E

CALCULATING CAPS—ASSUMPTIONS, METHODS AND TESTS

APPENDIX E1 INTRODUCTION

Under current legislation, the Authority is required to recommend annual caps under the carbon pricing mechanism to 2020. Chapter 13 sets out the relevant considerations and associated analysis.

This appendix presents the assumptions and methods used to estimate emissions, calculate caps and test the robustness of recommended caps against a range of possible futures. It draws extensively on the results of the economic modelling discussed in Chapter 10 and Appendix F.

All emissions are presented using Fourth Assessment Report (AR4) global warming potentials unless otherwise stated.

All references to covered emissions refer to emissions covered by the carbon pricing mechanism.

APPENDIX E2 DEFAULT CAPS

As outlined in Chapter 13, the Authority calculated default caps using the Liable Entities Public Information Database (CER 2014a) figure for 2012–13 covered emissions (Table E.1).

TABLE E.1: CALCULATION OF DEFAULT CAPS

	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20
Covered emissions	**285**							
Default caps		n/a	n/a	247	235	223	211	199

Note: All figures in Mt CO_2-e.
Source: Covered emissions 2012–13 from Liable Entities Public Information Database (CER 2014a)

To estimate the 2020 target implied by the default caps, the Authority calculated the total 2013–2020 emissions budget corresponding to these default caps (Table E.2). The national emissions budget is almost equal to the budget for a 2020 target of 15 per cent below 2000 levels (excluding carryover), or 19 per cent (including carryover).

TABLE E.2: 2013–2020 NATIONAL EMISSIONS BUDGET IMPLIED BY DEFAULT CAPS

Caps (2015–2020)	1,108
Fixed-price-period emissions (2013–2015)	+1,784
Uncovered emissions (2016–2020)	+1,385
Global Warming Potentials adjustment	+16
Voluntary action (GreenPower and voluntary cancellation of renewable energy certificates)	+16
Government purchase of international units	0
Carryover (from first Kyoto Protocol commitment period)	–116
National carbon budget (2013–2020)	**4,194**

Note: All figures in Mt CO_2-e. Totals do not sum due to rounding. Uncovered emissions include CFI estimates.
Source: Climate Change Authority based on Treasury and DIICCSRTE 2013 and GreenPower 2013

APPENDIX E3
ASSUMPTIONS AND METHODS FOR ESTIMATING EMISSIONS OUTSIDE THE CAPS

This appendix sets out the emissions estimates used to calculate caps and, where relevant, explains the method used to derive those estimates.

E3.1 WHOLE-OF-ECONOMY EMISSIONS DURING THE FIXED-PRICE PERIOD

The Authority has estimated Australia's domestic emissions for the fixed-price period (Table E.3). The estimate is based on the medium scenario from the modelling. Two additional adjustments were made to ensure the estimates are consistent with current legislative settings:

- the estimate of 2014–15 fixed-price emissions is based on the three-year fixed-price sensitivity test, which assumes the legislated fixed price applies in 2014–15. In contrast, the medium scenario assumes a floating price in 2014–15
- the estimate of 2013–14 and 2014–15 emissions is adjusted based on the heavy on-road vehicle sensitivity test, which assumes the equivalent carbon price does not apply to heavy on-road vehicles. In contrast, the medium scenario assumes the equivalent carbon price applies to heavy on-road vehicles from 2014.

TABLE E.3: EMISSIONS DURING THE FIXED-PRICE PERIOD (2012–13 TO 2014–15)

	2012–13	2013–14	2014–15
National emissions	593.07	593.04	597.57
Adjustment for heavy on-road vehicles (add)	n/a	0.06	0.20
Total fixed-price emissions	**1,783.93**		

Note: All figures in Mt CO_2-e. Adjustment for heavy on-road vehicles in 2013–14 reflects forward-looking behaviour by some entities. Numbers may not sum due to rounding.
Source: Treasury and DIICCSRTE 2013

E3.2 CREDITS FROM THE CARBON FARMING INITIATIVE

CFI credits for the flexible-price period are based on the medium price scenario (Table E.4), adjusted (increased) to include projects that have transitioned to the CFI from existing national and state-based schemes. This has been subtracted from the national emissions budget when calculating caps. The estimate takes into account:

- emerging information on the cost of eligible emissions reduction activities
- CFI project uptake rates
- the development of new CFI methodologies.

