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Climate Change

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Report on the individual review of the annual submission of Australia submitted in 2020*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2020 annual submission of Australia, conducted by an expert review team in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol”. The review took place from 16 to 21 November 2020 remotely.

* In the symbol for this document, 2020 refers to the year in which the inventory was submitted, not to the year of publication.



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Abbreviations and acronyms

AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
Annex I Party	Party included in Annex I to the Convention
AR	afforestation and reforestation
Article 8 review guidelines	“Guidelines for review under Article 8 of the Kyoto Protocol”
C	confidential
CER	certified emission reduction
CH ₄	methane
CM	cropland management
Convention reporting adherence	adherence to the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CP	commitment period
CPR	commitment period reserve
CRF	common reporting format
EF	emission factor
EFT	methane emission factor for manure in temperate climates
EFW	methane emission factor for manure in warm climates
ERT	expert review team
ERU	emission reduction unit
FM	forest management
FMRL	forest management reference level
Frac _{GASM}	fraction of applied organic nitrogen fertilizer materials and of urine and dung nitrogen deposited by grazing animals that volatilizes as ammonia and nitrogen oxides
Frac _{LEACH-(H)}	fraction of nitrogen input to managed soils that is lost through leaching and run-off
Frac _{LEACH-MS}	fraction of managed manure nitrogen losses due to leaching and run-off
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MMS	manure management system(s)
N	nitrogen
NA	not applicable
NE	not estimated
NF ₃	nitrogen trifluoride
NGER	Australian National Greenhouse and Energy Reporting

NH ₃	ammonia
NIR	national inventory report
NO	not occurring
NO _x	nitrogen oxides
N ₂ O	nitrous oxide
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF ₆	sulfur hexafluoride
UNFCCC Annex I inventory reporting guidelines	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
UNFCCC review guidelines	“Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”
VS	volatile solid(s)
WDR	wetland drainage and rewetting
Wetlands Supplement	<i>2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands</i>
2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
2019 IPCC Refinement	<i>2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>

I. Introduction

1. This report covers the review of the 2020 annual submission of Australia, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the “UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention” (annex to decision 13/CP.20). The review took place from 16 to 21 November 2020 remotely¹ and was coordinated by Lisa Hanle and María José López (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Australia.

Table 1

Composition of the expert review team that conducted the review for Australia

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Paul Duffy	Ireland
	Olia Glade	New Zealand
Energy	Ricardo Fernandez	European Union
	Norbert Nziramasanga	Zimbabwe
IPPU	Joseph Baffoe	Ghana
	Koen Smekens	Belgium
Agriculture	Jorge Alvarez	Peru
	Daniel Bretscher	Switzerland
LULUCF and KP-LULUCF	Ole-Kenneth Nielsen	Denmark
	Atsushi Sato	Japan
	Stanley Wapot	Vanuatu
Waste	Richard Claxton	United Kingdom
	Sumaia Elsayed	Sudan
Lead reviewers	Paul Duffy	
	Norbert Nziramasanga	

2. The basis of the findings in this report is the assessment by the ERT of the Party’s 2020 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that Australia resolve identified findings, including issues² designated as problems.³ Other findings, and, if applicable, the encouragements of the ERT to Australia to resolve related issues, are also included.

4. A draft version of this report was communicated to the Government of Australia, which provided no comments.

5. Annex I presents the annual GHG emissions of Australia, including totals excluding and including LULUCF, indirect CO₂ emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.

¹ Owing to the circumstances related to the coronavirus disease 2019, the review had to be conducted remotely.

² Issues are defined in decision 13/CP.20, annex, para. 81.

³ Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

6. Information to be included in the compilation and accounting database can be found in annex II.

II. Summary and general assessment of the Party's 2020 annual submission

7. Table 2 provides the assessment by the ERT of the Party's 2020 annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2

Summary of review results and general assessment of the 2020 annual submission of Australia

Assessment		Issue/problem ID#(s) in table 3 or 5 ^a	
Date of submission	Original submission: NIR, 27 May 2020; CRF tables (version 1), 27 May 2020; SEF tables (SEF-2019-CP1 and SEF-2019-CP2), 27 May 2020		
Review format	Centralized review conducted remotely		
Application of the requirements of the UNFCCC	Have any issues been identified in the following areas:		
Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	A.8, A.24, L.12
	(c) Development and selection of EFs?	Yes	A.22
	(d) Collection and selection of AD?	Yes	I.5, I.6, L.9, L.5, L.10, KL.7, KL.8
	(e) Reporting of recalculations?	Yes	G.4, E.7, E.10
	(f) Reporting of a consistent time series?	Yes	I.2
	(g) Reporting of uncertainties, including methodologies?	Yes	G.5
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness? ^b	Yes	I.8, L.11
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	No	G.1, E.5
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	I.11, I.12, I.13, A.13
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	No	

<i>Assessment</i>	<i>Issue/problem ID#(s) in table 3 or 5^a</i>		
(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No		
Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the standard independent assessment report?	No		
Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No		
Have any issues been identified related to the following reporting requirements for KP-LULUCF:			
(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes	KL.5, KL.9	
(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	No		
(c) Reporting requirements of decision 6/CMP.9?	Yes	KL.6	
(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	No		
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	Australia does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Question of implementation	Did the ERT list any questions of implementation?	No	

^a Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

^b Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of recommendations included in the previous review report

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 18 May 2020,⁴ and had not been resolved by the time of publication of the review report of the Party's 2019 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3
Status of implementation of recommendations included in the previous review report for Australia

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
General			
G.1	Notation keys (G.7, 2019) Transparency	Provide information stating that the total national aggregate estimated emissions for all gases and categories reported as "NE" remain below 0.1 per cent of the national total GHG emissions in line with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Addressing. Australia provided information in annex 5 to the NIR (vol. 3, pp.167–168) regarding the total aggregate emissions and removals for all gases and categories reported as "NE", reporting that total emissions excluded remain below 0.1 per cent of the national total GHG emissions. However, the information is incomplete as it does not cover CH ₄ and N ₂ O emissions from biomass consumption for category 1.A.3.d (domestic navigation), 1.A.3.e.ii other (other transportation) or 1.A.4.b.ii (off-road and other machinery (residential)) (see ID# E.5 in table 5) and CO ₂ emissions from methanol production for category 2.B.8.a (see ID# I.8 in table 5). The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided a complete list for all gases and categories that are currently not estimated confirming that the total national aggregate estimated emissions remain below 0.1 per cent of the national total GHG emissions, excluding LULUCF, in line with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
Energy			
E.1	International bunkers and multilateral operations – liquid fuels – all gases (E.2, 2019) Convention reporting adherence	Correct the AD on international bunkers to avoid discrepancies between CRF tables 1.D and 1.A(b).	Addressing. The discrepancies in AD for international marine bunkers identified for 2017 and reported in CRF tables 1.D and 1.A(b) have been corrected in the 2020 annual submission. The values reported for 2018 in CRF tables 1.D and 1.A(b) are also consistent. However, the errors identified for jet kerosene used in international aviation have not been corrected for 2011, 2016 and 2017, and the errors identified for gas/diesel oil and residual fuel oil used in international marine bunkers for 2014 and 2016 have not been corrected.

⁴ FCCC/ARR/2019/AUS.

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
E.2	1.A Fuel combustion – sectoral approach – solid fuels – CO ₂ (E.3, 2019) Transparency	Include the rationale for using constant country-specific CO ₂ EFs for coal combustion for sources other than electricity production.	Resolved. The sources and rationale for the use of constant country-specific CO ₂ EFs for solid fuels are given in the NIR (vol. 1, section 3.2.1, p.53).
E.3	1.A.3.b.iii Heavy-duty trucks and buses – liquid fuels – N ₂ O (E.4, 2019) Transparency	Explain in the NIR the inter-annual variation in the N ₂ O IEFs for heavy-duty trucks and buses and the impact on the N ₂ O IEFs under subcategory 1.A.3.b.iii.	Resolved. An explanation was included in the NIR (vol. 1, p.91) for the inter-annual variation in the N ₂ O IEFs and the impact on the N ₂ O IEFs for category 1.A.3.b.iii.
E.4	1.B.2.b Natural gas – liquid fuels – CO ₂ and CH ₄ (E.6, 2019) Comparability	Report emissions from transmission at liquefied natural gas terminals under category 1.B.2.a.3 in accordance with the 2006 IPCC Guidelines, or, if this is not possible, provide an explanation for the AD used for category 1.B.2.b.4 in the CRF documentation box.	Resolved. Australia still reported emissions for liquefied natural gas terminals under category 1.B.2.b.4 and reported the value and unit of AD as “NA” in CRF table 1.B.2. An explanation for the reporting of AD as “NA” has been included in the documentation box of CRF table 1.B.2 and elaborated upon in the NIR (vol. 1, table 3.42, pp.140–141).
IPPU			
I.1	2.A.4 Other process uses of carbonates – CO ₂ (I.18, 2019) Accuracy	Determine the correct fraction of calcination for the new ceramics facility for 2014 and 2015 to obtain correct AD, and recalculate the CO ₂ emissions for category 2.A.4.d.	Resolved. The Party determined the correct fraction of calcination for the new ceramics facility for 2014 and 2015 and recalculated the emissions accordingly. The significant increase of 16.6 per cent in the CO ₂ IEF for 2016 compared with that for 2015, as observed in the 2019 annual submission, was reduced to 0.3 per cent in the 2020 annual submission. Australia reported recalculations in the NIR (vol. 1, table 4.11, p.206), with increases in CO ₂ emissions of 15 and 17 per cent for 2014 and 2015, respectively.
I.2	2.C Metal industry – CO ₂ (I.8, 2019) (I.7, 2017) (I.11, 2016) (I.34, 2015) Consistency	Investigate whether other drivers could be applied to estimate emissions from lead production, zinc production and other (metal production) for 1990–2008, such as production volumes.	Addressing. Australia still assumed constant AD for lead, zinc and other metals (except silver and nickel) for years prior to 2009, as reported in the NIR (vol. 1, pp.229–230). During the review, Australia explained that it has identified an alternative data set for estimating CO ₂ emissions for 1990–2008 and is in the process of incorporating it into the time series, but that further analysis is required to verify the suitability of the data set for deriving production AD.
I.3	2.C.1 Iron and steel production – CO ₂ (I.19, 2019) Comparability	Collect AD for blast furnace gas transferred off site from iron and steel producers to facilities that use blast furnace gas as fuel for production of electricity or heat, and account for the emissions under the energy sector only in order to avoid double counting.	Resolved. On the basis of an assessment of NGER data, Australia reported in its NIR (vol. 1, p.222) that no blast furnace gas from iron and steel industry was consumed by any external facilities in 1990–2018. Therefore, the ERT agreed that there was no need to correct for the amount of blast furnace gas transferred off site for the years reported in the 2020 annual submission. The Party noted that this issue will be kept under review to account for any subsequent changes in practice.

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
I.4	2.C.1 Iron and steel production – CO ₂ (I.20, 2019) Transparency	Explain in the NIR that there are currently three facilities in Australia using electric arc furnace technology and that these facilities reported the consumption of fuels used as reductants or anode ingredients under the NGER system.	Resolved. Australia reported in its NIR (vol. 1, p.222) that there are currently three facilities using electric arc furnace technology, which reported the consumption of fuels used as reductants or anode ingredients under the NGER system. Emissions associated with the consumption of those reductants or anode ingredients were estimated under category 2.C.1.
I.5	2.D.1 Lubricant use – CO ₂ (I.21, 2019) Accuracy	Report emissions from lubricant use in two-stroke engines separately under category 1.A.3.b (road transportation) under the energy sector.	Addressing. Australia reported that, since it did not have any AD for lubricant use in two-stroke engines, it could not disaggregate and reallocate lubricant use in two-stroke engines to the energy sector. Therefore, all emissions were reported in category 2.D.1. Australia added information to explain this allocation in its NIR (vol. 1, pp.233 and 235) and indicated its intention to keep it under review. The ERT notes that not reporting these CO ₂ emissions in the energy sector means that CH ₄ and N ₂ O emissions from lubricant use in two-stroke engines are also missing from the energy sector reporting. The ERT believes that this issue should be assessed further to ensure that CO ₂ , CH ₄ and N ₂ O emissions from lubricant use in two-stroke engines are not underestimated.
I.6	2.G.3 N ₂ O from product uses – N ₂ O (I.15, 2019) (I.18, 2017) Accuracy	Explain the methodology used for estimating N ₂ O imports using the per capita usage factor, verify that no under- or overestimation of emissions occurs and report the results in the NIR.	Not resolved. Australia did not explain in its NIR the methodology used for estimating N ₂ O imports using the per capita usage factor, or verify that no under- or overestimation of emissions occurs. During the review, Australia indicated that it did not have access to any data on industrial gas production and importation since 2008. The ERT requested the Party to provide information on progress in disaggregating N ₂ O production and importation data, and either to demonstrate that no over- or underestimation of emissions occurred or to quantify the possible amount of such over- or underestimation. Australia provided the ERT with a time series of data for 1990–2018 for per capita N ₂ O emissions from product use. On the basis of an analysis of those data and a comparison with a number of other Parties, the ERT determined that Australia has likely not underestimated emissions for this category, and that any underestimation would probably be below the level of significance for inclusion of this issue in the list of potential problems and further questions raised by the ERT in accordance with decision 22/CMP.1 in conjunction with decision 4/CMP.11, annex, paragraph 80(b). However, the ERT considers that the recommendation has not yet been addressed because the Party has not provided sufficient information outlining the approach used to estimate emissions on a per capita basis and has not verified whether such an approach leads to an under- or overestimation of emissions.
Agriculture			
A.1	3. General (agriculture) – CH ₄ and N ₂ O	Report the number of animals used for the estimates for each category for the entire time series and include a brief description of how frequently the AD	Resolved. Australia reported the number of animals used for estimating emissions for each category in appendices 5.A–5.G to the NIR for the entire time series. Additionally, the Party included in its NIR (vol. 1, p.287)

