



# **Nuclear power in Australia's Energy Future**

**WA Energy Conference**

Tony Wood  
Program Director, Energy - Grattan Institute  
17 August 2011

## The context for Australia's energy technology choices

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Reducing Australia's carbon emissions will require a substantial shift to low-carbon electricity

Supporting a number of technologies seems prudent given the uncertainties about future technology

Nuclear is just one horse in the field – there is no guarantee that it will finish the course in front

Given lead times, Australia cannot count on a nuclear option towards its 2050 low-carbon electricity targets unless its politicians commit soon

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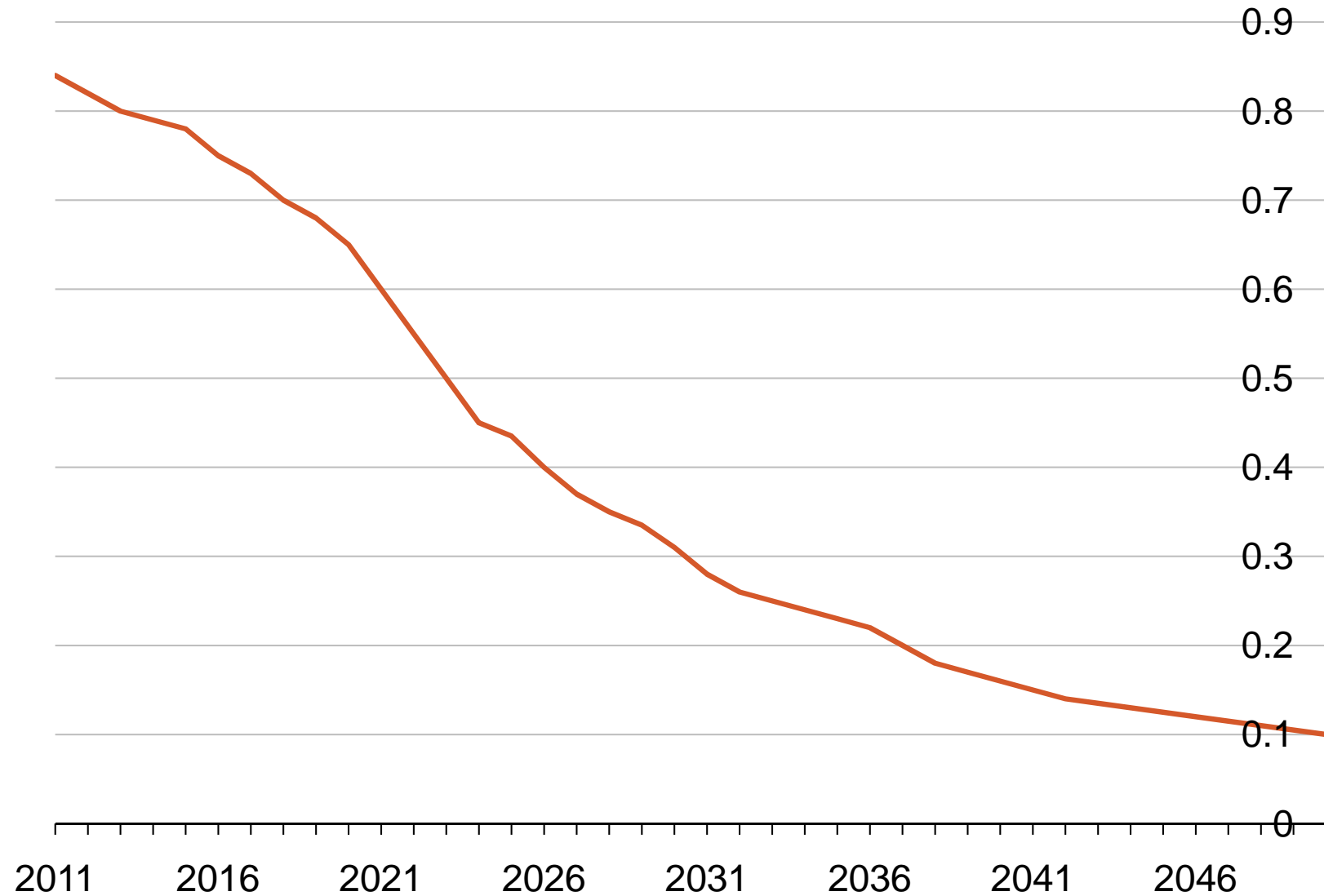
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# The electricity sector must be decarbonised

