Approved	Early
Nyngan#	NSW	100	Approved	Advanced
Various	USA	300	Early	Intermediate
<b>Total</b>		<b>567</b>		

## Comments

- Introduction of onerous state wind farm planning guidelines in Australia creates significant challenges for greenfield developments and underpins value of approved developments
- Sizable solar PV opportunity in Australia
- Capital East expected to be first solar PV and energy storage facility registered as a market generator in the National Electricity Market
- Joint development agreement with Pioneer Green Energy for development of US solar projects, as well as independent efforts

\* Infigen has a 32% equity interest; # Infigen has a 50% equity interest

# Agenda

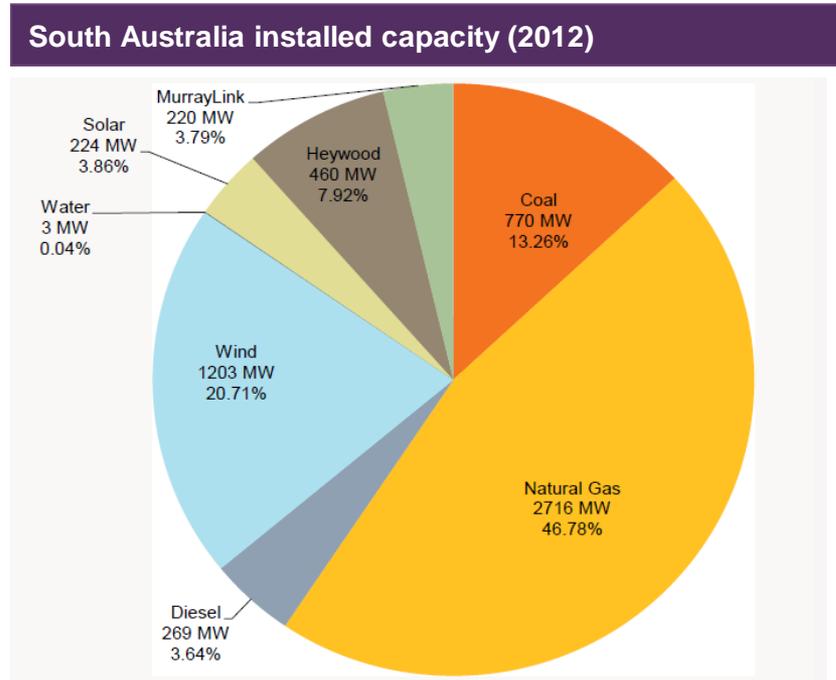


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# Australia's Electricity Generation Capacity

## Renewables are integrating into the NEM seamlessly

- South Australia provides an example of how the generation mix has changed
- South Australia has already achieved over 20% renewable energy generation displacing coal and gas fired generation
- AEMO has developed forecasting systems which accurately and reliably accommodate this level of wind energy.
- No new gas fired generation has been required to support this level of wind energy deployment
- Wholesale electricity prices have reduced in SA as a direct result.



South Australian Historical Market Information 2012 , AEMO

# Community Acceptance of Wind Farms



A vocal minority with vested interests seek media attention



- There is strong community support for the development of wind farms, including support from rural residents who do not seek media attention or political engagement to express their views.
- The actual and perceived local costs and benefits of wind farms are strongly influenced by the design, implementation, and community engagement processes.



