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Nuclear power in Australia's Energy Future

WA Energy Conference

Tony Wood
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17 August 2011

The context for Australia's energy technology choices

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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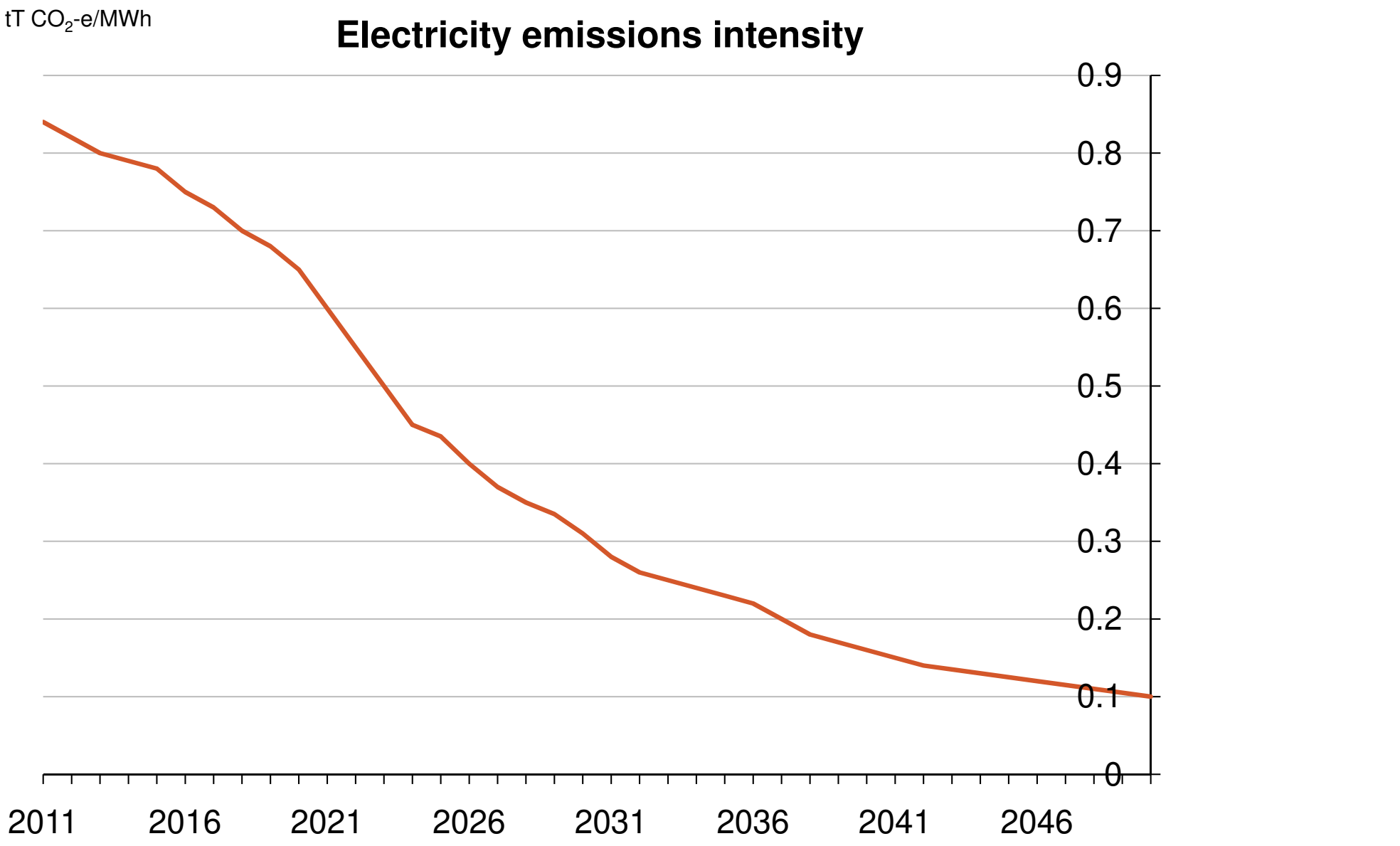
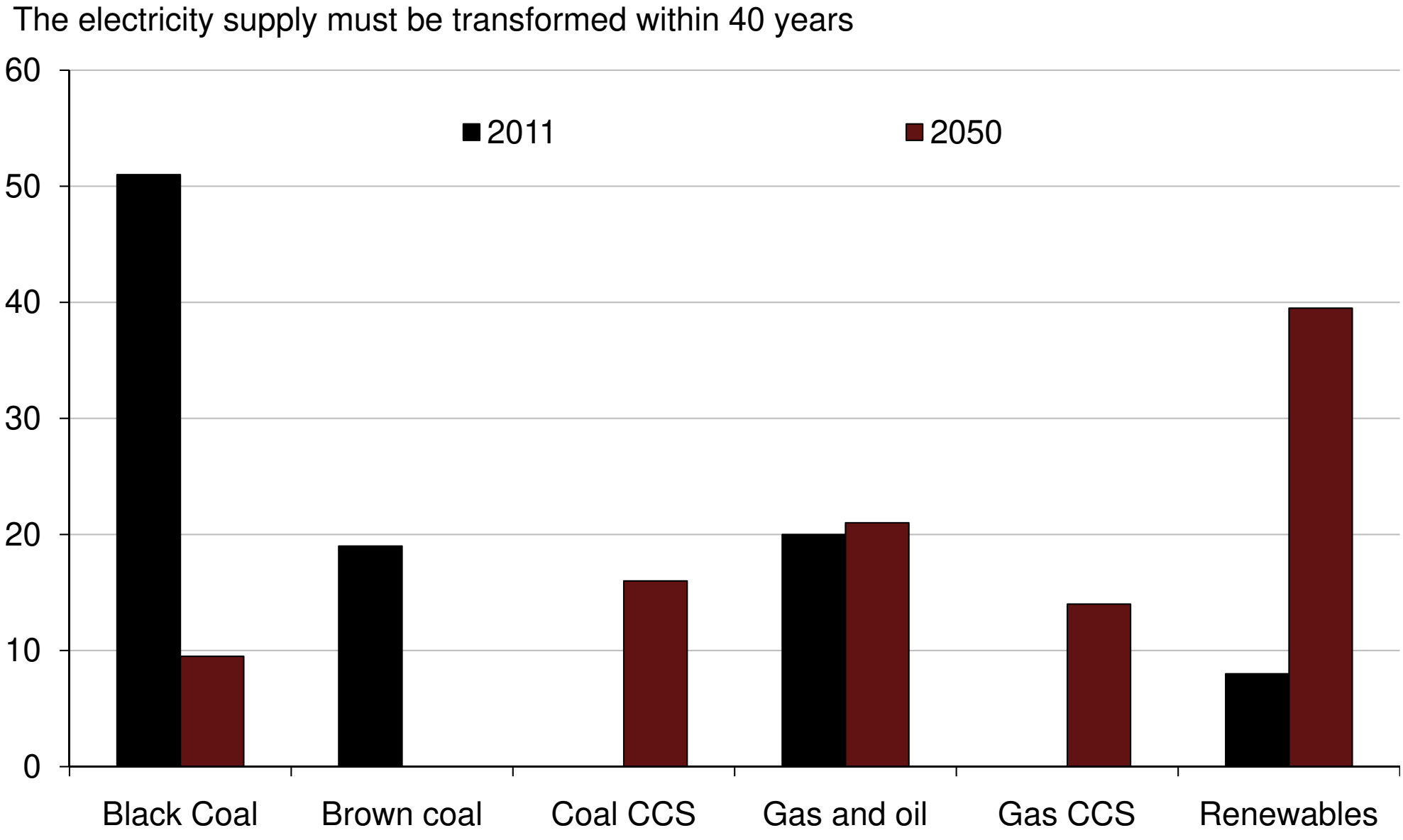
The electricity sector must be decarbonised



