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Report on the individual review of the annual submission of New Zealand submitted in 2022*

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 2022 annual submission of New Zealand, 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 12 to 17 September 2022 in Canberra.

* In the symbol for this document, 2022 refers to the year in which the inventory was submitted, not to the year of publication.

Contents

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
C	confidential
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
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"
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
EF	emission factor
ERT	expert review team
FM	forest management
FMRL	forest management reference level
$Frac_{LEACH}$	fraction of nitrogen input to managed soils that is lost through leaching and run-off
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*
LUCAS model	Land Use and Carbon Analysis System model
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MSW	municipal solid waste
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
NZD	New Zealand dollars
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RV	revegetation
SEF	standard electronic format

SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
SWDS	solid waste disposal site(s)
TOW	total organic load in wastewater
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 manual 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"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction

1. This report covers the review of the 2022 annual submission of New Zealand, 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 12 to 17 September 2022 in Canberra and was coordinated by Pedro Torres and Xuehong Wang (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for New Zealand.

Table 1
Composition of the expert review team that conducted the review for New Zealand

Area of expertise	*Name*	*Party*
Generalist	Marcelo Theoto Rocha	Brazil
Energy	Regine Röthlisberger	Switzerland
IPPU	Stanford Mwakasonda	United Republic of Tanzania
Agriculture	Olga Gavrilova	Estonia
LULUCF and KP-LULUCF	Sandro Federici	San Marino
Waste	Hans Oonk	Netherlands
Lead reviewers	Olga Gavrilova	
	Marcelo Theoto Rocha	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2022 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that New Zealand resolve identified findings, including issues[1] designated as problems.[2] Other findings, and, if applicable, the encouragements of the ERT to New Zealand to resolve related issues, are also included in this report. The assessment by the ERT takes into account that New Zealand does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol inscribed in the third column of Annex B in the Doha Amendment.

4. A draft version of this report was communicated to the Government of New Zealand, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

5. Annex I presents the annual GHG emissions of New Zealand, including totals excluding and including LULUCF, indirect CO_2 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.

II. Summary and general assessment of the Party's 2022 annual submission

6. Table 2 provides the assessment by the ERT of the Party's 2022 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.

[1] Issues are defined in decision 13/CP.20, annex, para. 81.
[2] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

Table 2
Summary of review results and general assessment of the 2022 annual submission of New Zealand

Assessment			*Issue/problem ID#(s) in table 3 or 5[a]*
Date of submission	Original submission: NIR, 14 April 2022; CRF tables (version 1), 14 April 2022; SEF tables, 14 April 2022		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	A.1, A.2, A.5, L.1, L.16, W.9, W.12, W.15
	(c) Development and selection of EFs?	Yes	E.10, W.13, W.14
	(d) Collection and selection of AD?	Yes	A.4, L.4, L.15, L.17, W.10
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	No	
	(g) Reporting of uncertainties, including methodologies?	No	
	(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	E.8, I.8, I.9, L.11, L.12, L.18
	(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	A.10
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
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	
	(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 assigned amount units, certified emission reductions, emission reduction units and removal units 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 SIAR?	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,	No	

Assessment			*Issue/problem ID#(s) in table 3 or 5[a]*
	paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?		
	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?	No	
	(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?	No	
	(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?	No	New Zealand does not have a previously applied adjustment as it does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol
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	
Questions 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

7. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 27 February 2023,[3] and had not been resolved by the time of publication of the report on the review of the Party's 2021 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 New Zealand

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
General			All recommendations from previous review reports have been resolved.
Energy			
E.1	1.A.1.a Public electricity and heat production – liquid fuels – CO_2, CH_4 and N_2O (E.4, 2021) (E.23, 2019) Transparency	Include information on trends in liquid fuel consumption, especially by explaining the values for 2001 (reported as "NO") and 1992 and 2008 (where consumption and emissions were significantly higher than in other years since 1990).	Resolved. The Party explained in its NIR (p.82) that emissions from public electricity and heat production fluctuate considerably from year to year and that particularly dry meteorological conditions result in an increase in fossil fuel electricity production to compensate for the shortfall in hydroelectric generation. In addition, as the storage capacity of hydro reservoirs is limited to around 10 per cent of New Zealand's production, fossil fuel electricity generation is used to balance supply and demand. Information provided in the NIR (table 10.2.2) indicates that AD were checked with the data system manager at the Ministry of Business, Innovation and Employment and found to be correct.
E.2	1.A.1.a Public electricity and heat production – gaseous fuels – CO_2 (E.18, 2021) Convention reporting adherence	Check the value of the CO_2 IEF for gaseous fuels in 2005 and either justify the inconsistency in the NIR or correct the value for the emission estimates in 2005.	Resolved. The Party reported in its NIR (p.84) that AD for natural gas consumption for electricity generation have been updated. This resulted in revised CO_2 IEFs for the entire time series. The ERT has not identified any issues with the CO_2 IEF reported for 2005.
E.3	1.A.2.e Food processing, beverages and tobacco – gaseous fuels – CO_2 (E.19, 2021) Transparency	Explain in the NIR the reasons why the AD for gaseous fuels were revised for 2013 and why the CO_2 IEF was lower between 1996 and 2012 after the recalculation performed for the 2021 submission. Report in the NIR why the CO_2 IEF was lower for 2003.	Resolved. The Party recalculated the CO_2 EF for gaseous fuels and reported revised emission estimates in CRF table 1.A(a)s2. According to the NIR (p.77), the GHG reporting data system was streamlined and simplified and a number of minor inconsistencies and errors were corrected. During the review, the Party confirmed that the CO_2 EF was one of the inconsistencies addressed.

[3] FCCC/ARR/2021/NZL.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
E.4	1.A.3.b Road transportation – liquid and gaseous fuels – CO_2, CH_4 and N_2O (E.8, 2021) (E.29, 2019) Comparability	Report as "NO", instead of "IE", the AD and emissions for biomass for light- and heavy-duty trucks and buses, and diesel, liquified petroleum gas and biomass for motorcycles for before 2000.	Not resolved. The Party has not yet changed the notation keys reported in CRF table 1.A(a)s3. During the review, the Party clarified that the notation keys will be changed for the next annual submission.
E.5	1.A.3.b Road transportation – liquid and gaseous fuels – CO_2 (E.9, 2021) (E.30, 2019) Convention reporting adherence	Continue to estimate the CO_2 emissions on the basis of fuel sold, but report the CO_2 emissions for before 2000 disaggregated by vehicle mode (cars, light-duty trucks, heavy-duty trucks and buses, and motorcycles) using the data collected for the estimation of CH_4 and N_2O emissions as a good practice to verify the CO_2 estimates obtained with a tier 1 approach.	Addressing. The Party stated in the NIR (p.393) that a project for disaggregating the data is under way and that key milestones of the system code reconfiguration have been reached. The Party plans to implement the changes for the next annual submission.
E.6	1.A.4 Other sectors – gaseous fuels – CO_2 (E.20, 2021) Transparency	Explain in the NIR the reasons for the lower CO_2 IEFs between 1996 and 2012 after the recalculation performed for the 2021 submission. Report in the NIR the reason for the lower value of the CO_2 IEF for 2003.	Resolved. The Party recalculated the CO_2 EF for gaseous fuels and reported revised emission estimates in CRF table 1.A(a)s2. According to the NIR (p.77), the GHG reporting data system was streamlined and simplified and a number of minor inconsistencies and errors were corrected. During the review, the Party confirmed that the CO_2 EF was one of the inconsistencies addressed.
E.7	1.A.4.a Commercial/institutional – liquid fuels – CO_2 (E.21, 2021) Transparency	Report fully and transparently on recalculations in the NIR in accordance with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines.	Resolved. During the 2021 review, the Party explained that there was a reallocation of AD from commercial/institutional (category 1.A.4.a) to road transportation (category 1.A.3.b). However, this reallocation was subsequently reversed in the national oil data system. No issues were identified with the reporting of the recalculations.
E.8	1.B.1.a Coal mining and handling – solid fuels – CH_4 (E.12, 2021) (E.15, 2019) (E.14, 2017) (E.17, 2016) (E.31, 2015) Completeness	Estimate CH_4 emissions from abandoned underground mines (subcategory 1.B.1.a.i.3) or, if these emissions are considered insignificant, report them as "NE" and provide a quantitative estimate of the likely level of the emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Addressing. The Party reported in its NIR (p.104) that a contractor was employed to review all the coal reports within the Ministry of Business, Innovation and Employment's online coal mine databases and extract details relevant to estimating emissions from abandoned coal mines. On the basis of the preliminary outcome, further research is needed for making a realistic estimate of emissions.
E.9	1.B.2.c Venting and flaring – gaseous fuels – CO_2 (E.15, 2021) (E.35,	Report the AD from the Kapuni gas treatment plant for subcategory 1.B.2.c.1.ii venting – gas as confidential, "IE" or "NE", as appropriate, in CRF table 1.B.2 and review	Addressing. The Party reported AD in CRF table 1.B.2 for venting (category 1.B.2.c.ii). However, in the NIR (p.110), and in the documentation box of CRF table 1.B.2, it stated that no AD are available. During the review, the Party clarified that the AD from the Kapuni gas treatment plant are confidential and that the value reported in CRF table 1.B.2.c.ii for venting is only a

