



# **PLMA Conference Toronto**

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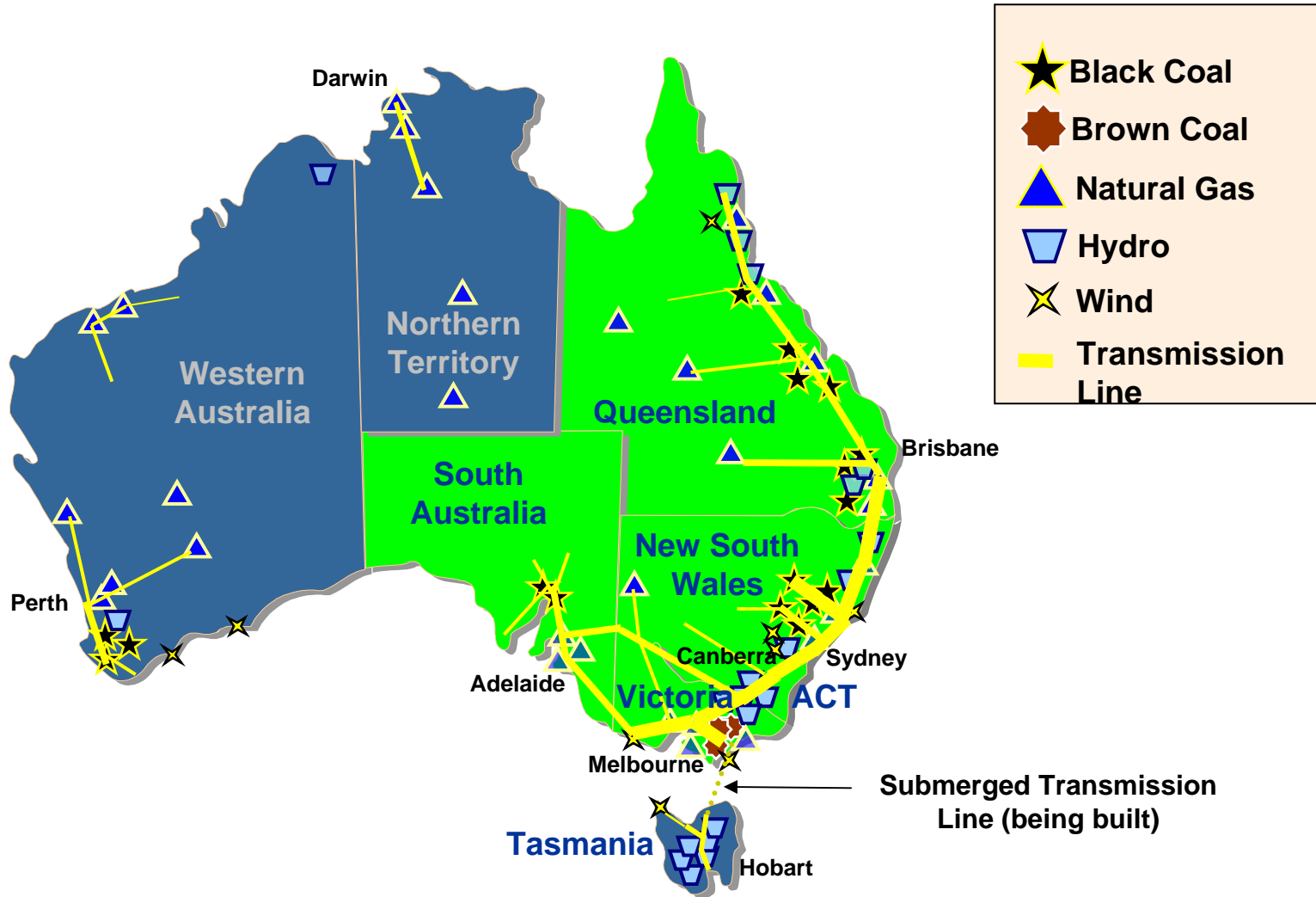
# The National Electricity Market (NEM)



- Wholesale Market
- National Regulatory Framework
- Market Code
- Market Operator
- Main Market Participants
  - Generators
  - Transmission Network Service Providers
  - Distribution Network Service Providers
  - Retailers
  - Large Customers
  - Traders
- State jurisdiction implementation of Contestable Retail Market



