

Senate Standing Committee on Environment and Communications
Legislation Committee
Answers to questions on notice
Environment portfolio

Question No: 109
Hearing: Additional Estimates
Outcome: Outcome 2
Programme: Climate Change Authority
Topic: Modelling assumptions
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Senator Canavan asked:

Senator CANAVAN: It is all coming back to me. Remind me if I am wrong. What were the technology assumptions under those? They assume clean coal would become economic in about the 2030s, I thought.

Ms Harris: I would need to go back and check. I am pretty sure there was clean coal in there, there was nuclear in there—this is for the world. For Australia, there was clean coal. I do not think this particular project included nuclear for Australia.

Senator CANAVAN: I did not think there was nuclear, but I remember clean coal coming like manna from heaven in the 2030s and saving everybody.

Ms Harris: Of course, it depends on your assumptions about costs.

Senator CANAVAN: Absolutely. Can you just check for me, perhaps on notice, how much was renewables in 2050 when that price ended? What share of electricity production was renewables?

Ms Harris: Yes. I think we have a very large proportion by 2050. We might be able to find that.

Answer:

As an input to the Targets and Progress Review, the Authority requested modelling support and emissions analysis from the Treasury and the former Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE). The resulting report was titled *Climate Change Mitigation Scenarios: Modelling report provided to the Climate Change Authority in support of its Caps and Targets Review* and released in 2013. The Treasury and DIICCSRTE report and the associated consultants' reports are published and available at <http://www.climatechangeauthority.gov.au/reviews/targets-and-progress-review/modelling-reports>.

The Treasury and DIICCSRTE modelling uses a suite of models at the global, national and sectoral scales. The Treasury ran the Global Trade and Environment Model (GTEM) for the global electricity sector and ACIL Allen modelled the Australian electricity sector. Full details on the range of modelled scenarios with different levels of global action and sensitivity analyses on key variables including technology assumptions are available in the published reports.

The responses below draw on the results of the main scenarios; additional detail including sensitivity analysis for technology availability, cost and performance is available in the ACIL Allen report.

Carbon capture and storage assumptions

The technology assumptions vary across the different models (reflecting both model structures and uncertainty surrounding the technology's future cost and performance).

The technology assumptions for the ACIL Allen model were developed through drawing upon the 2012 Australian Energy Technology Assessment (AETA) published by the Bureau of Resources and Energy Economics, ACIL Allen expertise and public consultation. The results of the ACIL Allen modelling were input to the Monash Multi-Regional Forecasting (MMRF) model.

The ACIL Allen model assumed:

- Carbon capture and storage is commercially available after 2030.
- Base capital costs for carbon capture and storage from the 2012 AETA. The base capital costs include capture and compression of CO₂ but exclude transport and storage costs.
- Separate CO₂ storage and transport costs between \$15/t CO₂ and \$30/t CO₂ depending on plant location based on analysis from the former Department of Resources, Energy and Tourism.

ACIL Allen have advised that the modelling generated indicative sent-out long run marginal costs for carbon capture and storage in 2029-30 ranging from \$128/MWh to \$217/MWh (in real \$A 2009-10, based on selected discount rates, technology availability and capacity factor assumptions). Note that the published modelling did not report long run marginal costs.

The GTEM assumed:

- Carbon capture and storage technology, combined with coal and gas electricity generation, is available globally on a commercial scale after 2020.
- Carbon capture efficiency is 90 per cent of produced emissions.
- The scale of its commercial uptake depends on the level of the carbon price in place at the time to allow for gains in cost competitiveness compared to other technologies. The threshold carbon price for commercial uptake of carbon capture and storage technology was \$32 for coal and \$35 for gas (in \$US 2012), reflecting the costs of transporting and storing the captured emissions.

Nuclear power technology assumptions

The Treasury and DIICSRTE modelling assumed that:

- Nuclear power continues to be available in regions of the world where it is currently deployed, but not elsewhere.
- Nuclear power remains unavailable in Australia.

Electricity generation technology shares by 2050 for Australia

ACIL Allen modelling projects that, under a high carbon price scenario, carbon capture and storage uptake starts in 2030 and progressively rises to 21 per cent of Australian electricity generation by 2050. However, under the low carbon price scenario uptake does not begin until 2044 and only achieves 7 per cent of Australian electricity generation by 2050.

ACIL Allen modelling shows the level of renewables generation varied across each of the modelled scenarios. For Australia, the projected share of renewable energy generation in 2050 ranges from 48 per cent (low carbon price scenario) to 69 per cent (high carbon price scenario). Within renewables the technology mix is projected to change over time, with solar emerging as the dominant technology as the capacity limits of hydro and wind are reached.