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
	2019) Comparability	the information on AD reported in the documentation box of the same table.	placeholder that was introduced during the upgrading of the data system. The Party stated its intention to report the AD as "C" in its next annual submission.
IPPU			
I.1	2. General (IPPU) (I.1, 2021) (I.1, 2019) (I.1, 2017) (I.1, 2016) (I.2, 2015) (37, 2014) (42, 2013) Transparency	Include in the NIR detailed information and methodological descriptions on how plant-specific data are estimated.	Resolved. The Party improved the relevant methodological descriptions in its NIR. In response to the recommendation, the Party clarified that information on plant-specific data and methods as well as references to emissions trading scheme regulations were first added to the 2018 submission and have been updated over several NIRs.
I.2	2. General (IPPU) – HFCs, PFCs and SF_6 (I.2, 2021) (I.17, 2019) (I.16, 2017) (I.20, 2016) (I.23, 2015) Transparency	Include in the NIR all the information indicated in the section "Reporting and documentation" of the 2006 IPCC Guidelines for categories 2.F product use as substitutes for ozone-depleting substances and 2.G other product manufacture and use.	Resolved. During the review, the Party explained that for product use as substitutes for ozone-depleting substances (category 2.F), most of the specific documentation listed in the 2006 IPCC Guidelines (e.g. vol. 3, chap. 7, table 7.10, p.7.60) is either unavailable or not relevant to the methods used by the Party, including, for example, a schedule for phasing out chlorofluorocarbons and hydrochlorofluorocarbons. The Party also explained that data provided by some manufacturers are confidential and are used in stock models at the national level. The ERT finds that the level of detail in the NIR is sufficiently transparent given New Zealand's methodological choice and national circumstances. For other product manufacture and use (category 2.G), the documentation listed in the 2006 IPCC Guidelines (vol. 3, chap. 8, table 8.6, p.8.22) is provided and used in the modelling. Information on archiving, including the models used, is summarized in the NIR and in a separate report (Verum Group, 2021) that is referenced in the NIR as unpublished, but which the Party provided to the ERT during the review.
I.3	2. General (IPPU) (I.3, 2021) (I.23, 2019) Convention reporting adherence	Correct the inconsistency in the reporting of key categories within the NIR, including in the annexes to the NIR, wherein cement production (CO_2) was reported as a key category in both the level and trend assessment in NIR table 4.1.2, but as a key category in the level assessment only in NIR section 4.2.1 and as a key category in the trend assessment only (including and excluding LULUCF) in CRF table 7.	Not resolved. The Party corrected the inconsistency in the reporting of key categories between NIR table 4.1.2 and section 4.2.1, noting that cement is a key category by level and trend, but continued to report the category as key in the trend assessment only in CRF table 7.
I.4	2. General (IPPU) – CO_2 (I.4, 2021) (I.26, 2019) Transparency	Explain how the AD for the chemical and metal industries (categories 2.B and 2.C) are obtained.	Resolved. The description in the NIR (sections 4.3.2 and 4.4.2) has been updated, which explained how the AD for chemical and metal industries are obtained.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
I.5	2.A.2 Lime production – CO_2 (I.6, 2021) (I.6, 2019) (I.23, 2017) Transparency	Update the description in the NIR to correctly reflect the AD and EFs used and to clarify the assumptions and methods applied for 1990–2013 and 2014 onward.	Resolved. The Party reported in the NIR (table 10.2.1) that consistent AD are now used for the entire time series. The ERT noted that the NIR includes some changes in the methodological description for estimating emissions from lime production.
I.6	2.A.2 Lime production – CO_2 (I.7, 2021) (I.24, 2019) Accuracy	Review and, if necessary, revise the CO_2 EF for kiln dust, noting that it cannot be the same as the CO_2 EF for calcium oxide because the dust contains a mixture of calcium oxide and magnesium oxide.	Resolved. During the review, the Party reported that both companies producing lime in New Zealand reported zero or insignificant amounts of magnesium oxide in kiln dust and therefore no amendment to the CO_2 EF is considered necessary. The ERT considers that the recommendation has been fully addressed and emphasizes the need to reflect such details in future NIRs for the sake of transparency.
I.7	2.B.1 Ammonia production – CO_2 (I.13, 2021) (I.27, 2019) Comparability	Subtract the total quantities of oil and gas used (fuel plus feedstock) in ammonia production from the quantity reported under energy use in the energy sector, include the emissions accordingly in the IPPU sector and explain this reallocation in the NIR.	Addressing. During the review, the ERT asked New Zealand to clarify its response that "the recommendation cannot be implemented because information submitted by the plant operators is subject to an obligation to keep gas consumption data confidential". The Party clarified that there was a misunderstanding on the exact requirement of the recommendation and explained that feedstock gas used for ammonia production was not included in the emissions reported for the energy sector and that appropriate notation keys will be used in future annual submissions to reflect any confidentiality issues.
I.8	2.C.1 Iron and steel production – CO_2 (I.14, 2021) (I.11, 2019) (I.26, 2017) Completeness	Estimate CO_2 emissions from electric steel production at the Pacific Steel plant, either by using a carbon balance or by applying an appropriate EF, and report these emissions under category 2.C.1.	Not resolved. The Party reported in its NIR (table 10.2.1) that the plant was closed in 2015. The ERT notes that the fact that the plant was closed in 2015 does not address the completeness issue for 1990–2015, assuming that the plant was in operation during that complete time period.
I.9	2.C.1 Iron and steel production – CH_4 (I.25, 2021) Completeness	Investigate all the potential CH_4 sources and report CH_4 emissions from iron and steel production under category 2.C.1 for the entire time series using a methodology consistent with the decision tree in the 2006 IPCC Guidelines (vol. 3, chap. 4, p.4.20, figure 4.8). Include a description of the methodologies, AD and EFs used for the estimates. Alternatively, report the emissions as "NE" and demonstrate in the NIR that the likely level of emissions is below the significance threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Addressing. During the review, the Party stated that it approached the steel company with a request for any available updated information on AD and that discussions with the steel company are ongoing.
I.10	2.C.1 Iron and steel production – CO_2	Investigate the source of significant changes in the CO_2 IEFs for steel production across the time series and include in the NIR	Addressing. Information on the changes in the CO_2 IEFs for steel production across the time series was not included in the NIR. During the review, the Party stated that it approached the steel company with a request for any available updated information on

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
	(I.26, 2021) Transparency	information concerning the trend and the reasons for the changes.	changes affecting the IEFs and that, providing no issues arise, the information will be included in its next annual submission.
I.11	2.C.4 Magnesium production – SF_6 (I.15, 2021) (I.14, 2019) (I.28, 2017) Transparency	State in the NIR that, for SF_6 emissions from magnesium casting, a country-specific uncertainty is used rather than the IPCC default uncertainty and explain the reason for its use.	Not resolved. The ERT could not find a statement in the NIR indicating that, for SF_6 emissions from magnesium casting, a country-specific uncertainty is used rather than the IPCC default uncertainty. During the review, the Party stated that an explanation is provided in the NIR (section 4.4.2), which states that, for such a small emissions source (estimated at 120 kg SF_6 or less than 3 kt CO_2 eq/year), only approximate estimates of the quantities of SF_6 used are available.
I.12	2.D.1 Lubricant use – CO_2 (I.16, 2021) (I.28, 2019) Transparency	Improve the information on the CO_2 EF for lubricant use, including the source of the EF.	Resolved. The Party reported in its NIR information on the CO_2 EF for lubricant use (section 4.5.2) and that the EF is the IPCC default (table 10.2.2).
I.13	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.17, 2021) (I.18, 2019) (I.30, 2017) Transparency	Explain, in section 4.7.3 of the NIR, which approach (other than a combination of uncertainties) was used to derive the uncertainty of 35 per cent presented in NIR table A2.1.1.	Resolved. The Party reported in its NIR (table 10.2.1) that an explanation was provided to the previous ERT and the approach is briefly explained in the NIR (section 4.7.3). During the review, the Party explained that the uncertainties are ±20 per cent for household refrigerators, 30 per cent for self-contained refrigerators, 30 per cent for remote cabinets, 40 per cent for dairy refrigeration, 70 per cent for cool stores, 50–80 per cent for three refrigerated transport components and 30 per cent for other air conditioning. The overall uncertainty is recalculated for each annual submission if the shares of these equipment types change. For other subapplications, the estimates do not change from year to year. The Party also explained that further information is available in a separate report (Verum Group, 2021).
I.14	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.18, 2021) (I.29, 2019) Transparency	Explain in the NIR the model used to estimate emissions for this category in more detail, including the assumptions made.	Resolved. The Party reported in its NIR (table 10.2.2) that such explanations are expanded on in the NIR (section 4.7.2) and will be further improved in future annual submissions. During the review, the Party informed the ERT that additional information is available in a separate report (Verum Group, 2021), referenced in the NIR.
I.15	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.19, 2021) (I.29, 2019) Transparency	Improve QA/QC for this category by comparing the results of the bottom-up model with the results of a top-down approach as the import data are based on comprehensive annual surveys, to allow for a clear comparison of the two results, as recommended in the 2006 IPCC Guidelines (vol. 3, chap. 7.1.4.1).	Resolved. During the review, the Party explained that the 2006 IPCC Guidelines (vol. 3, chap. 7) recommend comparing equipment-based estimates, at the subapplication level, with a mass balance approach, where applicable. The bottom-up stock models used by New Zealand are unique to each subapplication and have varying – and sometimes high – uncertainty related to the quality of statistical data from the equipment. Data on the total supply of each refrigerant inform the calculation of usage for new installations and the replacement of refrigerants currently in use. Consequently, the available top-down data contribute to the calculation of emissions for each subapplication and cannot be used for a straight comparison with the results of the bottom-up models.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
I.16	2.F.1 Refrigeration and air conditioning – HFCs (I.20, 2021) (I.19, 2019) (I.17, 2017) (I.37, 2016) Transparency	Describe in the NIR the methodology used to derive the 2 per cent decline in refrigerant charge in vehicle air-conditioning systems and demonstrate that this methodology is in line with the splicing techniques in the 2006 IPCC Guidelines.	Resolved. The Party included this description in its NIR (table 10.2.2 and section 4.7.2). During the review, the Party stated that further details are available in a separate report (Verum Group, 2021), referenced in the NIR, that is available to the ERT.
I.17	2.F.1 Refrigeration and air conditioning – HFCs (I.21, 2021) Accuracy	Update the average charge of HFC-134a for the years from 2010 onward by taking into consideration the cars added to the fleet in recent years on the basis of data available from importers and/or from fleet statistics.	Resolved. The Party reported in its NIR (section 4.7.2) that it imports a wide variety of vehicles, many of them used cars, and that obtaining more accurate and up-to-date statistics on their refrigerant charge is not feasible. However, on the basis of data from importers, the average charge in new vehicles added to the fleet reduced by 2 per cent/year from 2010 to 2020.
I.18	2.F.1 Refrigeration and air conditioning – HFCs (I.23, 2021) (I.31, 2019) Transparency	Explain in the NIR, for category 2.F.1.e mobile air conditioning, the trend in HFC-134a filled into new manufactured products, especially the decrease between 2003 and 2004.	Resolved. During the review, the Party explained that responses to enquiries to importers indicate that this trend continued from 2004 to 2005 and that obtaining more accurate and up-to-date statistics is not feasible.
I.19	2.G.2 SF_6 and PFCs from other product use – SF_6 (I.24, 2021) (I.22, 2019) (I.21, 2017) (I.23, 2016) (I.26, 2015) Transparency	Include in the NIR an explanation of the analysis of SF_6 emissions from SF_6 use in shoe and double-glazed window manufacturing based on the information that was provided to the ERT during the 2015 review in the responses to questions and a background report.	Resolved. The Party reported in its NIR (section 4.8.2) that, following enquiries, it has been confirmed that there is no use of SF_6 in New Zealand for those applications.
Agriculture			
A.1	3.A Enteric fermentation – CH_4 (A.16, 2021) Accuracy	Using the data and results of research, improve the model trends or changes in death rates over the time series used for estimating emissions from enteric fermentation for dairy cattle, beef cattle, sheep and deer, and document any recalculations in the NIR.	Addressing. For its 2022 submission, the Party continued to apply the fixed death rate values in the characterization of the monthly livestock population for New Zealand's tier 2 model for estimating emissions from enteric fermentation for dairy cattle, beef cattle, sheep and deer. During the review, the Party clarified that the relevant country-specific research is ongoing and that updated information on death rates for daily-cattle will be used for its 2023 annual submission. The Party also clarified that research into birth and slaughter dates for beef cattle and sheep has just been finalized and these data could be used to revise death rates for beef cattle and sheep for its 2024 annual submission.

