United Nations

FCCC/ARR/2021/NZL

Framework Convention on Climate Change

Distr.: General
27 February 2023

English only

Report on the individual review of the annual submission of New Zealand submitted in 2021*

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 2021 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 6 to 11 September 2021 remotely.

* In the symbol for this document, 2021 refers to the year in which the inventory was submitted, not to the year of publication.

Contents

		Page
	Abbreviations and acronyms	3
I.	Introduction	5
II.	Summary and general assessment of the Party's 2021 annual submission	6
III.	Status of implementation of recommendations included in the previous review report	9
IV.	Issues and problems identified in three or more successive reviews and not addressed by the Party	33
V.	Additional findings made during the individual review of the Party's 2021 annual submission	35
VI.	Application of adjustments	45
VII.	Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol	45
VIII.	Questions of implementation	45
Annexes		
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 2021 annual submission	46
II.	Additional information to support findings in table 2	50
III.	Reference documents	51

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
C	carbon
CaO	calcium oxide
CEF	carbon emission factor
CEF-hc	harvested and converted forest plantation
CEF-ne	newly established forest
CER	certified emission reduction
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
ERU	emission reduction unit
ETS	emissions trading scheme
EU ETS	European Union Emissions Trading System
FM	forest management
FMRL	forest management reference level
$Frac_{GASM}$	fraction of applied organic nitrogen fertilizer materials and of urine and dung nitrogen deposited by grazing animals that volatilizes as ammonia and nitrogen oxides
$Frac_{LEACH}$	fraction of nitrogen input to managed soils that is lost through leaching and run-off
GDP	gross domestic product
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
k	methane generation rate
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*

LPG	liquefied petroleum gas
LUCAS	Land Use and Carbon Analysis System
LULUCF	land use, land-use change and forestry
MBIE	Ministry of Business, Innovation and Employment of New Zealand
MgO	magnesium oxide
MPI	Ministry for Primary Industries of New Zealand
MSW	municipal solid waste
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NEU	non-energy use
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
ODS	ozone-depleting substance(s)
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
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)
UNFCCC Annex I inventory reporting guidelines	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
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 2021 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 6 to 11 September 2021 remotely[1] and was coordinated by Claudia do Valle, Lisa Hanle and Nalin Srivastava (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	Mausami Desai	United States
	Marius Taranu	Republic of Moldova
Energy	Hiroshi Ito	Japan
	Benon Bibbu Yassin	Malawi
	Carmen Teresa Meneses Lopez	Bolivarian Republic of Venezuela
IPPU	Niculina Mihaela Balanescu	Romania
	Jet Chong	Australia
	Valentina Idrissova	Kazakhstan
Agriculture	Olga Gavrilova	Estonia
	Bernard Hyde	Ireland
	Asia Adlan Mohamed Abdalla	Sudan
LULUCF and KP-LULUCF	Valentin Bellassen	France
	Koki Okawa	Japan
	Amanda Thomson	United Kingdom
Waste	Qingxian Gao	China
	Takefumi Oda	Japan
	Igor Ristovski	North Macedonia
Lead reviewers	Mausami Desai	
	Marius Taranu	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2021 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[2] designated as problems.[3] 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

[1] Owing to the circumstances related to the coronavirus disease 2019, the review had to be conducted remotely.
[2] Issues are defined in decision 13/CP.20, annex, para. 81.
[3] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

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 2021 annual submission

6. Table 2 provides the assessment by the ERT of the Party's 2021 annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2
Summary of review results and general assessment of the 2021 annual submission of New Zealand

Assessment			*Issue/problem ID#(s) in table 3 or 5[a]*
Dates of submission	Original submission: NIR, 15 April 2021; CRF tables (version 1), 14 April 2021; SEF tables, 14 April 2021		
Review format	Centralized review conducted remotely		
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?	Yes	I.3
	(b) Selection and use of methodologies and assumptions?	Yes	I.21, A.9, A.20, L.1, L.11, L.13, L.20, L.21, L.27, W.3, W.10
	(c) Development and selection of EFs?	Yes	I.7, A.12
	(d) Collection and selection of AD?	Yes	A.16, A.17, A.19, L.8, W.11
	(e) Reporting of recalculations?	Yes	E.21
	(f) Reporting of a consistent time series?	Yes	E.18
	(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.12, I.14, I.25, A.23, L.12, L.15, L.16, L.18, L.22, L.25, KL.17, KL.18, KL.20
	(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	
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	Have any issues been identified related to the following aspects of the national system:		