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	(A.7, 2019) Transparency	are collected (e.g. in tabular format or in a methodological annex to the NIR).	information on the frequency of the data collection.
A.2	3.A.4 Other livestock – CH ₄ (A.5, 2019) (A.15, 2017) Accuracy	Describe in the NIR a justification of the methodology used to identify the country-specific EFs for emus/ostriches in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 2, table 2A.1); for example, by providing a summary or references in the NIR to the available information on the expert judgment (reports or peer review); or revise the methodology in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 10.2.4).	Resolved. Australia has updated its methodology for estimating emissions from emus/ostriches and no longer derives approximated EFs for these animals using a tier 1 EF for animals with similar digestive systems on the basis of weight ratios. The Party recalculated the respective emissions and reported in its NIR (vol. 1, p.298) that it applied default EFs for ostriches from the 2019 IPCC Refinement (vol. 4, chap. 10, table 10.10). The ERT agrees with Australia's approach.
A.3	3.B Manure management – CH ₄ (A.8, 2019) Transparency	Explain in the NIR why the total shares allocated across all MMS exceed 100 per cent.	Resolved. Australia reported on the allocation of manure in its NIR (vol. 1, p.304), clarifying that the shares of swine and poultry manure allocated across all MMS exceed 100 per cent because the manure may pass through multiple treatment stages (see ID#s A.11–A.12 in table 5).
LULUCF			
L.1	4. General (LULUCF) – CO ₂ , CH ₄ and N ₂ O (L.2, 2019) (L.3, 2017) (L.29, 2016) Comparability	Explain in the NIR and CRF table 9 under which categories the estimates for the following categories and pools are reported: cropland, wetlands and settlements converted to forest land (all pools except organic soils); cropland converted to grassland (all pools); and cropland and grassland converted to settlements (all pools).	Resolved. The Party reported carbon stock change for cropland, wetlands and settlements converted to forest land separately. It reported cropland converted to grassland and cropland and grassland converted to settlements (all pools) as “IE” and specified in CRF table 9 in which categories or pools estimates reported as “IE” were included. The ERT confirmed that all reporting of “IE” under the LULUCF sector was explained in CRF table 9. The Party's reporting across land-use categories was broadly described in the NIR (vol. 2, pp.20 and 134; vol. 3, p.166).
L.2	4. General (LULUCF) – CO ₂ , CH ₄ and N ₂ O (L.3, 2019) (L.4, 2017) (L.29, 2016) Comparability	Provide separate AD and estimates for the following categories and pools currently reported as “IE”: cropland, wetlands and settlements converted to forest land (all pools except organic soils); cropland converted to grassland (all pools); and cropland and grassland converted to settlements (all pools). Until this is done, provide in the NIR an update of the status of efforts to provide estimates for these pools.	Addressing. The Party reported AD and carbon stock changes for all carbon pools for cropland, wetlands and settlements converted to forest land separately in CRF table 4.A. While acknowledging the acceptance by the previous ERT of Australia's rationale for not separately reporting conversions of cropland to grassland, the current ERT notes that the other categories have yet to be separated. During the review, the Party clarified that a project to identify cropland and grassland converted to settlements is ongoing, and related information was included in its NIR (vol. 2, p.134). The ERT considers that the recommendation has not yet been fully addressed because, despite making progress since the previous annual submission, the Party has not yet provided separate AD and estimates for cropland and grassland converted to settlements.
L.3	Land representation – CO ₂ , CH ₄ and N ₂ O	Change the information reported in CRF table 4.1 from net changes to actual areas of conversion (e.g. report values for both the areas converted from forest land to grassland and the areas converted from	Resolved. The Party updated the land representation system and reported the actual area of conversion instead of net area changes between forest land and non-forest land in CRF table 4.1. Whereas in the 2019 annual submission the area of forest land converted to grassland was reported as “IE” for 2017, in the

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	(L.11, 2019) Transparency	grassland to forest land) to increase transparency and ensure consistency with the approach described by Australia in table A.5.1 of annex 5 to the NIR.	2020 annual submission it was reported as actual area (422.42 kha for 2017). Similarly, the area of grassland converted to forest land was updated from the net area change in the 2019 annual submission (759.69 kha for 2017) to the gross area change in the 2020 submission (895.20 kha for 2017) in CRF table 4.1. This is consistent with the information presented in table A.5.1 of annex 5 to the NIR.
L.4	4.B Cropland – CO ₂ (L.8, 2019) Transparency	Report in the NIR the actual values of total biomass and the biomass accumulation rates for perennial woody vegetation on cropland used in the calculations.	Resolved. The Party reported the total biomass and biomass accumulation rates in tables 6.37a and 6.37b of its NIR (vol. 2, p.81) that were used in its calculations.
L.5	4.B Cropland – CO ₂ (L.9, 2019) Accuracy	Stratify cropland areas on organic soils by natural zone and calculate the CO ₂ emissions by applying corresponding EFs, for example from the 2006 IPCC Guidelines (vol. 4, chap. 5, table 5.6).	Not resolved. The Party reported in its NIR (vol. 2, pp.85–86) all CO ₂ emissions from drained organic soils in wetlands converted to cropland using the EF for the cool temperate zone (5 t carbon/ha/year as provided in vol. 4, chap. 5, table 5.6, of the 2006 IPCC Guidelines) on the basis of expert understanding of wetland ecosystems in areas where such conversions occur. During the review, the Party clarified that organic soils are mostly located in Tasmania, which has a cool temperate climate, but noted that this area is not actually subject to cultivation and that cultivated organic soils in cropland are mostly used for sugar cane production (reported under the agriculture sector, category 3.D.a.6 (N ₂ O emissions from cultivation of organic soils), and amounting to an area of 4,000 ha). The Party also explained that organic soils in cropland accounted for a very small area, with no significant variation in landscape characteristics. While the ERT notes that stratification might not significantly improve accuracy for cropland under the LULUCF sector, it emphasizes the importance of consistently addressing areas of organic soils under LULUCF and agriculture (see also ID#s A.21, A.22 and L.9 in table 5).
L.6	4.B Cropland – CO ₂ (L.10, 2019) Convention reporting adherence	Report in the corresponding table in the next NIR the actual crop partitioning used for the calculations.	Resolved. The Party provided an updated table in its NIR (vol. 2, table 6.B.4, p.184) detailing plant partitioning by crop and pasture type.
Waste			
W.1	5.A Solid waste disposal on land – CH ₄ (W.10, 2019) Transparency	Explain how data from background studies conducted in 2008 were used to estimate the waste composition for the most recent years of the time series.	Addressing. The Party reported in the NIR (vol. 2, p.306) that data from the 2008 studies (conducted by the GHD and Hyder Consulting companies), which were not considered NGER data, accounted for approximately 30 per cent of landfilled waste in 2018 and that the base waste mix percentages are derived as a simple average of waste mixes presented in these studies. The Party also stated that waste mix percentages changed over time in line with the varying quantities of wood waste and paper entering landfill, for which a separate

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
			reference was provided in the NIR (table 7.8). However, the ERT considers that the Party could more transparently present and describe the time-series data for waste composition that are not derived from NGER data, for example by highlighting any extrapolation techniques used. In addition, whereas it is stated in the NIR (vol. 2, p.306) that percentages for 2017 were reported in NIR table 7.8, the ERT noted that NIR table 7.8 actually pertains to 2018 data.
W.2	5.B Biological treatment of solid waste – CH ₄ (W.11 2019) Transparency	Explain in the NIR the method used for calculating the CH ₄ emissions and its adherence to the IPCC tier 1 method, and revise the reference to the method in the NIR and CRF table summary 3, as needed.	Addressing. The Party transparently reported its country-specific methodology and choice of EFs for estimating emissions from composting in its NIR (vol. 2, pp.315–316). However, the ERT noted that the applied method should be reported in CRF table summary 3s2 as tier 2 rather than tier 1.
W.3	5.B Biological treatment of solid waste – CH ₄ and N ₂ O (W.14, 2019) Convention reporting adherence	Ensure that consistent information on emissions from the biological treatment of solid waste is provided in the NIR and CRF table summary 2.	Resolved. The Party reported emissions consistently in the NIR (vol. 2, pp.294 and 315) and CRF table summary 2.
W.4	5.B.2 Anaerobic digestion at biogas facilities – CH ₄ and N ₂ O (W.13, 2019) Comparability	Report emissions from anaerobic digestion at biogas facilities as “NE” instead of “NO” and justify the reporting of “NE” in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party reported “NE” in CRF table 5.B for CH ₄ and N ₂ O emissions from anaerobic digestion at biogas facilities. According to the NIR (vol. 2, p.315), CH ₄ emissions from these facilities are estimated to be approximately 2.6 kt CO ₂ eq, which is below the threshold of significance for Australia (279.02 kt CO ₂ eq in 2018). The ERT notes that, since there are no default EFs for estimating N ₂ O emissions for this category, reporting such emissions is not mandatory. The ERT further notes that no explanation was provided in CRF table 9 for the reporting of “NE” (see ID# W.6 in table 5).
W.5	5.D Wastewater treatment and discharge – CH ₄ (W.16, 2019) Transparency	Provide in the NIR additional information on the rationale for using chemical rather than biochemical oxygen demand in the calculation, and specify how the EFs for wastewater treated at wastewater plants and for sludge treated at wastewater plants for calculating CH ₄ emissions from domestic wastewater are determined, including information on how this approach is in accordance with the 2006 IPCC Guidelines.	Resolved. The Party reported in the NIR that chemical oxygen demand was used because it was the preferred parameter of companies reporting under NGER. According to the Party’s reporting in the NIR (vol. 2, pp.319, 326 and 328), this approach was aligned with domestic licensing provisions and consistent with the 2006 IPCC Guidelines (vol. 5, section 6.2.2.2, table 6.2), which also provide a default factor for chemical oxygen demand. The fraction of chemical oxygen demand removed as sludge from wastewater treatment and the methane correction factors were also provided in the NIR (vol. 2, pp.326–327 and table 7.22).
KP-LULUCF			
KL.1	Deforestation – CO ₂ (KL.5, 2019) Transparency	Correct the error in the reporting of forest conversion deforestation on organic soils.	Resolved. The Party reported both the area and the net carbon stock change for organic soils under the subcategory of forest conversion (i.e. non-mangrove

ID#	Issue/problem classification ^{a, b}	Recommendation made in previous review report	ERT assessment and rationale
KL.2	FM – CO ₂ (KL.6, 2019) Convention reporting adherence	Report a revised table 11.19 in the NIR to reflect the construction of the background level and margin for the application of the natural disturbance provision.	forest) as “IE” for the entire time series, which is the correct notation key for the method applied by Australia, in CRF table 4(KP-I)A.2. Resolved. The Party updated table 11.19 in its NIR (vol. 3, p.31), with the years labelled correctly.
KL.3	FM – CO ₂ , CH ₄ and N ₂ O (KL.8, 2019) Transparency	Report information on total emissions from wildfires before application of the natural disturbance provision in CRF table 4(KP-I)B.1.3, taking into account footnotes 4, 6 and 9 to the table.	Resolved. The Party reported total emissions from natural disturbances (wildfires) by gas (columns F–H) and aggregated the GHG emission total (column J) before application of the natural disturbance provision, and separately reported emissions that could be excluded due to application of the natural disturbance provision (column N) in CRF table 4(KP-I)B.1.3.
KL.4	RV – CO ₂ (KL.7, 2019) Comparability	Report the carbon stock changes for different carbon pools separately and eliminate the error in the reporting of the notation key in CRF table 4(KP-I)B.4.	Addressing. The Party reported all carbon pools together under above-ground biomass but eliminated the error in the reporting of the notation key for litter, deadwood, mineral soils and organic soils, reporting them as “IE” instead of “NA” for the entire time series in CRF table 4(KP-I)B.4. During the review, the Party clarified that it was working on incorporating sparse woody vegetation into its Full Carbon Accounting Model, and that fieldwork was under way across all significant bioregions in Australia to better characterize biomass in subforest woody vegetation. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet reported carbon stock changes for different carbon pools separately.
KL.5	HWP – CO ₂ (KL.4, 2019) (KL.7, 2017) (KL.8, 2016) Transparency	Document the process for deriving the country-specific half-lives for HWP and provide information to justify that the methodologies used are at least as detailed or accurate as those prescribed in decision 2/CMP.7, annex, paragraph 29.	Not resolved. The Party has yet to report the required information in its NIR. During the review, the Party provided details on the method used to calculate the implied half-lives reported in CRF table 4.Gs2, including on the application of a formula and the consideration of country-specific stratified data on HWP pools. In addition, the Party clarified that it was continuing to undertake analyses, including a comparison of its tier 3 method and the default method based on the first-order decay function contained in equation 12.1 from the 2006 IPCC Guidelines (vol. 4, chap. 12, p.11) with default half-lives. According to the Party, an improved explanation of its methodology is being prepared for inclusion in a future submission.

^a References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) in which the issue or problem was raised. Issues are identified in accordance with paras. 80–83 of the UNFCCC review guidelines and classified as per para. 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with para. 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

^b The report on the review of the 2018 annual submission of Australia was not available at the time of this review. Therefore, 2018 is excluded from the list of review years in which issues could have been identified.

IV. Issues and problems identified in three or more successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2020 annual submission of Australia, and had not been addressed by the Party at the time of publication of this review report.

Table 4

Issues and/or problems identified in three or more successive reviews and not addressed by Australia

<i>ID#</i>	<i>Previous recommendation for the issue</i>	<i>Number of successive reviews issue not addressed^a</i>
General	No issues identified.	
Energy	No issues identified.	
IPPU		
I.2	Investigate whether other drivers could be applied to estimate emissions from lead production, zinc production and other (metal production) for 1990–2008, such as production volumes.	5 (2015–2020)
I.6	Explain the methodology used for estimating N ₂ O imports using the per capita usage factor, verify that no under- or overestimation of emissions occurs and report the results in the NIR.	3 (2017–2020)
Agriculture	No issues identified.	
LULUCF		
L.2	Provide separate AD and estimates for the following categories and pools currently reported as “IE”: cropland, wetlands and settlements converted to forest land (all pools except organic soils); cropland converted to grassland (all pools); and cropland and grassland converted to settlements (all pools). Until this is done, provide in the NIR an update of the status of efforts to provide estimates for these pools.	4 (2016–2020)
Waste	No issues identified.	
KP-LULUCF		
KL.5	Document the process for deriving the country-specific half-lives for HWP and provide information to justify that the methodologies used are at least as detailed or accurate as those prescribed in decision 2/CMP.7, annex, paragraph 29.	4 (2016–2020)

^a The report on the review of the 2018 annual submission of Australia has not yet been published. Therefore, 2018 was not included when counting the number of successive years for this table.