Source: Australian Government Treasury: Strong Growth, Low Pollution

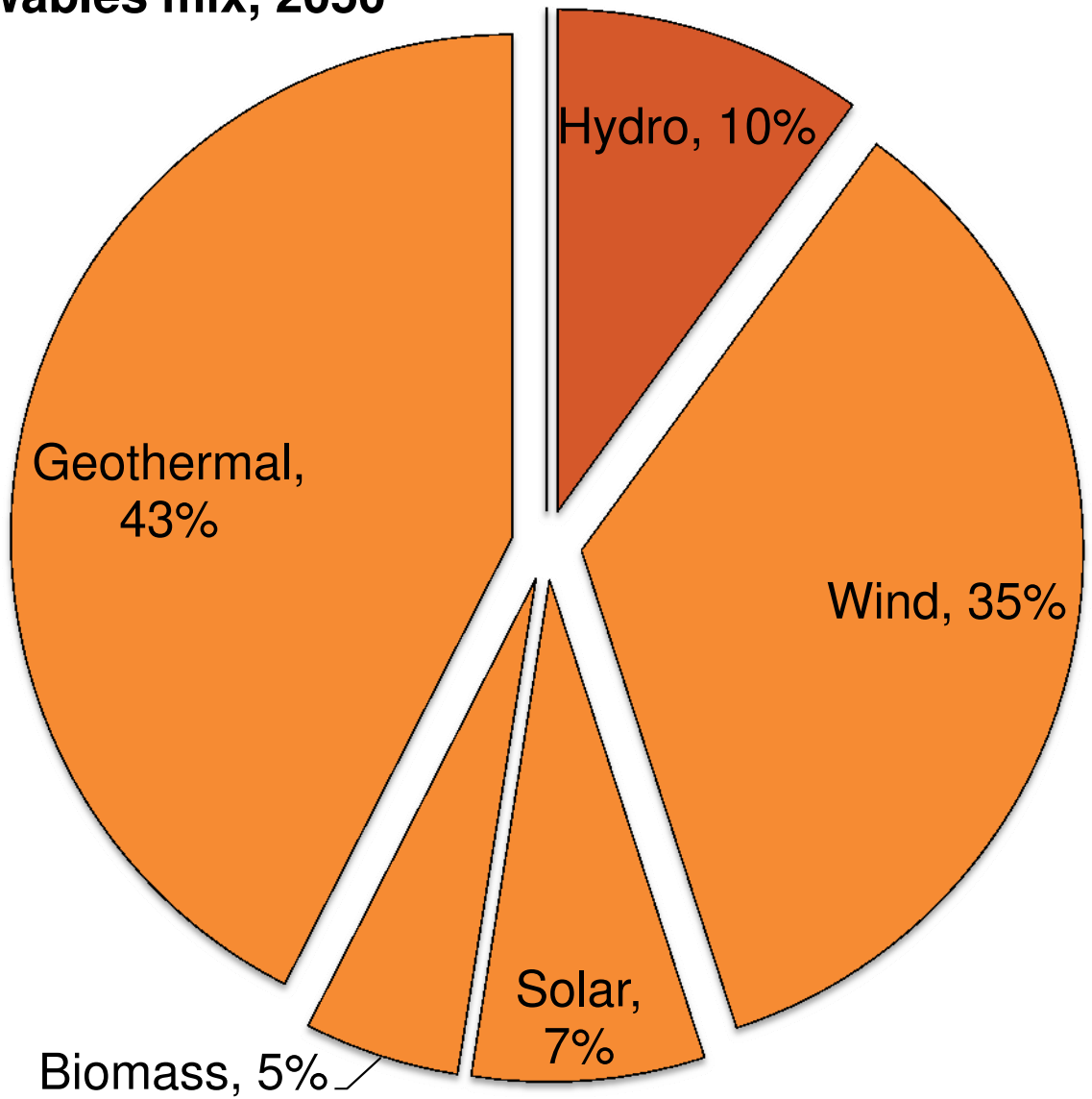
There are not many plausible future states



Source: Australian Government Treasury: Strong Growth, Low Pollution