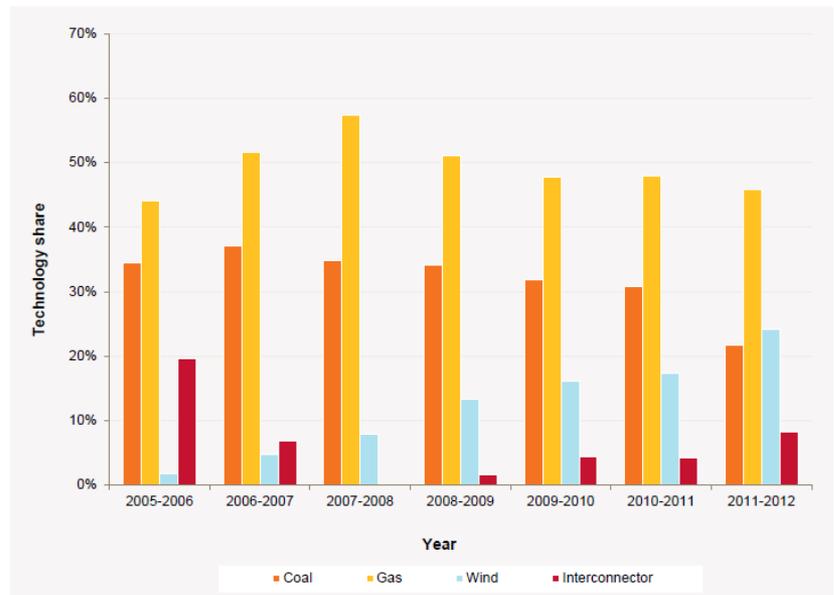
Source: "Exploring community acceptance of rural wind farms in Australia: a snapshot" by Nina Hall, Peta Ashworth and Hylton Shaw, CSIRO Science into Society Group, 2012

# Over 25% of SA electricity comes from wind power

Wind has displaced coal as a larger electricity generating technology

- No new OCGT generation was required to be built to support wind deployment
- The cost of energy from wind farms has not increased – unlike coal and gas fired plant
- There is strong community support for the industry

South Australia generation technology over time



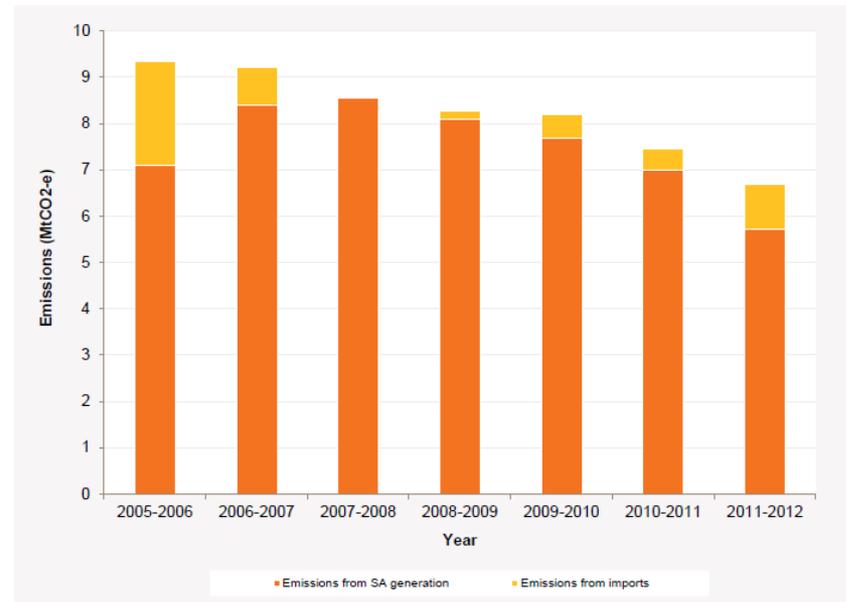
Source: South Australian Historical Market Information 2012 , AEMO

# Resulting in a Reduction in Greenhouse Emissions

## Wind has displaced coal as the largest electricity generating technology

- There is clear evidence that wind has led to carbon emission reductions as a provider of zero carbon emission electricity generation
- Other technologies, including hydro and gas peaking plant were installed many years ago across the NEM to support unscheduled fossil fuel plant outages and short term demand variability. These factors have a far more dramatic effect on market volatility than highly predictable wind energy output
- Renewable energy is about securing a lower cost electricity future that is insulated from rising fossil fuel prices