V. Additional findings made during the individual review of the Party's 2020 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2020 annual submission of Australia that are additional to those identified in table 3.

Table 5

Additional findings made during the individual review of the 2020 annual submission of Australia

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?^a</i>
General			
G.2	Key category analysis	<p>Australia did not complete CRF table NIR-3 with information on key categories for KP-LULUCF. In response to a question raised during the review, Australia stated that it had never been able to complete table NIR-3 using CRF Reporter, and that the information on the key category analysis for activities under Article 3, paragraph 3, and relevant activities under Article 3, paragraph 4 of the Kyoto Protocol was reported in table 11.42 of the NIR (vol. 3, p.73).</p> <p>The ERT encourages Australia to address this matter with the UNFCCC secretariat CRF Reporter help desk and to complete CRF table NIR-3.</p>	Not an issue/problem
G.3	Methods	<p>Australia used the 2019 IPCC Refinement for estimating emissions for categories in a number of sectors. For the agriculture sector in particular, this resulted in significant recalculations (e.g. increases of CO₂ eq emissions of approximately 17 per cent for N leaching and run-off and 20 per cent for rice cultivation across the time series). However, it was not transparently explained in the NIR why Australia had chosen methods, parameters and EFs from the 2019 IPCC Refinement for estimating emissions. As the 2019 IPCC Refinement has not been adopted for use by Annex I Parties for the preparation of GHG emissions inventories, the ERT asked Australia during the review to outline why it had chosen to use it for estimating emissions for some gases and categories. In response, Australia detailed which estimates for gases and categories had been revised for the first time using the 2019 IPCC Refinement.</p> <p>The ERT notes the recommendations below that Australia include a more detailed description for each category and gas where the 2019 IPCC Refinement was used for estimating emissions, particularly in relation to fugitive emissions from post-meter gas appliances (see ID# E.9 below), parameters in the agriculture sector used for estimation under enteric fermentation, manure management and rice cultivation (see ID# A.7 below), Fra_{CLEACH-MS} and Fra_{CLEACH-(H)} (see ID#s A.8 and A.25 below, respectively), the CH₄ EF for pasture, range and paddock (see ID# A.10 below) and Fra_{CASM} (see ID# A.23 below).</p>	Not an issue/problem
G.4	Recalculations	<p>Australia provided information on recalculations made between its 2019 and 2020 submissions in the NIR (vol. 2, chap. 10, table 10.1), outlining which categories had been recalculated and which section of the NIR described the quantitative impacts of those recalculations. The ERT noted that, while NIR table 10.1 referred to recalculations in category 3.E (prescribed burning of savannahs), the same category had been reported as "IE" since the 2016 annual submission. In response to a question raised during the review, Australia confirmed that it had reported the information in error and will update the table in its next submission. The ERT also noted that the driver for</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>recalculating emissions and the quantitative impact of most recalculations (see ID#s E.7, E.10 and A.4 below) were not clearly described in the sections of the NIR referred to in NIR table 10.1.</p> <p>The ERT recommends that Australia correct the error in NIR table 10.1 regarding recalculations for category 3.E, and encourages the Party to outline in chapter 10 and the relevant sectoral chapters of the NIR the quantitative impact of recalculations by gas on the sectoral and national totals, including and excluding LULUCF.</p>	
G.5	Uncertainty analysis	<p>According to the NIR (vol. 3, annex 2, table A2.4), the level and trend uncertainties for 2018, excluding LULUCF, are ± 3.3 and ± 3.5 per cent, respectively, whereas for 2017 they were ± 5.5 and ± 5.2 per cent, respectively. When asked about this by the ERT during the review, Australia stated that the changes were due mainly to the revision of uncertainty for the categories underground coal mines (1.B.1.a.i), surface coal mines (1.B.1.a.ii), aluminium production (2.C.3) and enteric fermentation (3.A). However, the ERT noted that no additional information regarding changes to the uncertainty assessment was reported in the relevant sectoral chapters of or in annex 2 to the NIR.</p> <p>The ERT recommends that Australia elaborate, in annex 2 to the NIR and the appropriate sectoral chapters, on any changes to the category-specific uncertainty estimates as well as on any changes to the overall uncertainty analysis affecting the uncertainties estimated for the level of and trend in emissions (including and excluding LULUCF) with respect to the uncertainty assessment conducted for the previous annual submission.</p>	Transparency
Energy			
E.5	1.A Fuel combustion – sectoral approach – biomass – CH ₄ and N ₂ O	<p>Australia reported CO₂ emissions from biomass for categories 1.A.3.d domestic navigation (7.29 kt), 1.A.3.e.ii other (other transportation) (0.36 kt) and 1.A.4.b.ii off-road and other machinery (residential) (2.21 kt) for 2018. However, N₂O and CH₄ emissions were reported as “NO”. During the review, Australia clarified that the reported notation key was incorrect and should be “NE” for those three categories. The Party provided further evidence of the likely level of emissions during the review. Given that the biomass reported is the ethanol component of E10 gasoline sold in some regions of Australia, it applied the biomass IEF for cars (category 1.A.3.b.i) for estimating emissions of CH₄ and N₂O. The Party’s calculations resulted in estimated emissions for the three categories combined of 0.003 kt CH₄ and 0.001 kt N₂O. The ERT agrees with Australia that these emissions are below the significance threshold (279.02 kt CO₂ eq for 2018) and therefore below the level for including an issue in the list of potential problems and further questions raised by the ERT.</p> <p>The ERT recommends that the Party report the correct notation key (“NE”) for biomass for categories 1.A.3.d (domestic navigation), 1.A.3.e.ii (other (other transportation)) and 1.A.4.b.ii (off-road and other machinery (residential)) and justify why the emissions were not estimated if they are below the significance threshold in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines and in line with the information provided to the ERT during the review, or estimate and report CH₄ and N₂O emissions for these categories.</p>	Yes. Transparency
E.6	1.A.1.b Petroleum refining – gaseous fuels – CO ₂	<p>The CO₂ IEF reported by Australia in CRF table 1.A(a)s1 for gaseous fuels in petroleum refining of 54.61 t/TJ (net calorific value, calculated on the basis of the gross calorific value of 49.14 t/TJ) for 2018 is lower than the values reported by most Annex I Parties. Moreover, the IEFs reported for previous years of the time series were even lower (e.g. 52.54 t/TJ for 2013, 53.14 t/TJ for 2014, 53.44 t/TJ for 2015 and 53.29 t/TJ for 2016). These EFs are also below the default value for natural gas of 56.10 t/TJ and the uncertainty range (54.30–58.30 t/TJ) given in the 2006 IPCC Guidelines (vol. 2, chap. 2, table 2.2). During the review, Australia clarified that it uses facility-specific</p>	Yes. Comparability

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
E.7	1.A.2 Manufacturing industries and construction – all fuels – CO ₂ , CH ₄ and N ₂ O	<p>petroleum refining EFs as reported under the NGER system, and that the EFs reported represent individual refinery configurations and are considered more accurate than the IPCC default factors. The Party added that Australian refineries are periodically audited and are subject to legal penalties if they fail to comply with the NGER standards and calculation methods.</p> <p>While the ERT agrees with Australia that the plant-specific data should be more accurate than the default IPCC EFs, the CO₂ IEF for gaseous fuels for petroleum refining of 54.61 t/TJ for 2018 is significantly lower than the equivalent CO₂ IEF for gaseous fuels in public electricity and heat production of 56.62 t/TJ, where plant-specific data are also used for the same year. During the review, Australia provided evidence of fuel consumption by fuel type, EFs and emissions of gaseous fuels reported by its refineries, which enabled the ERT to assess the adequacy of the CO₂ IEFs reported in the CRF tables for petroleum refining. One petroleum refinery in Australia reported combustion of “other” gaseous fossil fuels in addition to natural gas. On the basis of the information provided, a large share of the total volume reported under gaseous fuels in the CRF tables appears to correspond to the “other” gaseous fossil fuels reported by that refinery. Although the facility is not required to disaggregate the exact composition of those fuels, the Party confirmed that the fuels are likely to include refinery gas that could have been allocated to liquid fuels.</p> <p>On the basis of the information provided by Australia during the review, the ERT recommends that the Party allocate any known refinery gas used in petroleum refining to liquid fuels or, if the volumes and types of “other” gaseous fossil fuels are not known with sufficient certainty, allocate them to other fossil fuels under CRF category 1.A.1.b and only report natural gas under gaseous fuels. If Australia is unable to reallocate these other gaseous fossil fuels, the ERT recommends that the Party explain in the NIR why the CO₂ IEF for gaseous fuels consumed in petroleum refining is comparatively low by including the (non-confidential) information provided to the ERT during the review (e.g. that a large share of the volume reported under gaseous fuels corresponds to the “other” gaseous fossil fuels reported by a single refinery).</p> <p>Compared with its 2019 annual submission, Australia’s 2020 submission contains significant recalculations of GHG emissions for a number of manufacturing industries and construction subcategories, including, for 2017: iron and steel (1.A.2.a), –300 kt CO₂ eq (–17.2 per cent); non-ferrous metals (1.A.2.b), –374 kt CO₂ eq (–2.9 per cent); pulp, paper and print (1.A.2.d), –391 kt CO₂ eq (–28.1 per cent); and food processing, beverages and tobacco (1.A.2.e), –192 kt CO₂ eq (–6.5 per cent). These recalculations also affected previous years of the time series. Australia’s NIR (vol. 1, section 3.4.5, p.76) states that the recalculations were carried out to reflect revisions in fuel consumption as reported to Australian Energy Statistics, in particular for solid fuels. The recalculations affected CO₂ above all.</p> <p>During the review, Australia clarified that there had been a decrease in emissions from black coal, coke and coal by-products, and that Australian Energy Statistics sometimes reallocated or adjusted data on the basis of improved survey, company and industry data. The Party also clarified that the effect on total fuel combustion was in general minimal at the overall net emissions level because reallocations tended to cancel each other out. The ERT notes that, according to the 2020 <i>Guide to the Australian Energy Statistics</i> (chap. 7 on revisions), the method for estimating activity levels for fuels and subcategories of manufacturing industries with lower NGER coverage had been updated. The ERT finds that Australia could more transparently explain the recalculations included in the NIR, for example by including the additional information provided to the ERT during the review. Revisions to energy statistics are common and can significantly affect estimated GHG emissions for the energy sector, including for previous years of the time series.</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
E.8	1.B.2 Oil, natural gas and other emissions from energy production – liquid and gaseous fuels – CH ₄	<p>The ERT recommends that Australia improve the transparency of explanations related to any recalculations under manufacturing industries and construction by providing more specific reasons for the recalculations, for example by providing any relevant explanations provided by Australian Energy Statistics, together with a link to the annual guide in which such revisions are explained and updated.</p> <p>Australia reported fugitive CH₄ emissions from abandoned oil wells (category 1.B.2.a.6) for the first time in its 2020 annual submission (in CRF table 1.B.2). In 2018, emissions from these operations totalled 0.08 kt CH₄. Australia also reported fugitive CH₄ emissions from abandoned gas wells (category 1.B.2.b.6) for the first time in its 2020 submission. In 2018, emissions from these operations, along with post-meter emissions from natural gas (see ID# E.9 below), totalled 14.39 kt CH₄.</p> <p>According to the NIR (vol. 1, p.138), estimates for abandoned wells were calculated using the tier 1 method from the 2019 IPCC Refinement (vol. 2, chap. 4). The number of abandoned wells was determined on the basis of information from State and territory governments and the related AD were subcategorized by plugging status (plugged, unplugged, unknown), production type (oil, gas) and location (onshore, offshore). Where wells were identified as having oil and gas, or where the production type was unknown, abandoned wells were allocated to gas operations (category 1.B.2.b.6). This categorization was not included in the NIR, but during the review Australia provided a table with the number of wells by plugging status, production type and location.</p> <p>The ERT recommends that Australia include a table categorizing abandoned wells by plugging status (plugged, unplugged, unknown), production type (oil, gas) and location (onshore, offshore) in its NIR.</p>	Yes. Transparency
E.9	1.B.2 Oil, natural gas and other emissions from energy production – gaseous fuels – CH ₄	<p>Australia reported post-meter CH₄ emissions from natural gas for the first time in its 2020 annual submission (in CRF table 1.B.2). Post-meter emissions included those from appliances in the commercial and residential sectors, leakage from industrial and power stations and natural-gas-fuelled vehicles. Australia explained in the NIR (vol. 1, p.150) that the methods and EFs used for estimating leakage from industrial and power stations and natural-gas-fuelled vehicles were tier 1 from the 2019 IPCC Refinement (vol. 2, chap. 4). During the review, Australia clarified that it used country-specific methods for estimating post-meter emissions in accordance with both the 2019 IPCC Refinement and other relevant scientific literature, but that for industrial plants and power stations, and for natural-gas-fuelled vehicles, the EFs from the 2019 IPCC Refinement represented the best available science relevant to Australia's national circumstances. Post-meter emissions were reported together with emissions from abandoned gas wells in category 1.B.2.b.6 (see ID# E.8 above). During the review, Australia provided a table distinguishing between emissions from post-meter operations and emissions from abandoned gas wells. The ERT notes that, owing to the different methodologies used for estimating these two sources of emissions, the Party could improve transparency by including a table in the NIR distinguishing between emissions from these two sources.</p> <p>The ERT recommends that Australia provide a rationale in its NIR for its choice of country-specific EFs for post-meter emissions, explaining why the factors chosen are representative of Australia's circumstances. The ERT also recommends that Australia include a table in its NIR distinguishing between CH₄ emissions from abandoned gas wells and post-meter CH₄ emissions.</p>	Yes. Transparency
E.10	1.B.2.c Venting and flaring – liquid and	<p>Significant recalculations of GHG emissions, particularly of CO₂, from venting and flaring were conducted for the 2020 annual submission, leading to a reduction in estimated emissions of 1,127.3 kt CO₂ eq (or by 6.9 per cent) versus those reported in the 2019 submission for 2017, as reported in the NIR (vol. 1, table 3.49). The NIR (section 3.9.5, p.154) states that the recalculations were due to revised AD obtained under NGER. During the review,</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
	gaseous fuels – CO ₂ , CH ₄ and N ₂ O	<p>Australia clarified that, for certain facilities, the quantities flared were double counted in the 2019 annual submission by including them under both oil flaring and gas flaring (categories 1.B.2.c.i and 1.B.2.c.ii, respectively), and that this had been rectified in the 2020 annual submission, resulting in a downward recalculation of emissions from oil flaring operations. The ERT noted, on the basis of the data reported in NIR table 3.49, that overestimation of emissions from flaring had also occurred for 2015 and 2016. According to the Party, the reporting errors in previous submissions were identified in the preparation of the 2020 submission as part of a long-term initiative to improve the tracking of individual facilities over time within the Australian Greenhouse Emissions Information System.</p> <p>The ERT recommends that the Party more comprehensively explain in its NIR the reasons for any recalculations, for example by providing information on the specific drivers for the recalculations or the process by which such errors were identified (e.g. QC activities). In addition, the ERT encourages the Party to continue improving the QC of data of individual facilities to ensure that no double counting or omission of emissions occurs and that emissions are correctly allocated across the relevant CRF categories.</p>	
IPPU			
I.7	2.B.1 Ammonia production – CO ₂	<p>The inter-annual change in the CO₂ IEF for ammonia production reported by Australia in CRF table 2(I).A-Hs1 is significant for a number of years of the time series. The CO₂ IEF increased by 19.9 per cent from 2013 (1.19 t/t) to 2014 (1.43 t/t) and then declined by 21.7 per cent from 2014 to 2015 (1.12 t/t). During the review, the Party explained that ammonia production emissions were estimated on the basis of natural gas feedstock use as reported under the NGER system, and that the increase in the IEF for 2014 reflected the higher proportion of natural gas feedstock used per unit of ammonia produced (total fuel requirement increased from 23.3 GJ natural gas/t NH₃ produced to 27.9 GJ natural gas/t NH₃ produced). The Party further explained that the decline in the CO₂ IEF from 2014 to 2015 reflected a decline in the feedstock consumed per unit of ammonia (down to 21.9 GJ natural gas/t NH₃ produced), and that total fuel requirements were particular to individual plants, such that the overall CO₂ IEF fluctuated according to the production levels of each plant. According to the Party, each plant also experienced fluctuations year on year as a result of events such as planned and unplanned shutdowns and commissioning of new plant capacity – both of which occurred at one large ammonia producer in 2014, partially explaining the increase. In addition, Australia identified that the natural gas feedstock consumption of two further plants had been entered incorrectly for 2014. Accounting for this error, the Party estimated the IEF for 2014 at 1.41 t/t (18.7 per cent increase).</p> <p>The ERT recommends that Australia provide an explanation for the large inter-annual fluctuations in the CO₂ IEF for 2013 onward, for example by describing the fluctuations in the underlying fuel requirement per unit of ammonia production reported by plants, and correct the data entry error relating to AD for 2014.</p>	Yes. Transparency
I.8	2.B.8 Petrochemical and carbon black production – CO ₂	<p>Australia reported AD for methanol production as “C” for the entire time series and reported CO₂ emissions as “NO” in CRF table 2(I).A-Hs1, whereas the 2006 IPCC Guidelines (vol. 3, chap. 3, table 3.12) provide default CO₂ EFs for methanol production. During the review, the Party clarified that, owing to the inability of the only methanol plant in Australia to secure competitively priced natural gas in Victoria, with prices exceeding 10 Australian dollars/GJ, the plant was placed in care and maintenance mode in March 2016. The Party explained that it had not calculated CO₂ emission estimates for methanol production for time-series years prior to 2016. Moreover, it was not sure which of the default EFs to apply for the plant’s particular methanol production process – the “leading concept methanol” process according to the Coogee Chemicals website (www.coogee.com.au). However, the Party noted</p>	Yes. Completeness