tT CO<sub>2</sub>-e/MWh

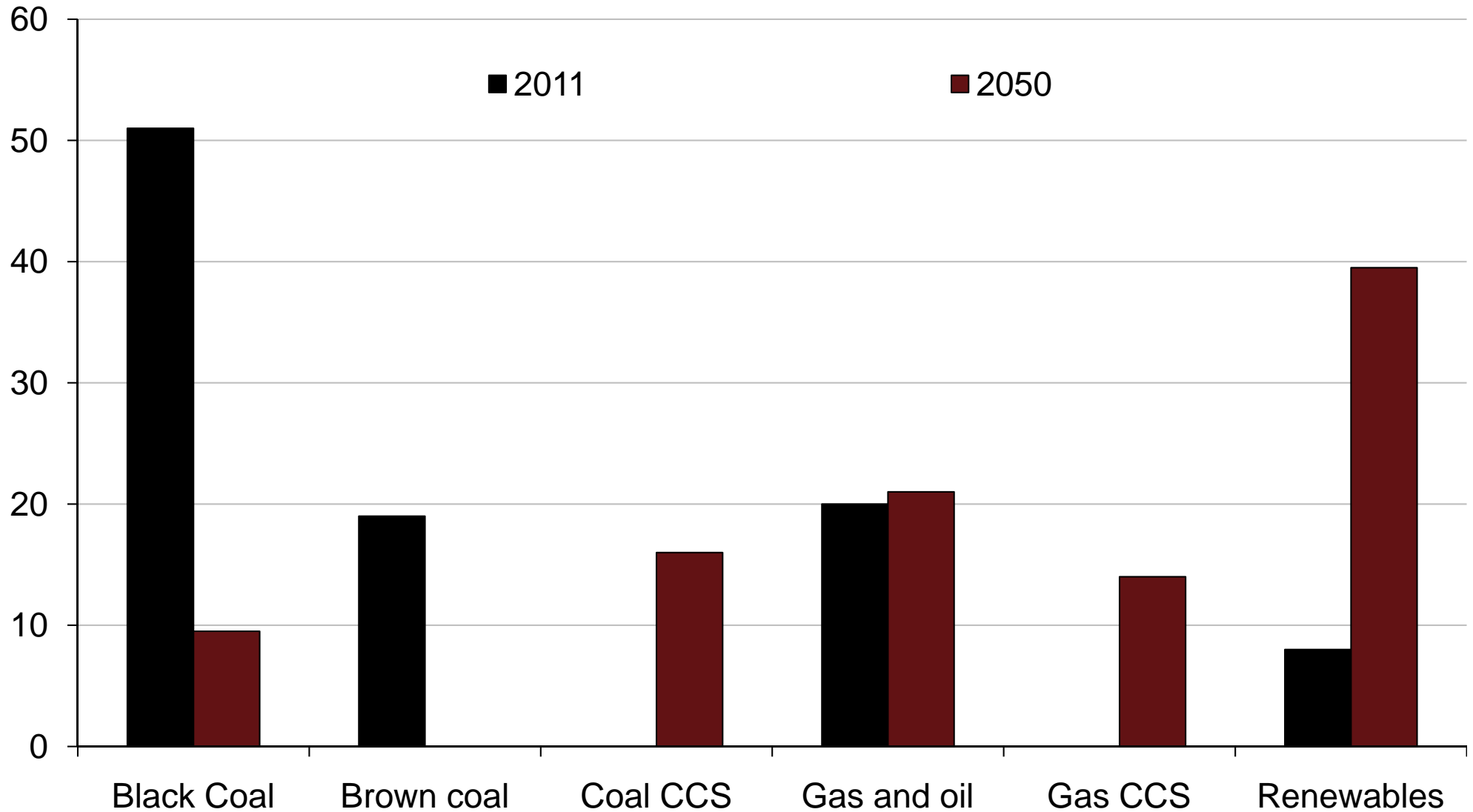
## Electricity emissions intensity



Source: Australian Government Treasury: Strong Growth, Low Pollution

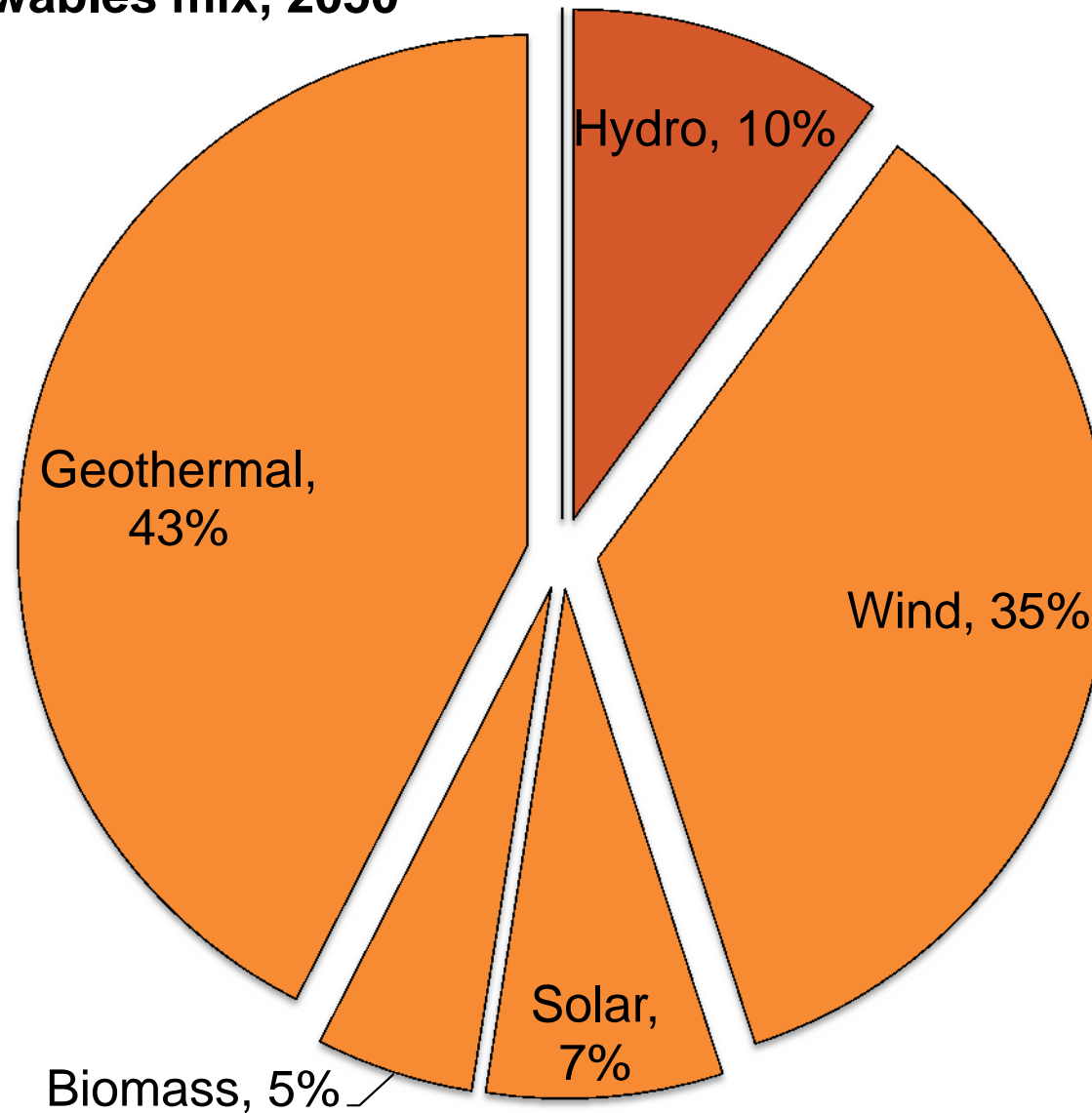
## There are not many plausible future states