South Australia emissions over time

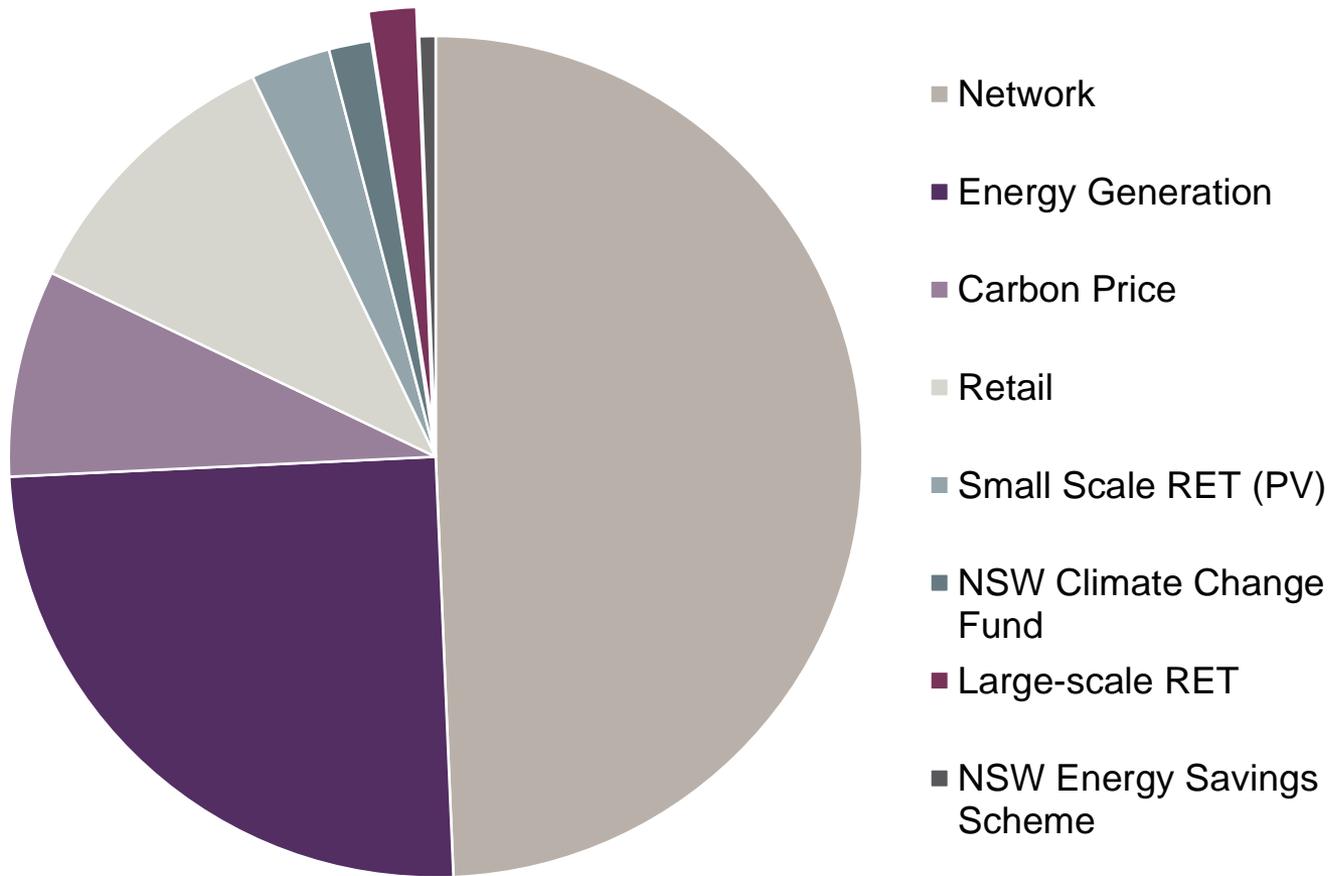


Source: South Australian Historical Market Information 2012 , AEMO

Note: Reduced emissions in Victoria when wind energy was being exported are not included