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>that, on the basis of the EFs from the 2006 IPCC Guidelines referred to above, CO₂ emissions from the plant would be between 14 and 54 kt CO₂/year from 1990 to 2016.</p> <p>The ERT recommends that the Party estimate CO₂ emissions from methanol production for all years of the time series by conducting a literature review of the “leading concept methanol” process with a view to identifying the most relevant tier 1 EF, or by applying a mass balance equation (equation 3.17 in vol. 3, chap. 3, of the 2006 IPCC Guidelines).</p>	
I.9	2.B.8 Petrochemical and carbon black production – CO ₂	<p>Australia reported AD for ethylene oxide production as “C” for the entire time series and reported CO₂ emissions as “NA” in CRF table 2(I).A-Hs1, whereas the 2006 IPCC Guidelines (vol. 3, chap. 3, table 3.20) provide default CO₂ EFs for ethylene oxide production. No CO₂ EF was provided for ethylene oxide in NIR table 4.15 and the only methodological description for this category in the NIR (vol. 1, p.281) was provided in the context of category 2.H, where the Party noted that CO₂ captured and supplied from an ethylene oxide plant is used in the food and drink industry (applying a CO₂ EF of 0.45 t CO₂/t ethylene oxide). During the review, Australia indicated that CO₂ emissions from ethylene oxide production should have been reported as “IE” and were reported in category 2.B.10 other (chemical industry).</p> <p>The ERT recommends that Australia report CO₂ emissions from ethylene oxide separately in category 2.B.8, or, if this is not possible, report them as “IE” and indicate in CRF table 9 where the emissions are reported, and provide a description, in the relevant section of the NIR, of the method used for estimating CO₂ emissions for this category.</p>	Yes. Comparability
I.10	2.C.1 Iron and steel production – CO ₂	<p>Australia reported AD for steel production (category 2.C.1.a) as “C” for the entire time series and CO₂ emissions as “NA” in CRF table 2(I).A-Hs2, whereas the 2006 IPCC Guidelines (vol. 3, chap. 4, table 4.1) provide default CO₂ EFs for steel production. During the review, the Party indicated that category 2.C.1.a is used for reporting fugitive emissions of CH₄ from integrated iron and steel plants (reported as “IE”), and that CO₂ emissions associated with iron and steel production are reported as “IE” under categories 2.C.1.f (coke) and 2.C.1.f (pulverized coal). The Party also indicated that aggregate emissions from iron and steel, ferroalloys and other metals are reported under category 2.C.7 (other (metal industry)) to protect confidentiality. With regard to the notation key used, it explained that, while there are established data on the fugitive emissions rate for CH₄, fugitive emissions of CO₂ from blast furnace gas and other process gases are reported as part of the totals for the energy sector and relate only to the distribution of natural gas, which may contain trace amounts of CO₂. According to the Party, fugitive emissions from this source are negligible and are therefore considered as not occurring. The ERT notes that CO₂ emissions from steel production are not related solely to the consumption of blast furnace gas and other process gases allocated to the energy sector, so this explanation may not fully justify the Party not reporting these emissions.</p> <p>The ERT recommends that Australia estimate and report CO₂ emissions from steel production separately under category 2.C.1.a, or, if this is not possible, report the emissions as “IE” under category 2.C.1.a and indicate in CRF table 9 and in the NIR where these emissions are reported.</p>	Yes. Comparability
I.11	2.F Product uses as substitutes for ozone-depleting substances – HFCs	<p>The volume of HFCs filled into new manufacturing products for closed-cell foams reported in CRF table 2(II)B-Hs2 for 2017 was significantly higher than that reported for 2016. Similar percentage increases were observed for commercial and transport refrigeration and solvents. The following inter-annual percentage increases for closed-cell foams were observed for 2016–2017: HFC-125, 4,259.6 per cent; HFC-134, 8,851.7 per cent; HFC-134a, 4,379.2 per cent; HFC-143a, 4,598.5 per cent; HFC-152a, 5,093.6 per cent; HFC-227ea, 5,239.1 per cent; HFC-23, 5,624.6 per cent; HFC-245fa, 4,083.5 per cent; HFC-32, 4,188.5 per cent; and HFC-365mfc, 4,292.2 per cent. During the</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>review, Australia explained that its HFC emissions model allocates estimates of imported bulk HFC gases first to domestic production of equipment whose stocks were known (for light-vehicle air conditioning, domestic refrigeration and air conditioning), then to replenishment of existing products in the economy, and finally to domestic production of other equipment. The volume of HFCs reported for 2017 for closed-cell foams – and for commercial and transport refrigeration and solvents – was higher than that for 2016 because a higher volume of imported bulk HFC gases had been allocated to domestic production of equipment whose stocks were known and replenishment of existing products in 2016 than in 2017 (i.e. less bulk gas was available for allocation to domestic production of foams, commercial and transport refrigeration and solvents in 2016).</p> <p>The ERT recommends that Australia clarify how its HFC allocation model does or does not explain any large inter-annual percentage changes observed in the volumes of HFCs filled into new manufactured products.</p>	
I.12	2.F.1 Refrigeration and air conditioning – HFCs	<p>There were significant increases for 2013–2014 in the volumes of HFCs filled into new manufactured products in domestic refrigeration reported in CRF table 2(II)B-Hs2. The following inter-annual percentage increases were observed for 2013–2014: HFC-125, 5,413.1 per cent; HFC-134, 4,296.1 per cent; HFC-134a, 5,157.9 per cent; HFC-143a, 4,098.8 per cent; HFC-152a, 4,547.4 per cent; HFC-227ea, 3,442.2 per cent; HFC-23, 3,192.2 per cent; HFC-245fa, 6,244.9 per cent; HFC-32, 7,408.7 per cent; and HFC-365mfc, 4,233.7 per cent. In addition, the volumes of these gases filled into new products in 2016, 2017 and 2018 were reported as “NO”. Australia explained that it estimated the number of new manufactured refrigerators on the basis of the difference between opening and closing stock numbers (according to census data), imports, exports and retirements, and that this number had been low for 2013. It further explained that where the balance was negative, as it had been for 2016–2018, it was assumed that no gas had been filled into manufactured units.</p> <p>The ERT recommends that Australia provide an explanation of the model used for estimating the volumes of HFCs filled into new manufactured products, and describe in its NIR the inter-annual changes resulting from use of that model.</p>	Yes. Transparency
I.13	2.F.1 Refrigeration and air conditioning – HFCs	<p>Australia reported volumes filled into new manufactured products in CRF table 2(II)B-Hs2 for all HFCs except HFC-43-10mee for 2017 and earlier years for mobile air conditioning. For 2018, all volumes filled into new manufactured products for all HFCs were reported as “NO”. The Party did not provide an explanation for its reporting in the NIR. During the review, the Party clarified that HFCs for mobile air conditioning were estimated on the basis of two independent data sets: motor vehicle census data and pre-charged equipment import data provided by the Australian Department of Agriculture, Water and the Environment. The Party explained that, when imports exceed the increase in new vehicle stocks (as they did in 2018), it is assumed that no domestic filling of new manufactured products occurs.</p> <p>The ERT recommends that Australia explain in the NIR that when imports exceed the increase in new vehicle stocks it is assumed that no domestic filling of new manufactured products occurs.</p>	Yes. Transparency
Agriculture			
A.4	3. General (agriculture) – CH ₄ and N ₂ O	<p>Australia reported on recalculations conducted for the agriculture sector in the NIR (chaps. 5.3.8, 5.4.11 and 5.6.13). For each of the categories covered – namely 3.A (enteric fermentation), 3.B (manure management) and 3.D (agricultural soils) – more than one recalculation was mentioned but only the total impact on emissions was provided. During the review, Australia clarified that the increase in emissions for category 3.B was almost entirely</p>	Not an issue/problem