Assessment			*Issue/problem ID#(s) in table 3 or 5[a]*
the Kyoto Protocol	(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?	Yes	I.19
	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 AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the 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, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No	
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes	KL.6, KL.8
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	Yes	KL.4, KL.12, KL.13, KL.14
	(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?	Yes	KL.22
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?	NA	
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	NA	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	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	

Assessment		*Issue/problem ID#(s) in table 3 or 5*[a]
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 2 June 2020,[4] and had not been resolved by the time of publication of the report on the review of the Party's 2019 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

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

ID#	*Issue/problem classification[a, b]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Article 3.14 (G.3, 2019) KP reporting adherence	Report in the NIR information on changes in the reporting on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.	Resolved. New Zealand reported in its NIR (p.503) on changes in its reporting on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.
G.2	Uncertainty analysis (G.7, 2019) Convention reporting adherence	Include in the NIR an uncertainty analysis for 1990 (the base year under the Convention).	Resolved. New Zealand included in its NIR (p.50) and in the annex to its NIR (p.27) an uncertainty analysis for 1990 (the base year under the Convention) using approach 1 from the 2006 IPCC Guidelines, consistently with paragraph 15 of the UNFCCC Annex I inventory reporting guidelines.
Energy			
E.1	Fuel combustion – reference approach – liquid fuels – CO_2 (E.2, 2019) (E.1 and E.2, 2017) (E.1 and E.8, 2016) (E.6 and E.21, 2015) (24, 2014) (27, 2013) Accuracy	Endeavour to separate naphtha and crude oil with a view to improving the transparency of the reference approach as well as the accuracy of the reporting of NEU of fuels and feedstocks.	Resolved. New Zealand separated the reporting of naphtha and crude oil under the reference approach (CRF table 1.A(b)) across the time series. Previously, AD for these fuels were reported together under crude oil. The Party explained that such disaggregation was enabled by the migration of its data system to a different programming language (NIR sections 3.3.2, p.93, and 3.3.3, p.94).
E.2	Fuel combustion – reference approach – CO_2 (E.3, 2019) (E.3, 2017) (E.9, 2016) (E.7 and E.22, 2015) (24, 2014)	Endeavour to incorporate disaggregated data for lubricants, petroleum coke and bitumen in the submission or, if this is not possible, report on progress in addressing the recommendation.	Resolved. New Zealand reported disaggregated data for lubricants, petroleum coke and bitumen in CRF table 1.A(b) across the time series. Previously AD for these fuels were reported together under bitumen. The Party explained that such disaggregation was enabled by the migration of its data system to another programming language (NIR sections 3.3.2, p.93, and 3.3.3, p.94).