# Electricity Price Signals

LRET accounts for < 2% of a residential electricity bill



Source : Infigen based on NSW IPART FY13 Price Determination

# Electricity Price Signals

## CCA recommended no change to LRET following extensive consultation

- Some electricity retailers and others with vested fossil fuel interests are advocating for a reduced RET
- The Climate Change Authority Review rejected this approach
  - The investment certainty and stability of a fixed 41,000 GWh LRET target was of primary importance for the industry
  - The CCA also cited increased sovereign risk and cost of capital
- The CCA's modelling showed a reduced RET would be a Lose-Lose-Lose scenario
  - 94 Million tonnes more greenhouse gas emissions
  - \$4.4 Billion less investment (and fewer jobs created in regional areas)
  - No benefit to consumers on a NPV basis
- The reduced RET case promoted by these parties would largely eliminate new utility scale renewable energy investment in Australia for the medium to long term

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# Australia's Energy Sources

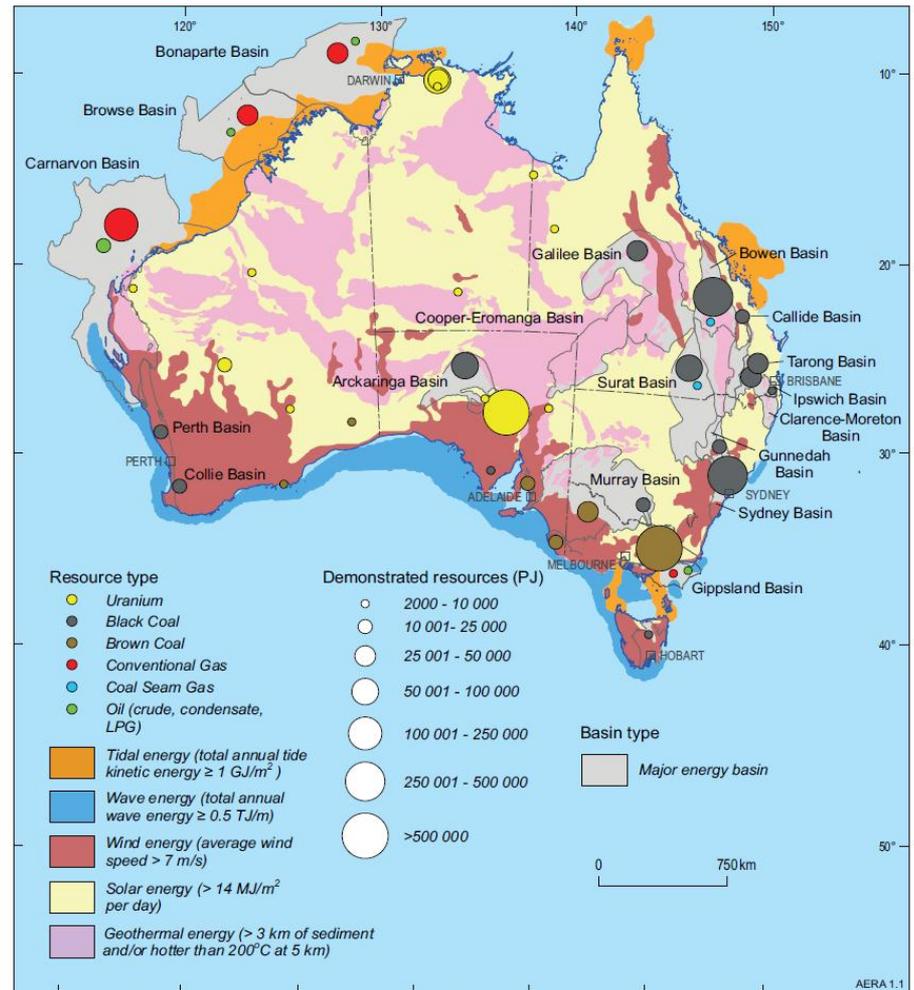
Market forces and consumer demand are changing the way we source our electricity