Wind, CCS and geothermal dominate this scenario

Australia's renewables mix, 2050



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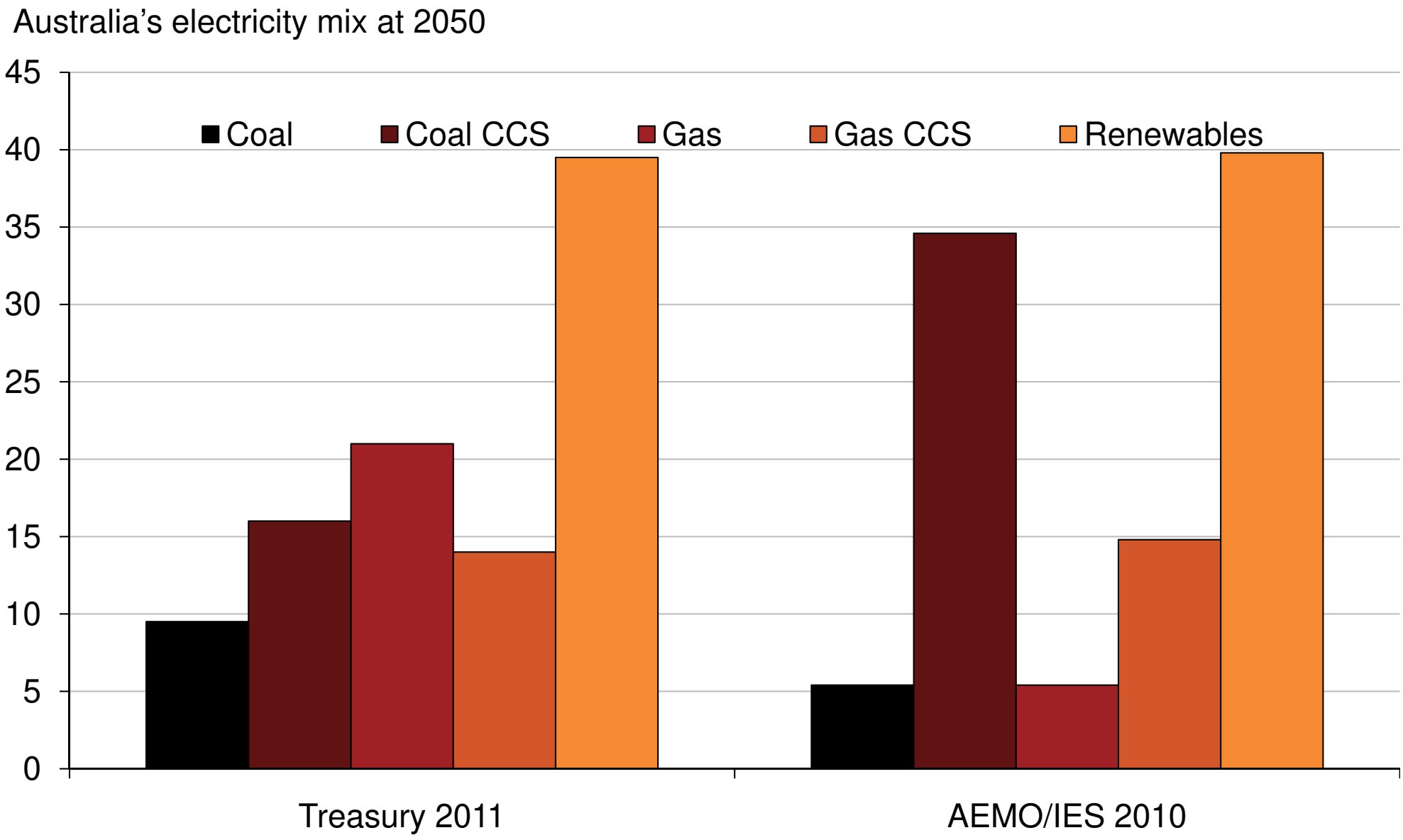
It's models at 30 paces, but where's the reality check?