Credits are assumed to be generated in the year the emissions reductions occur. Further information on the CFI is provided in Appendix C of the Treasury and DIICCSRTE modelling report.

TABLE E.4: ASSUMED CREDITS FROM THE CFI (2015–16 TO 2019–20)

2015–16	2016–17	2017–18	2018–19	2019–20	TOTAL
11.35	12.54	14.46	15.73	16.99	**71.07**

Note: All figures in Mt CO_2-e. Numbers may not sum due to rounding.
Source: Climate Change Authority analysis based on data from Treasury and DIICCSRTE 2013 and the Clean Energy Regulator

E3.3 OPT-IN EMISSIONS

The Authority has estimated opt-in emissions and added these to the budget available for caps (Table E.5). The estimate has been developed based on data on applications for opt-in from the Clean Energy Regulator, and estimates from the modelling exercise on how these emissions might change over time. It is also informed by discussions with liable entities that have not yet applied to opt in, but may do so in the future.

Opt-in emissions reduce uncovered sector emissions and from this point forward are excluded from the estimate of uncovered sector emissions.

TABLE E.5: OPT-IN EMISSIONS (2015–16 TO 2019–20)

2015–16	2016–17	2017–18	2018–19	2019–20	TOTAL
15.41	13.63	13.95	14.23	14.50	**71.72**

Note: All figures in Mt CO_2-e.
Source: Climate Change Authority analysis based on data from Treasury and DIICCSRTE 2013

E3.4 BELOW-THRESHOLD EMISSIONS

The Authority has estimated below-threshold emissions for sectors other than waste, and deducted this from the budget available for caps (Table E.6). The estimate has been developed by comparing historical emissions from covered activities with liable emissions under the carbon pricing mechanism using data from the Clean Energy Regulator. The estimate is also informed by the modelling exercise, including the growth rate of covered emissions from the medium price scenario. Below-threshold emissions for the waste sector are included in the total estimate of uncovered emissions (Table E.6).

Below-threshold emissions increase uncovered sector emissions and from this point forward are included in the estimate of uncovered sector emissions.

TABLE E.6: BELOW-THRESHOLD EMISSIONS (2015–16 TO 2019–20)

2015–16	2016–17	2017–18	2018–19	2019–20	TOTAL
2.37	2.40	2.42	2.45	2.47	**12.12**

Note: All figures in Mt CO_2-e. Numbers may not sum due to rounding.
Source: Treasury and DIICCSRTE 2013

E3.5 UNCOVERED EMISSIONS DURING THE FLEXIBLE-PRICE PERIOD

The Authority has estimated emissions from sources not covered by the carbon pricing mechanism, based on the medium price scenario. This estimate includes below-threshold emissions and excludes opt-in emissions. The Authority adjusted these estimates to remove the impact of the equivalent carbon price on heavy on-road vehicles (so the final estimate reflects emissions levels with no equivalent carbon price on heavy on-road vehicles) (Table E.7).

TABLE E.7: UNCOVERED EMISSIONS DURING THE FLEXIBLE-PRICE PERIOD (2015–16 TO 2019–20)

	2015–16	2016–17	2017–18	2018–19	2019–20
Uncovered emissions	260.11	261.86	261.21	260.16	259.81
Adjustment for heavy on-road vehicles (add)	0.35	1.22	1.99	3.11	3.61
Total uncovered emissions	**1,313.44**				
Total uncovered emissions including CFI	**1,384.50**				

Note: All figures in Mt CO_2-e.
Source: Treasury and DIICCSRTE 2013

E3.6 ADJUSTMENT FOR ACCOUNTING DISCREPANCIES—CHANGES IN GLOBAL WARMING POTENTIALS

Different global warming potential (GWP) values will be used to calculate emissions in the carbon pricing mechanism and in Australia's national emissions budget until 2017–18, when the rules are harmonised. The Authority estimated the discrepancy arising from this difference for 2015–16 and 2016–17 (Table E.8), and deducted it from the budget available for caps. A small residual discrepancy relating to waste sector emissions will continue after 2016–17. This discrepancy is not material, so no further adjustment has been made.