## Then

- Centralised generation benefiting from economies of scale and long ago subsidised and/or amortised capital costs of transmission and generation
- Cheap fuel sources available – no price on carbon and other fossil fuel pollution, and no gas export opportunity
- The cost of electricity transmission and distribution remained reasonably steady

## Now

- Improvements in cost competitiveness of renewables provides distributed generation opportunities
- Rising fuel and pollution control costs are increasing coal fired generation costs. Gas prices are rising to export parity
- Transmission costs have risen rapidly in response to increased peak demand

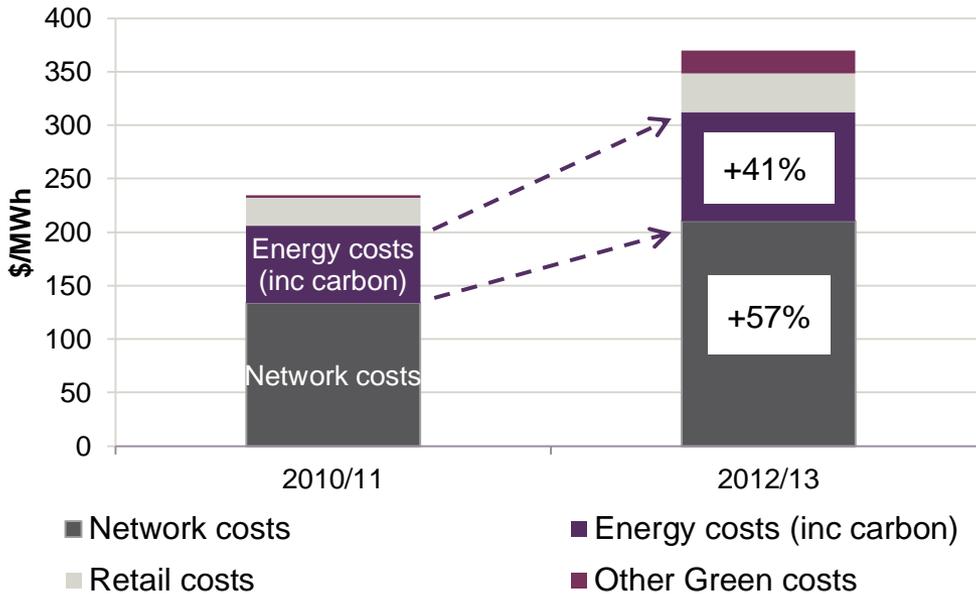


Source: BREE, Australian Energy projections (2011)

# Electricity Price Signals

Rising network costs and pricing carbon emissions are the major contributors to price increases

Components of NSW (Country Energy) Retail Electricity Bill



Source: IPART Changes in regulated electricity retail prices (2011), (2012)

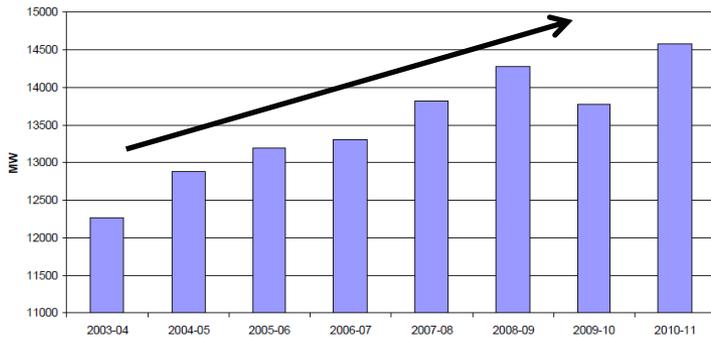
Comments

- The so called 'gold plating' of the network monopolies' assets has resulted in significant price increases for consumers
- The introduction of a price on carbon emissions from 1 July 2012 has contributed to energy price increases
- The roll off of legacy coal contracts, and future East coast LNG exports will put further upward pressure on energy costs
- Regulated retail margins (based on a percentage) benefit from higher component allowances and contribute to higher prices
- Renewable energy contributes to lower average wholesale prices
- The widespread uptake of residential solar PV has reduced price volatility during daytime peak demand periods