The electricity supply must be transformed within 40 years



## Wind, CCS and geothermal dominate this scenario

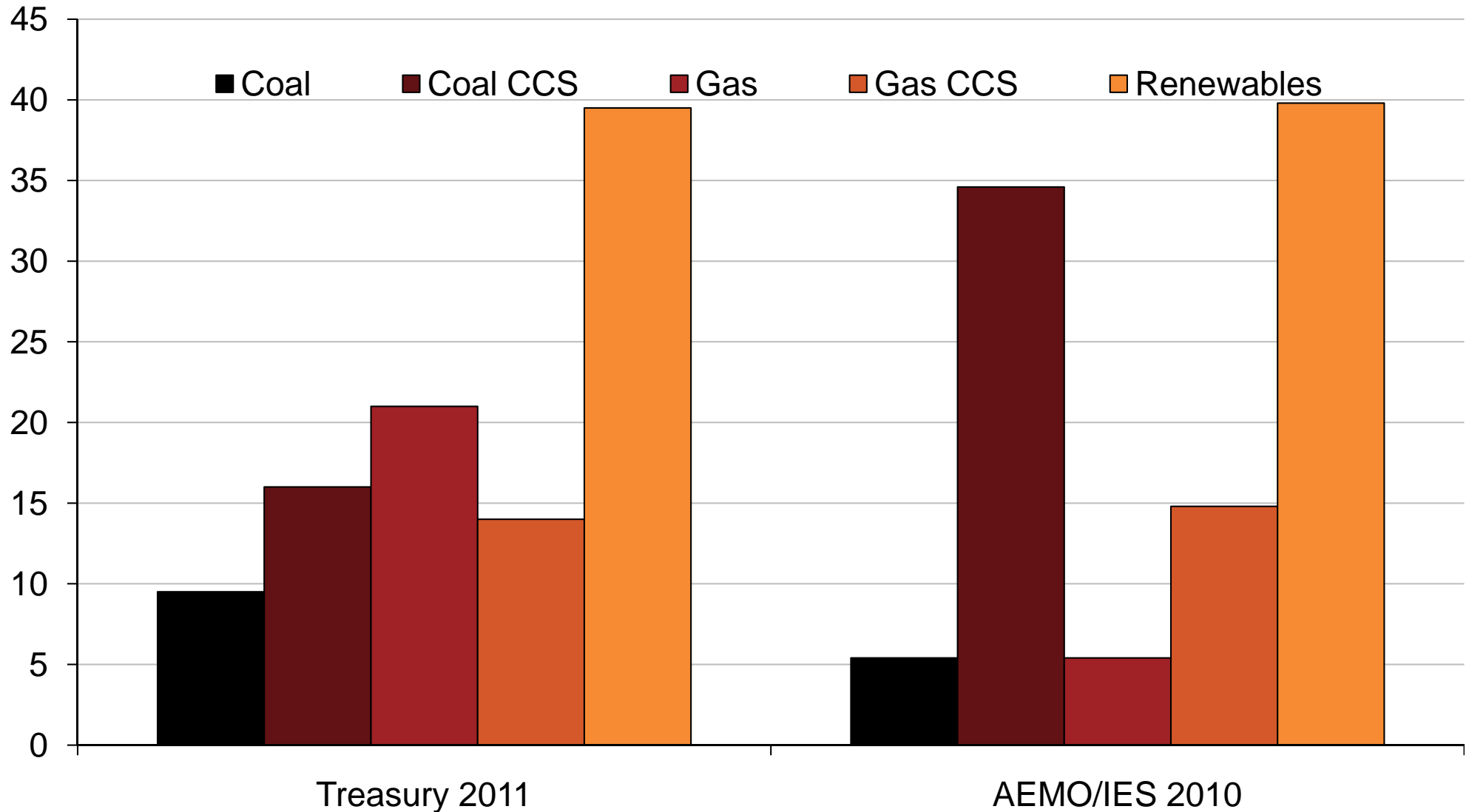
### Australia's renewables mix, 2050



Source: Australian Government Treasury: Strong Growth, Low Pollution