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A.2	3.A.1 Cattle – CH_4, N_2O (A.17, 2021) Accuracy	Review whether a lactation length of six months and a milk yield of 800 l for beef cows are appropriate for the emission estimates and provide further justification for these values in the NIR or recalculate emissions using more appropriate values for milk yield for beef cows.	Not resolved. The Party did not provide any information to justify the appropriateness of a lactation length of six months and milk yield of 800 l for estimating emissions for beef cows. During the review, the Party clarified that there are currently no data available to justify the values and that, owing to the delay in receiving the 2021 review report, it is unlikely that the issue will be resolved before the 2023 submission. New Zealand will engage with sectoral experts to determine whether the assumed values are still appropriate and, in the event that they are found not to be, identify next steps for addressing the issue.
A.3	3.A.1 Cattle – CH_4 (A.18, 2021) Transparency	Include a clearer description in the NIR of how productivity data for milk production from the Livestock Improvement Corporation are matched with terrestrial livestock data, including for those instances where Livestock Improvement Corporation data combine geographically close regions to obtain a single value (productivity data) that is then used for livestock population in these regions.	Not resolved. The Party did not update the description of how Livestock Improvement Corporation productivity data are matched with terrestrial livestock data in its NIR (p.161). During the review, the Party clarified that this was not done owing to the delay in receiving the 2021 review report. A clearer description will be included in the 2023 submission.
A.4	3.A.1 Cattle – CH_4, N_2O (A.19, 2021) Accuracy	Incorporate the data and results of the ongoing research in order to provide more up-to-date data on the proportion of dry cows and update the parameter $POPdnmc_t$ (total number of dairy cows and heifers not in milk or calf in year t), recalculate the emission estimates and explain the recalculations in the NIR.	Not resolved. New Zealand did not provide additional information on the results of the ongoing research aimed at updating the data on the proportion of dry cows and the parameter $POPdnmc_t$. During the review, the Party clarified that the research is being finalized and the results will be used once available, hopefully as part of improvements for the 2023 submission.
A.5	3.A.1 Cattle – CH_4 (A.20, 2021) Accuracy	Improve the methodology related to the instantaneous gain of 10 per cent of the weight of mature cows to account for their higher energy requirements and recalculate the associated emission estimates. Document clearly these recalculations in the NIR.	Addressing. New Zealand continued to assume that growing heifer live weight gain linearly increases from 9 per cent when a heifer is born to 90 per cent when it becomes a mature heifer at 638 days old. After 638 days, growing heifers join the class of mature milking cows and make an instantaneous jump in weight to the full mature dairy cow weight. During the review, the Party clarified that the instantaneous weight gain is related to the fact that growing heifers are moving up into the next subcategory of cattle. The Party specified that ongoing research to improve the methodology for estimating dairy cattle population will address this issue and the results will be incorporated into its 2023 submission.
A.6	3.A.4 Other livestock – CH_4 (A.9, 2021) (A.13, 2019) Accuracy	Implement the planned methodological changes regarding revising the assumptions about the population of dairy goats and the total goat population, recalculate the emission estimates and explain them in the NIR.	Resolved. In its NIR (table 10.2.2, p.392), the Party stated that it used revised estimates of the dairy goat population for the 2020 inventory. This resulted in an updated CH_4 EF for enteric fermentation for the whole time series in the 2020 inventory (CRF table 3.A.s1). During the review, the Party clarified that data from recent research (Burggraaf et al., 2019) have now been adopted in the methodology regarding the proportion of dairy goats

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			in the overall farmed population and emission estimates have been recalculated accordingly. The ERT noted that a reference to this research was provided in the NIR (p.177).
A.7	3.B.1 Cattle – N_2O (A.21, 2021) Transparency	Correct the description of N excretion in the first two months of life for dairy cattle in section 5.1 of the New Zealand Ministry for Primary Industries technical report in order to resolve the inconsistency with section 5.1.1.2 of the same technical report.	Not resolved. The inconsistency in the technical report (New Zealand Ministry for Primary Industries, 2022) remains: it is stated on page 97 that for dairy cattle in the first two months of their life, N excretion is set to zero, whereas it is stated on pages 97–98 of the same report that for dairy cattle less than one year old, N excretion is calculated on the basis of N intake through milk powder and its protein content, as shown in equation 5.3 in the report (p.98). During the review, the Party clarified that the recommendation was not implemented because of the delay in receiving the 2021 review report and that the report by the Ministry for Primary Industries will be updated to ensure consistency.
A.8	3.B.4 Other livestock – CH_4 (A.12, 2021) (A.16, 2019) Accuracy	Revise the calculation procedures for the CH_4 EF for deer and explain the revisions in the NIR. If three studies from 2003 are still used as the basis for the calculation, consider using a more appropriate average value than a simple arithmetic average, such as a weighted average, to estimate the CH_4 EF for deer; and justify that the obtained value is more appropriate than the IPCC default value.	Resolved. The Party continued to apply a simple arithmetic average of CH_4 yield value of 0.000914788 kg CH_4/kg faecal dry matter, which was obtained on the basis of two studies for sheep and three studies for cattle. During the review, the Party clarified that the current procedure for calculating the CH_4 EF for deer remains appropriate given the information available. As deer weights are approximately halfway between those of sheep and beef and the values for sheep and beef are based on robust, country-specific research, basing the CH_4 EF for deer on the average of those two values is likely to be more accurate than using the IPCC default value. The ERT considers the arguments provided by New Zealand to be relevant and robust and thus considers the issue to have been resolved.
A.9	3.D.a.2.a Animal manure applied to soils – N_2O (A.22, 2021) Transparency	Provide additional information describing the manure management systems used for dairy cattle in the NIR, including the information from Rollo et al. (2017).	Not resolved. New Zealand continued to report that "some manure is also collected but not stored; rather it is daily spread directly onto pasture (e.g. swine manure and some dairy manure)" (NIR p.200), and did not include detailed information from Rollo et al. (2017) justifying its stance that this manure management practice does not fall under the definition of the manure management system daily spread, or on reporting "NO" for dairy cattle in CRF tables 3.B(a)s2 and 3.B(b). During the review, the Party clarified that the recommendation was not implemented because of the delay to the 2021 review report; however, more information will be provided in its 2023 submission in order to resolve this issue.
A.10	3.D.a.2.c Other organic fertilizers applied to soils – N_2O (A.23, 2021) Completeness	Undertake an updated analysis of the AD related to N applied to soils for non-manure components of organic fertilizers and estimate and report N_2O emissions for this subcategory. If the emissions are considered to fall below the threshold of significance, report in the NIR information in accordance	Addressing. New Zealand did not report updated information to justify that N_2O emissions from other organic fertilizers applied to soils are below the threshold of significance in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. During the review, the Party clarified that it continued to refer to van der Weerden et al. (2014), in which the reported results illustrate a yearly breakdown of the contribution of organic amendments as a percentage of total GHG emissions, which ranges from 0.01 to

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		with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines on the likely level of N_2O emissions, demonstrating that they are below 0.05 per cent of the national total and do not exceed 500 t CO_2 eq.	0.025 per cent. The Party also clarified that, according to the same report, the results should be reviewed in five years, but such a review was not undertaken owing to resource constraints. The Party further clarified that it had listed the need to review the results in van der Weerden et al. (2014) as a priority in the current annual budget round. The ERT considers that the results and information used to evaluate emissions from the organic sources in the aforementioned 2014 report are a robust justification for considering that N_2O emissions from other organic fertilizers applied to soils are below the threshold of significance, as required by paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, but that such results and information should be reviewed, as referred to in the same report.
A.11	3.D.b Indirect N_2O emissions from managed soils – N_2O (A.15, 2021) (A.19, 2019) Transparency	Revise the description in the NIR of the country-specific values for $Frac_{LEACH}$ and for the fraction of applied organic N fertilizer materials and of urine and dung N deposited by grazing animals that volatilizes as ammonia and nitrogen oxides in kg N volatilized.	Addressing. To estimate indirect N_2O emissions from managed soils, New Zealand used the $Frac_{LEACH}$ value, which is further disaggregated for two land-use systems: cropping and grassland. The updated $Frac_{LEACH}$ value for cropping systems was applied. In its NIR (p.217), the Party gave a brief description of the methodology used to derive the value, provided a reference (Welten et al., 2021) and clarified that, as the field investigations were ongoing at the time of compiling the NIR, the $Frac_{LEACH}$ value for grazing systems was not updated. During the review, the Party clarified that the results of the research to evaluate the country-specific $Frac_{LEACH}$ values was partially applied for the 2022 submission and that the remaining findings are scheduled to be applied for the 2023 submission.
LULUCF			
L.1	4. General (LULUCF) – CO_2 and N_2O (L.1, 2021) (L.10, 2019) Accuracy	Either provide evidence that the estimated SOC changes do not result in systematic over- or underestimations, given that land-use changes occur randomly across the entire SOC variability of a land-use category or subcategory, or replace the current method with one consistent with good practice as defined in the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1).	Addressing. The Party reported in its NIR (p.396) that to undertake a robust study to collect this information would likely cost between NZD 400,000 and 600,000/year. At a minimum, this is more than five times the annual research budget for the LULUCF sector. Following decision tree 2.4 in volume 4 of the 2006 IPCC Guidelines, there are insufficient resources to implement such research in the near future without a significant increase in funding. During the review, the Party clarified that it recently assigned a multi-year budget to conduct work on improving mineral soil estimates and that, owing to the nature of the research required, results will not be available for reporting purposes for several years yet. The ERT considers that the recommendation has not yet been fully addressed because the Party has neither verified the accuracy of SOC change estimates produced by the model nor applied an alternative method consistent with the 2006 IPCC Guidelines. The ERT noted that the country-wide application of the IPCC default methodology for SOC in mineral soils together with either IPCC default values (tier 1) or country-specific values (tier 2) for reference SOC stocks and SOC change factors would resolve the issue.
L.2	4. General (LULUCF) – CO_2	Provide a comparison across the available time series of data of roundwood statistics	Resolved. The Party added an additional section in annex 3 to the NIR (vol. 2, pp.95–96) describing forest land model validations and, specifically, the differences between