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

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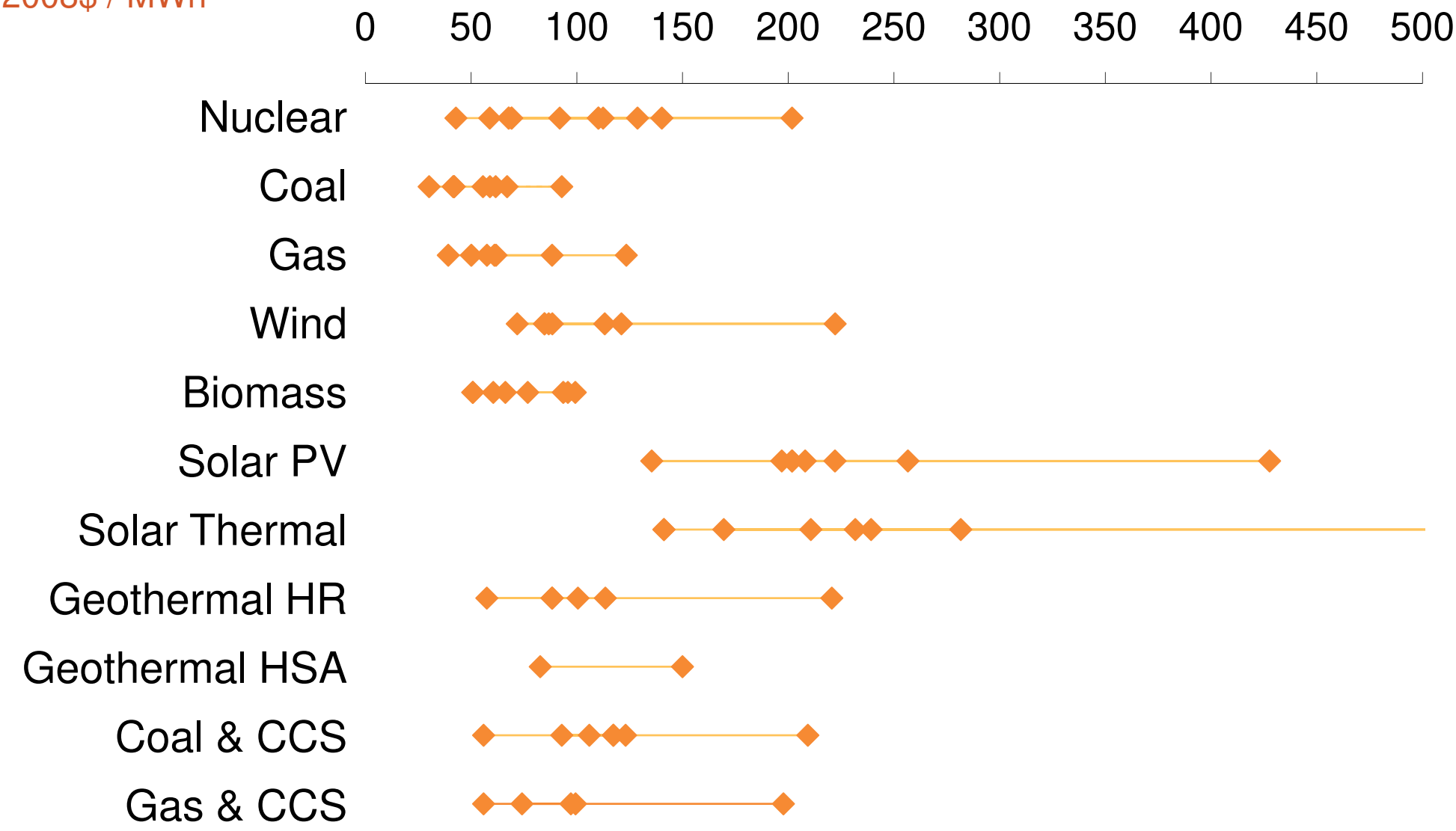
Estimates of electricity generation costs prior to 2015