## It's models at 30 paces, but where's the reality check?

Australia's electricity mix at 2050



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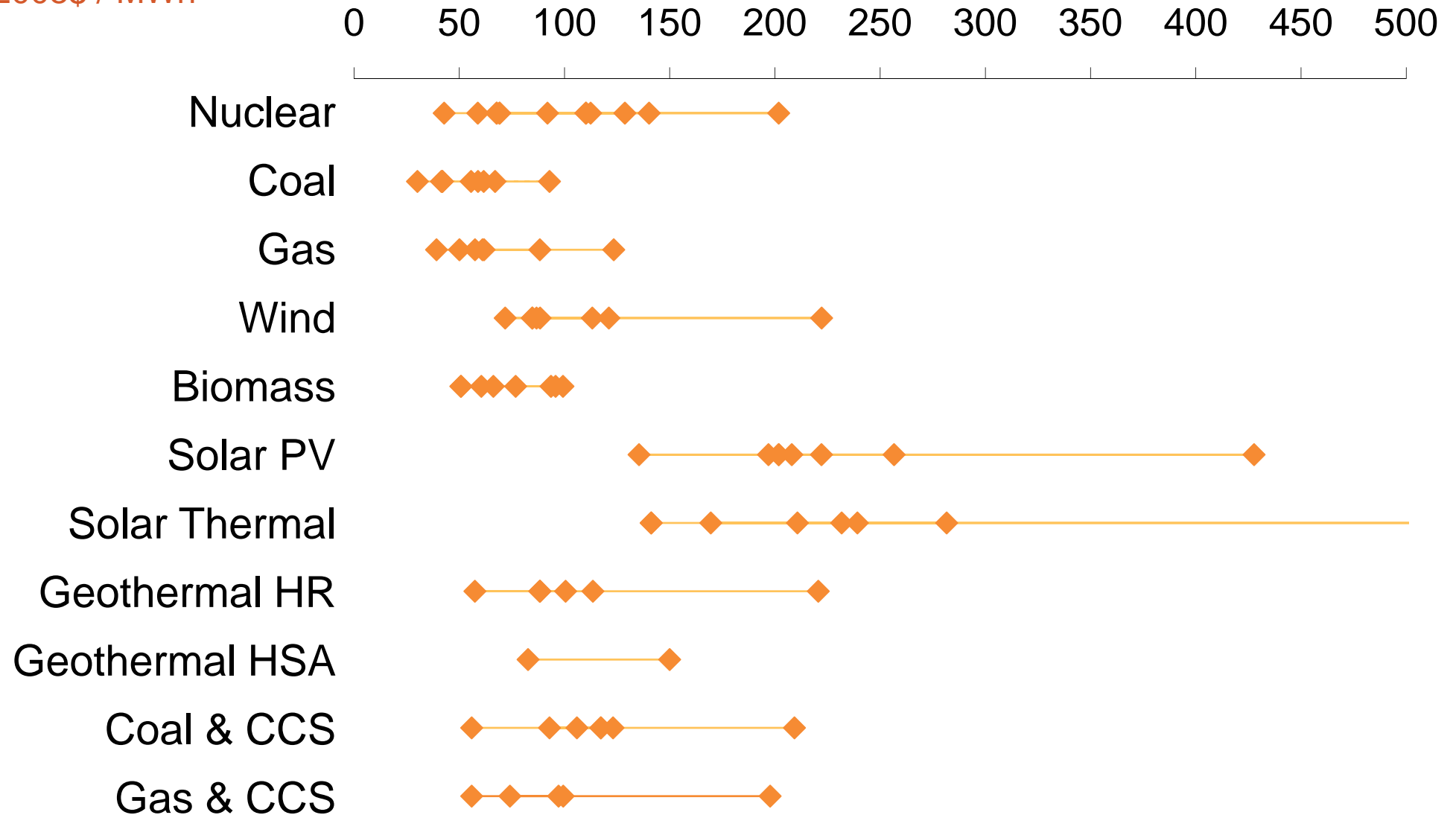
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# There is a lot of uncertainty about how much technologies cost – now –