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	(L.2, 2021) (L.11, 2019) Convention reporting adherence	reported by the Ministry for Primary Industries and the quantities estimated by the LUCAS model based on the harvested area as allocated to age classes and provide justification for any discrepancies.	LUCAS model harvest losses and the roundwood statistics reported by the Ministry for Primary Industries.
L.3	4. General (LULUCF) – CO_2 (L.3, 2021) (L.12, 2019) Convention reporting adherence	Replace "IE" with estimates of biomass carbon stock losses only for the year in which an area conversion occurs, and with "NO" for any year in which conversion of additional areas does not occur, in CRF tables 4.A and 4.B.	Resolved. The Party reported "NO" in its NIR (p.396) for annual biomass carbon stocks where conversions did not occur during the time series (e.g. for conversions of post-1989 forest to cropland). Where a land-use conversion had previously occurred but there were some years in the time series when conversion of additional areas did not occur, the annual biomass carbon stocks were reported as "NA" since the methodology does not require the Party to estimate annual biomass stock changes in such years. Perennial biomass carbon stocks were reported as "NA" where biomass carbon gain occurred owing to conversion to land uses that do not host any perennial biomass carbon stock. The ERT agrees with the use of "NA" in these circumstances.
L.4	Land representation – CO_2, CH_4 and N_2O (L.8, 2021) (L.16, 2019) Accuracy	Investigate how to use the results of the accuracy assessment, once available, to adjust the reported AD for the land representation.	Addressing. The Party reported in its NIR (p.397), with reference to annex A3.2.2 to the NIR, that a confusion matrix for the 2012 map was developed, demonstrating that mapping errors and biases were very limited for all land categories, except grassland and grassland with woody biomass. The Party also reported that a new land-use map using imagery acquired in 2020–2021 is being produced. Once that is complete, an accuracy assessment of the map series with a focus on the accuracy of land-use change mapping will be conducted. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet completed the accuracy assessment, in particular for land-use change categories where small land-area errors are associated with large errors in emission estimates.
L.5	4.A Forest land – CO_2 (L.10, 2021) (L.17, 2019) Transparency	Provide information on the actual age of harvest of forest plantations as derived from information collected through the National Exotic Forest Description.	Resolved. The Party added information on the actual age of harvest and on the actual age profile of forest plantations (figure A.3.2.11) in annex 3.2.5 to the NIR.
L.6	4.A Forest land – CO_2 (L.26, 2021) Transparency	Include in the NIR the definitions of tall and regenerating forests, their respective areas and how this distinction and the associated calculations result in complete estimates of CSC, in particular in the event of natural disturbances.	Resolved. The Party reported in its NIR the definitions (table 6.3.5, p.255) and areas (table 6.3.6, p.255) of tall and regenerating forests. Forest areas are classified spatially as either tall or regenerating and, accordingly, CSC is calculated separately. Natural disturbances affect the carbon stocks measured in the national forest inventory plot network and therefore are implicitly included in the CSC calculations.
L.7	4.A.1 Forest land remaining forest land – CO_2 (L.11, 2021) (L.4,	Update the below-ground biomass ratios, noting that choosing a value above the median in the range of 9–33 per cent without further documentation entails the risk of	Resolved. The Party reported below-ground biomass ratios in its NIR (vol. 2, table A3.2.10, p.87) that were updated on the basis of peer-reviewed literature (Easdale et al., 2019).

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	2019) (L.5, 2017) Accuracy	overestimation of removals from forest land remaining forest land, or, if that update is not possible, report in the NIR on the progress on the ongoing work to update the below-ground biomass ratios.	
L.8	4.A.1 Forest land remaining forest land – CO_2 (L.12, 2021) (L.18, 2019) Completeness	Report estimates of above-ground biomass CSCs, noting that those estimates should include all gains and losses in tall natural forest remaining tall natural forest; however, carbon stock losses as a result of stand-replacing disturbances (such as storms or destructive wildfires) that lead to a subsequent regeneration of the natural forest, and carbon stock gains up to the average carbon stock of tall forests, should be reported within the regenerating natural forest category, including the entire transition of regenerating natural forest to tall natural forest.	Resolved. The Party reported in its NIR (p.88) and in CRF table 4.A estimates of CSC for tall and regenerating forests.
L.9	4.A.1 Forest land remaining forest land – CO_2 (L.13, 2021) (L.19, 2019) Accuracy	Provide evidence that national circumstances make the collection of data on SOC in mineral soils and on its variation across time in forest land remaining forest land impracticable or, if this is not possible, plan activities to be implemented in the next few years to collect the data needed to apply a tier 2 method to estimate SOC changes in mineral soils of tall natural forest remaining tall natural forest.	Resolved. The Party reported in its NIR (pp.397–398) that undertaking a robust study to collect this information would likely cost between NZD 400,000 and 600,000/year. At a minimum, this is more than five times the annual research budget for the LULUCF sector. In line with guidance in the 2006 IPCC Guidelines (vol. 4, chap. 2, figure 2.4), there are insufficient resources to implement such research in the near future. To do so would require a significant increase in funding. During the review, the Party clarified that it recently assigned a multi-year budget to conduct work on improving mineral soil estimates. However, results will not be available for reporting purposes for several years yet.
L.10	4.A.2 Land converted to forest land – N_2O (L.14, 2021) (L.20, 2019) Transparency	Report disaggregated information for the two subcategories of post-1989 natural forest and post-1989 plantations.	Not resolved. The Party reported in CRF table 4(III) information on N_2O emissions from land converted to forest land but that information was not disaggregated by forest type. During the review, New Zealand stated that it has identified a solution to disaggregate reporting in CRF table 4(III) and it is currently determining whether it could be implemented in time for the 2023 submission. The ERT considers that the recommendation has not yet been addressed because the Party has not yet reported in CRF table 4(III) information on land converted to forest land disaggregated by forest type.
L.11	4.B.1 Cropland remaining cropland –	Identify the main subdivisions for New Zealand's perennial cropland on the basis of	Not resolved. The Party reported in its NIR (p.398) that emissions from cropland remaining cropland are low relative to those for other categories, such as forest land and

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	CO_2 (L.15, 2021) (L.21, 2019) Completeness	the harvesting cycle and the biomass carbon stock at the end of the harvesting cycle, and build an age–class distribution for each subdivision; estimate and report annual biomass carbon stock gains and losses accordingly; and report the estimation and all additional information in the NIR.	harvested wood products. The category is therefore a low research priority and funding is unable to be directed to this at present. The ERT considers that the recommendation has not yet been addressed because the Party has not yet estimated CSCs in perennial biomass associated with the ageing and replanting of perennial crops. The ERT noted that the use of historical statistical data on perennial crop area allows for an age–class distribution to be built and used to estimate annual carbon stock gains and losses associated with the ageing of perennial crop plantations and the renewal of those at the end of the production cycle.
L.12	4.B.1 Cropland remaining cropland – CO_2 (L.16, 2021) (L.22, 2019) Completeness	Plan the activities needed to collect data and prepare estimates of SOC changes in cropland associated with changes in management practices.	Addressing. The Party reported in its NIR (p.271) that a longitudinal study on the impact of management practices on grassland and cropland soils is under way. Time-series data on a network of 500 soil sample plots over 12 years will be collected, but the data are not expected to be available for several years. During the review, New Zealand clarified that the baseline data for this study will be collected by 2023/2024 and that the 12-year timeline is for the resampling of those 500 sample plots, which will inform and refine estimates of SOC changes within one land use over time. New Zealand also clarified that it aims to use these baseline data to improve its mineral SOC stock change estimates for all agricultural land uses by its 2026 submission, and that improvements to its reporting on management practices may also be made before the resampled data are available. The ERT considers that the recommendation has not yet been fully addressed because, while the Party has secured dedicated funding and commenced a multi-year research programme, it has not yet collected the necessary data to estimate and report SOC changes in mineral soils associated with agricultural management changes as required for the IPCC default methodology for cropland remaining cropland.
L.13	4.C.2 Land converted to grassland – CO_2 (L.17, 2021) (L.23, 2019) Convention reporting adherence	Report "NE" for biomass carbon stock losses for wetlands converted to grassland, providing relevant references to the 2006 IPCC Guidelines for justification, or revise the methodology by assigning a biomass carbon stock value to wetlands before conversion, in particular for the subcategory vegetated wetlands.	Resolved. The Party reported this subcategory as "NE" in CRF table 4.C because the 2006 IPCC Guidelines (vol. 6, chap. 6.7.2) do not provide default values for above-ground biomass or dead organic matter and the country has no country-specific data. During the review, the Party clarified that, following its 2022 submission, a literature review was conducted on available research on biomass carbon stocks in vegetated wetlands. This research will allow New Zealand to assign biomass carbon stock values to vegetated wetlands before conversion, and the results will be used for its 2023 submission.
L.14	4.D Wetlands – CO_2 (L.18, 2021) (L.6, 2019) (L.7, 2017) Completeness	Continue the ongoing work to improve estimates for wetlands and report the emissions for subcategories 4.D.1.1 (peat extraction remaining peat extraction) and 4.D.2.1 (land converted to peat extraction).	Resolved. Although the Party reported in its NIR (p.280) that information from land converted to peat extraction was reported as "NE" in the CRF tables because the areas under peat extraction have remained the same since 1990, the ERT noted that in CRF table 4.D, it is reported that "New Zealand does not have activity data available to reliably report on this activity", so reporting this subcategory as "NE" is appropriate.

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L.15	4.E.2 Land converted to settlements – CO_2 (L.27, 2021) Accuracy	Assess the share of impervious surfaces within the settlements category and estimate soil CSC for land converted to settlements on the basis of this share and in accordance with the 2006 IPCC Guidelines.	Not resolved. The Party did not report any relevant information in its NIR. During the review, the Party clarified that research on settlements is low priority and it has not been possible to direct funding to this area. The ERT considers that the recommendation has not yet been addressed because the Party has not yet applied, as a first step, the IPCC default method and values to calculate SOC losses for land converted to settlements.
L.16	4.F Other land – CO_2, CH_4 and N_2O (L.20, 2021) (L.27, 2019) Accuracy	Reclassify all other land with significant SOC content under the most appropriate land-use category and recalculate the land representation and SOC changes for the revised area of conversion to and from other land.	Not resolved. The Party reported in its NIR (section 6.8.6, p.287) that the mapping of other land in 1990 was based on low 30 m resolution Landsat satellite imagery, meaning that some areas of lower productive grassland and bare ground without a typical grassland spectral signature could have been incorrectly classed as other land. Subsequent land-use change has highlighted that the 1990 classification should be reviewed and updated. This is a scheduled improvement activity. The Party also reported that the country-specific reference SOC value, based only on three estimates, is high compared with the default value in the 2006 IPCC Guidelines (vol. 4, chap. 2) and has a relatively high uncertainty. Further soil sampling in land classified as other land is required to improve soil carbon estimates for this land-use category. However, while this action is listed as a planned improvement, it has not yet received funding and is unlikely to be implemented before the next annual submission. During the review, New Zealand, stated that it aims to narrow its definition of other land and ensure estimates of mineral SOC stock changes are more representative for this category through improving mapping and additional soil sampling. The ERT considers that the recommendation has not yet been addressed because the Party has not yet separated land without significant SOC stocks in mineral soils from land with significant SOC. Mixing of both types within a single category results in a high likelihood of overestimating SOC gains in conversion to vegetated land uses and SOC losses in conversion from vegetated land uses to other land. That is because conversion of other land to other vegetated land uses occurs exclusively on other land with significant SOC stocks.
L.17	4.F.2 Land converted to other land – CO_2 (L.21, 2021) (L.28, 2019) Accuracy	Verify the occurrence of the conversion of land with organic soils to other land and, if SOC losses are not reported for organic soils converted to other land, report “NA” in the CRF table.	Not resolved. The Party reported in its NIR (p.399) that improving the 1990 classification of other land is a scheduled activity. The ERT considers that the recommendation has not yet been addressed because the Party has not yet reported on the goal of the scheduled activity (expected by the ERT to be a classification of land cover and soil types) or the timescale for achieving that goal.
L.18	4(II) Emissions/removals from drainage and rewetting and other management of	Report N_2O emissions from drainage of non-agricultural organic soils in CRF table 4(II) for each land category for which an SOC loss in organic soils is reported in CRF tables 4.A, 4.D and 4.E.	Addressing. The Party reported in CRF table 4(II) carbon stock losses from drained organic soils in forest land. During the review, the Party clarified that, during the review of its 2021 submission, the previous ERT acknowledged that there is no default value in the 2006 IPCC Guidelines that can be applied for wetlands or settlements. However, the ERT suggested that, because