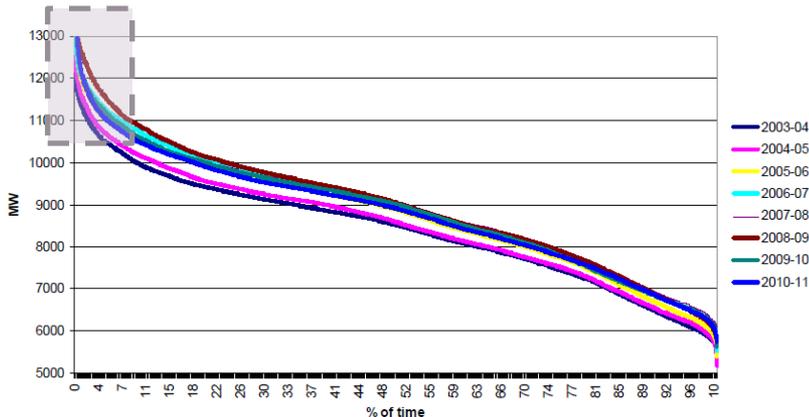
# Market Response to Higher Electricity Prices

Need to time shift demand to reduce network investment and lower wholesale prices

## NSW Peak Load



## NSW Load Duration



## Comments

- Notwithstanding falling demand for grid supplied electricity, peak demand is growing
- Between 2007-2013 ~\$40bn network investment approved with significant future investment expected unless there is change to the status quo
- There is little incentive for network providers or retailers to change consumer behaviour
- Time of use metering with structured tariffs can change consumer behaviour
- Consumers should benefit from demand side management which also benefits the retailer

# Consumer Response

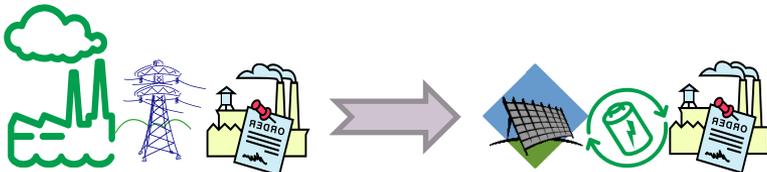
In the absence of a market response consumers are seeking to adapt

## Reduce demand and reliance on the network

- Energy efficiency should be the first consumer response
- Network costs (by far the largest single component of an electricity bill) are typically consumption based and therefore modifying time of use patterns will not benefit the consumer
- Where time of use tariffs are available consumers should analyse consumption patterns and shift demand to lower cost periods
- Consumers can avoid network costs through embedded generation
- This can be supplemented with energy storage technology to provide off grid solutions