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
A.5	3. General (agriculture) – CH ₄ and N ₂ O	<p>attributable to the revision of the method for calculating CH₄ emissions from range-kept livestock (beef cattle, sheep, other livestock) in response to new wetlands data. Looking more closely at the recalculations for category 3.D, the ERT noted that the small increase in overall emissions primarily resulted from major recalculations of Fra_{C_{LEACH}(H)} and EF₅ (for indirect emissions from leaching and run-off) that almost compensated for one another. The ERT found that the lack of detailed information on individual recalculations hampered the assessment of the respective impacts.</p> <p>The ERT encourages the Party to provide more detailed information in its NIR on the impact of individual recalculations so that their impact on emission totals can be assessed.</p>	Not an issue/problem
A.6	3. General (agriculture) – CH ₄ and N ₂ O	<p>The ERT welcomed the information in Australia’s NIR (vol. 1, chap. 5.2.1, p.288) on the differences between the data reported to the Food and Agriculture Organization of the United Nations and the UNFCCC, and on the issues encountered with the time-series consistency of animal populations. However, the ERT considers that such issues should be reported in the category-specific subchapters of the NIR on QA/QC and time-series consistency.</p> <p>The ERT encourages the Party to discuss comparisons between the data provided to the UNFCCC and other international organizations in the appropriate subchapters of the NIR on category-specific QA/QC (e.g. vol. 1, chaps. 5.3.7, 5.4.10 and 5.6.12) and discuss issues related to time-series consistency of animal populations in the subchapters of the NIR on uncertainties and time-series consistency (e.g. vol. 1, chaps. 5.3.6, 5.4.9 and 5.6.11), or to include references in those subchapters to the appropriate paragraphs of the NIR (i.e. vol. 1, chap. 5.2.1).</p> <p>Australia reported the calculation parameters used for estimating agriculture emissions in the NIR (vol. 1, chap. 5, and appendices 5.A–5.J), but data sources for the calculation parameters were not always reported transparently: references were provided either in chapter 5 or appendices 5.A–5.J or not at all. Data sources were not, or were only partially, indicated for the following tables in appendices 5.A–5.J: 5.A.1 dairy cattle – liveweight (kg); 5.A.2 dairy cattle – liveweight gain (kg/day); 5.A.3 dairy cattle – standard reference weights (kg); 5.A.5 dairy cattle – data for pre-weaned calves; 5.A.8 dairy cattle – allocation of waste to MMS – milking cows; 5.B.3 beef cattle – dry matter digestibility of feed intake (per cent); 5.B.4 beef cattle – crude protein content of feed intake (per cent); 5.D.1 sheep – liveweight (kg); 5.D.2 sheep – dry matter digestibility of feed intake (per cent); 5.D.4 sheep – crude protein content of feed intake (per cent); 5.D.5 sheep – liveweight gain (kg/day); 5.E.1 pigs – herd characteristics; 5.E.2 pigs – feed specifications; 5.E.5 pigs – allocation of waste to MMS 1990–2018 (per cent); 5.F.1 poultry – diet properties; and 5.I.3 crop residues – proportion burnt or removed.</p> <p>The ERT recommends that the Party transparently report data sources for the calculation parameters included in appendices 5.A, 5.B, 5.D, 5.E, 5.F and 5.I of the NIR and indicate where calculation parameters were estimated on the basis of expert judgment.</p>	Yes. Transparency
A.7	3. General (agriculture) – CH ₄ and N ₂ O	<p>Australia used several parameters and EFs from the 2019 IPCC Refinement for estimating emissions from the agriculture sector (see ID# G.3 above). The Party also used the 2019 IPCC Refinement for the CH₄ EF for enteric fermentation for buffalo, the VS excretion rate per animal mass per day for other cattle, the MCF values for uncovered anaerobic lagoons, the baseline CH₄ EF for rice cultivation and the appropriate scaling factors for a continuously flooded water regime and a non-flooded pre-season. However, Australia did not sufficiently justify its use of the 2019 IPCC Refinement values as more suitable to Australian conditions than the corresponding values from the 2006 IPCC Guidelines in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines. The ERT noted that the application of the factors from the 2019 IPCC Refinement for buffalo and for</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
A.8	3. General (agriculture) – N ₂ O	<p>rice cultivation had led to an increase in estimated emissions over the time series; and while it could not assess the precise impact of the revisions of the VS excretion rate and the MCF values within the framework of the overall revision of the methodology, it noted that overall the estimated CH₄ emissions from manure management had increased considerably. During the review, the Party expanded on an analysis undertaken in 2019 by Australia's Commonwealth Scientific and Industrial Research Organization on CH₄ flows, which included selected categories in the agriculture sector. The review analysed domestic and international scientific literature, including the 2019 IPCC Refinement, in recognition that this source reflected well-documented and updated information. The Party explained that this and other reviews undertaken for the 2020 annual submission that draw on the 2019 IPCC Refinement are consistent with the UNFCCC Annex I inventory reporting guidelines because they have improved the accuracy and completeness of Australia's annual submission.</p> <p>The ERT recommends that the Party provide a clear justification in its NIR for the use of the following country-specific parameters and EFs from the 2019 IPCC Refinement: CH₄ EF for enteric fermentation for buffalo, VS excretion rate per animal mass per day for other cattle, MCF values for uncovered anaerobic lagoons, the baseline CH₄ EF for rice cultivation and the appropriate scaling factors for a continuously flooded water regime and a non-flooded pre-season.</p> <p>Australia reported in its NIR (vol. 1, p.308) a $\text{Frac}_{\text{LEACH-MS}}$ of 0.24 kt N/kt N applied for N leaching from solid storage MMS, referring to the 2019 IPCC Refinement, but the values for $\text{Frac}_{\text{LEACH-MS}}$ provided in table 10.22 of the 2019 IPCC Refinement (vol. 4, chap. 10) are much lower than this (e.g. 0.02 for solid storage for all livestock types). A value of 0.24 is provided for $\text{Frac}_{\text{LEACH-(H)}}$ in table 11.3 of the 2019 IPCC Refinement (vol. 4, chap. 11) and applies to leaching of N from agricultural soils. The ERT noted that overestimation of N losses from manure management may lead to an underestimation of total N₂O emissions since, according to equation 3DA_3 in the NIR (vol. 1, p.331), less manure N would be transferred to agricultural soils and accounted for under category 3.D.a.2.a (animal manure applied to soils).</p> <p>During the review, the Party clarified that it had updated the $\text{Frac}_{\text{LEACH-MS}}$ reported in the 2020 annual submission and that it was not aware of the more specific values in table 10.22 of the 2019 IPCC Refinement. Australia estimated that, by using a lower value of 0.02 (from table 10.22 of the 2019 IPCC Refinement) for leaching from solid manure storage, overall estimated N₂O emissions from the agriculture sector would increase by approximately 2 kt CO₂ eq. This is in line with the estimates of the ERT and well below the level of significance for Australia (279.02 kt CO₂ eq) for including this issue in the list of potential problems and further questions raised by the ERT.</p> <p>The ERT recommends that the Party revise the estimation of N losses from manure management by updating $\text{Frac}_{\text{LEACH-MS}}$ to an appropriately justified value within the range provided in the 2006 IPCC Guidelines (vol. 4, chap. 10, equation 10.28) (i.e. 0.01–0.20), or provide a justification for the country-specific value currently used in the calculation model, including any value adopted from the 2019 IPCC Refinement.</p>	Yes. Accuracy
A.9	3.B Manure management – CH ₄	<p>Australia reported MCFs for beef cattle – feedlot, dairy cattle, swine and poultry in CRF table 3.B(a)s2 as decimal numbers (e.g. 0.76 for beef cattle – feedlot), which is not in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 10.4.2, table 10.17), where MCFs are given as percentages. Furthermore, the approach of Australia is not consistent with the practice applied by other Annex I Parties.</p> <p>The ERT encourages the Party to revise the MCFs in CRF table 3.B(a)s2 and to report values as percentages.</p>	Not an issue/problem