## Estimates of electricity generation costs prior to 2015

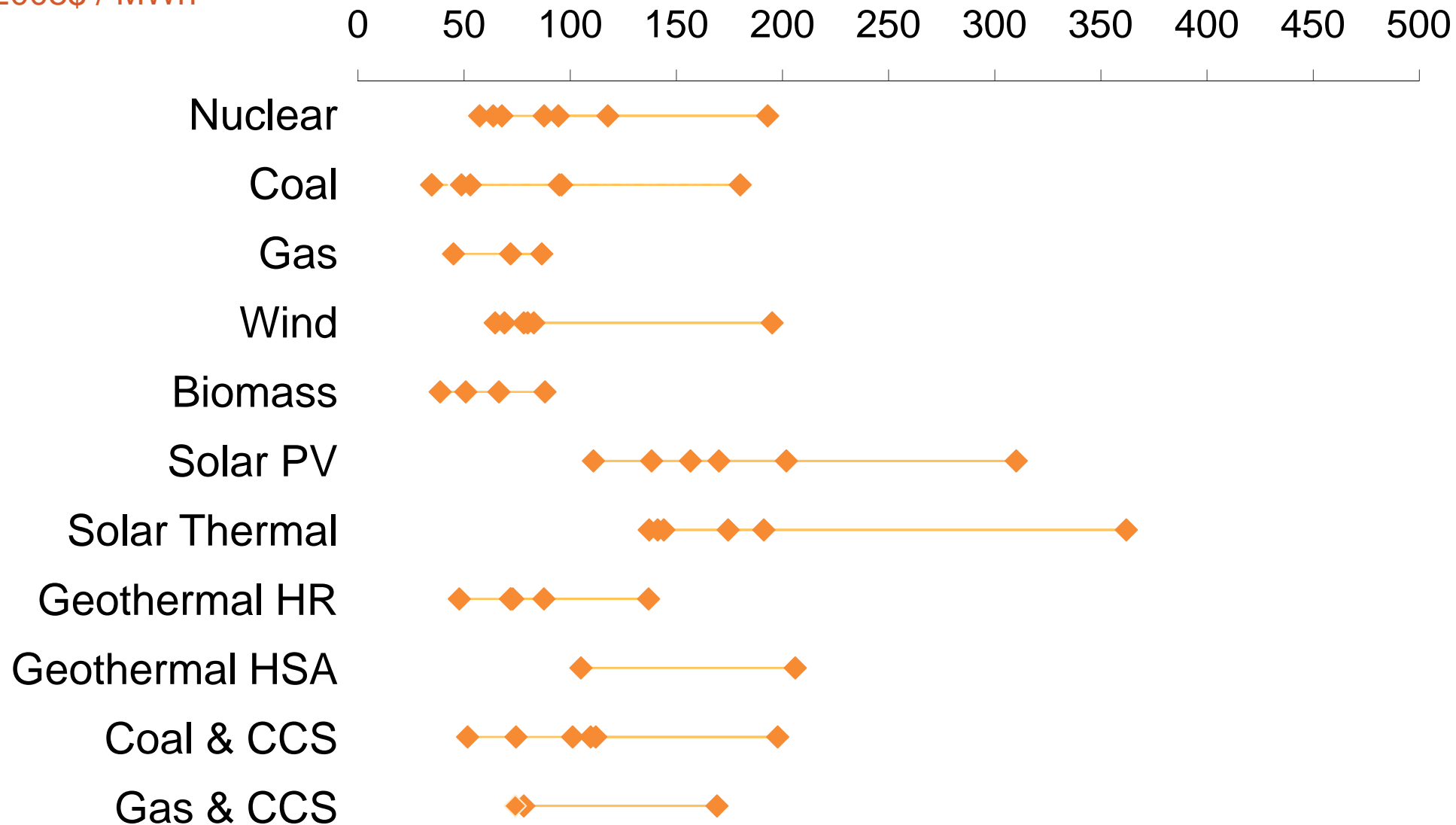
2008\$ / MWh



– and in the future

Estimates of electricity generation costs 2030

2008\$ / MWh



Source: ABARE (2010); ACIL Tasman (2009); EPRI (2009); IEA (2010); MMA (2008); Uranium Mining, Processing and Nuclear Energy Review Taskforce (2006).

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# Nuclear Outlook post Fukushima – the positive

## Nett Nuclear Capacity ( GW)

	2010	2015	2020
USA	101	104	109
France	63	65	66
Japan	47	45	45
Russia	23	30	41
Germany	21	12	9
South Korea	19	24	28
Ukraine	13	13	16
Canada	13	13	15
UK	11	10	13
China	10	37	63
<b>TOTAL</b>	<b>320</b>	<b>351</b>	<b>405</b>