## Plan for the future

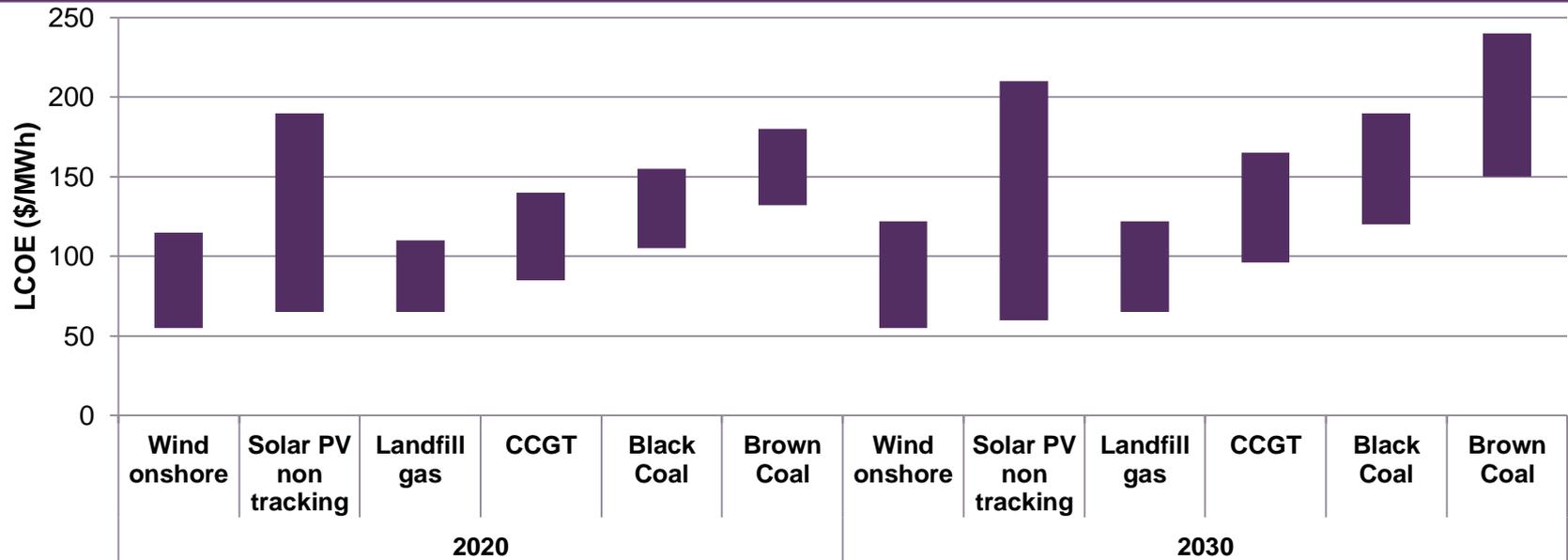
- Energy costs are the second largest contributor to total delivered electricity costs
- Energy cost increases primarily driven by increased fossil fuel costs (including the price for carbon emissions)
- Gas fired generation cost is moving rapidly upwards to reflect export parity fuel pricing by around 2015
- Carbon emission reduction targets result in higher thermal generation costs as emitters pass through their cost of emissions
- Renewables are a competitive alternative as they are insulated from rising fuel costs and carbon emissions costs



# Technology Costs

Renewables are expected to be amongst the lowest cost electricity technologies

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 towards the end of the 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