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
A.10	3.B Manure management – CH ₄	<p>Australia reported in its NIR (vol. 1, p.304) that the country-specific CH₄ EF for range-kept livestock was calculated as a weighted average of the 2019 IPCC Refinement default anaerobic lagoon EF, which is used for constructed ponds or stock dams, and the default EF from the 2019 IPCC Refinement for pasture, range and paddock (based on the average CH₄ EF for cattle and sheep). The EFW and EFT were reported by Australia as 0.012 and 0.003 kg CH₄/kg dry matter, respectively, in the NIR (vol. 1, p.305). These values were used to estimate CH₄ emissions from pasture, range and paddock by multiplying them by livestock-specific excretion rates for dry matter manure. However, the ERT was not sure how the Party determined the reported CH₄ EFs for warm and temperate climates or which data sources it used.</p> <p>During the review, Australia clarified that it used CH₄ EFs from table 10.14 of the 2019 IPCC Refinement (vol. 4, chap. 10) for pasture, range and paddock (0.6 g CH₄/kg VS) and for uncovered anaerobic lagoons (69.7 g CH₄ kg/Vs; low productivity, warm climate zone). The Party asserted that these factors were derived from a large corpus of recent scientific literature and that, since they were appropriate to Australian conditions, had been used in lieu of the previous outlier factors. Together with a typical animal mass of 352.43 kg and a VS excretion rate of 8.7 g/kg animal mass/day, Australia calculated the EF values for lagoon (78.00 kg CH₄/head/year) and pasture, range and paddock (0.67 kg CH₄/head/year). By using manure proportions of 5 and 95 per cent for allocation to lagoons and pasture, range and paddock, respectively, a combined weighted IEF of 4.54 kg CH₄/head/year was estimated. Australia explained that this CH₄ IEF was then used to revise the EFW and EFT reported in the previous submission (0.000054 and 0.000014 kg CH₄/head/year, respectively), which had been based on a combined weighted IEF of 0.02 kg CH₄/head/year (e.g. for EFW: 0.000054/0.02 x 4.54 = 0.012).</p> <p>The ERT recommends that the Party provide a more transparent description and justification in the NIR of the approach used for estimating CH₄ emissions from livestock manure deposited onto pasture, range and paddock, and report all data sources for all calculation parameters (CH₄ EFs by animal category (g CH₄/kg VS), typical animal mass (kg), VS excretion rate (g/kg animal mass/day), EFW and EFT (kg CH₄/kg dry matter), weighting proportions (per cent) and any other parameter, as appropriate), clearly delineating the calculation procedure.</p>	Yes. Transparency
A.11	3.B Manure management – CH ₄ and N ₂ O	<p>Australia reported the allocation of animal manure to the different MMS in CRF tables 3.B(a)s2 and 3.B(b), and in the case of swine and poultry the total shares allocated across the MMS exceeded 100 per cent. The ERT acknowledges that the Party has resolved the transparency issue identified in the previous review report (see ID# A.3 in table 3) and now describes its rationale for the manure allocations exceeding 100 per cent.</p> <p>The ERT encourages the Party to revise the reporting of emissions from manure management in the CRF tables so that the total shares of manure allocated across the MMS do not exceed 100 per cent, and adjust the MCFs and EFs as necessary.</p>	Not an issue/problem
A.12	3.B.1 Cattle – CH ₄	<p>Australia reported MMS and climate region allocation in CRF table 3.B(a)s2, but the cell for beef cattle – feedlot – temperate under solid storage and dry lot is blank. During the review, the Party clarified that all the cells for temperate climate for the time series should be completed referring to 100 per cent allocation and that it will update the figures in CRF table 3.B(a)s2 as appropriate in its next submission.</p> <p>The ERT recommends that the Party correct the data entry error in CRF table 3.B(a)s2 and ensure that the cell for temperate climate for beef cattle – feedlot is completed.</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
A.13	3.B.3 Swine – N ₂ O	<p>Australia reported in CRF table 3.B(b) IEFs per animal for N₂O emissions from manure management. The increase in the N₂O IEF for swine between 1990 and 2018 is significant: the 2018 value (0.0787 kg N₂O/head/year) is 220.5 per cent higher than the 1990 value (0.0246 kg N₂O/head/year). During the review, the Party clarified that the increase could be attributable to the intensification of the swine industry, and it noted that there has also been a change in the allocation of N to MMS, with a downward trend in the use of anaerobic lagoons.</p> <p>The ERT recommends that the Party provide an explanation in the NIR for the trend in the N₂O IEF from manure management of swine.</p>	Yes. Transparency
A.14	3.B.4 Other livestock – CH ₄	<p>Australia reported allocation by climate region of animal manure from buffalo and deer in CRF tables 3.B(a)s1 and 3.B(a)s2. In CRF table 3.B(a)s2 all manure is allocated to the temperate climate zone, whereas in CRF table 3.B(a)s1 some manure is allocated to the warm climate zone for buffalo, and for deer the allocation to the temperate climate zone was 98.49 per cent in 2018. During the review, the Party clarified that the data entries were incorrect for buffalo in CRF table 3.B(a)s2 and for deer in both CRF tables, but that the correct climate allocations had been used in the calculation of emissions.</p> <p>The ERT recommends that the Party report correct and consistent data for allocation of manure by climate region for buffalo and deer in CRF tables 3.B(a)s1 and 3.B(a)s2.</p>	Yes. Convention reporting adherence
A.15	3.D.a.1 Inorganic N fertilizers – N ₂ O	<p>The N₂O EF for application of inorganic N fertilizers reported in CRF table 3.D is significantly below the default value of 0.01 kg N₂O-N/kg N given in the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.1) (e.g. for 2018, 0.0037 kg N₂O-N/kg N). In the NIR (vol. 1, p.329) the Party reported that the EFs are based on analyses of Australian measurement studies and that the experimental work to date has shown large variation from the IPCC default EF across different classes of crop and pasture systems. During the review, the Party clarified that the country-specific EF is based on a series of measurements conducted in Australia (Sherbak and Grace, 2014) reflecting 67 individual multi-treatment studies and over 150 data points. It explained that the EFs take account of country-specific environmental and management conditions (soil, climate, fertilizer type, application rate, irrigation, crop type).</p> <p>The ERT recommends that the Party provide transparent information in the NIR on how the different EFs in the study by Sherbak and Grace (2014) are weighted by crop type, climate region, management system (e.g. irrigation) and fertilizer type (particularly relevant for non-urea fertilizers).</p>	Yes. Transparency
A.16	3.D.a.1 Inorganic N fertilizers – N ₂ O	<p>With respect to ID# A.15 above, the ERT acknowledged the efforts of Australia to develop country-specific EFs, but noted that most measurements in Sherbak and Grace (2014) were based on urea fertilizers and therefore might not be representative of all inorganic fertilizers. On the basis of data reported under category 3.H (urea application) in CRF table 3.G-I, the ERT estimated that approximately 40 per cent of all N in inorganic N fertilizers is non-urea N. In response, Australia explained that the N₂O EFs for application of inorganic N fertilizers were reviewed by an eminent scientific panel and recommended for use in the Australian inventory. Australia further explained that the EFs were in accordance with the latest global empirical evidence summarized in the 2019 IPCC Refinement (vol. 4, chap. 11, table 2A2).</p> <p>The ERT recommends that the Party provide detailed evidence in the NIR to support the country-specific N₂O EF for the application of inorganic N fertilizers, including a justification for the application of the EFs in the study by Sherbak and Grace (2014) to non-urea fertilizers.</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
A.17	3.D.a.1 Inorganic N fertilizers – N ₂ O	<p>With respect to ID# A.15 above, Australia referred to the country-specific N₂O EFs for the application of inorganic N fertilizers when reporting N₂O emissions for category 3.D.a.5 (mineralization/immobilization associated with loss/gain of soil organic matter) and to the country-specific EFs for direct N₂O emissions from soils when reporting N₂O emissions for category 3.D.b.1 (atmospheric deposition). Accordingly, the EFs for categories 3.D.a.5 and 3.D.b.1 are significantly lower than the default values of 0.01 kg N₂O-N/kg N provided in the 2006 IPCC Guidelines (vol. 4, chap. 11, tables 11.1 and 11.3). Australia reported an EF of 0.002 kg N₂O-N/kg N for category 3.D.a.5, as stated in the NIR (vol. 1, p.334) (see ID# A.20 below regarding the reporting of the IEF for category 3.D.a.5 in CRF table 3.D), and 0.00367 kg N₂O-N/kg N for category 3.D.b.1 in CRF table 3.D for 2018. The ERT considers that the use of the country-specific EFs for direct N₂O from application of inorganic N fertilizers might not be appropriate for reporting emissions for categories 3.D.a.5 and 3.D.b.1 and should be justified, since the biochemical processes that lead to N₂O emissions might be different. Referring to the NIR (vol. 1, p.305), Australia pointed out during the review that the highest NH₃ deposition rates are found within a few hundred metres of the emissions source. As the volatilized N undergoes significant dilution and is deposited on the wider landscape at very low rates, the fertilizer EFs for neighbouring production systems were considered to provide a more accurate estimate of emissions than the IPCC default EF.</p> <p>The ERT recommends that the Party provide in the NIR a more detailed justification for the use of country-specific EFs for categories 3.D.a.5 (mineralization/immobilization associated with loss/gain of soil organic matter) and 3.D.b.1 (atmospheric deposition), for example by referring to measurements, published scientific findings, causal biochemical explanations, and country-specific soil and/or climate conditions.</p>	Yes. Transparency
A.18	3.D.a.2.a Animal manure applied to soils – N ₂ O	<p>Australia reported in CRF table 3.D an N₂O IEF for animal manure applied to soils of 0.0086 kg N₂O-N/kg N (mean value for 1990–2018), but reported in its NIR (vol. 1, pp.330–331) a value of 1 per cent for the same source (i.e. 0.01 kg N₂O-N/kg N), referring to the IPCC default value in the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.1). During the review, the Party clarified that the discrepancy was down to the direct N₂O EF for swine being 0.0039 kg N₂O-N/kg N deposited, based on the output of the PigBal model for estimating pigs' waste output. Australia explained that the IEF therefore fluctuates according to the relative N inputs from swine and non-swine livestock. The ERT was not able to fully assess the PigBal model during the remote centralized review, but estimated that any possible underestimation of overall emissions would be well below the level of significance for Australia (279.02 kt CO₂ eq in 2018) and therefore did not include this issue in the list of potential problems and further questions raised by the ERT.</p> <p>The ERT recommends that the Party transparently explain in the NIR the estimation of the N₂O EF for animal manure applied to soils.</p>	Yes. Transparency
A.19	3.D.a.2.b Sewage sludge applied to soils – N ₂ O	<p>Australia reported in its NIR (vol. 1, pp.331–332) N₂O emissions for category 3.D.a.2.b (sewage sludge applied to soils), but did not provide a data source for the estimation of the mass of sewage sludge applied to soils. During the review, the Party clarified that such data originate from the waste sector (category 5.D wastewater treatment and discharge – domestic and commercial) and represent the quantity of sewage sludge removed from wastewater treatment plants for application to land, which is reported by wastewater treatment plants under NGER.</p> <p>The ERT recommends that the Party provide the data source for the amount of sewage sludge applied to soils in the agriculture chapter of the NIR.</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
A.20	3.D.a.5 Mineralization/ immobilization associated with loss/gain of soil organic matter – N ₂ O	Australia reported in its NIR (vol. 1, p.334) that it applies a country-specific EF of 0.002 kg N ₂ O-N/kg N for N inputs from mineralization (category 3.D.a.5) that is based on the country-specific EF for fertilizer additions to non-irrigated crops. However, the value of 2.92 kg N ₂ O-N/kg N (average for 1990–2018) reported in CRF table 3.D is not consistent with the value reported in the NIR. During the review, the Party clarified that the value of 0.002 kg N ₂ O-N/kg N was used in the emission calculation model and that there were errors in the AD in the CRF table (and therefore in the reported IEF). The ERT recommends that the Party report the correct AD for category 3.D.a.5 and ensure consistency between the values reported in the NIR and CRF table 3.D.	Yes. Convention reporting adherence
A.21	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N ₂ O	Australia reported in CRF table 3.D an area of cultivated organic soils of 4,000.00 ha for the entire time series (see ID# L.9 below). The NIR does not include any quantitative or reference information on the area used in the calculations, noting only that the area of cultivated histosols in Australia is very small (vol. 1, p.335). The Party also reported 12,660.94 ha organic soils under wetlands converted to cropland (CRF table 4.B) and 48,877.43 ha organic soils under wetlands converted to grassland (CRF table 4.C) for the entire time series, which are not consistent with the area reported under category 3.D.a.6 (cultivation of histosols) (the areas of organic soils under cropland remaining cropland and grassland remaining grassland were reported as “IE”). During the review, the Party clarified that it considered the area reported under category 3.D.a.6 more accurate and reliable for determining the area of cultivated organic soils than the areas subject to land-use change reported under categories 4.B and 4.C, which could include a variety of soil types. Australia explained that it will report the area of 4,000.00 ha cultivated organic soils under wetlands converted to cropland (category 4.B.2.3) to ensure consistency. The ERT recommends that the Party clearly describe the data source for the area of cultivated organic soils reported in the agriculture chapter of the NIR, and explain in the NIR any differences between this reported area and the areas reported in CRF tables 4.B and 4.C.	Yes. Transparency
A.22	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N ₂ O	The Party reported an EF of 8.00 kg N ₂ O-N/ha for category 3.D.a.6 (cultivation of organic soils) in CRF table 3.D. With respect to ID# L.5 in table 3, the ERT noted that the EF might not apply to the whole area of organic soils since some of that area is used for sugar cane production in tropical climate zones (NIR, vol. 1, p.335) and should therefore have an N ₂ O EF of 16.00 kg N ₂ O-N/ha according to the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.1). However, noting that any underestimate of emissions for category 3.D.a.6 resulting from the application of the revised EF would be below the level of significance for Australia (279.02 kt CO ₂ eq in 2018), the ERT did not include this issue in the list of potential problems and further questions raised by the ERT. The ERT recommends that Australia report N ₂ O emissions from the area of cultivated organic soils under category 3.D.a.6 using the appropriate N ₂ O EFs considering all relevant climate zones.	Yes. Accuracy
A.23	3.D.b.1 Atmospheric deposition – N ₂ O	Australia reported in its NIR (vol. 1, p.336) that it uses a Frac _{GASM} for manure application to soils of 0.21 Gg N/Gg applied, in accordance with the 2019 IPCC Refinement (vol. 4, chap. 11, table 11.3). Noting the incorrect units in the NIR (the default EF should be in kg NH ₃ -N + NO _x -N per kg N applied or deposited), the ERT also observed that this value is different from that reported in CRF table 3.D (0.20 kg NH ₃ -N + NO _x -N per kg N applied or deposited), which in turn is the same as the default value included in the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.3). During the review, the Party clarified that it applied a value of 0.21 for Frac _{GASM} in the emission calculation model	Yes. Convention reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>and that it will correct the erroneous value reported in CRF table 3.D. The ERT noted that the Party did not adequately justify the use of the value from the 2019 IPCC Refinement (see ID# G.3 above).</p> <p>The ERT recommends that the Party report correct and consistent values for $\text{Frac}_{\text{GASM}}$ in CRF table 3.D and in the NIR and provide clear evidence in the NIR to support the use of the 2019 IPCC Refinement value of $\text{Frac}_{\text{GASM}}$ as more representative for Australia's circumstances than the default values given in the 2006 IPCC Guidelines (vol. 4, table 11.3).</p>	
A.24	3.D.b.1 Atmospheric deposition – N ₂ O	<p>The Party reported in CRF table 3.D an IEF for indirect N₂O emissions from atmospheric deposition of 0.00367 kg N₂O-N/kg N for 2018. The ERT noted that this is the lowest IEF of all reporting Parties (ranging from 0.01–0.03 kg N₂O-N/kg N for 2018 excluding Australia) and observed the same pattern across the entire time series. The ERT further noted that the 31.9 per cent increase in the N₂O IEF from 1990 (0.0028 kg N₂O-N/kg N) to 2018 (0.0037 kg N₂O-N/kg N) also lies outside the data set for reporting Parties (the maximum increase observed for other Parties is 12.2 per cent over the same period). During the review, the Party clarified that volatilized N from sheep manure and sewage sludge were erroneously not included in AD, and that, if they had been, the IEF would be approximately 0.0028 N₂O-N/kg N for 2018. The ERT noted that any underestimate of emissions for category 3.D.b.1 resulting from the application of the incorrect AD (i.e. excluding volatilized N from sheep manure and sewage sludge) would be below the level of significance for Australia (279.02 kt CO₂ eq for 2018) and therefore the ERT did not include this issue in the list of potential problems and further questions raised by the ERT.</p> <p>The ERT recommends that the Party report accurate AD and corresponding N₂O IEF for atmospheric deposition in CRF table 3.D and explain significant trends in the time series in the NIR.</p>	Yes. Accuracy
A.25	3.D.b.2 N leaching and run-off – N ₂ O	<p>Australia reported in the NIR (vol. 1, pp.338 and 340) that a $\text{Frac}_{\text{LEACH-(H)}}$ of 0.24 kg N/kg N additions or deposition by grazing animals is used for regions where leaching and run-off occurs in accordance with the corresponding factor in the 2019 IPCC Refinement (vol. 4, table 11.3). This factor is lower than the respective default factor of 0.30 provided in the 2006 IPCC Guidelines (vol. 4, table 11.3), which is also the value reported in CRF table 3.D. The ERT noted that Australia recalculated not only $\text{Frac}_{\text{LEACH-(H)}}$ but also the N₂O EF for N losses through leaching and run-off (EF₅) using the EF₅ value of 0.011 kg N₂O-N/kg N from leaching and run-off from the 2019 IPCC Refinement (vol. 4, table 11.3) as opposed to the value of 0.0075 kg N₂O-N/kg N from leaching and run-off from the 2006 IPCC Guidelines (vol. 4, table 11.3). Overall, the recalculations led to an increase in estimated indirect N₂O emissions from N leaching and run-off (category 3.D.b.2) of 17.3 per cent (average for 1990–2017). However, Australia did not provide a clear justification for the use of the values for $\text{Frac}_{\text{LEACH-(H)}}$ and EF₅ from the 2019 IPCC Refinement.</p> <p>During the review, the Party clarified that a $\text{Frac}_{\text{LEACH-(H)}}$ of 0.24 kg N/kg N additions or deposition by grazing animals was used for calculating the emissions and that the value of 0.30 kg N/kg N additions or deposition by grazing animals given in CRF table 3.D was reported erroneously. It explained that it was using the values for $\text{Frac}_{\text{LEACH-(H)}}$ and EF₅ from the 2019 IPCC Refinement because they were based on the latest science and were more suited to Australian conditions. The ERT finds that the use of the default values from the 2019 IPCC Refinement should be considered as using country-specific values as they have not yet been adopted for use by Annex I Parties for the preparation of GHG emissions inventories (see ID# G.3 above). The ERT notes, however, that, given the overall increase in estimated N₂O emissions for category 3.D.b.2 between the 2019 and 2020 annual submissions, this issue does not constitute a potential problem.</p>	Yes. Convention reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
<p>The ERT recommends that the Party report the correct value of $Frac_{LEACH-(H)}$ in CRF table 3.D and provide clear evidence to support the use of a country-specific $Frac_{LEACH-(H)}$ of 0.24 kg N/kg N additions or deposition by grazing animals and a country-specific EF_5 of 0.011 kg N_2O-N/kg N from leaching and run-off as a more accurate representation of Australia's circumstances than the default values given in the 2006 IPCC Guidelines (vol. 4, table 11.3).</p>			
LULUCF			
L.7	4.A Forest land – CO_2 , CH_4 and N_2O	<p>The Party applied the methodology provided in the 2019 IPCC Refinement for classifying emissions from wildfires into anthropogenic biomass burning and non-anthropogenic natural disturbances. This was not the same approach as that applied for FM under KP-LULUCF. The ERT was unable to fully assess the applied methodology during the remote centralized review.</p>	Not an issue/problem
L.8	4.A.2.3 Wetlands converted to forest land – CO_2	<p>The Party reported carbon stock changes due to establishment or reforestation of mangrove forest on degraded coastal (tidal) wetlands under wetlands converted to forest land, which is covered in the NIR (vol. 2, p.69). The Party reported significant carbon gains in the organic soils pool, with the CO_2 IEF given as 9.10 t carbon/ha/year in CRF table 4.A for 2018. The carbon stock change in mineral soils was reported as “NO”. During the review, the Party clarified that it had used organic soils and not mineral soils for reporting carbon stock changes, since the most severely affected emerging mangroves in Australia were estuarine mangroves, whose habitat had relatively higher levels of sediment organic carbon content than the definitional threshold of organic soils. Regarding the large carbon gain in the organic soils carbon pool, the Party explained that it had applied a plant growth model estimation for all carbon pools of mangroves, including soils, as explained in the NIR (vol. 2, p.69). Australia noted during the review that, because fine roots were the main contributor of soil carbon content, a plant growth model estimation was also applied for the soil carbon pool, using national data. The Party also noted that it had voluntarily reported this information on the basis of the specific methodologies provided in the Wetlands Supplement.</p> <p>The ERT recommends that the Party include in its NIR the reason for using organic soils for reporting carbon stock changes for establishment or reforestation of mangrove forest on degraded coastal (tidal) wetlands, and the scientific basis for the relatively significant carbon gain in organic soils.</p>	Yes. Transparency
L.9	4.B.2.3 Wetlands converted to cropland – CO_2	<p>The Party reported CO_2 emissions from drained organic soils under wetlands converted to cropland in CRF table 4.B (as 232.12 kt CO_2 for all years) using the IPCC default EF for temperate cropland (5 t carbon/ha/year) and the whole area of wetlands converted to cropland (12,660.94 ha) as AD. This approach is based on an assumption that all wetlands converted to cropland are considered organic soils; however, the converted area was calculated from land-use change between 1996 and 2010, which was not directly linked to soil data (see NIR, vol. 2, pp.85–86).</p> <p>The area of cultivated organic soils under cropland used for estimating N_2O emissions under category 3.D.a.6 (agricultural soils) (4,000.00 ha) (see ID# A.21 above) is not consistent with the above-mentioned estimation using an area of 12,660.94 ha. During the review, the Party clarified that it considered the area reported under category 3.D.a.6 more accurate and reliable for determining the area of cultivated organic soils, and explained that it will use the area of 4,000.00 ha cultivated organic soils in its estimation of CO_2 emissions for the LULUCF sector.</p> <p>The ERT noted that if the above-mentioned assumption is maintained and the Party reports the same organic soils area under wetlands converted to cropland, 8,660.94 ha will be reported as uncultivated cropland organic soils and the remaining 4,000.00 ha as cultivated cropland organic soils.</p>	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
L.10	4.C.2.3 Wetlands converted to grassland – CO ₂	<p>The ERT recommends that the Party calculate CO₂ emissions for organic soils on wetlands converted to cropland using a consistent cultivated area to that reported under category 3.D.a.6, and reconsider the assumption that all wetlands converted to cropland contain organic soils (see also ID# A.21 above for a transparency recommendation and ID# L.5 in table 3 for an accuracy recommendation regarding the selection of an appropriate EF for this method).</p> <p>The Party reported CO₂ emissions from drained organic soils under grassland in CRF table 4.C (as 896.09 kt CO₂ for all years) using the EF for temperate cropland (5 t carbon/ha/year) from the 2006 IPCC Guidelines (vol. 4, chap. 5, table 5.6) and the whole area of wetlands converted to grassland (48,877.43 ha) as AD. This estimation method is the same as that applied for wetlands converted to cropland (see NIR, vol. 2, p.105). The ERT noted that inconsistent reporting of cultivated organic soils areas between the agriculture and LULUCF sectors (see ID#s A.21 and L.9 above) may also be relevant to grassland, since agricultural soils reported under category 3.D.a.6 include cropland and managed grassland.</p> <p>To ensure consistent reporting of organic soils areas between the agriculture and LULUCF sectors, the ERT recommends that the Party (1) explain the relationship between the areas reported under the agriculture and LULUCF sectors (specifically categories 4.B and 4.C); (2) assess whether using the EF for cropland is appropriate for cultivated grassland organic soils in Australia; and (3) assess and report appropriate areas of drained or cultivated organic soils grassland as AD for GHG estimation and undrained or uncultivated organic soils on grassland. The ERT further recommends that the Party recalculate the emissions for the entire time series and describe the impact of the recalculation in the NIR.</p>	Yes. Accuracy
L.11	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO ₂ and N ₂ O	<p>The Party reported “NE” for AD and CO₂, CH₄ and N₂O emissions for forest land, cropland, grassland and flooded land under wetlands in CRF table 4(II). The Party explained in CRF table 9 that “NE” had been reported for all gases since the categories in question were reported voluntarily.</p> <p>The ERT agrees that estimation methodologies for most of the categories covered in CRF table 4(II) are provided only in the Wetlands Supplement and reporting of those emissions or removals is voluntary in accordance with the UNFCCC Annex I inventory reporting guidelines. However, CO₂ emissions from drained organic soils in forest land, cropland and grassland and N₂O emissions from drained forest organic soils are covered in the methodologies given in the 2006 IPCC Guidelines (vol. 4, chap. 2, equation 2.26 (methodology for CO₂ from drained organic soils); chap. 4, table 4.6 (EFs for drained organic soils in forest land), chap. 5, table 5.6 (EF for cultivated organic soils on cropland); chap. 6, table 6.3 (EF for drained grassland organic soils) and chap. 11, equations 11.1–11.2 and table 11.1 (methodology and EFs for N₂O emissions from managed organic soils including forest land)). In addition, CO₂ emissions or removals should be reported in CRF table 4(II) only where they are not already included in the background CRF tables 4.A–4.F (footnote (4) to CRF table 4(II)). The Party reported CO₂ emissions from drained organic soils in CRF tables 4.A–4.C (with estimated CO₂ emissions for wetlands converted to cropland and grassland (conversion to forest land was relevant to mangrove expansion) and as “IE” or “NO” for others). Thus, the explanations in CRF table 9 were not considered to be consistent with the reporting of the Party or with the requirements of the UNFCCC Annex I inventory reporting guidelines. During the review, the Party agreed with the observation of the ERT and explained that drained organic soils in CRF table 4(II) should be reported as “IE” rather than “NE”.</p>	Yes. Completeness