# Electricity Generation & Transmission

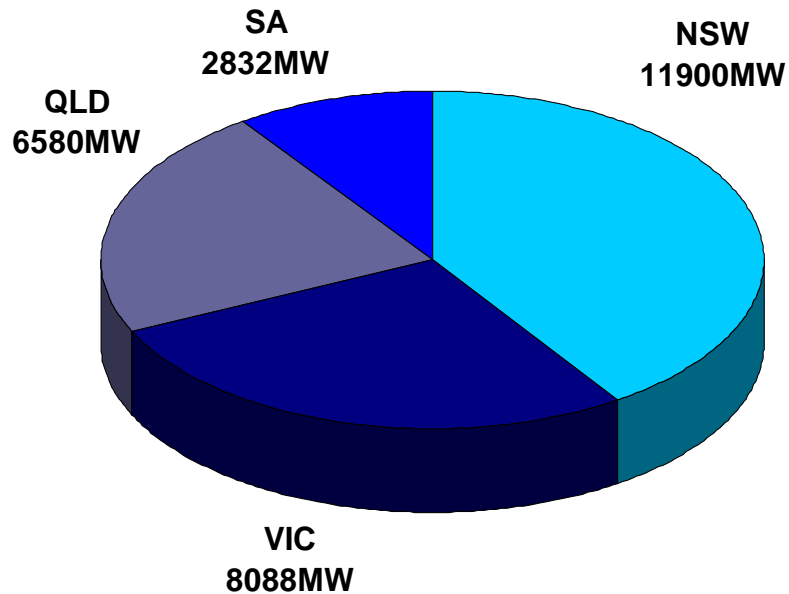


Source: Electricity Supply Association of Australia (ESAA)

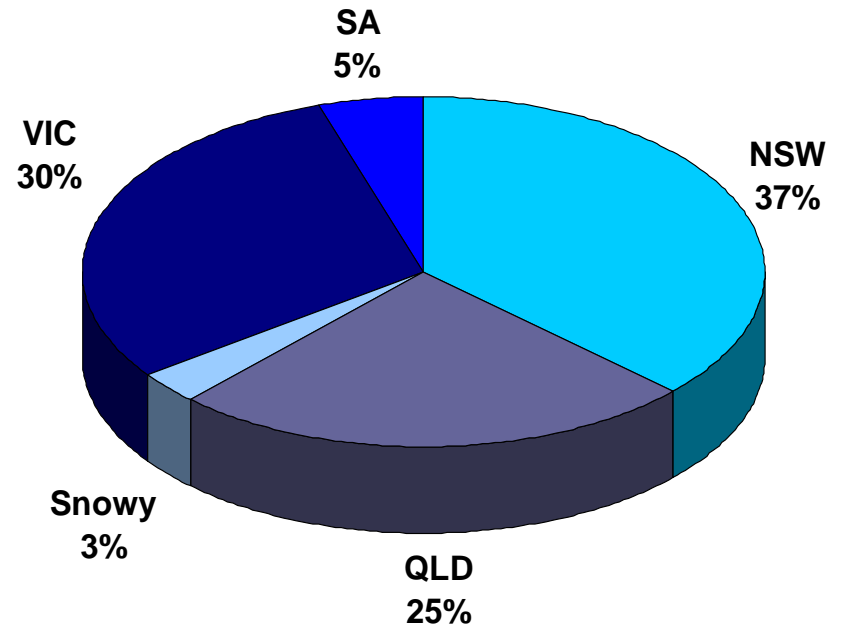
# Peak Demand & Capacity



## Peak Electricity Demand by region (MW)



## Total NEM Generation : 51GW



## Daily demand 21GW

Source: National Electricity Market Management Company (NEMMCO)

# Breakdown of demand by customer class



<b>Customer Class</b>	<b>No of Customers</b>	<b>Annual Energy Consumption (GWh)</b>
Commercial	1,220,046 (13.6%)	41,954 (23.8%)
Industrial		83,311 (47.3%)
Residential	7,749,047 (86.4%)	51,012 (28.9%)



- International collaborative effort designed to help foster the development of demand response solutions in competitive electricity markets around the world
- Leverage the experience of participating countries:
- Produce a roadmap and study to inform policy makers in Australia.