The estimate is based on the projected level of emissions covered by the carbon pricing mechanism in the medium price scenario. Emissions are estimated using both sets of GWPs (the IPCC AR2 values are used for the carbon pricing mechanism, and AR4 values for the national emissions budget), and the differences summed.

TABLE E.8: GLOBAL WARMING POTENTIALS ADJUSTMENT (2015–16 AND 2016–17)

	2015–16	2016–17	TOTAL
Covered emissions (AR2)	350.21	351.20	
Covered emissions (AR4)	358.06	359.35	
Difference	**7.85**	**8.15**	**16.00**

Note: All figures in Mt CO_2-e.
Source: Treasury and DIICCSRTE 2013

E3.7 ADJUSTMENT FOR VOLUNTARY ACTION

The Authority estimated the emissions reductions associated with GreenPower purchases and the voluntary cancellation of Renewable Energy Certificates (RECs) for the period 2012–13 to 2019–20 (Table E.9), and deducted this from the national emissions budget when calculating caps. This helps ensure GreenPower and the voluntary cancellation of RECs deliver emissions reductions additional to Australia's national target.

The estimate of GreenPower purchases is based on 2011 purchases (the latest available audited data) from the GreenPower administrator. It is assumed that GreenPower remains a constant share of total electricity demand over the period to 2019–20. Emissions reductions associated with GreenPower are calculated based on the average emissions intensity of the electricity grid on a state-by-state basis. Electricity demand and emissions intensity are based on the medium scenario.

The estimate for the voluntary cancellation of RECs is based on the average cancellation for 2010, 2011 and 2012 from the Clean Energy Regulator. It is also assumed that the voluntary cancellation of RECs remains a constant share of total electricity demand over the period to 2019–20. Emissions reductions associated with the voluntary cancellation of RECs are calculated based on the national average emissions intensity of the electricity grid. Electricity demand and emissions intensity are also based on the medium scenario.

TABLE E.9: ADJUSTMENT FOR VOLUNTARY ACTION (2012–13 TO 2019–20)

	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20
GreenPower	1.77	1.78	1.88	1.87	1.85	1.82	1.78	1.75
Voluntary cancellation of RECs	0.25	0.25	0.27	0.26	0.25	0.24	0.23	0.23
Total	**16.47**							

Note: All figures in Mt CO_2-e. Numbers may not sum due to rounding.
Source: Based on GreenPower 2013, Treasury and DIICCSRTE 2013 and the Clean Energy Regulator

E3.8 CARRYOVER FROM THE FIRST COMMITMENT PERIOD OF THE KYOTO PROTOCOL

The carryover from Australia's first commitment under the Kyoto Protocol (for the period 2008–12) is estimated to be 121.5 Mt CO_2-e (DoE 2013). This is calculated by comparing Australia's assigned amount against domestic emissions for the 2008–12 period. This estimate is then reduced by 5.1 Mt CO_2-e to account for the estimated emissions reductions from relevant voluntary action (GreenPower purchases and the Greenhouse Friendly program) for the same period.
The Commonwealth Government has already cancelled 2.3 Mt CO_2-e of assigned amount units (CER 2014b). This means Australia has an estimated 116.4 Mt CO_2-e to carryover.

APPENDIX E4 ASSUMPTIONS AND METHODS FOR YEAR-BY-YEAR SHAPE OF CAPS

As outlined in Chapter 13, the Authority's general preference is to have caps that follow the shape of the national trajectory. To determine the annual caps, the total budget available for caps is distributed across the flexible-price period at the same declining percentage rate as the national trajectory.

The annual caps are then assessed to ensure they are sufficient to accommodate free allocation and early auction of carbon units, and to avoid impacts on the carbon price.

E4.1 FREE ALLOCATION AND EARLY AUCTION

The Authority estimated the number of carbon units required for free allocation under the Jobs and Competitiveness Program by analysing production levels for eligible industries in the medium scenario. Free allocation under the Energy Security Fund, and early auction of carbon units, are scheduled according to regulations and previous government policy. Table E.10 summarises the annual requirements, which are well below the recommended caps in every year.