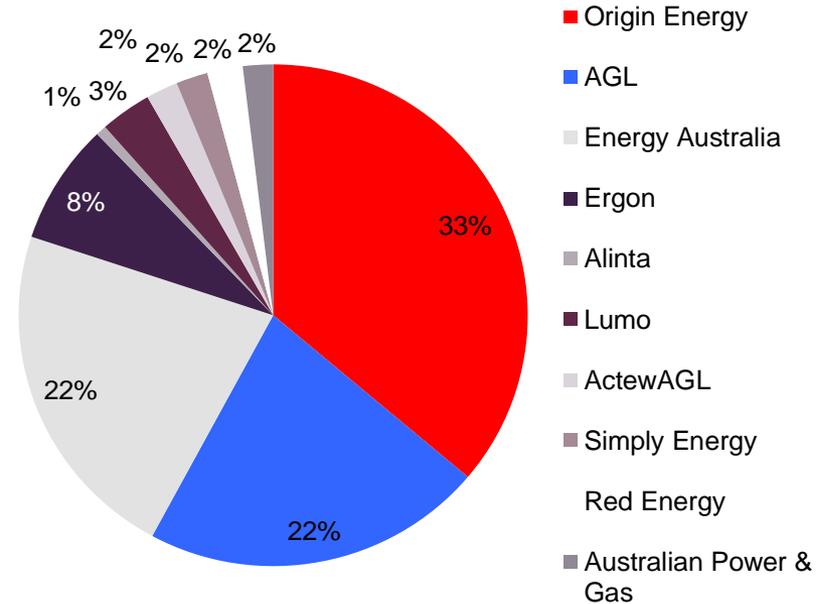
# Consumer Choice

## Consolidation and vertical integration among electricity utilities has limited consumer choice

### Comments

- All three utilities are vertically integrated with deep vested interests in centralised gas and coal fired generation
- LRET will result in renewables crowding out gas in the medium term due to rising gas costs, and it is now doubtful that gas will be viable at all as a “transition” generation fuel
- An oligopoly market reduces consumers’ choices. Offerings to consumers are based on utilities’ deep vested fossil fuel interests.
- There is no incentive for retailers to manage risk by contracting or diversifying fuel supply sources over the longer term for their large customers
- Large electricity customers will bear the brunt of costs associated with a slower than optimum move away from legacy generation technologies

### Electricity Market Share



Source: UBS Australian Utilities Structure (2011); Excludes WA and Tasmania where there is minimal competition

# The future integrated energy services delivery model

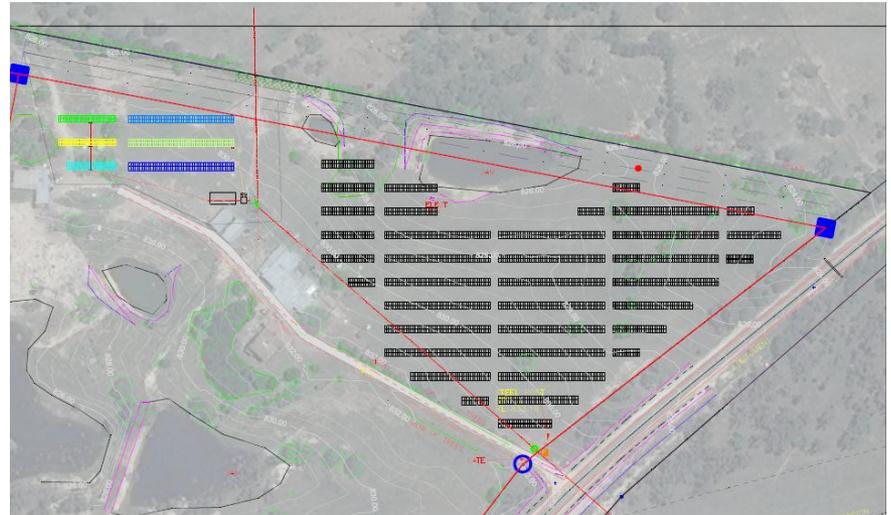
Expanding product offerings to give the customer the power of choice

- **Demand side management**
  - Demand smoothing
  - Load shedding
  - Smart metering
  - Energy efficiency advice and products
- **Distributed generation**
  - Renewables
  - Energy Storage
  - Waste Heat
- **Network/Retail supplier**
  - Contract
  - Firm/Variable Supply Options
  - Energy Cost Minimisation
- **Financing**
  - Sale and lease back of generation assets

# Capital Solar Demonstration Plant

Infigen is seeking to expand and demonstrate its solar PV capability

- 120kW solar PV plant
- Integrated Energy Storage System (ESS)
- Registered on the NEM
  - First registered solar PV facility
  - First registered PV/ESS hybrid facility
  - NEM's smallest generator
- Objectives:
  - demonstrate Infigen's solar PV capability to industry, financial and regulatory stakeholders
  - build Infigen's capability in, and lower the cost of, developing and constructing utility-scale PV in Australia
  - adapting international experience in utility-scale PV to Australia's unique conditions



# Capital Solar Demonstration Plant

## R&D trial of solar PV and balance-of-plant technologies

- Trials include
  - PV module types
  - Central and string inverter configurations
  - Power optimisation techniques
  - Electrical wiring configurations
  - Mounting Structures
  - Foundations
  - Installation and construction techniques
  - Lithium-ion batteries
- Outcomes:
  - A lower delivered cost of energy for utility-scale PV in Australia
  - Proof of solar PV's low technological, operational and financial risk
  - Demonstration of value proposition of solar PV and energy storage in the electricity network



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# QUESTIONS





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