## Australian Team

- 8 financial members;
  - Government: CSIRO, Australian Greenhouse Office, Department of Infrastructure Vic, Energy Supply Industry Planning Council(SA), Sustainability Victoria
  - Industry associations: Energy Retailers Association of Australia
  - Energy companies: Origin Energy, EnergyAustralia
- Additional in-kind participants;
  - Energetics and Energy Users Association of Australia
- Supporting participants;
  - Essential Services Commission (Vic), Essential Services Commission of SA, IPART, NEMMCO, VENCORP and Office of Energy Planning & Conservations & Dept of Infrastructure (Tas)

## Overseas participants

USA\*, Denmark, Finland, Norway, Sweden, Spain\*, Italy\*, Netherlands, Japan\*, Korea\*

\* Indicates similar summer climatic issues



## Roadmap for Demand Response in the Australian NEM

IEA DSM Task XIII (DRR) Seminar  
16<sup>th</sup> November 2006  
Melbourne, Australia

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IEA DSM Task XIII Country Expert  
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## DR Roadmap in the Australian NEM



- ❑ Introduction
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- ❑ DR Roadmap
- ❑ Influencing factors
- ❑ The way forward
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**Disclaimer** - The views expressed in this presentation are those of the authors at the time of writing. They are the views of **individual team members**, and do not necessarily represent the views of the organisations which they represent. Please note that all dollar figures expressed in this presentation are in Australian dollars (AUD) unless otherwise specified.



**Task XIII** – outcomes of Task XIII have highlighted the **significant** and **tangible** benefits of DR's role in the future management and efficient operation of Australia's electricity market.

**DR Roadmap Purpose** – **culmination** of Task XIII → **inform** policy debate on value and role of DR in the NEM → **engage** key stakeholders in debate of supply-side verses demand-side options → potentially **influence** the future structure of the electricity market.

# Major benefits

## DR in the Australian NEM



The main benefits of increasing the uptake of DR in the NEM are that it can:

1. **Improve** system reliability.
2. **Reduce** transmission and distribution congestion and **save and / or delay** transmission and distribution capital expenditure.
3. **Increase** the security of supply by substituting voluntary load shedding for enforced load shedding.
4. **Provide** a means for **avoiding** the use of expensive fuels for meeting peak demand.
5. **Defer or avoid** the need for investment in peaking generation plant.
6. Provide a **check** on the market power of generators.
7. **Reduce** final prices to consumers by optimising use of all energy options.

# DR Roadmap

The Australian NEM: 2007 to 2025



IEA DRR Task XIII



**By the year 2025** → around an additional **5%** reduction in system peak demand or approx. **2,800 MW** of load reduction compared to the current situation.

**Significant system-wide benefits** → the net present value of **system-wide market benefits** 2007 to 2025 (**excluding network related benefits**) is between **\$363 to \$949 million**, depending on the way in which supply-side resources are chosen and used.

**Demand Response** → **critical factor** in the **future management** and **efficient operation** of Australia's electricity market.

# DR Roadmap

The Australian NEM: 2007 to 2025



IEA DRR Task XIII



**Reasonable** → these results do not take into account:

1. Savings from deferral or avoidance of transmission or distribution system network augmentation.
2. Value of greenhouse gas reductions or any other environmental impacts.
3. DR impacts from more cost-reflective price signals in retail contract or tariff structures and levels (other than the Price Responsive Load Program in the modelling representing a small amount of DR potential).

**US Survey** → 40 North American Utilities → part of the Task XIII study “Estimating Demand Response Market Potential” → indicated 8 -10% of total demand available for DR.