2008$ / MWh

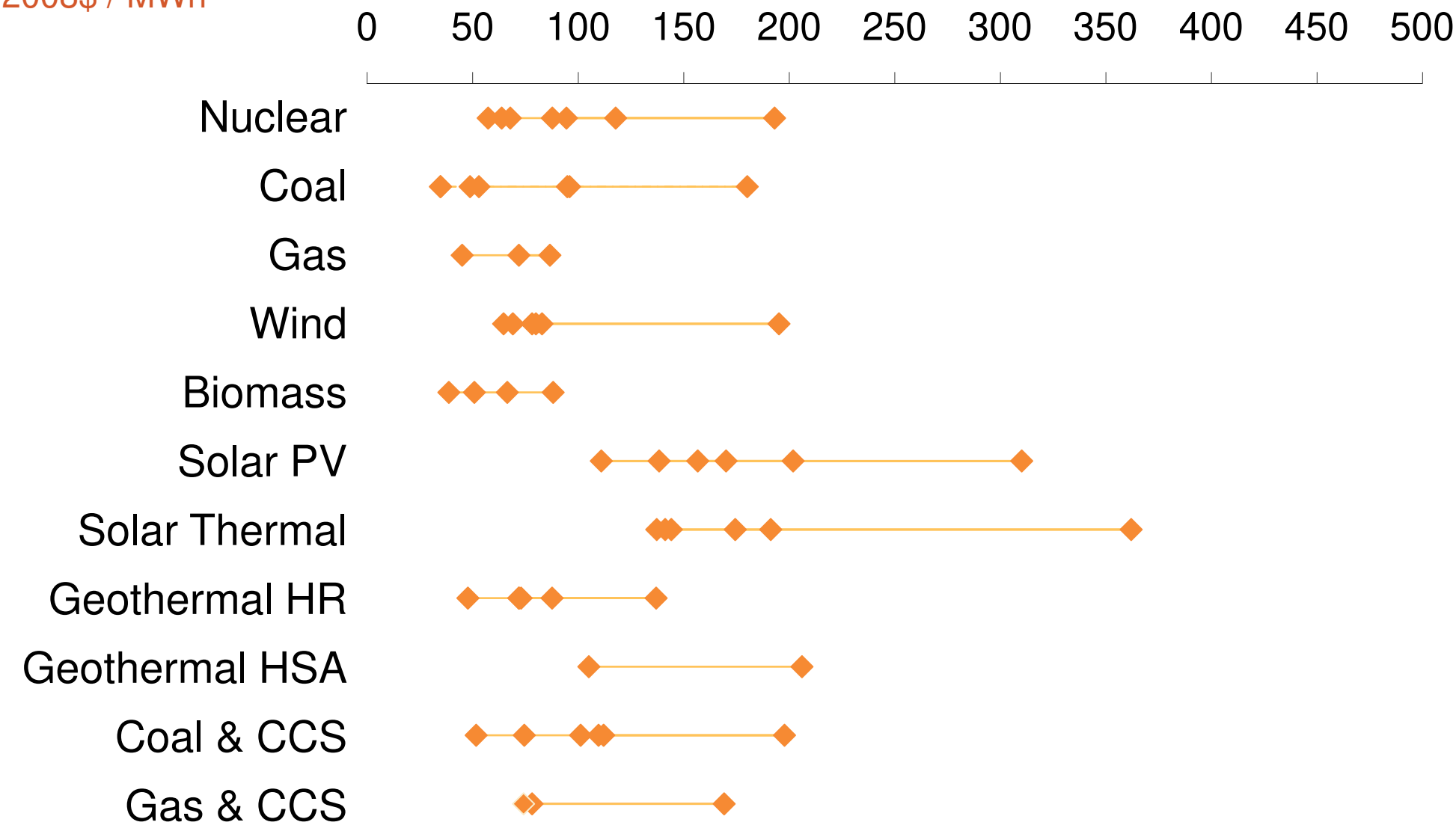


Source: ABARE (2010); ACIL Tasman (2009); EPRI (2009); IEA (2010); MMA (2008); Uranium Mining, Processing and Nuclear Energy Review Taskforce (2006).