TABLE E.10: CARBON UNITS REQUIRED FOR FREE ALLOCATION AND EARLY AUCTION (2015–16 TO 2019–20)

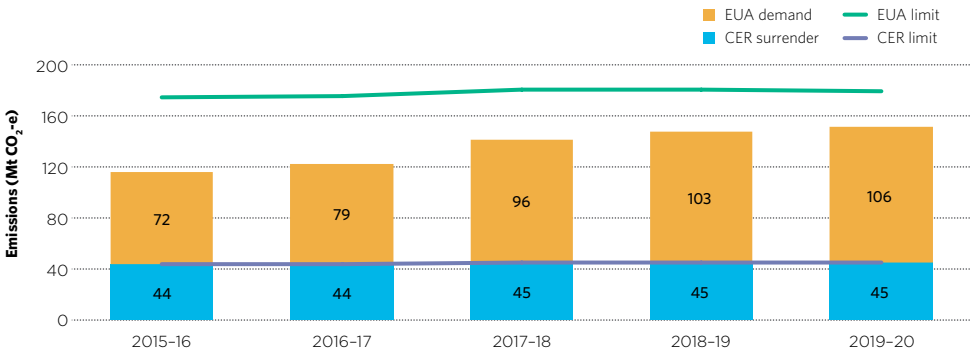
	2015–16	2016–17	2017–18	2018–19	2019–20
Jobs and Competitiveness Program (estimate)	106	108	108	106	105
Energy Security Fund	42	42	0	0	0
Early auction	40	20	0	0	0
Total	**188**	**169**	**108**	**106**	**105**

Note: All figures in Mt CO_2-e. Numbers may not sum due to rounding.
Source: Based on Treasury and DIICCSRTE 2013 data

E4.2 MINIMISING CARBON PRICE EFFECTS DUE TO IMPORT LIMITS

Caps calculated for the 15 per cent target plus carryover are robust across all carbon price scenarios (low, medium and high). The 12.5 per cent sublimit on Kyoto units binds in every year, and the overall 50 per cent limit on international units does not bind in any year. Figure E.1 illustrates the result for the medium scenario.

FIGURE E.1: IMPORT LIMIT TESTING UNDER A 19 PER CENT TARGET, MEDIUM SCENARIO

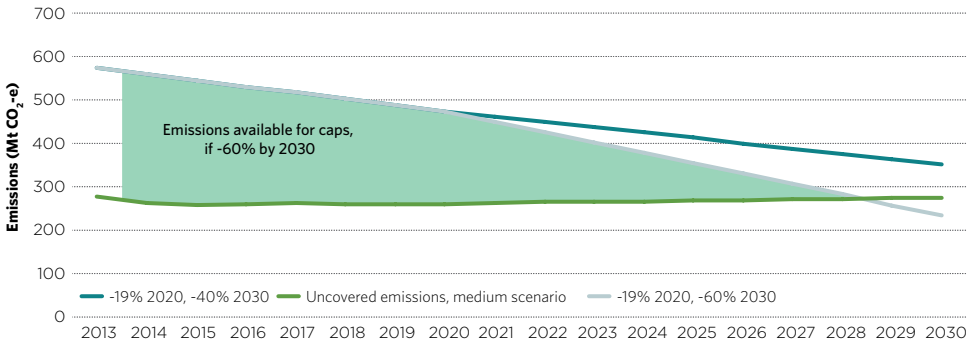


Source: Based on Treasury and DIICCSRTE 2013 data

APPENDIX E5
OUTLOOK FOR CAPS BEYOND 2020

Based on current legislation, the budget available for caps would continue to decline after 2020. Caps would become increasingly tight to 2030 (Figure E.2) and, for the lower (more ambitious) bound of the trajectory range, decline to zero by 2029. The uncovered emissions estimate used here is based on current legislation and the medium scenario. Any new policies, or higher prices, could reduce uncovered emissions and increase the budget available for caps.

FIGURE E.2: ESTIMATED BUDGET AVAILABLE FOR CAPS, 2013–2030



Note: Uncovered emissions estimate is indicative; it does not include all the adjustments discussed in this Appendix.
Source: Climate Change Authority; Treasury and DIICCSRTE 2013