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	organic/mineral soils – N_2O (L.22, 2021) (L.29, 2019) Completeness		New Zealand considers that most of its settlement area can be counted as grassland when it comes to soil carbon, the EFs for grassland should be applied to settlements. For the 2022 submission, these emissions were calculated but not included in the CRF tables or emission totals. As there is no reporting category for these emissions in the CRF tables, assistance was sought on how they could be reported. Unfortunately, the response to this request was not received in time to incorporate the emission estimates into the submission. Therefore, the value of 23.2 kt CO_2 eq emissions resulting from drained organic soils in settlements has not been included in the total emissions for LULUCF, but this is planned for the 2023 submission. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included in its inventory the estimated N_2O emissions caused by the drainage of organic soils in the settlements land-use category.
L.19	4(IV) Indirect N_2O emissions from managed soils – N_2O (L.25, 2021) (L.31, 2019) Completeness	Report indirect N_2O emissions from leaching and run-off of N mineralization associated with SOC losses in mineral soils in CRF table 4(IV).	Resolved. The Party reported in CRF table 4(IV) indirect N_2O emissions from leaching and run-off for all land-use categories other than cropland remaining cropland.
L.20	4(V) Biomass burning – CO_2 (L.28, 2021) Transparency	Transparently describe in the NIR how CO_2 emissions from wildfires are captured in the estimates for planted forests by the general stock change calculation, specifying in particular what share of salvage logging is assumed, whether it is entirely or partly deducted from the estimated 'non-salvage' harvest area, and whether age distribution is impacted by wildfire.	Resolved. The Party reported in its NIR (p.297) that CO_2 emissions from wildfires in forest land remaining forest land are included in the general stock change calculation. In forest land remaining forest land, burned stands are either harvested (so emissions are included with the harvesting emissions) or left to grow at reduced stocking. For both natural and planted forests, emissions from areas burned are captured within the forest plot networks that New Zealand uses to estimate CSC. In these cases, to avoid double counting of CO_2 emissions, "IE" is reported in CRF table 4(V).
L.21	4(V) Biomass burning – N_2O (L.29, 2021) Transparency	Provide explanations in the NIR on how the Fire and Emergency New Zealand database is fed, whether by remote sensing data or field reports, together with information on the time series of annually burned area.	Resolved. The Party reported in its NIR (p.298) that wildfire AD are sourced from Fire and Emergency New Zealand, which maintains a database in which wildfire events are recorded. Historically, burned areas were estimated and allocated by field staff by vegetation type: grass, tussock, gorse, scrub, wetlands, plantation forest and indigenous forest. The process was updated in 2017 and now involves mapping the burned area and overlaying land-cover categories to identify vegetation types. The ERT noted that a reference to the online information on wildfire compiled by Fire and Emergency New Zealand would further enhance the transparency of the inventory.
Waste			
W.1	5. General (waste) – CO_2 (W.1, 2021) (W.17,	Include more information on current waste management, such as an overview of MSW generation and its treatment method	Not resolved. The previous ERT noted that the Party did not indicate how management practices impact the composition of waste disposed to landfill. During the review, the

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
	2019) Transparency	(recycling, composting, incineration or disposal) in NIR section 7.1.1, and its impact on the composition of waste disposed to landfill.	Party indicated that no changes were made to NIR section 7.1.1 compared with the 2021 submission.
W.2	5.A Solid waste disposal on land – CH_4 (W.3, 2021) (W.4, 2019) (W.5, 2017) (W.4, 2016) (W.7, 2015) Accuracy	Provide substantive justification for the country-specific values for CH_4 recovery efficiency, including justification for the factors that can enhance the recovery, or revise the estimates for CH_4 recovery at SWDS for which metered data are not available to 20 per cent, in order to be consistent with the 2006 IPCC Guidelines.	Resolved. The Party provided in its NIR (p.318) a reference to an unpublished study in which these country-specific values on CH_4 recovery are justified (see ID# W.12 in table 5).
W.3	5.A Solid waste disposal on land – CH_4 (W.13, 2021) Transparency	Include information in the NIR on the consolidation of MSW landfill sites – from numerous small and poorly managed to fewer large-scale and well-managed landfills – and any additional information on the changing trends in waste generation and waste management in the country.	Resolved. The Party provided in its NIR (p.308) an explanation of the waste policies that resulted in the disposal of solid waste to fewer larger and better managed landfills.
W.4	5.A.3 Uncategorized waste disposal sites – CH_4 (W.14, 2021) Transparency	Provide additional information in NIR section 7.1.1 on current waste management practices, including a higher-resolution version of figure 7.1.1 and an overview of MSW generation and its treatment method (recycling, composting, incineration, or disposal), and the impact of such practices on the composition of waste disposed to landfill.	Addressing. The Party indicated that no changes were made to NIR figure 7.1.1 because the previous ERT was insufficiently explicit on what improvements would be useful for future reviews. According to the current ERT, figure 7.1.1 should be an introductory figure, allowing the reader to understand the main waste generation, pre-treatment and disposal methods and to assess completeness. The figure should preferably contain some quantitative information for a recent year (preferably the latest reported year of the annual submission). The figure may be simplified; intermediate actors (waste collectors, aggregators and redistributors) do not need to be included. Terms should be consistent with text in the NIR and in the 2006 IPCC Guidelines (e.g. MSW instead of residential households).
W.5	5.B.1 Composting – CH_4 (W.15, 2021) Convention reporting adherence	Correct the text in the NIR (p.381) to refer to the correct number in table 7.2.3 (which reflects total MSW) and provide a description of the AD on composting used for the estimates.	Resolved. The Party provided in its NIR (p.322) a reference to the correct NIR table 7.2.3 (solid waste deposited to municipal and uncategorized landfills from 1950 to 2020).
W.6	5.C.1 Waste incineration – CO_2 (W.8, 2021) (W.21, 2019)	Investigate historical data on waste incineration in schools and revise the estimates, if appropriate.	Addressing. The Party reported the incineration of MSW (category 5.C.1) in CRF table 5.C as "NO". The Party stated in the NIR (p.302) that MSW is generally not incinerated in New Zealand. The Party provided in annex 6 to the NIR an explanation of why emissions from waste incineration in schools are below the significance threshold. In annex 6.2 to the NIR, estimated emissions were reported to be 0.04 kt CO_2 eq/year, which is less than 1