– and in the future

Estimates of electricity generation costs 2030

2008$ / MWh



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Nuclear Outlook post Fukushima – the positive

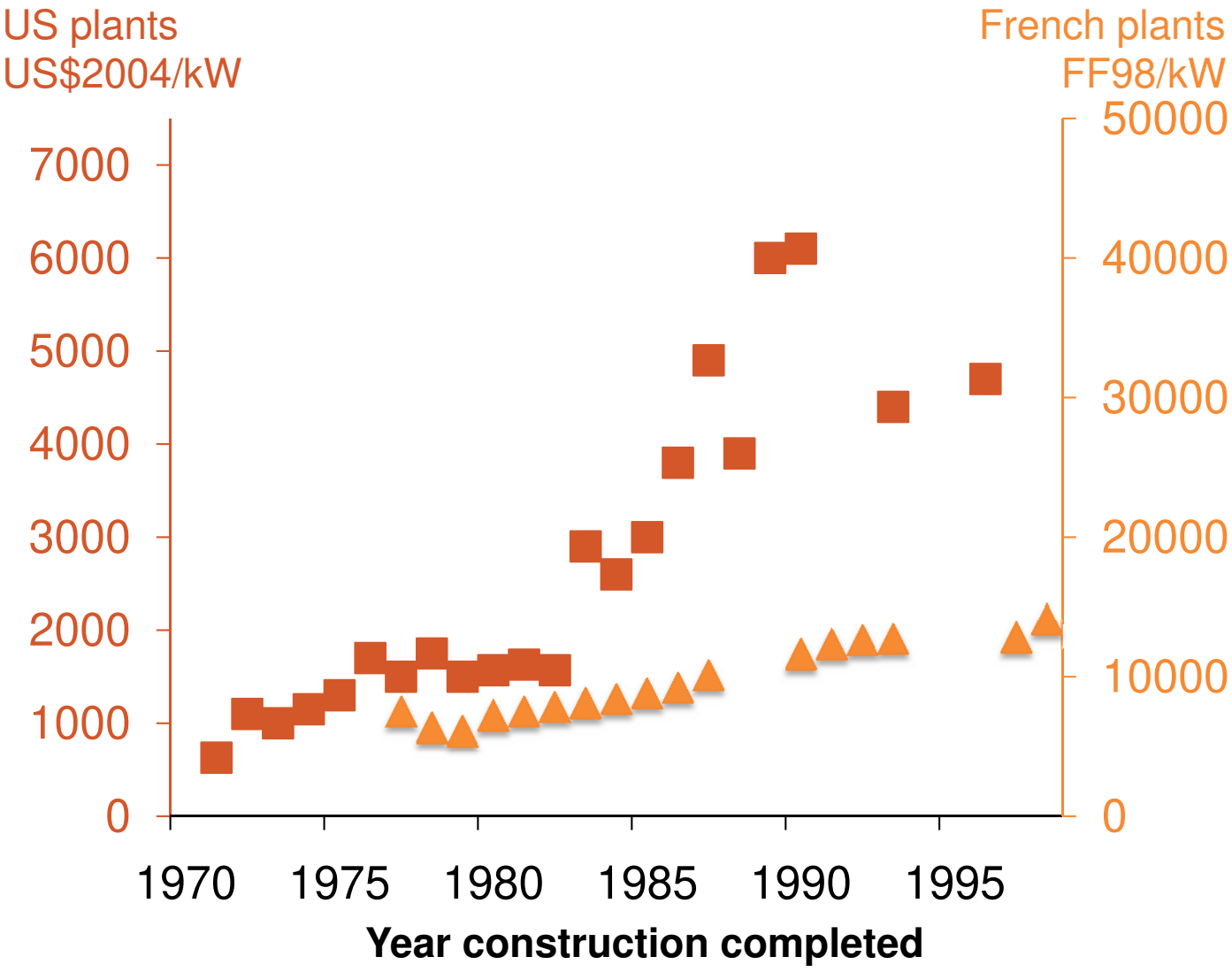
Nett Nuclear Capacity (GW)

	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
TOTAL	**320**	**351**	**405**

Source: The Economist, 2011

Nuclear Outlook – challenges

Nuclear plant construction costs are very difficult to predict



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"

Source: Grubler (2010) The costs of French nuclear scale-up: A case of negative learning by doing