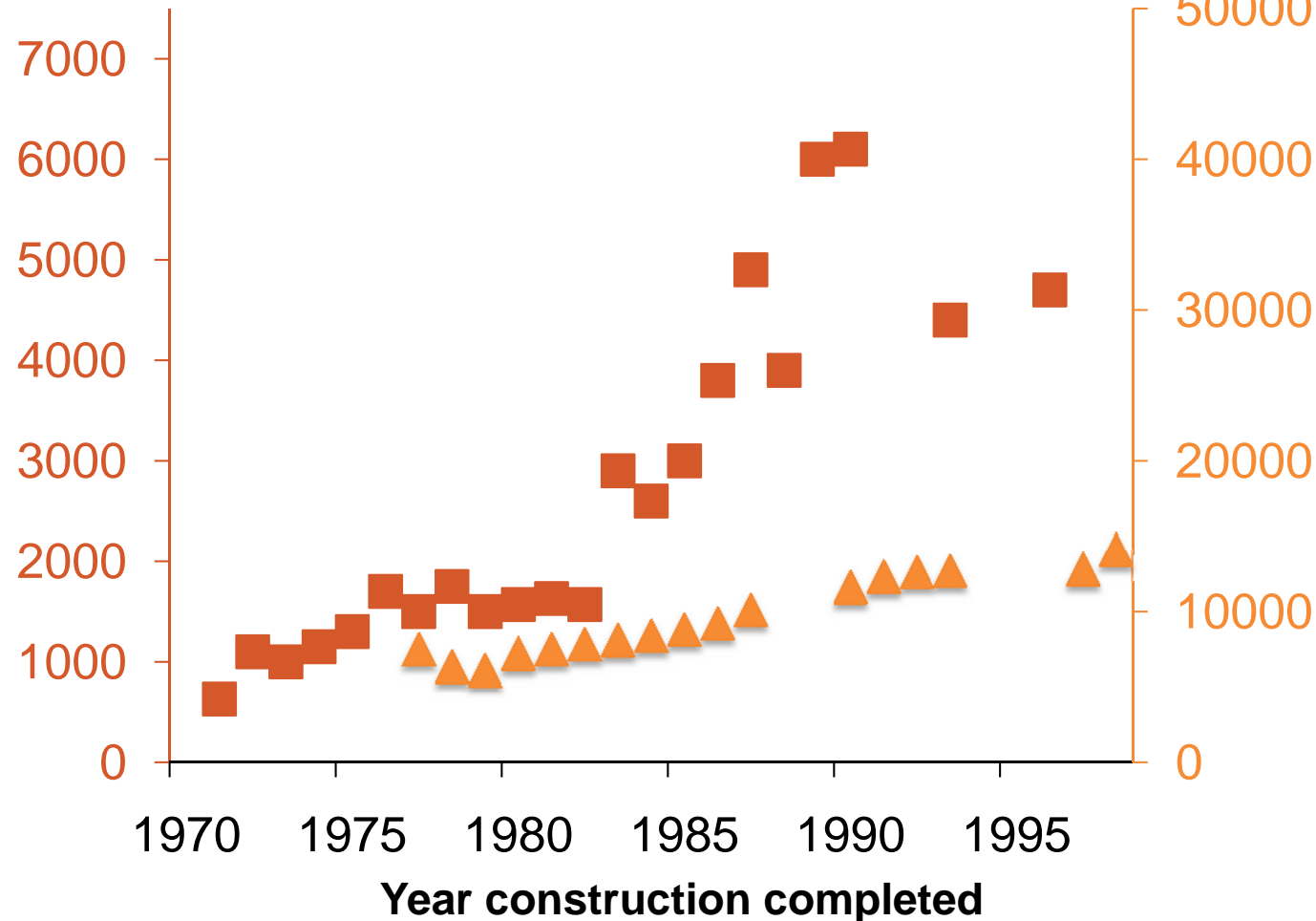
Source: *The Economist*, 2011

# Nuclear Outlook – challenges

## Nuclear plant construction costs are very difficult to predict

US plants  
US\$2004/kW

French plants  
FF98/kW



### In future:

#### **Costs might be higher**

- Costs increasing due to rising regulatory requirements
- US costs variable as designs not standardised
- Risk premiums are likely to be high without government support

#### **Costs might be lower**

- Chinese “mass production”

# Nuclear Outlook - challenges

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- Absence of low-emission demand drivers (policies to price emissions)
- Financing is more challenging than likely energy costs
- There is, as yet, no long term waste storage
- Resource constraints may emerge
- Safety and security has been heightened post-Fukushima
- Supply chain and people availability
  
- Risk exposures are difficult to manage for the private sector
  - The economics say not in the West
  - Governments take control
  - Successful projects, on time and on budget, will address construction and operational risks
  - Governments take the price risk