# DR Roadmap

## Influencing factors

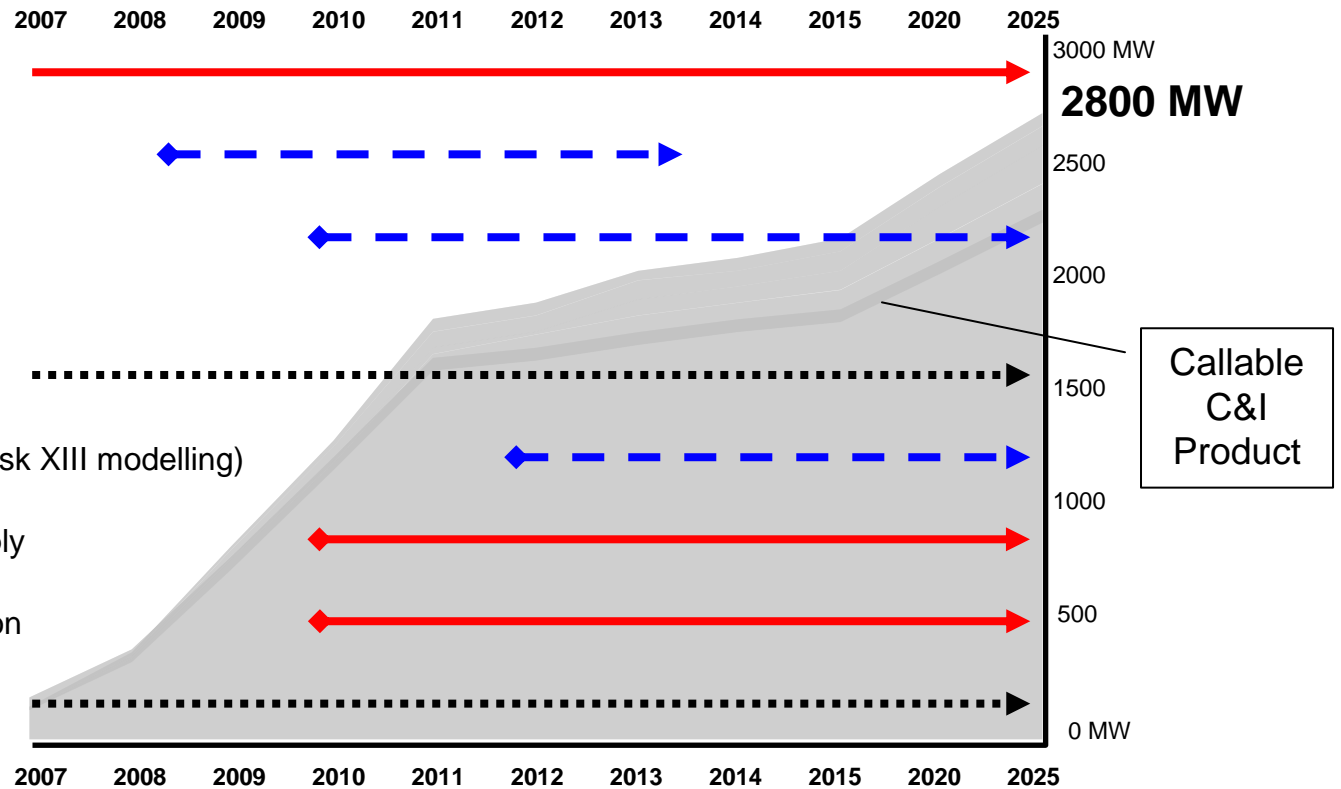
### Roadmap Timeline

#### Key Influencing factors

- ① Peak demand growth
- ② Roll out of smart meters
- ③ Cost reflective pricing

#### Other Influencing factors

- ④ Climate change
- ⑤ Carbon signal (not in Task XIII modelling)
- ⑥ Renewable energy supply
- ⑦ DR technology innovation
- ⑧ Income growth



#### Legend:





### Key Influencing factors

1. **Peak demand** - growing faster than total energy requirements → deterioration load factors for networks & generators → upward pressure prices & declining reliability → tens of billions of dollars of investment in the mid to long term.
2. **Roll-out of smart meters** - wider deployment → facilitate introduction of more cost-reflective pricing → more informed customer base.
3. **Cost reflective pricing** - progressive removal retail price regulation → increased ability for retailers to offer more innovative products → assist removal of cross-subsidies.

### Other Influencing factors

4. **Climate Change** – continued global warming trend → more frequent hot summer days → greater price volatility.
5. **Carbon signal** – due to climate change → inclusion of carbon price of some form in future electricity prices.