[4] FCCC/ARR/2019/NZL. The ERT notes that the report on the individual inventory review of New Zealand's 2020 annual submission has not been published yet owing to insufficient funding for the review process. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2019 annual submission.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(27, 2013) Comparability		
E.3	Fuel combustion – reference approach – all fuels – CO_2 (E.5, 2019) (E.24, 2017) Transparency	Provide in the NIR a comparison of the allocation of fuel consumption data used in the inventory (CRF table 1.A(b)) and in the energy balance.	Resolved. New Zealand included information in NIR section 3.2.6 (p.88) on the cases in which the structure of CRF table 1.A(b) does not align with that of its energy balance: (1) crude oil and refinery feedstock are combined in the energy balance but reported separately in CRF table 1.A(b); (2) indigenous production of LPG, which is considered a primary fuel, is included in the national energy balance but CRF table 1.A(b) does not allow for the entry of LPG production, so it is included under natural gas production and then allocated to LPG via stock change; and (3) the energy balance includes the production of synthetic gasoline from natural gas under energy transformation but CRF table 1.A(b) does not allow for the entry of synthetic gasoline transformation, so it is included under natural gas production and then allocated to gasoline via stock change.
E.4	1.A.1.a Public electricity and heat production – liquid fuels – CO_2, CH_4 and N_2O (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).	Not resolved. New Zealand did not include information related to the fluctuation in the consumption of liquid fuels (diesel and fuel oil) across the time series, in particular in 1992 and 2008, and did not clarify the reporting of "NO" for 2001. The Party reported in the NIR (section 3.3.6, p.99) the same information as in the 2019 NIR on inter-annual fluctuations in thermal and renewable generation between 1990 and 2019 (figure 3.3.6, p.99), mentioning specifically the increase in natural gas and coal consumption during years in which a shortfall in hydroelectric generation was observed. During the review, the Party explained that, after further investigation with the MBIE, the liquid fuel AD reported were found to be in alignment with the data reported by companies at the time.
E.5	1.A.2 Manufacturing industries and construction – liquid fuels – CO_2, CH_4 and N_2O (E.24, 2019) Transparency	Include more detail on the method used for disaggregation of liquid fuels to the subcategories under manufacturing industries and construction (such as energy intensities in PJ per unit of GDP).	Resolved. New Zealand included in its NIR (section 3.3.7, p.104) a full explanation of how liquid fuels are disaggregated by type of industry (manufacturing industries and construction subcategories), as well as table 3.3.5, which shows the energy intensity values (GJ per unit of GDP) used to disaggregate liquid fuel consumption by type of industry.
E.6	1.A.2 Manufacturing industries and construction – gaseous fuels – CO_2, CH_4 and N_2O (E.28, 2019) Comparability	Review the allocation of emissions for subcategories 1.A.2.f non-metallic minerals and 1.A.2.g.i manufacturing of machinery from gaseous fuel consumption for 2009–2015 and explain any recalculation in the NIR.	Resolved. New Zealand reviewed natural gas consumption under subcategories 1.A.2.f (non-metallic minerals) and 1.A.2.g.i (manufacturing of machinery) in conjunction with the MBIE (the oil and gas data system manager) and concluded that, in the light of the available information, there is currently insufficient justification to reallocate energy sales data, noting that, to maintain consistency, the emission estimates should continue to be based directly on energy sales data (i.e. data reported directly by natural gas sellers already aggregated at the level of the corresponding New Zealand Standard Industrial Classification code). The ERT agreed with this conclusion.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
E.7	1.A.2.c Chemicals – gaseous fuels – CO_2, CH_4 and N_2O (E.26, 2019) Transparency	Explain the trend in fuel consumption and emissions from chemicals in the NIR.	Resolved. New Zealand provided in its NIR (section 3.2.3, p.87) the required explanation, clarifying that the fluctuation in natural gas under subcategory 1.A.2.c is related to the national methanol production industry, which saw a reduction in its production levels in 2004 following a gas supply shortage in 2003, before increasing its capacity in 2008 and again in 2012, reaching full capacity again from December 2013 onward.
E.8	1.A.3.b Road transportation – liquid and gaseous fuels – CO_2, CH_4 and N_2O (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, liquefied petroleum gas and biomass for motorcycles for before 2000.	Addressing. New Zealand did not report "NO" for biomass use in subcategories 1.A.3.b.ii (light-duty trucks) and 1.A.3.b.iii (heavy-duty trucks and buses) for 1990–2000. The Party explained during the previous review that biomass was not consumed under these subcategories during this period. For subcategory 1.A.3.b.iv (motorcycles), the Party changed the notation key and reported "NO" for biomass and LPG for 1990–2000. However, for diesel, "IE" is still reported for this period (according to the Party in the previous review, diesel was not used for motorcycles).
E.9	1.A.3.b Road transportation – liquid and gaseous fuels – CO_2 (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. New Zealand explained during the review that a project to disaggregate these emissions by vehicle mode is under way, noting that key progress in reconfiguring the related system codes has been made (see NIR section 3.3.3, p.94). It expects to be able to include such disaggregated information in its 2022 submission.
E.10	1.A.3.b Road transportation – gaseous fuels – CO_2, CH_4 and N_2O (E.31, 2019) Transparency	Include in the NIR the description of the trend of gaseous fuels for cars and heavy-duty trucks and buses.	Resolved. New Zealand included in the NIR (section 3.3.8, p.111) information on the trend of gaseous fuels used in road transportation, indicating that compressed natural gas and LPG began to be phased out of the market in 1987 owing to the cessation of government subsidies for bifuel vehicles, with just one bus company continuing to use compressed natural gas until 2017. No compressed natural gas or LPG has been used for road transportation since then.
E.11	1.A.3.b Road transportation – biomass – CO_2, CH_4 and N_2O (E.32, 2019) Transparency	Explain the trend of biomass (biodiesel) used in road transportation, including the information that the biodiesel grant scheme ceased in June 2012.	Resolved. New Zealand included in the NIR (section 3.3.8, p.114) information on the trend of biodiesel used in road transportation, indicating that two supporting schemes for biodiesel use (Biofuel Sales Obligation and Biodiesels Grant Scheme) were discontinued in 2012, following which availability of AD for biodiesel fell significantly and has remained relatively stagnant since then.
E.12	1.B.1.a Coal mining and handling – solid fuels – CH_4 (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	Addressing. New Zealand reported "NO" in CRF table 1.B.1 for subcategory 1.B.1.a.i.3 (abandoned underground mines). The Party explained in the NIR (section 3.4.1, p.120) that a project is under way to identify whether activities under this subcategory occur in the country. To date, the results show that the activity does not take place on the North Island, with data still being collected or processed for the South Island. During the review, the Party clarified that progress has been made in identifying