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
	Convention reporting adherence		per cent of the significance threshold for 2020. It is unlikely that emissions in the past would have exceeded the significance thresholds in specific years of the time series 1990–2020. During the review, the Party clarified that it incorrectly reported "NE" under subcategory 5.C.2.2.a instead of subcategory 5.C.1.2.a in CRF Reporter. The ERT considers the use of "NE" for reporting under subcategory 5.C.1.2.a to be appropriate as emissions for this subcategory are below the significance threshold.
W.7	5.C.1 Waste incineration – CO_2, CH_4 and N_2O (W.16, 2021) Transparency	Include information in the NIR to clarify how clinical waste is defined in line with national circumstances.	Resolved. In the NIR (section 7.4.1, p.323), New Zealand clarified the term clinical waste: "clinical wastes refers to a combination of clinical, medical and quarantine wastes". The ERT considers that this definition of clinical waste is consistent with the terminology in the 2006 IPCC Guidelines.
W.8	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O (W.17, 2021) Transparency	Clarify in the NIR that farm fills are disposed of in two different treatment pathways (i.e. under unmanaged landfill and under open burning) and that the AD for both pathways have the same value, and provide some basis on which to justify why the same value of AD is applied for both farms fills and open burning.	Resolved. The Party described in the NIR (pp.312–313 and 325) the two treatment pathways for this uncollected waste, providing justification for assuming a 50:50 split between both treatment options in the absence of better information and expressing the need to understand the split.
W.9	5.D Wastewater treatment and discharge – N_2O (W.10, 2021) (W.22, 2019) Accuracy	Revise the reporting of N_2O emissions from industrial wastewater and sewage sludge applied to soils in the agriculture and waste chapters of the NIR and in CRF table 3.D, and explain any recalculations in the NIR.	Not resolved. During the review, the Party indicated that this is a low-priority issue owing to the expected small scale of emissions. Therefore, New Zealand has not yet taken action to address the recommendation (see ID# W.15 in table 5).
W.10	5.D Wastewater treatment and discharge – CH_4 and N_2O (W.11, 2021) (W.23, 2019) Accuracy	Clarify and report consistent information on the final treatment or disposal of sludge, including incineration and disposal in municipal landfills; review the estimates; and explain any recalculations in the NIR.	Addressing. The Party did not report a clear and consistent overview of final treatment and disposal of sludge in the NIR. The ERT considers that the overview should provide information on all sludge treatment and removal options (reuse, landfilling, biological treatment, incineration), ensuring that the total amount of sludge treated is consistent with the total amount of biochemical oxygen demand removed as sludge in the calculation of emissions from wastewater treatment and discharge (see ID# W.15 in table 5).
W.11	5.D.2 Industrial wastewater – CH_4 (W.12, 2021) (W.24, 2019) Comparability	Estimate and report the amount of CH_4 flared and for energy recovery, respectively, in CRF table 5.D, noting that the amount of CH_4 for energy recovery, if occurring, should probably be reported as "IE" in that table and the estimates reported under the energy sector.	Resolved. The Party reported CH_4 flared as "NE" and CH_4 utilized for energy production as "IE" in CRF table 5.D. On the basis of a number of submissions from Parties included in Annex I to the Convention in a similar situation, the ERT considers that "NE" is appropriate for reporting CH_4 flared.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
KP-LULUCF			
KL.1	General (KP-LULUCF) – all gases (KL.1, 2021) KP reporting adherence	Ensure that the areas reported under KP-LULUCF at the end of an inventory year in CRF table NIR-2 are the same as those used for the calculation of the areas for those activities at the beginning of the following year.	Resolved. The Party reported in CRF table NIR-2 areas reported under KP-LULUCF at the end of an inventory year that are equal to the areas for the activities at the beginning of the following year.
KL.2	General (KP-LULUCF) – all gases (KL.4, 2021) KP reporting adherence	Recalculate the background level and the associated margin for AR and FM, including all GHG emissions (i.e. CO_2, CH_4 and N_2O) rather than only non-CO_2 emissions, and revise the FMRL with a technical correction.	Resolved. The Party recalculated the background level using the default methodology described in section 2.3.9.6 of the Kyoto Protocol Supplement. Then, a technical correction to the FMRL was implemented to include non-CO_2 emissions from biomass burning as included in the recalculated background level of disturbances. The update of the FMRL is described in the annexes to the NIR (pp.151–161).
KL.3	AR – CO_2 (KL.6, 2021) KP reporting adherence	Include in the NIR the information provided to the ERT during the 2017 review (see document FCCC/ARR/2017/NZL, table 5, ID# KL.6) on how surrogate data sets on AR used for 1990–2007 and 2008–2012 are applied in order to demonstrate that AR is directly human-induced and differentiated from natural expansion and/or restocking.	Resolved. The Party reported in the annexes to its NIR (p.54) information on surrogate data used to estimate land-use changes in 1990–2007 and 2008–2012.
KL.4	FM – CO_2 (KL.8, 2021) KP reporting adherence	Include relevant information in the NIR in support of the mandatory requirement to demonstrate that the mineral soil pool under FM is not a source, following the guidance in the Kyoto Protocol Supplement (section 2.3.1).	Not resolved. The Party reported in its NIR (p.391) that undertaking a robust study to collect this information would likely cost between NZD 400,000 and 600,000/year. At a minimum, this is more than five times the annual research budget for the LULUCF sector. In line with guidance in the 2006 IPCC Guidelines (vol. 4, chap. 2, figure 2.4), there are insufficient resources to implement such research in the near future. To do so would require a significant increase in funding. The ERT concludes that this potential problem in relation to a mandatory requirement does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.
KL.5	FM – CO_2 (KL.12, 2021) KP reporting adherence	Exclude from the FMRL the technical correction projections of any change in management practices occurring after 31 December 1989, since the aim of the FMRL is to account for the change in emissions and removals occurring as a consequence of those changes.	Resolved. The Party reported in the annexes to its NIR (p.154) that the first step taken to calculate technical corrections to the FMRL was to replicate the FMRL as submitted in 2011, applying the same policy assumptions, but using the reporting system and historical data that are used to report on FM in the current inventory.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
KL.6	FM – all gases (KL.13, 2021) Transparency	Report in the NIR quantitative information on the drivers that have determined the deviation of the actual estimates of GHG emissions and removals reported under FM from the projected GHG emissions and removals included in the FMRL correction value, including the time series (from 1990 to the most recently reported year) of annual harvesting rates, biomass annual increment and GHG emissions from natural disturbances used for preparing the estimates for FM during the commitment period; and the historical time series (1990–2009) of annual harvesting rates, biomass annual increment and GHG emissions from natural disturbances used for projecting the FMRL correction value.	Resolved. The Party reported in its NIR (p.421) that the emissions from FM were lower because the realized rate of harvest is lower than the rate of harvest projected in the FMRL technical correction, as shown in NIR figure 11.3.2.
KL.7	FM – CO_2 (KL.14, 2021) KP reporting adherence	Recalculate the technical correction to the FMRL removing the projection of carbon emission factor.	Resolved. The emissions associated with carbon emission factor have been removed from the FMRL, as described by the Party in its NIR (p.423).
KL.8	FM – CO_2 (KL.16, 2021) Transparency	Report information on newly established forest and harvested and converted forest plantations in CRF table 4(KP-I)B.1.	Not resolved. The Party did not report information on newly established forest or harvested and converted forest plantations in CRF table 4(KP-I)B.1. The ERT concludes that this potential problem in relation to a mandatory requirement does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.
KL.9	FM – CO_2 (KL.17, 2021) Completeness	Recalculate the FM estimates of the biomass CSCs, noting that those estimates should include all gains and losses in tall natural forest remaining tall natural forest (however, carbon stock losses as a result of stand-replacing disturbances (such as storms or destructive wildfires) that lead to a subsequent regeneration of the natural forest, and carbon stock gains up to the average carbon stock of tall forests, should be reported within the regenerating natural forest category, including the entire transition of regenerating natural forest to tall natural	Resolved. The Party described the updated approach to classifying tall and regenerating forest subcategories, and to calculating the EF applied for each, for pre-1990 natural forest in its NIR (p.432). The same approach was applied to the calculation of the technical correction to the FMRL.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
		forest); and apply a technical correction to the FMRL.	
KL.10	FM – CO_2 (KL.18, 2021) Completeness	Either demonstrate that the national circumstances differ from those of other developed countries, preventing the collection of information on SOC in forest land across time, or recalculate the FM estimates of SOC changes in mineral soils and then apply a technical correction to the FMRL when estimates of SOC changes in mineral soils become available.	Not resolved. The Party reported in its NIR (p.391) that undertaking a robust study to collect this information would likely cost between NZD 400,000 and 600,000/year. At a minimum, this is more than five times the annual research budget for the LULUCF sector. In line with guidance in the 2006 IPCC Guidelines (vol. 4, chap. 2, figure 2.4), there are insufficient resources to implement such research in the near future. To do so would require a significant increase in funding. The ERT concludes that this potential problem in relation to a mandatory requirement does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.
KL.11	FM – CO_2 (KL.19, 2021) KP reporting adherence	Report the correct values, in kt CO_2 eq, for the FMRL (11,150.00 kt CO_2 eq) and the technical correction to the FMRL in the CRF accounting table.	Resolved. The Party reported the FMRL and the technical correction to the FMRL in the CRF accounting table.
KL.12	FM – CO_2 (KL.21, 2021) Transparency	Clarify in the NIR how the 1990–2009 yield tables can differ from the post-2009 yield tables (2010–2019), whereas the corresponding plot measurements are not statistically different at a given age.	Resolved. The Party reported in its NIR (p.262) that, during the review of the 2021 submission, it was suggested that submissions revert to two yield tables until further data are available for the yield table representing stands from 2010 onward. Therefore, two yield tables have been used for the 2022 submission: one for stands planted before 1990 and one for stands planted from 1990 onward.
KL.13	FM – all gases (KL.22, 2021) Transparency	If the natural disturbance provision is applied and therefore a background level and margin continue to be reported, report in the NIR the time series of natural disturbances and indicate which years are excluded from the background group used to calculate the background level.	Not resolved. The Party did not report in its NIR the time series of emissions associated with natural disturbances that were used to calculate the background level. The ERT concludes that this potential problem in relation to a mandatory requirement does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.
KL.14	FM – all gases (KL.23, 2021) Accuracy	Provide in the NIR a comparison of the FMRL model's outputs with the historical data over the period for which the consistency between the FMRL and inventory estimates had initially been assessed (e.g. 2000–2009). In the event of a substantial inconsistency between the two time series, implement a last technical correction by applying the methods to ensure time-series consistency, as recommended in the Kyoto Protocol Supplement (section 2.7.6.1, p.2.101).	Not resolved. The Party did not provide such a comparison in its NIR. The ERT concludes that this potential problem in relation to a mandatory requirement does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
KL.15	CH_4 and N_2O emissions from drained and rewetted organic soils – N_2O (KL.20, 2021) Completeness	Report N_2O emissions from drainage of non-agricultural organic soils in CRF table 4(KP-II)2 for each non-agricultural land category for which a SOC loss in organic soils is reported in CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1.	Resolved. The Party reported in CRF table 4(KP-II)2 N_2O emissions from drainage of non-agricultural organic soils.

[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.

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

8. 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 2022 annual submission of New Zealand, and had not been addressed by the Party by 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 New Zealand

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
General	No issues identified.	
Energy		
E.4	Report as "NO", instead of "IE", the AD and emissions for biomass for light- and heavy-duty trucks and buses, and diesel, liquefied petroleum gas and biomass for motorcycles for before 2000.	3 (2019–2022)
E.5	Continue to estimate the CO_2 emissions on the basis of fuel sold, but report the CO_2 emissions for before 2000 disaggregated by vehicle mode (cars, light-duty trucks, heavy-duty trucks and buses, and motorcycles) using the data collected for the estimation of CH_4 and N_2O emissions as a good practice to verify the CO_2 estimates obtained with a tier 1 approach.	3 (2019–2022)
E.8	Estimate CH_4 emissions from abandoned underground mines (subcategory 1.B.1.a.i.3) or, if these emissions are considered insignificant, report them as "NE" and provide a quantitative estimate of the likely level of the emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	5 (2015/2016–2022)
E.9	Report the AD from the Kapuni gas treatment plant for subcategory 1.B.2.c.1.ii venting – gas as "C", "IE" or "NE", as appropriate, in CRF table 1.B.2, and review the information on AD reported in the documentation box of the same table.	3 (2019–2022)
IPPU		

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
I.3	Correct the inconsistency in the reporting of key categories within the NIR, including in the annexes to the NIR, wherein cement production (CO_2) was reported as a key category in both the level and trend assessment in NIR table 4.1.2, but as a key category in the level assessment only in NIR section 4.2.1 and as a key category in the trend assessment only (including and excluding LULUCF) in CRF table 7.	3 (2019–2022)
I.7	Subtract the total quantities of oil and gas used (fuel plus feedstock) in ammonia production from the quantity reported under energy use in the energy sector, include the emissions accordingly in the IPPU sector and explain this reallocation in the NIR.	3 (2019–2022)
I.8	Estimate CO_2 emissions from electric steel production at the Pacific Steel plant, either by using a carbon balance or by applying an appropriate EF, and report these emissions under category 2.C.1.	4 (2017–2022)
I.11	State in the NIR that, for SF_6 emissions from magnesium casting, a country-specific uncertainty is used rather than the IPCC default uncertainty and explain the reason for its use.	4 (2017–2022)
Agriculture		
A.11	Revise the description in the NIR of the country-specific values for $Frac_{LEACH}$ and for the fraction of applied organic N fertilizer materials and of urine and dung N deposited by grazing animals that volatilizes as ammonia and nitrogen oxides in kg N volatilized.	3 (2019–2022)
LULUCF		
L.1	Either provide evidence that the estimated SOC changes do not result in systematic over- or underestimations, given that land-use changes occur randomly across the entire SOC variability of a land-use category or subcategory, or replace the current method with one consistent with good practice as defined in the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1).	3 (2019–2022)
L.4	Investigate how to use the results of the accuracy assessment, once available, to adjust the reported AD for the land representation.	3 (2019–2022)
L.10	Report disaggregated information for the two subcategories of post-1989 natural forest and post-1989 plantations.	3 (2019–2022)
L.11	Identify the main subdivisions for New Zealand's perennial cropland on the basis of the harvesting cycle and the biomass carbon stock at the end of the harvesting cycle, and build an age–class distribution for each subdivision; estimate and report annual biomass carbon stock gains and losses accordingly; and report the estimation and all additional information in the NIR.	3 (2019–2022)
L.12	Plan the activities needed to collect data and prepare estimates of SOC changes in cropland associated with changes in management practices.	3 (2019–2022)
L.16	Reclassify all other land with significant SOC content under the most appropriate land-use category and recalculate the land representation and SOC changes for the revised area of conversion to and from other land.	3 (2019–2022)
L.17	Verify the occurrence of the conversion of land with organic soils to other land and, if SOC losses are not reported for organic soils converted to other land, report "NA" in the CRF table.	3 (2019–2022)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
L.18	Report N_2O emissions from drainage of non-agricultural organic soils in CRF table 4(II) for each land category for which a SOC loss in organic soils is reported in CRF tables 4.A, 4.D and 4.E.	3 (2019–2022)
Waste		
W.1	Include more information on current waste management, such as an overview of MSW generation and its treatment method (recycling, composting, incineration or disposal) in NIR section 7.1.1, and its impact on the composition of waste disposed to landfill.	3 (2019–2022)
W.6	Investigate historical data on waste incineration in schools and revise the estimates, if appropriate.	3 (2019–2022)
W.9	Revise the reporting of N_2O emissions from industrial wastewater and sewage sludge applied to soils in the agriculture and waste chapters of the NIR and in CRF table 3.D, and explain any recalculations in the NIR.	3 (2019–2022)
W.10	Clarify and report consistent information on the final treatment or disposal of sludge, including incineration and disposal in municipal landfills; review the estimates; and explain any recalculations in the NIR.	3 (2019–2022)
KP-LULUCF	No issues identified.	