Nuclear Outlook - challenges

- 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

Ref: Citigroup, 2009; Pew Center 2011

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

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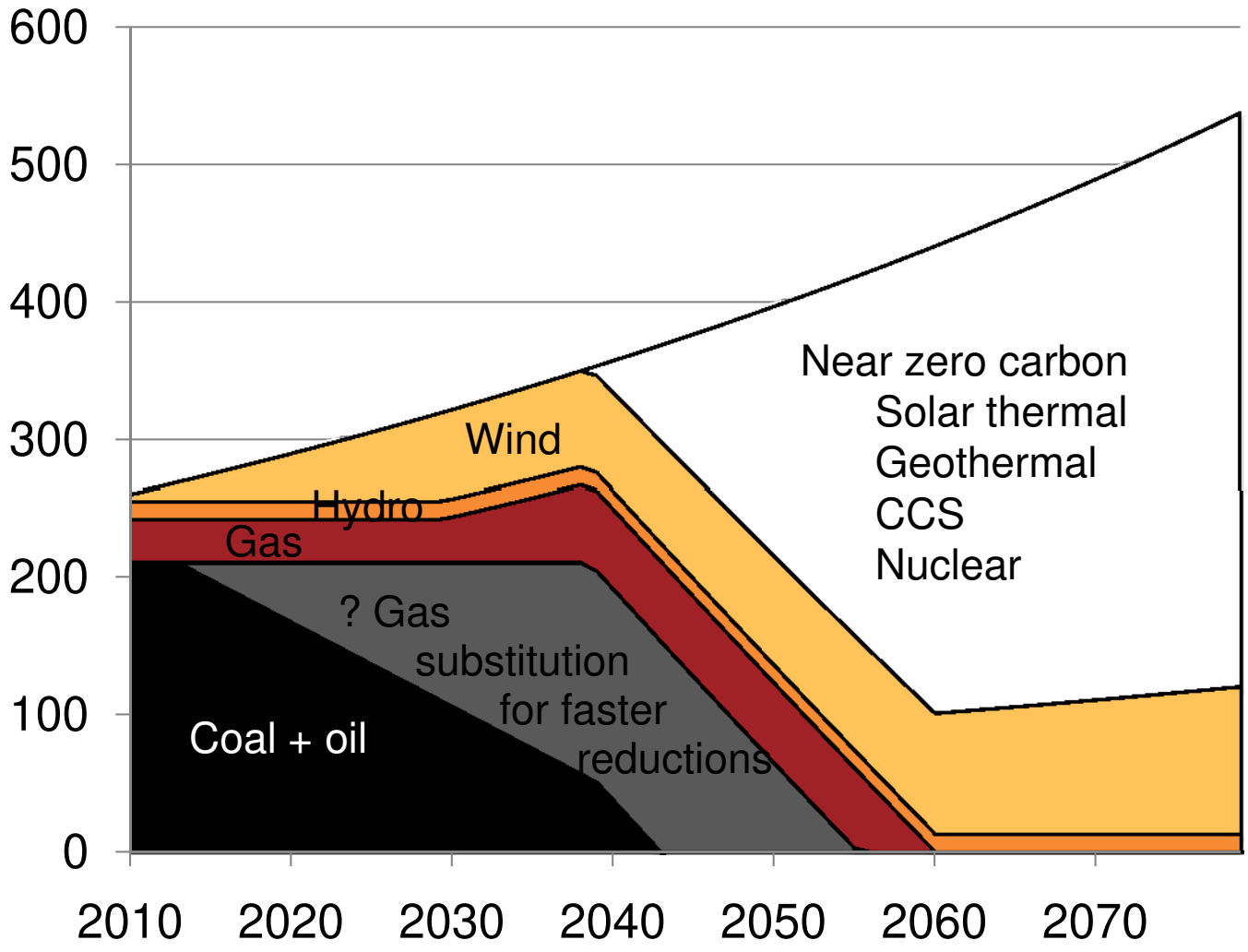
Australian electricity production