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	old mines from historical mine records in the South Island, but these data still require significant manual processing before they can be used to meaningfully assess CH_4 fugitive emissions.
E.13	1.B.1.a Coal mining and handling – solid fuels – CO_2 (E.33, 2019) Convention reporting adherence	Report CO_2 emissions for subcategory 1.B.1.a.i.3 abandoned underground mines as "NO" instead of "NE" in CRF table 1.B.1 if no recovery or flaring of CH_4 from abandoned underground mines occurred.	Resolved. New Zealand reported "NO" for subcategory 1.B.1.a.i.3 (abandoned underground mines) in CRF table 1.B.1.
E.14	1.B.2.a Oil – liquid fuels – CO_2 (E.34, 2019) Comparability	Change the allocation of emissions from refinery flaring from subcategory 1.B.2.a.6 oil – other to subcategory 1.B.2.c.2 flaring – oil.	Resolved. New Zealand reallocated CO_2 emissions from refinery flaring from subcategory 1.B.2.a.6 (oil – other) to subcategory 1.B.2.c.2.i (flaring – oil). "NO" is now reported for CO_2 emissions under subcategory 1.B.2.a.6.
E.15	1.B.2.c Venting and flaring – gaseous fuels – CO_2 (E.35, 2019) Comparability	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 the information on AD reported in the documentation box of the same table.	Addressing. New Zealand changed its reporting from "NA" to "confidential" for the AD under subcategory 1.B.2.c.1.ii (venting – gas), but did not update the documentation box to CRF table 1.B.2 to reflect this.
E.16	1.B.2.c Venting and flaring – gaseous fuels – CH_4 (E.36, 2019) Comparability	Report the AD and emissions for subcategory 1.B.2.c.1.ii venting – gas as confidential, "IE" or "NE", as appropriate.	Resolved. New Zealand changed the notation key for CH_4 emissions from "NA" to "NE" in CRF table 1.B.2. For AD, see ID# E.15 above.
IPPU			
I.1	2. General (IPPU) – (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.	Addressing. New Zealand reported in its NIR (section 4.1.6, p.134) that it used emission data reported under its ETS for categories 2.A mineral industry (CO_2 emissions) and 2.C.3 aluminium production (PFC emissions), but did not improve the description in the NIR. The ERT noted that New Zealand uses ETS data for category 2.C.1 for verification purposes (NIR section 4.1.6, p.134)
I.2	2. General (IPPU) – HFCs, PFCs and SF_6 (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 (a) 2.E electronic industry, (b) 2.F product use as substitutes ODS; and (c) 2.G other product manufacture and use.	(a) Resolved. New Zealand reported in its NIR (p.153) that no industries manufacture electronic products in the country, meaning that no emissions are reported in this category; (b) Addressing. New Zealand included more information in its NIR about the data sources used, and explained during the review that this section will be reviewed further with a view to improving it for future submissions;