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
		The ERT recommends that the Party report N ₂ O emissions from drained forest organic soils, using the same AD that were used to estimate CO ₂ emissions from drained forest organic soils, to enhance completeness. The ERT also recommends that the Party complete the cells for CO ₂ emissions from drained organic soils in forest land, cropland and grassland in CRF table 4(II) consistently with the reporting of carbon stock changes in organic soils in background CRF tables 4.A–4.C to enhance comparability.	
L.12	4.H Other (LULUCF) – N ₂ O	<p>The Party voluntarily reported N₂O emissions from aquaculture production on the basis of the tier 1 methodology given in the Wetlands Supplement (equation 4.10), both in its NIR (vol. 2, p.114–115) and in CRF table 4 under category 4.H. However, the NIR (vol. 2, table 6.56) did not contain AD; only emission estimates were given. The ERT reviewed the source data for the AD (Australian Bureau of Agriculture and Resource Economics, 2018) referred to in the NIR and noted that the N₂O estimation was reported in CRF table 4 on an N₂O-N basis and not converted to N₂O. During the review, the Party clarified that this error will be corrected in the next annual submission.</p> <p>The ERT recommends that the Party accurately report N₂O emissions from aquaculture production by expressing the emissions in CRF table 4 as N₂O instead of N₂O-N and also include the AD for aquaculture production in the same table, showing the estimated emissions, in the NIR (vol. 2, table 6.56).</p>	Yes. Accuracy
Waste			
W.6	5.B.2 Anaerobic digestion at biogas facilities – CH ₄	<p>Australia reported “NE” for CH₄ emissions from anaerobic digestion of municipal solid waste for the entire time series in CRF table 5.B and noted in the NIR that these emissions are below the level of significance for Australia (see ID# W.4 in table 3). No information was provided in CRF table 9 to explain the reporting of “NE”. During the review, the Party indicated that it will provide this information in CRF table 9 in its next annual submission.</p> <p>The ERT recommends that the Party provide a rationale for reporting CH₄ emissions from anaerobic digestion as “NE” in CRF table 9.</p>	Yes. Transparency
W.7	5.C.1 Waste incineration – CO ₂	<p>The Party reported CO₂ emissions for 2018 for non-biogenic clinical waste incineration (category 5.C.1.b) in CRF table 5.C (13.49 kt CO₂ eq) but did not report any corresponding AD in the table. During the review, the Party acknowledged its error and provided the missing value of 16.13 kt for incinerated waste.</p> <p>The ERT recommends that the Party correct the missing information for 2018 and include AD for clinical waste incineration in CRF table 5.C.</p>	Yes. Comparability
KP-LULUCF			
KL.6	General (KP-LULUCF) – CO ₂ , CH ₄ and N ₂ O	<p>The areas subject to AR, deforestation and RV reported in background CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.4, respectively, were inconsistent with those reported in CRF table NIR-2 (KP-LULUCF land matrix). For 2018, the figures 8,400.51 kha and 8,429.24 kha were reported for AR, 10,652.36 kha and 10,650.27 kha for deforestation, and 14,108.80 kha and 13,985.28 kha for RV. During the review, the Party noted that it had encountered difficulties when entering data into the CRF tables for KP-LULUCF and provided revised land-matrix figures. For CRF table NIR-2, the land matrix did not properly account for either mangrove excavation under deforestation or the emergence of forest cover in settlements under AR. Moreover, CRF table 4(KP-I)A.1 did not properly account for areas of cropland and settlements converted to forest. The Party explained that this did not affect the reporting of emissions or removals under AR, which were included in the subcategory of grassland</p>	Yes. Convention reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem? ^a
		converted to forest land. Lastly, CRF table 4(KP-I)B.4 did not properly account for areas of sparse vegetation consistently over time.	
		The ERT recommends that the Party consistently and accurately report areas of AR, deforestation and RV in background CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.4, respectively, and CRF table NIR-2 (KP-LULUCF land matrix).	
KL.7	CM – CO ₂	<p>The Party reported in CRF table 4(KP-I)B.2 CO₂ emissions from drainage of organic soils under CM using the total area of wetlands converted to cropland reported for the LULUCF sector. The observations of the ERT regarding the inaccurate estimation of CO₂ emissions from wetlands converted to cropland also apply here (see ID# L.9 above).</p> <p>The ERT recommends that the Party report the correct area used for estimation of CO₂ emissions from drainage of organic soils under CM, ensuring consistency with the area reported for the LULUCF sector, as appropriate.</p>	Yes. Accuracy
KL.8	GM – CO ₂	<p>The Party reported in CRF table 4(KP-I)B.3, CO₂ emissions from drainage of organic soils under GM using the total area of wetlands converted to grassland reported for the LULUCF sector. The observations of the ERT regarding the inaccurate estimation of CO₂ emissions from wetlands converted to grassland also apply here (see ID# L.10 above).</p> <p>The ERT recommends that the Party report the correct area used for estimation of CO₂ emissions from drainage of organic soils under GM, ensuring consistency with the area reported for the LULUCF sector, as appropriate.</p>	Yes. Accuracy
KL.9	RV – CO ₂ , CH ₄ and N ₂ O	<p>The Party reported emissions and removals from all sparse woody vegetation in wetlands and settlements under RV in CRF table 4(KP-I)B.4. As the total area of RV has been decreasing since 1990, the estimated carbon stock changes in RV are reported as net emissions in the NIR (vol. 3, table 11.39). For accounting purposes, Australia reported in the NIR (vol. 3, table 11.40) a net credit of removals because the net emissions in the years of the commitment period were lower than in the base year. For example, for 2018, Australia reported an area of 14,108.80 kha and net emissions of 107.69 kt CO₂ in CRF table 4(KP-I)B.4, and, for 1990, an area of 14,201.07 kha and emissions of 323.47 kt CO₂. According to the NIR (vol. 3, section 11.2, p.3), revegetation includes establishment of vegetation that covers a minimum area of 0.05 ha and does not meet the definition of AR, and is restricted to settlements and wetlands. The ERT notes that this is basically consistent with the RV definition set out in decision 16/CMP.1 but excludes the reference to RV being a “human-induced activity”.</p> <p>According to decision 2/CMP.8, annex II, paragraph 5(a), the Party shall demonstrate that activities under Article 3, paragraph 4, of the Kyoto Protocol have occurred since 1 January 1990 and are human induced, which is based on the definitional regulation set out in decision 2/CMP.7, annex, paragraph 9. The ERT noted that, by including all sparse woody vegetation under RV, the Party is not able to demonstrate that the covered areas have been established since 1990 and the activities are human induced. During the review, the Party clarified that RV of wetlands and settlements is calculated using the same methods as for reporting under the Convention, which includes impacts of transitions prior to 1990, and that it intends to correct this error in a future submission.</p> <p>The ERT recommends that the Party report and account for only net emissions and removals from human-induced RV activities that have occurred since 1990 in the next annual submission.</p>	Yes. Accuracy

^a Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines or problems as defined in para. 69 of the Article 8 review guidelines.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments for the 2020 annual submission of Australia.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

12. Australia elected annual accounting for AR and deforestation. Table I.5 presents the accounting quantities reported by Australia and the final values agreed by the ERT. The final quantities of units to be issued and cancelled are presented in table I.6.

13. Australia elected commitment period accounting for FM, CM, GM and RV and therefore the issuance and cancellation of units for those activities is not applicable to the 2020 review.

VIII. Questions of implementation

14. No questions of implementation were identified by the ERT during the individual review of the Party's 2020 annual submission.

Annex I

Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Australia in its 2020 annual submission

1. Tables I.1–I.4 provide an overview of the total GHG emissions and removals as submitted by Australia.

Table I.1
Total greenhouse gas emissions for Australia, base year^a–2018
 (kt CO₂ eq)

	<i>Total GHG emissions excluding indirect CO₂ emissions</i>		<i>Total GHG emissions including indirect CO₂ emissions^b</i>		<i>Land-use change (Article 3.7 bis as contained in the Doha Amendment)^c</i>	<i>KP-LULUCF (Article 3.3 of the Kyoto Protocol)^d</i>	<i>KP-LULUCF (Article 3.4 of the Kyoto Protocol)</i>	
	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>			<i>CM, GM, RV, WDR</i>	<i>FM</i>
FMRL								4 700.00
Base year	617 651.01	424 998.38	NA	NA	148 163.36		31 641.78	
1990	617 651.01	424 998.38	NA	NA				
1995	497 942.11	439 004.90	NA	NA				
2000	545 376.96	489 373.84	NA	NA				
2010	593 537.55	540 571.41	NA	NA				
2011	573 028.92	542 511.92	NA	NA				
2012	555 333.35	544 732.76	NA	NA				
2013	540 628.00	535 006.81	NA	NA		5 523.85	22 351.02	–8 122.05
2014	539 739.53	530 411.02	NA	NA		7 873.54	23 950.21	–7 847.89
2015	538 821.14	538 618.78	NA	NA		238.54	17 309.54	–19 356.57
2016	526 148.36	548 862.55	NA	NA		–3 695.56	5 134.41	–449.77
2017	529 486.52	556 612.27	NA	NA		–5 624.35	406.77	–6 771.27
2018	537 446.39	558 047.22	NA	NA		4 068.69	509.68	–12 119.53

Note: Emissions and removals reported in the sector other (sector 6) are not included in the total GHG emissions.

^a “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year for CM, GM and RV under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

^b The Party did not report indirect CO₂ emissions in CRF table 6.

^c The value reported in this column relates to GHG emissions from conversion of forests (deforestation) in 1990, as contained in the report to facilitate calculation of the Party’s assigned amount for the second commitment period of the Kyoto Protocol of the Party.

^d Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

Table I.2
Greenhouse gas emissions by gas for Australia, excluding land use, land-use change and forestry, 1990–2018

(kt CO₂ eq)

	<i>CO₂^a</i>	<i>CH₄</i>	<i>N₂O</i>	<i>HFCs</i>	<i>PFCs</i>	<i>Unspecified mix of HFCs and PFCs</i>	<i>SF₆</i>	<i>NF₃</i>
1990	278 424.66	124 383.18	15 938.29	1 424.68	4 607.01	NO	220.56	NO
1995	305 410.17	115 158.28	15 585.37	1 004.03	1 530.84	NO	316.21	NO
2000	350 195.02	116 699.19	19 366.19	1 613.95	1 287.06	NO	212.43	NO
2010	405 502.80	106 258.99	19 711.35	8 672.21	283.32	NO	142.74	NO
2011	404 172.76	108 278.93	20 478.32	9 139.82	301.30	NO	140.79	NO
2012	406 506.24	107 907.07	20 821.19	9 055.87	294.88	NO	147.50	NO
2013	397 943.18	107 218.47	19 651.62	9 859.71	192.00	NO	141.83	NO
2014	394 116.89	105 070.91	20 096.66	10 778.85	192.54	NO	155.17	NO
2015	401 554.76	105 368.80	19 557.63	11 795.32	171.32	NO	170.94	NO
2016	411 031.53	105 873.93	19 566.39	11 979.46	224.92	NO	186.31	NO
2017	415 097.43	108 170.70	21 265.59	11 685.94	202.63	NO	189.99	NO
2018	415 953.95	109 532.21	20 114.44	11 982.08	236.00	NO	228.53	NO
Percentage change 1990– 2018	49.4	-11.9	26.2	741.0	-94.9	NA	3.6	NA

Note: Emissions and removals reported in the sector other (sector 6) are not included in this table.

