

Technical note to NSW Government Guide to Cost-Benefit Analysis TPG23-08

Carbon value in cost-benefit analysis

Introduction

The *NSW Government Guide to Cost-Benefit Analysis (TPG23-08)* (the CBA Guide) states that the cost of CO₂ emissions (and other emissions measured in CO₂ equivalent emissions), or the benefits of reduced CO₂ emissions, should be included in CBA where the cost or benefit is likely to materially affect the NPV and BCR.

This document sets out the method, consistent with the discussion in the CBA Guide, to calculate carbon values for all initiatives.

Carbon emissions value for the purpose of preparing a CBA

Table 1 shows carbon emissions values for the purpose of preparing a CBA. Values (in 2022 dollars) are calculated using the method set out below for all years from 2023 onwards. These values will be updated biannually.

Table 1: AUD Carbon emissions value (per tonne) for the purpose of preparing a CBA (in 2022 dollars)

FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032
\$123	\$126	\$128	\$131	\$134	\$137	\$140	\$144	\$147	\$150

Methodology

I. Approach to value carbon emissions

The CBA guide states that a carbon emissions value based on market price should be used in the absence of a comprehensive Australian emissions market or modelled target-consistent marginal abatement cost.

The market price of the EU emissions trading scheme (ETS) is used to determine the value of carbon emissions. The EU ETS is the largest such scheme in the world and the EU economy and emissions objectives are to a certain degree comparable to Australian and NSW objectives.

II. Carbon emissions value using EU ETS market price

The FY2023 carbon emissions value is the average EU ETS market spot price over the 2022 calendar year, converted to Australian dollars using the average EUR/AUD exchange rate over the 2022 calendar year. EU ETS spot prices and EUR/AUD exchange rates are drawn, respectively, from:

- [ember-climate.org](https://ember-climate.org/data/data-tools/carbon-price-viewer/) (<https://ember-climate.org/data/data-tools/carbon-price-viewer/>) and
- [rba.gov.au](https://www.rba.gov.au/statistics/historical-data.html) (<https://www.rba.gov.au/statistics/historical-data.html>).

III. Escalation

The carbon emissions value (in 2022 dollars) is increased by 2.25 per cent per annum for each year after FY2023. This escalation accounts for expected real increases in the cost of emissions. The rate is broadly consistent with the increase in real prices suggested by the EU ETS futures market (<https://www.eex.com/en/market-data/environmentals/futures>) calculated by adjusting nominal futures prices by inflation. It is also of a similar order to the rate of increase observed in carbon values used in CBA in other jurisdictions. Escalated values are converted to Australian dollars using the average EUR/AUD exchange rate over the 2022 calendar year.

Application

I. Sensitivity testing

Sensitivity analysis is mandated by the CBA guide. The following carbon emission values (in 2022 dollars) may be used for sensitivity testing in CBA:

- 2022 calendar year high and low EU ETS spot price, converted to Australian dollars using the average EUR/AUD exchange rate over the 2022 calendar year.
- Global marginal abatement cost (MAC) estimate included in the IPCC Sixth Assessment Report (<https://www.ipcc.ch/report/ar6/wg3/>). The report provides an estimated MAC for 2030 and 2050 to limit warming globally to 2°C (\$90 and \$210 in 2015 USD respectively). Figures in table 2 were calculated by:
 - Determining the 2030 MAC in 2022 USD by escalating 2030 MAC in 2015 USD by CPI (<https://data.bls.gov/cgi-bin/surveymost?bls>).
 - Determining 2030 MAC in 2022 AUD by converted the 2030 MAC in 2022 USD to Australian dollars using the average USD/AUD exchange rate over the 2022 calendar year (<https://www.rba.gov.au/statistics/historical-data.html>).
 - The 2030 MAC in 2022 AUD is used from FY23 to FY31 because 2030 is the first year included in the IPCC report.
 - The IPCC MAC estimate (in 2022 dollars) is escalated by 4.3 per cent from FY32 to FY51 (in line with the IPCC report modelling compound annual growth rate)

The sensitivity of CBA results to carbon costs should also be illustrated with a test that sets these costs to zero (i.e., a scenario that effectively excludes carbon costs from analysis). This scenario will help to demonstrate the emissions impact of a project on its NPV and BCR.

Table 2 shows values that may be used for CBA sensitivity analysis and is expected to be updated biannually.

Table 2: AUD Carbon emissions value (per tonne) for CBA sensitivity analysis (in 2022 dollars)

	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32
2022 EU ETS high spot price	\$149	\$152	\$155	\$159	\$162	\$166	\$170	\$174	\$178	\$182
2022 EU ETS low spot price	\$88	\$90	\$92	\$95	\$97	\$99	\$101	\$103	\$106	\$108
IPCC MACC estimate	\$163	\$163	\$163	\$163	\$163	\$163	\$163	\$163	\$163	\$170
Zero carbon value	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0