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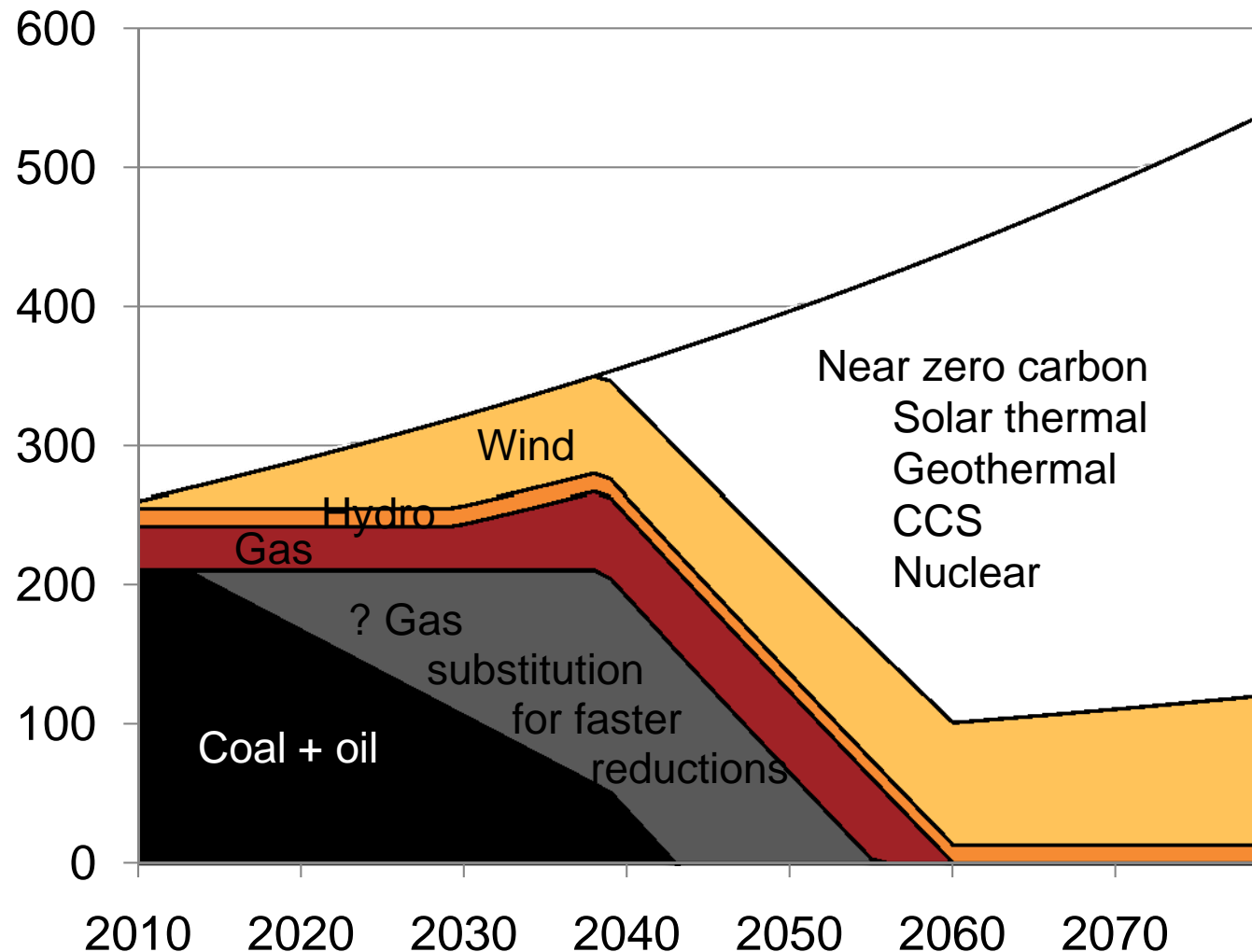
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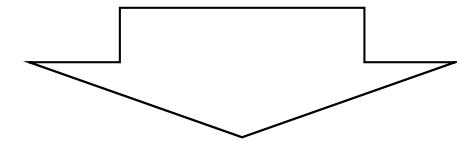
# Even with optimistic assumptions, Australia would need to begin an aggressive rollout of near zero electricity generation by 2040

## Australian electricity production 000 GWh/yr



### Assumptions

- Demand growth as CPRS-5 (1.1% / yr)
- No new coal
- Build wind for all new demand until 20% of supply (→1.1GW/yr)
- Near zero emissions by 2060
- Build near zero carbon at 3GW capacity/yr, with 60% utilisation



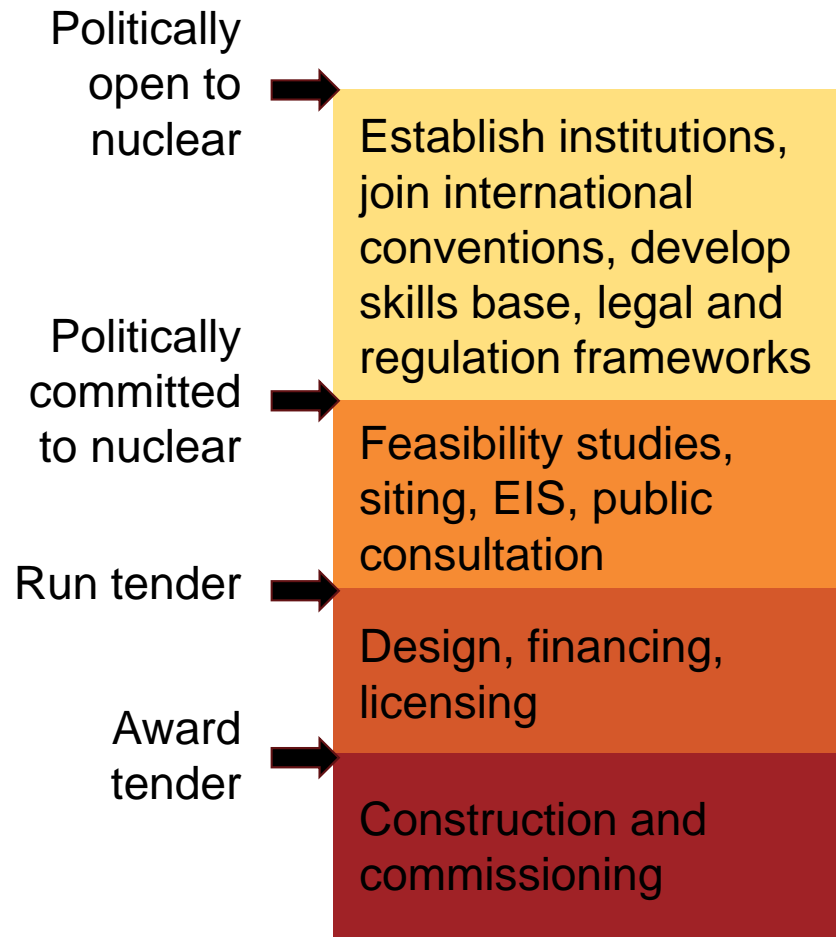
Must start building near zero carbon in earnest by 2040