[a] Reports on the reviews of the 2018 and 2020 annual submissions of New Zealand have not yet been published. Therefore, 2018 and 2020 were not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

V. Additional findings made during the individual review of the Party's 2022 annual submission

9. Table 5 presents findings made by the ERT during the individual review of the 2022 annual submission of New Zealand that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2022 annual submission of New Zealand

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General		No general findings additional to those included in table 3 were made by the ERT during the review.	
Energy			
E.10	1. General (energy sector) – gaseous fuels – CO_2	On the basis of information provided in the NIR (pp.75 and 91) and an annex to the NIR (annex 4, table A4.1), the CO_2 EFs for liquid fuels are based on regular measurements from the only refinery in New Zealand. During the review, the Party clarified that these CO_2 EFs are not based on actual measurements of calorific value and carbon content, but are calculated on the basis of the fuel density. The Party stated that the refinery used to provide approximately 75 per cent of all liquid fuels consumed in New Zealand, but that dropped to 52 per cent in 2021 and	Yes. Accuracy

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		the refinery ceased operation in 2022. As of April 2022, the facility is being converted into an import terminal without refinery activities. The ERT recommends that New Zealand review the carbon content and calorific values of the imported liquid fuels in accordance with good practice guidance provided in the 2006 IPCC Guidelines or equivalent international standards and recalculate its estimates on the basis of any changes to the CO_2 EFs.	
IPPU		No findings for the IPPU sector additional to those included in table 3 were made by the ERT during the review.	
Agriculture			
A.12	3.B.1 Cattle – CH_4	New Zealand stated in its NIR (p.185) that, to determine CH_4 emissions from dairy cattle manure in anaerobic lagoons, the default MCF value of 0.76 at an average annual temperature of 15 °C was used. However, the ERT noted that New Zealand also stated in its NIR (p.193) that the "current value [sic] for the MCF is 0.74, based on the 2006 IPCC default value for uncovered anaerobic lagoons at an annual temperature of 15 degrees Celsius". The ERT also noted that, in CRF table 3.B(a)s2, New Zealand reported "NA" for the MCF value for anaerobic lagoons used to store and treat manure generated by dairy cattle. In response to a request for clarification of the MCF value for anaerobic lagoons used in the estimates of CH_4 emissions from manure management of dairy cattle, and to specify the range of average annual temperatures used to select the MCF values for the entire reporting period, the Party clarified that the MCF value used is from the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.17) and that value (0.74) is correctly stated in the NIR (p.193). The Party also clarified that the MCF value was selected on the basis of an annual average temperature of 15 °C, which is a conservative estimate given that average historical temperatures have typically been lower. To confirm this statement, the Party provided the ERT with the data on average annual temperatures for 1990–2020 from the National Institute of Water and Atmospheric Research for the Waikato region, which is a more northern and warmer region of New Zealand where the majority of its dairy cattle are farmed. Additionally, New Zealand stated that the annual temperature ranges from 10 °C in the south to 16 °C in the north and the MCF for anaerobic lagoon was selected on the basis of the higher end of that range. The ERT recommends that New Zealand (1) correct the omission in the reporting of the MCF value for anaerobic lagoons used to store and treat dairy cattle manure; (2) report the MCF value for anaerobic lagoons in CRF table 3.B(a)s2 for the entire reporting period; and (3) provide the reference source and brief description of the climate data used as the basis for selecting an appropriate MCF value for anaerobic lagoon manure management system from the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.17).	Yes. Transparency
LULUCF		No findings for the LULUCF sector additional to those included in table 3 were made by the ERT during the review.	
Waste			
W.12	5.A Solid waste disposal on land – CH_4	The Party reported in its NIR (p.318) that CH_4 recovery from SWDS was estimated assuming a 68 per cent recovery efficiency for SWDS that were open in the latest reporting year and a 52 per cent recovery efficiency for sites that were closed. These recovery efficiencies were justified by referring to an unpublished study by consulting group Eunomia, which cites these percentages as being the instantaneous recovery efficiency (the ratio of CH_4 recovery and predicted generation, using a model for emissions from landfill named the MELMod model) at SWDS in the United Kingdom of Great Britain and Northern Ireland and argues that, with respect to waste composition and	Yes. Accuracy

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
		biodegradation of organic material, there are no substantial differences between SWDS in the United Kingdom and New Zealand. Also, site management practices appear to be similar. In the absence of more of the data used by operators (to arrive at alternative lifetime capture rates), it is unclear to Eunomia why the rates would differ so widely between active sites in the two countries. The ERT noted that the justification of Eunomia's argument that United Kingdom CH_4 recovery efficiencies are applicable to New Zealand is insufficient. Collection efficiency is dependent on the permeability of the cover soil, the part of the SWDS where CH_4 is collected (with emphasis on freshly deposited waste), well density (gas well/ha) and screening for surface emissions, among other factors. After 2000, the United Kingdom developed strict regulations on this, and it is not clear whether similar regulations exist in New Zealand and, if so, whether they have been successfully implemented. The ERT noted that the assumption of a 68/52 per cent recovery rate is not in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3, pp.3.18–3.19), which indicate that CH_4 recovery should be measured (either directly or indirectly from energy generation). If no measurement data are available, recovery might be estimated on the basis of installed capacity (assuming 35 per cent of this capacity is actually used) or a default recovery of 20 per cent can be assumed for the part of the waste where CH_4 is collected. The ERT also noted that, according to the Eunomia study, SWDS operators do have available measurements of CH_4 collected. However, owing to commercial confidentiality and administrative simplicity, these data are not reported to the competent authorities and so are not available to the GHG inventory team. The ERT recommends that the Party quantify CH_4 recovery on the basis of amounts measured by the SWDS operators. As long as this information is not available, a recovery efficiency of 20 per cent can be assumed for the part of the waste where CH_4 is collected or, alternatively, recovery can be estimated as 35 per cent of available collection capacity in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3, pp.3.18–3.19). The ERT also encourages the Party to build up an institutional framework, so that measurements of CH_4 collection by the SWDS operators become available to the inventory team.	
W.13	5.A Solid waste disposal on land – CH_4	The Party reported in its NIR (pp.317–318) that CH_4 generation in SWDS was estimated assuming country-specific values for the decay rate constant. This is justified by referring to the unpublished Eunomia study, wherein it is suggested that decay rate constant values from a model for landfill gas named the GasSim model be used because the United Kingdom and New Zealand have similar waste composition and management practices and both, being islands, have a maritime climate. According to the Eunomia study, the use of the GasSim factors allows for maritime climate to be taken into account, which is not the case for the default decay rate constant values from the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.17). However, it is indicated in the study that these values should be further verified in New Zealand using a similar benchmarking process to that undertaken in the United Kingdom to identify whether the appropriate factors are being used as New Zealand sites typically have higher temperatures and higher rainfall than those in the United Kingdom. The 2006 IPCC Guidelines (vol. 1, chap. 2, p.2.12 and table 2.2) give guidance on what information can be used for developing country-specific model parameters. Other specific studies, census, surveys, measurement and monitoring data can also be used. However, the factors must be representative and standard methods must be used. The ERT noted that the assumptions in GasSim are not transparent and the details of the validation of GasSim in British landfills are not available for review. The ERT agrees that the model from the 2006 IPCC Guidelines has its	Yes. Accuracy

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		limitations and that GasSim might result in a better prediction for both the United Kingdom and New Zealand. However, an open and scientific discussion on the accuracy of GasSim's prediction is needed before results from the GasSim model can be accepted for GHG inventory purposes. The ERT agrees with the opinion expressed in the Eunomia study that a benchmarking process would provide valuable information on biodegradation in SWDS in New Zealand. The ERT recommends that the Party either justify that the decay rate constant values from the GasSim model are appropriate for New Zealand's circumstances, for example by undertaking a benchmarking process to ensure that the values are appropriate for the country's climatic conditions, or quantify CH_4 generation from SWDS using the default decay rate constant values from the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.17).	
W.14	5.A Solid waste disposal on land – CH_4	The Party reported in its NIR (p.317) that CH_4 emissions from SWDS are estimated assuming a fraction of CH_4 in landfill gas of 0.57. This is justified by referring to the unpublished Eunomia study, wherein reference is made to Golder Associates (2014), according to which the fraction of CH_4 in landfill is based on 50,000 landfill gas monitoring data sets supplied by SWDS in the United Kingdom for 2010–2012. The ERT noted that the value of 0.57, as proposed by Golder Associates (2014), is based on available analyses of the composition of recovered landfill gas. The 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.15) indicate that, in SWDS, CO_2 is absorbed in seepage water and the neutral condition of the SWDS transforms much of the absorbed CO_2 to bicarbonate. Therefore, if the fraction of CH_4 in landfill gas is based on measurements of CH_4 concentrations measured in emitted landfill gas, it is good practice to adjust for the CO_2 absorption in seepage water. During the review, the Party confirmed that while the value of 0.57 was based on experimental data, CO_2 absorption was not accounted for in Golder Associates (2014). The ERT recommends that the Party either adjust the county-specific value of 0.57 for CO_2 absorption in seepage water or revert to the default value of 0.5 from the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.15).	Yes. Accuracy
W.15	5.D Wastewater treatment and discharge – CH_4 and N_2O	The Party reported in its NIR (p.329) that sludge amounts are reported as "IE" for both domestic and industrial wastewater because most of the sludge is sent to SWDS, and that AD and emissions from sludge disposal are reported in the solid waste disposal source category (see NIR p.316). In addition, emissions from sludge treatment and disposal are mentioned in the NIR for the energy (p.86) and agriculture (p.201) sectors, as well as for the waste sector under the category incineration (p.325). The ERT noted that this is not in agreement with the 2006 IPCC Guidelines. Where statistics on sludge removal are not available, the amount of TOW removed as sludge in equations 6.1 and 6.4 of the 2006 IPCC Guidelines (vol. 5, chap. 6) is zero. In this case, all organic material (TOW) is assumed to be completely converted to gases (i.e. CO_2, CH_4, N and N_2O) and reported under wastewater treatment and discharge (category 5.D) and CH_4 and N_2O emissions from sludge treatment and disposal are included in the total emissions for category 5.D, assuming the EFs for category 5.D (see the 2006 IPCC Guidelines, vol. 5, chap. 6.6.1). When sludge is included in other categories, the calculation of emissions for category 5.D should be corrected for the corresponding amount of TOW removed as sludge, as indicated in equations 6.1 and 6.4 of the 2006 IPCC Guidelines (vol. 5, chap. 6, pp.6.11 and 6.18, under "completeness" and "reporting and documentation"). Failure to make this correction results in double counting of emissions. Therefore, if New Zealand has information on the mass of sludge removed and an estimate of the organic matter in dry sludge, the amount of TOW removed as sludge might be calculated as the product of (1) the total dry mass of sludge, (2) the average organic matter content in sludge and (3) a conversion of organic matter to chemical	Yes. Accuracy

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		oxygen demand. When one assumes that organic matter can be described as cellulose ($C(H_2O)_n$), the oxidation proceeds via $C(H_2O)_n + n\ O_2 \rightarrow n\ CO_2 + n\ H_2O$ and the conversion of 1 kg organic matter corresponds to 32/30 kg chemical oxygen demand.	
		The ERT recommends that the Party revise its estimates to prevent double counting of emissions by either removing emissions from sludge treatment and discharge for all sectors other than for category 5.D, or correcting the calculation of emissions for category 5.D using equations 6.1 and 6.4 from the 2006 IPCC Guidelines and an amount of TOW removed as sludge that corresponds to the AD for emissions from sludge treatment and disposal for categories 5.A and 5.C and in the energy and agriculture sectors. If New Zealand were to choose the first option, the issues in ID# W.9 and W.10 in table 3 would automatically be resolved as well.	
KP-LULUCF		No findings for KP-LULUCF additional to those included in table 3 were made by the ERT during the review.	