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

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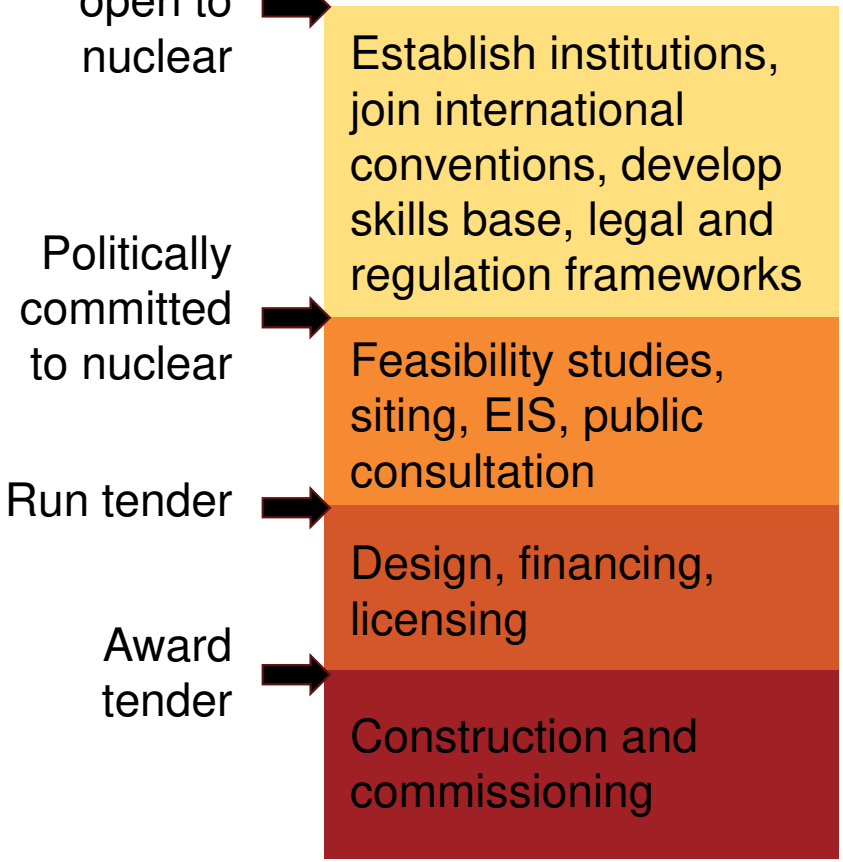
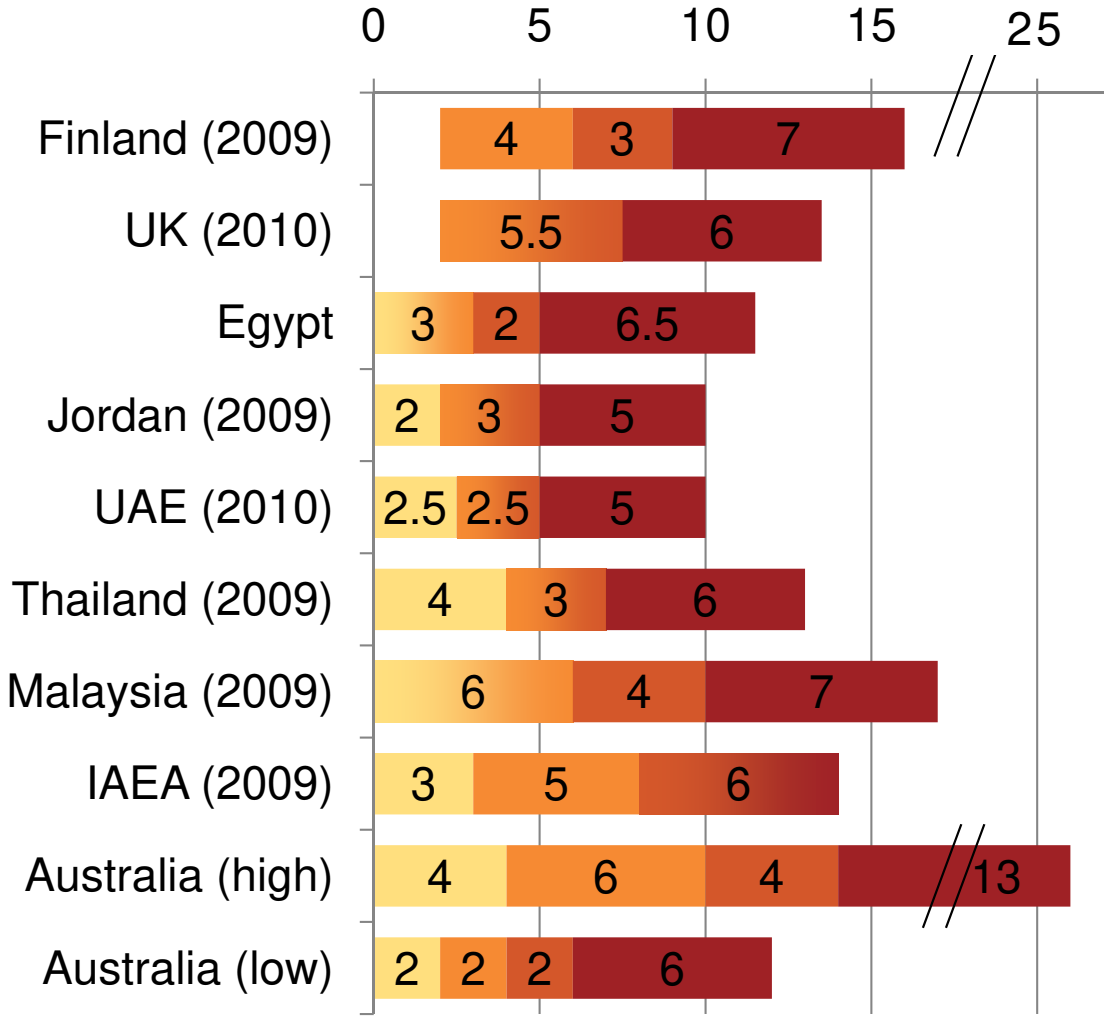
Stages in nuclear power development



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

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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