Note: Simplified Grattan Institute model for illustrative purposes only

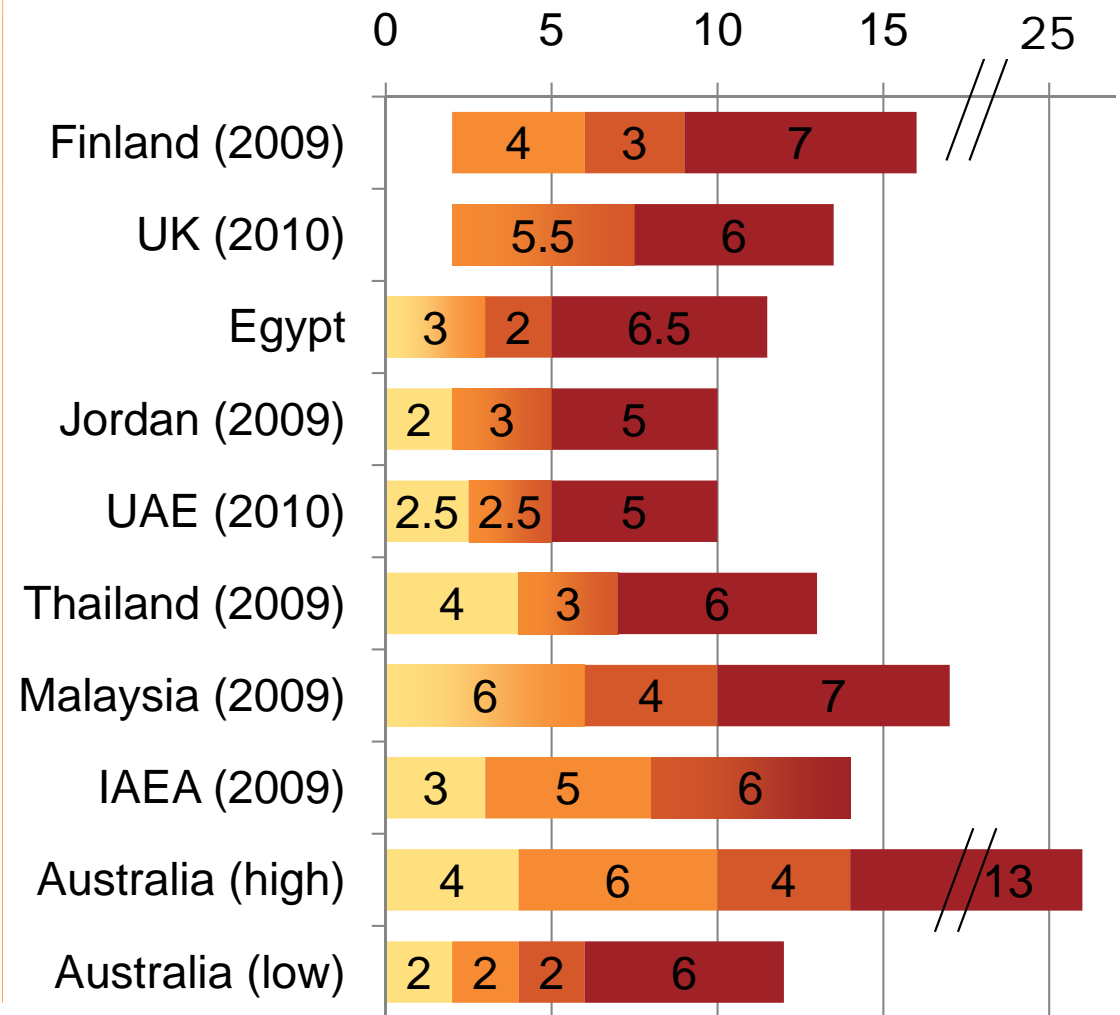
Source: Current supply calculated according to Electricity Supply Association of Australia, *Facts in Brief 2010*

# Australia is running out of time to begin acquiring a nuclear option

## Stages in nuclear power development



## Years to commence operation



Note: The extent of **prior work** varies greatly between countries. For instance, in Thailand a nuclear program had been started and then put on hold during the 1980s. In others, such as the UAE, joining conventions and policy development began several years prior to commencement of the official policy. The UK and Finland have operating nuclear sectors

Source: Grattan Institute analysis

# Australia's energy technology choices

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This is not a technology issue. It is one of economics and policy.

The Options:

- Set a cap on emissions and leave it to the market to deliver
  - Unlikely to deliver for both theoretical and pragmatic reasons
- Pick winners and back them
  - We are not very good at this
- Support a best-mix set of options for Australia with a calibrated Technology Options Strategy
  - Solar thermal/gas
  - CCS
  - Geothermal
  - Nuclear



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