### Other Influencing factors (cont.)

6. **Renewable electricity supply** - significant increase in the generation mix → potential to create greater price volatility due to its intermittent nature.
7. **DR technology innovation** – technology changes on supply-side (DG) and demand-side (new cooling technology options, next generation electricity storage, developments in load control) → increased array and reduced cost of DR related technology.
8. **Income growth** - increased electricity consumption and increased consumer desire for comfort.

**In short**, the challenges are **extensive** and **complex**. Innovative solutions are needed

- **Demand Response** (DR) – where electrical demand is reduced at times when wholesale market prices are high or when system reliability is jeopardised, **is a logical and economically viable way forward.**

# The way forward

## DR in the Australian NEM



IEA DRR Task XIII



**Collaboration - governments** (both state and federal), **regulators** and **industry** *all* have a role to play in facilitating the greater uptake of DR in the NEM (Already begun: COAG has requested MCE to develop implementation plan for national roll-out of smart meters beginning 2007).

**Peak Pricing Signals** - Enabling DR will be **best served** within a market structure that understands and promotes the benefits of allowing peak pricing signals to operate effectively → significant investment DR infrastructure to enable markets to communicate the value and cost of electricity supply.

# The way forward

## DR in the Australian NEM



IEA DRR Task XIII



**Focus on potential** – Task XIII outcomes reveals **85 %** of DR potential lies with the **Callable C&I** product. We need to:

- ❑ Provide **better transparency** in the market for DR resources – especially for business consumers entering bilateral contracts, where there is an information asymmetry in favour of the retailers.
- ❑ Develop **information tools** to enable business **consumers** to better assess DR resource they have available to ‘sell’ into the market.
- ❑ Review clean **air regulations** → identify opportunities to facilitate the use of standby generation in DR programs.
- ❑ Investigate the option of using **appliance standards** to facilitate DR → either through standards relating to standby generation or a requirement for HVAC system controls to be suitable for participation in DR programs.

# The way forward

## DR in the Australian NEM



IEA DRR Task XIII



**Address penetration of residential air conditioning** – whilst Task XIII outcomes suggest **DLC** and **CPP** will play a relatively minor role in delivering value to the NEM, these products have a role to play due to:

- a) benefits in residential areas that have network constraints
- b) relatively fast response time
- c) directly address the increasing penetration of residential air conditioning - a key driver for increased peak demand.

# The way forward

## DR in the Australian NEM



A number of further actions could be taken to encourage the development of **DLC** and **CPP**. These are:

- ❑ Collate and disseminate learning from current trials (ETSA Utilities, Solar Cities, Sydney Demand Management & Planning Project and the Victorian smart meter trials) and package both for industry stakeholders and general public.
- ❑ Undertake detailed technical (end-use metering) and behavioural studies to obtain better data on the relationship between appliance use and peak demand, and the loads that consumers are most likely to control under a CPP regime.
- ❑ Continued support for issues addressed by the A-HELP project to develop communication standards to facilitate direct load control of appliances, and to investigate the feasibility of using appliance regulations to ensure that where relevant new products sold are already enabled for DLC.

# Key observations

## DR in the Australian NEM



### Introduction

- ✓ **significant** and **tangible** benefits from wider uptake of DR in NEM

### Major benefits

- ✓ benefits of DR are **widely dispersed** → requires government and industry to **work together**.

### DR Roadmap

- ✓ around an additional **5 %** reduction in system peak demand by **2025**
- ✓ NPV of system-wide benefits 2007 to 2025 (excluding network related benefits) between **\$363 to \$949 million**, depending on the way in which supply-side resources are chosen and used.
- ✓ **conservative** valuation excludes network benefits among others

### The way forward

- ✓ Enabling DR best served within a market structure that **understands** and **promotes** the benefits of **allowing peak pricing signals to operate effectively**.