^a Australia did not report indirect CO₂ emissions in CRF table 6.

Table I.3
Greenhouse gas emissions by sector for Australia, 1990–2018

(kt CO₂ eq)

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
1990	294 160.60	26 031.43	84 780.35	192 652.63	20 026.01	NO
1995	319 010.96	25 201.91	75 937.60	58 937.21	18 854.43	NO
2000	364 493.62	26 683.68	82 534.72	56 003.12	15 661.82	NO
2010	419 501.84	35 707.17	70 140.86	52 966.14	15 221.54	NO
2011	416 960.06	36 242.14	74 728.11	30 517.00	14 581.60	NO
2012	422 073.73	33 402.12	76 173.56	10 600.59	13 083.34	NO
2013	414 672.17	31 495.76	76 369.14	5 621.19	12 469.74	NO
2014	409 306.24	31 709.12	76 841.54	9 328.51	12 554.12	NO
2015	419 452.07	33 067.53	74 037.09	202.36	12 062.09	NO
2016	430 158.62	32 992.49	73 122.70	-22 714.19	12 588.73	NO

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
2017	433 806.55	33 133.28	77 018.06	-27 125.75	12 654.38	NO
2018	435 570.94	34 197.45	75 587.64	-20 600.83	12 691.19	NO
Percentage change 1990–2018	48.1	31.4	-10.8	-110.7	-36.6	NA

Note: Australia did not report indirect CO₂ emissions in CRF table 6.

Table I.4

Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year^a–2018, for Australia
(kt CO₂ eq)

	<i>Article 3.7 bis as contained in the Doha Amendment^b</i>	<i>Activities under Article 3.3 of the Kyoto Protocol</i>		<i>FM and elected activities under Article 3.4 of the Kyoto Protocol</i>				
	<i>Land-use change</i>	<i>AR</i>	<i>Deforestation</i>	<i>FM</i>	<i>CM</i>	<i>GM</i>	<i>RV</i>	<i>WDR</i>
FMRL				4 700.00				
Technical correction				-3 346.04				
Base year	148 163.36				18 154.21	13 164.10	323.47	NA
2013		-28 959.82	34 483.67	-8 122.05	3 058.83	19 249.92	42.27	NA
2014		-29 580.31	37 453.86	-7 847.89	3 955.52	19 943.20	51.49	NA
2015		-28 044.19	28 282.73	-19 356.57	421.36	16 818.79	69.39	NA
2016		-30 553.63	26 858.07	-449.77	-3 107.55	8 195.01	46.95	NA
2017		-31 769.81	26 145.45	-6 771.27	-3 450.05	3 779.40	77.42	NA
2018		-22 784.72	26 853.41	-12 119.53	-2 649.81	3 051.80	107.69	NA
Percentage change base year–2018					-114.6	-76.8	-66.7	NA

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.

^a The base year for CM, GM and RV under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol, and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

^b The value reported in this column relates to 1990.

- Table I.5 provides information on the Party's accounting quantities for reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5
Accounting quantities for activities under Article 3, paragraph 3, and forest management and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol for Australia
 (kt CO₂ eq)

GHG source/sink activity	Net emissions/removals								Accounting parameters	Accounting quantity ^c
	Base year ^a	2013	2014	2015	2016	2017	2018	Total ^b		
A.1. AR		-28 959.821	-29 580.315	-28 044.188	-30 553.627	-31 769.808	-22 784.721	-171 692.480		-171 692.480
Excluded emissions from natural disturbances ^d		NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA		NA
A.2. Deforestation		34 483.670	37 453.858	28 282.730	26 858.071	26 145.453	26 853.411	180 077.193		180 077.193
B.1. FM		NA	NA	NA	NA	NA	NA	NA		NA
Net emissions/removals		NA	NA	NA	NA	NA	NA	NA		
Excluded emissions from natural disturbances ^d		NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA		NA
Any debits from newly established forest		NA	NA	NA	NA	NA	NA	NA		NA
FMRL ^e									NA	
Technical corrections to FMRL									NA	
FM cap									NA	NA
B.2. CM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.3. GM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.4. RV (if elected)	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA		NA

Note: Australia has elected annual accounting for AR and deforestation; for other activities, the Party has elected commitment period accounting. The information presented in this table is only for those activities for which the Party has elected annual accounting.

^a Net emissions and removals from CM, GM, RV and/or WDR, if elected, in the Party's base year as established in decision 9/CP.2.

^b Cumulative net emissions and removals for all years of the commitment period reported in the annual submission under review.

^c The accounting quantity is the total quantity of units to be issued or cancelled for a particular activity.

^d The Party indicated that it is excluding emissions from natural disturbances at the end of the commitment period.

^e As inscribed in the appendix to the annex to decision 2/CMP.7 in kt CO₂ eq per year.

3. Table I.6 provides an overview of key relevant data from Australia's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.6

Key relevant data for Australia under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2020 annual submission

<i>Parameter</i>	<i>Data values</i>
Periodicity of accounting	(a) AR: annual accounting (b) Deforestation: annual accounting (c) FM: commitment period accounting (d) CM: commitment period accounting (e) GM: commitment period accounting (f) RV: commitment period accounting (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	CM, GM, RV
Election of application of provisions for natural disturbances	Yes, for FM
3.5% of total base-year GHG emissions, excluding LULUCF	14 651.806 kt CO ₂ eq (117 214.453 kt CO ₂ eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	Issue 37 199 068 RMUs
2. Deforestation	Cancel 26 015 608 units
3. FM	NA
4. CM	NA
5. GM	NA
6. RV	NA

Note: Values in this table reflect the difference in the accounting quantities for activities under Article 3, para. 3, and FM and any elected activities under Article 3, para. 4, of the Kyoto Protocol as reported in table I.5 between this report and the previously published review report for the Party.

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.6 include the information to be included in the compilation and accounting database for Australia. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1

Information to be included in the compilation and accounting database for 2018, including on the commitment period reserve, for Australia

(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
CPR	4 060 457 844	–	–	4 060 457 844
Annex A emissions				
CO ₂	415 953 947	–	–	415 953 947
CH ₄	109 532 210	–	–	109 532 210
N ₂ O	20 114 445	–	–	20 114 445
HFCs	11 982 082	–	–	11 982 082
PFCs	236 003	–	–	236 003
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	228 533	–	–	228 533
NF ₃	NO	–	–	NO
Total Annex A sources	558 047 220	–	–	558 047 220
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–22 784 721	–	–	–22 784 721
Deforestation	26 853 411	–	–	26 853 411
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–12 119 533	–	–	–12 119 533
CM	–2 649 808	–	–	–2 649 808
CM for the base year	18 154 211	–	–	18 154 211
GM	3 051 796	–	–	3 051 796
GM for the base year	13 164 104	–	–	13 164 104
RV	107 695	–	–	107 695
RV for the base year	323 468	–	–	323 468

Table II.2

Information to be included in the compilation and accounting database for 2017 for Australia

(t CO₂ eq)

	<i>Original estimate</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	415 097 428	–	–	415 097 428
CH ₄	108 170 696	–	–	108 170 696
N ₂ O	21 265 585	–	–	21 265 585
HFCs	11 685 936	–	–	11 685 936
PFCs	202 626	–	–	202 626
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	189 994	–	–	189 994
NF ₃	NO	–	–	NO
Total Annex A sources	556 612 265	–	–	556 612 265

	<i>Original estimate</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final value</i>
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-31 769 808	–	–	-31 769 808
Deforestation	26 145 453	–	–	26 145 453
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-6 771 268	–	–	-6 771 268
CM	-3 450 047	–	–	-3 450 047
CM for the base year	18 154 211	–	–	18 154 211
GM	3 779 403	–	–	3 779 403
GM for the base year	13 164 104	–	–	13 164 104
RV	77 416	–	–	77 416
RV for the base year	323 468	–	–	323 468

Table II.3

Information to be included in the compilation and accounting database for 2016 for Australia(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
Annex A emissions				
CO ₂	411 031 531	–	–	411 031 531
CH ₄	105 873 930	–	–	105 873 930
N ₂ O	19 566 392	–	–	19 566 392
HFCs	11 979 462	–	–	11 979 462
PFCs	224 924	–	–	224 924
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	186 307	–	–	186 307
NF ₃	NO	–	–	NO
Total Annex A sources	548 862 546	–	–	548 862 546
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-30 553 627	–	–	-30 553 627
Deforestation	26 858 071	–	–	26 858 071
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-449 771	–	–	-449 771
CM	-3 107 550	–	–	-3 107 550
CM for the base year	18 154 211	–	–	18 154 211
GM	8 195 006	–	–	8 195 006
GM for the base year	13 164 104	–	–	13 164 104
RV	46 951	–	–	46 951
RV for the base year	323 468	–	–	323 468

Table II.4

Information to be included in the compilation and accounting database for 2015 for Australia(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
Annex A emissions				
CO ₂	401 554 757	–	–	401 554 757
CH ₄	105 368 801	–	–	105 368 801
N ₂ O	19 557 631	–	–	19 557 631
HFCs	11 795 325	–	–	11 795 325
PFCs	171 324	–	–	171 324
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	170 938	–	–	170 938
NF ₃	NO	–	–	NO

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
Total Annex A sources	538 618 776	–	–	538 618 776
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–28 044 188	–	–	–28 044 188
Deforestation	28 282 730	–	–	28 282 730
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–19 356 573	–	–	–19 356 573
CM	421 358	–	–	421 358
CM for the base year	18 154 211	–	–	18 154 211
GM	16 818 788	–	–	16 818 788
GM for the base year	13 164 104	–	–	13 164 104
RV	69 391	–	–	69 391
RV for the base year	323 468	–	–	323 468

Table II.5

Information to be included in the compilation and accounting database for 2014 for Australia(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
Annex A emissions				
CO ₂	394 116 892	–	–	394 116 892
CH ₄	105 070 906	–	–	105 070 906
N ₂ O	20 096 664	–	–	20 096 664
HFCs	10 778 852	–	–	10 778 852
PFCs	192 536	–	–	192 536
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	155 168	–	–	155 168
NF ₃	NO	–	–	NO
Total Annex A sources	530 411 018	–	–	530 411 018
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–29 580 315	–	–	–29 580 315
Deforestation	37 453 858	–	–	37 453 858
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–7 847 893	–	–	–7 847 893
CM	3 955 517	–	–	3 955 517
CM for the base year	18 154 211	–	–	18 154 211
GM	19 943 202	–	–	19 943 202
GM for the base year	13 164 104	–	–	13 164 104
RV	51 488	–	–	51 488
RV for the base year	323 468	–	–	323 468

Table II.6

Information to be included in the compilation and accounting database for 2013 for Australia(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
Annex A emissions				
CO ₂	397 943 179	–	–	397 943 179
CH ₄	107 218 469	–	–	107 218 469
N ₂ O	19 651 621	–	–	19 651 621
HFCs	9 859 713	–	–	9 859 713
PFCs	192 001	–	–	192 001
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	141 832	–	–	141 832

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
NF ₃	NO	–	–	NO
Total Annex A sources	535 006 814	–	–	535 006 814
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–28 959 821	–	–	–28 959 821
Deforestation	34 483 670	–	–	34 483 670
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–8 122 053	–	–	–8 122 053
CM	3 058 826	–	–	3 058 826
CM for the base year	18 154 211	–	–	18 154 211
GM	19 249 923	–	–	19 249 923
GM for the base year	13 164 104	–	–	13 164 104
RV	42 270	–	–	42 270
RV for the base year	323 468	–	–	323 468

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which estimation methods are included in the 2006 IPCC Guidelines that were reported as “NE” or for which the ERT otherwise determined that there may be an issue with the completeness of the reporting in the Party’s inventory are the following:

- (a) 2.B.8.a methanol (CO₂) (see ID# I.8 in table 5);
- (b) 4(II).A forest land – drained organic soils (N₂O) (see ID# L.11 in table 5).

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl>.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at <https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/>.

IPCC. 2019. *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. E Calvo Buendia, K Tanabe, A Kranjc, et al. (eds.). Geneva: IPCC. Available at <https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/>.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2015, 2016, 2017 and 2019 annual submissions of Australia, contained in documents FCCC/ARR/2015/AUS, FCCC/ARR/2016/AUS, FCCC/ARR/2017/AUS and FCCC/ARR/2019/AUS, respectively.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at https://unfccc.int/sites/default/files/resource/AGI%202020_final.pdf.

Annual status report for Australia for 2020. Available at https://unfccc.int/sites/default/files/resource/asr2020_AUS.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Nicola McPherson and Robert Sturgiss (Department of Industry, Science, Energy and Resources of Australia), including additional material on the methodology and assumptions used. The following references have been reproduced as received:

Australian Bureau of Agriculture and Resource Economics, 2018. Australian Fisheries and Statistics Report. Available online at <https://www.agriculture.gov.au/abares/research-topics/fisheries/fisheries-and-aquaculture-statistics>.

Department of Industry, Science, Energy and Resources. September 2020. Guide to the Australian Energy Statistics. Available online at <https://www.energy.gov.au/sites/default/files/Guide%20to%20the%20Australian%20Energy%20Statistics%202020.pdf>.

Serrano, O., Lovelock, C. E., Atwood, T. B., Macreadie, P. I., Canto, R., Phinn, S., & Duarte, C. M. (2019). Australian vegetated coastal ecosystems as global hotspots for climate change mitigation. *Nature Communications*, 10(1), 4313.

Sherbak, I. and Grace, P., 2014. Determination of emission factors for estimating fertiliser-induced nitrous oxide emissions from Australia's rural production systems. Report to the Department of the Environment.