[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

10. New Zealand does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol and therefore the application of adjustments does not apply.

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

11. New Zealand does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol and does not account for KP-LULUCF.

VIII. Questions of implementation

12. No questions of implementation were identified by the ERT during the individual review of the Party's 2022 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 New Zealand in its 2022 annual submission

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

Table I.1
Total greenhouse gas emissions and removals for New Zealand, base year–2020
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions and removals including indirect CO_2 emissions*[a]		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)*[b]	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)*[c]	*KP-LULUCF (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*[d]	*FM*
FMRL								11 150.00
1990	43 964.59	65 193.81	NA	NA				
1995	46 563.87	69 009.77	NA	NA				
2000	48 576.78	75 511.68	NA	NA				
2010	49 095.52	78 421.79	NA	NA				
2011	48 655.54	78 285.74	NA	NA				
2012	53 753.17	80 478.30	NA	NA				
2013	53 506.87	79 802.14	NA	NA		–8 583.68	NA	–24 180.66
2014	53 965.55	80 614.91	NA	NA		–11 255.97	NA	–21 978.22
2015	53 836.48	80 446.64	NA	NA		–13 088.79	NA	–20 019.50
2016	52 150.07	78 388.04	NA	NA		–13 562.41	NA	–18 514.99
2017	55 182.26	79 886.06	NA	NA		–15 640.75	NA	–15 503.61
2018	55 773.64	80 075.95	NA	NA		–15 421.97	NA	–15 247.05
2019	58 577.84	81 612.76	NA	NA		–13 601.76	NA	–15 220.72
2020	55 460.93	78 774.19	NA	NA		–13 444.19	NA	–16 031.92

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

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

[b] The value reported in this column relates to GHG emissions from conversion of forests (deforestation) in 1990 as contained in the report on the review of the Party's report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol.

[c] Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

[d] In accordance with decision 3/CMP.11, para. 8, the Party previously reported that it would not report on any activities under Article 3, para. 4, of the Kyoto Protocol.

Table I.2
Greenhouse gas emissions and removals by gas for New Zealand, excluding land use, land-use change and forestry, 1990–2020
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*Nitrogen trifluoride*
1990	25 501.21	32 970.72	5 791.96	NO, NA	909.95	NO, NA	19.97	NO, NA
1995	28 002.12	34 235.50	6 569.95	24.51	153.28	NO, NA	24.42	NO, NA
2000	32 244.56	35 949.64	6 996.69	233.61	67.61	NO, NA	19.56	NO, NA
2010	34 808.56	34 762.54	7 679.64	1 100.66	47.56	NO, NA	22.84	NO, NA
2011	34 263.31	34 930.92	7 859.74	1 177.67	35.15	NO, NA	18.94	NO, NA
2012	35 942.77	35 236.30	7 968.71	1 262.16	47.46	NO, NA	20.90	NO, NA
2013	35 239.38	35 185.22	8 000.37	1 310.86	48.13	NO, NA	18.18	NO, NA
2014	35 437.28	35 484.57	8 267.26	1 335.58	73.41	NO, NA	16.80	NO, NA
2015	35 811.48	34 987.56	8 186.61	1 385.95	58.59	NO, NA	16.46	NO, NA
2016	34 150.93	34 537.01	8 214.73	1 419.31	48.69	NO, NA	17.36	NO, NA
2017	35 686.34	34 414.38	8 244.36	1 465.74	60.46	NO, NA	14.79	NO, NA
2018	35 702.65	34 444.36	8 363.03	1 478.80	72.40	NO, NA	14.71	NO, NA
2019	37 118.49	34 508.95	8 399.44	1 480.77	89.13	NO, NA	15.98	NO, NA
2020	34 454.33	34 271.47	8 463.73	1 480.06	87.92	NO, NA	16.69	NO, NA
Percentage change 1990–2020	**35.1**	**3.9**	**46.1**	**NA**	**–90.3**	**NA**	**–16.5**	**NA**

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

[a] New Zealand did not report indirect CO_2 emissions in CRF table 6.

Table I.3
Greenhouse gas emissions and removals by sector for New Zealand, 1990–2020
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	23 877.89	3 579.92	33 792.88	–21 229.22	3 943.11	3.17
1995	25 866.12	3 174.43	35 734.70	–22 445.90	4 234.51	3.14
2000	30 019.02	3 443.22	37 614.88	–26 934.90	4 434.56	3.49
2010	32 247.49	4 591.13	37 711.50	–29 326.27	3 871.67	4.52
2011	31 571.43	4 627.39	38 362.27	–29 630.20	3 724.65	4.54
2012	32 953.12	4 703.19	39 203.36	–26 725.14	3 618.63	4.27
2013	32 089.37	4 836.35	39 306.76	–26 295.26	3 569.66	3.52
2014	32 159.28	5 006.98	39 922.77	–26 649.37	3 525.88	3.48

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2015	32 405.70	5 137.32	39 415.79	–26 610.16	3 487.83	3.42
2016	31 001.33	4 883.07	39 042.96	–26 237.97	3 460.68	3.45
2017	32 452.95	4 928.44	39 082.39	–24 703.80	3 422.28	3.53
2018	32 524.23	4 825.07	39 368.29	–24 302.31	3 358.36	3.64
2019	33 920.37	4 861.05	39 518.64	–23 034.92	3 312.70	4.30
2020	31 461.42	4 618.35	39 425.54	–23 313.25	3 268.87	4.18
Percentage change 1990–2020	**31.8**	**29.0**	**16.7**	**9.8**	**–17.1**	**31.9**

Note: New Zealand did not report indirect CO_2 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–2020, for New Zealand

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment	*Activities under Article 3.3 of the Kyoto Protocol*		*FM and elected activities under Article 3.4 of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				11 150.00				
Technical correction				–25 489.31				
1990[a]	NA				–	–	–	–
2013		–17 520.32	8 936.64	–24 180.66	NE, NA	NE, NA	NE, NA	NE, NA
2014		–17 913.49	6 657.53	–21 978.22	NE, NA	NE, NA	NE, NA	NE, NA
2015		–18 054.09	4 965.30	–20 019.50	NE, NA	NE, NA	NE, NA	NE, NA
2016		–18 004.76	4 442.35	–18 514.99	NE, NA	NE, NA	NE, NA	NE, NA
2017		–18 486.49	2 845.74	–15 503.61	NE, NA	NE, NA	NE, NA	NE, NA
2018		–17 741.14	2 319.18	–15 247.05	NE, NA	NE, NA	NE, NA	NE, NA
2019		–16 733.54	3 131.78	–15 220.72	NE, NA	NE, NA	NE, NA	NE, NA
2020		–14 764.73	1 320.54	–16 031.92	NE, NA	NE, NA	NE, NA	NE, NA
Percentage change base year–2020					**NA**	**NA**	**NA**	**NA**

[a] New Zealand has elected not to report on any activities under Article 3, para. 4, of the Kyoto Protocol. 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.

2. Table I.5 provides an overview of key data from New Zealand's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5
Key data for New Zealand under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 annual submission

Parameter	*Data*
Periodicity of accounting	NA
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF	2 303.993 kt CO_2 eq (18 431.946 kt CO_2 eq for the duration of the commitment period)
Cancellation of assigned amount units, certified emission reductions and emission reduction units and/or issuance of removal units in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA

[a]

Annex II

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) 1.B.1.a coal mining and handling – solid fuels (CH_4) (see ID# E.8 in table 3);

(b) 2.C.1 iron and steel production (CO_2 and CH_4) (see ID#s I.8 and I.9 in table 3);

(c) 3.D.a.2.c other organic fertilizers applied to soils (N_2O) (see ID# A.10 in table 3);

(d) 4.B.1 cropland remaining cropland (CO_2) (see ID#s L.11 and L.12 in table 3);

(e) 4(II) emissions/removals from drainage and rewetting and other management of organic/mineral soils (N_2O) (see ID# L.18 in table 3).

Annex III

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 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at https://www.ipcc.ch/publication/2013-revised-supplementary-methods-and-good-practice-guidance-arising-from-the-kyoto-protocol/.

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/.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2015, 2016, 2017, 2019 and 2021 annual submissions of New Zealand, contained in documents FCCC/ARR/2015/NZL, FCCC/ARR/2016/NZL, FCCC/ARR/2017/NZL, FCCC/ARR/2019/NZL and FCCC/ARR/2021/NZL 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/documents/510888.

Annual status report for New Zealand for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_NZL.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Chris Bean, Andrea Brandon, Asher Cook, Ted Jamieson, Ben Morrow and Michael Smith (New Zealand Ministry for the Environment), including additional material on the methodology and assumptions used. The following references may not conform to UNFCCC editorial style as some have been reproduced as received:

Burggraaf V., Rollo M., de Klein CAM, Lio, J., 2019. *A review of greenhouse gas emissions inventory methodology for farmed goats in New Zealand*. Report prepared for the Ministry for Primary Industries by AgResearch. Unpublished.

Easdale T.A., Richardson S.J., Marden M., England J.R., Gayoso-Aguilar J., Guerra-Carcamo J.E., Brandon A.M., 2019. Root biomass allocation in southern temperate forests. *Forest Ecology and Management* 453: 117542.

Golder Associates, 2014. *Review of Landfill Methane Emissions Modelling*. Report for Defra, Report number 13514290381.506/A.1, Golder Associates (UK) Ltd. Available at: https://slidelegend.com/queue/wr1908-review-of-methane-emissions-modelling-defra-uk_5b9c8092097c473b598b45cf.html.

Ministry for Primary Industries, 2022. *Methodology for calculation of New Zealand's agricultural greenhouse gas emissions*. Wellington: New Zealand Ministry for Primary Industries.

Rollo M., Ledgard S., Longhurst B., 2017. *Final Report: Trends in Dairy Effluent Management*. Report prepared for the Ministry for Primary Industries by AgResearch. Wellington: Ministry for Primary Industries.

van der Weerden A., de Klein C., Kelliher F., Rollo M., 2014. *Reporting to 2006 IPCC Guidelines for N_2O Emissions from Additional Sources of Organic N: Final Report*. Ministry for Primary Industries Technical Report. Wellington: Ministry for Primary Industries.

Verum Group, 2021. *Inventory of HFC, SF_6 and Other Industrial Process Emissions for New Zealand 2020*. Wayne Hennessy.

Welten B., Mercer G., Smith C., Sprosen M., Ledgard S., 2021. *Refining estimates of nitrogen leaching for the New Zealand agricultural greenhouse gas inventory*. Report prepared for the Ministry for Primary Industries.