# Key documents

Availability



IEA DRR Task XIII



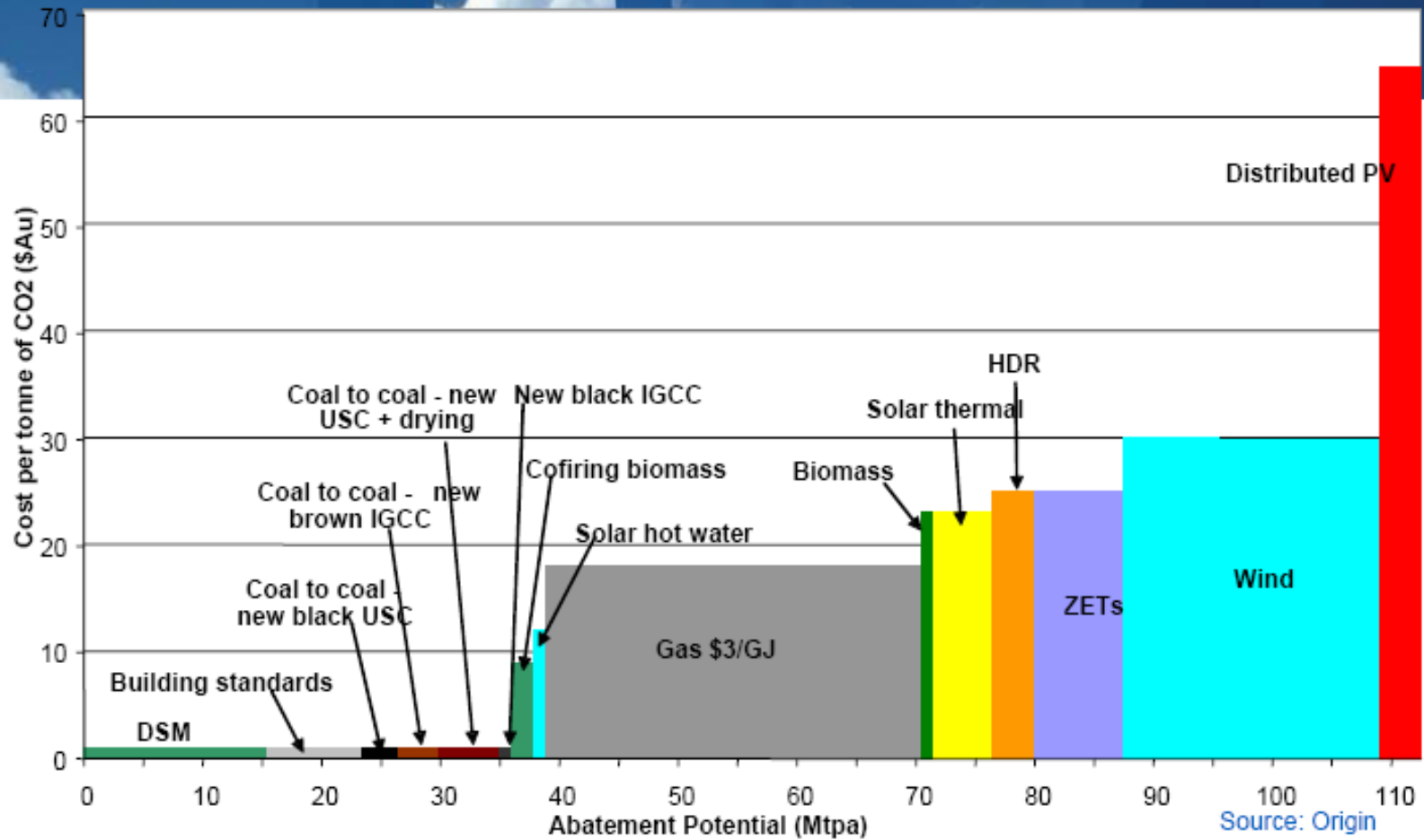
- 1. The Australian IEA DSM Task XIII (DRR) Team, Roadmap for Demand Response in the Australian NEM, 16<sup>th</sup> November 2006.**  
- Available at <http://www.demandresponseresources.com/>
- 2. CRA International, Assessing the Value of Demand Response in the NEM, 3<sup>rd</sup> November 2006.**  
- Available at <http://www.demandresponseresources.com/>



# Task XIII

6 months later - outcomes for  
Australia

# Where will the 'deep cuts' come from?



## Election Commitments

- Climate Change Bill
- 60% emissions reduction target by 2050
- 10% emissions reduction in household by 2010
- 20% renewable and low emissions energy generation by 2020
- 5% biofuels target (400 ML) by 2010
- Support for a national emissions trading scheme by 2010
- Victorian Energy Efficiency Target (VEET)
- Solar power in 500 schools and community buildings
- Introduce Feed-in Tariff law



Thank you