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			(c) Addressing. New Zealand improved the description by including information in the NIR concerning the EFs used for category 2.G.1, but did not make any changes for the other categories (2.G.2 and 2.G.3).
I.3	2. General (IPPU) – (I.23, 2019) Convention reporting adherence	Correct the following inconsistencies in the reporting of key categories and uncertainties within the NIR, including in the annexes to the NIR: (a) 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; (b) Aluminium production (PFCs) was reported as a key category in the trend assessment only in NIR table 4.1.2, but it was identified as also being key in the level assessment for 2017 in tables A1.3.2(a) and A1.3.2(b) in the annexes to the NIR; (c) In the NIR (p.125), methanol was reported as a key category in the trend assessment, but it was not identified as a key category in the annexes to the NIR; (d) In the NIR (p.128), petrochemical and carbon black was reported as a key category, but it was not identified as a key category in the annexes to the NIR; (e) Uncertainties reported in NIR table 4.7.3 were not reflected in table A.2.1.1 of the annexes to the NIR.	(a) Addressing. New Zealand corrected the relevant information in NIR section 4.2.1 (p.136) to reflect that cement production (CO_2) is a key category in both the level and trend assessment (see also NIR table 4.1.2, p.133). However, the Party did not update CRF table 7 to reflect this; (b) Resolved. Aluminium production (PFCs) is reported in NIR table 4.1.2 (p.133) as a key category in the trend assessment only. In the annexes, tables A1.3.1(a–b), the level assessment for this category for 2019, including and excluding LULUCF, is above the threshold of 95 per cent of the total emissions and it is therefore not considered a key category. The Party included in the annexes the level assessment for 1990, including and excluding LULUCF (tables A1.3.2–A.1.3.2), under which aluminium production (PFCs) is considered a key category, but this information, as reported by the Party, is included in the NIR for reference only. The category is also identified as key in the trend assessment for 1990–2019 in the annexes, tables A1.3.3(a–b); (c) Resolved. New Zealand reported in the NIR (p.141) that there are no key categories in the chemical industry category. This is reflected correctly in the annexes (pp.1–19) and category 2.B.8.a (methanol) does not appear in the level or trend assessments; (d) Resolved. New Zealand reported in NIR section 4.3.4 (p.144) that there are no key categories in the chemical industry. This is reflected correctly in the annexes (pp.1–19), where category 2.B.8 (petrochemical and carbon black) is above the threshold of 95 per cent in the level and trend assessments; (e) Resolved. Uncertainties reported in NIR table 4.7.3 (p.159) are correctly reflected in table A.2.1.1 of the annexes (p.27).
I.4	2. General (IPPU) – CO_2 (I.26, 2019) Transparency	Explain how the AD for the chemical and metal industries (categories 2.B and 2.C) are obtained.	Addressing. For category 2.B, New Zealand provided in its NIR (section 4.3.2, p.141) information on the sources of AD for categories and subcategories 2.B.1, 2.B.8, 2.B.8.a and 2.B.10. For subcategory 2.B.5.b, the Party specified that the quantity of calcium carbide used to produce acetylene gas for welding is imported but did not explain how the AD were obtained. For category 2.C, it provided all necessary information concerning how the AD for category 2.C.3 were obtained (p.146). For category 2.C.1, (p.141) the Party explained that the AD (tonnes of steel produced) was provided to MBIE by two steel producers up to 2015 and has been provided by one producer since

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			then, but this information is regarded as commercially confidential and thus reported as confidential in CRF table 2(I).A-Hs2. Information on the other AD used for CO_2 emission estimates (i.e. use of coal and limestone in multiheart furnaces and carbon-containing additives) was not reported, however. During the review, the Party clarified that such data are provided to the MBIE by industry.
I.5	2.A Mineral industry – CO_2 (I.3, 2019) (I.22, 2017) Convention reporting adherence	Review the calculation of the uncertainty for category 2.A and correct the values in NIR tables 4.2.1 and A2.1.1, if needed.	Resolved. New Zealand reviewed the uncertainty values related to the AD and EF for category 2.A reported in the NIR (annex) table A2.1.1 (p.28) and made them consistent with those reported in NIR table 4.2.1 (p.139) (1 per cent for AD and 1 per cent for EF).
I.6	2.A.2 Lime production – CO_2 (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.	Not resolved. New Zealand did not update the description in the NIR to reflect clearly the correct methods used. The Party recalculated CO_2 emissions using an EF of 0.784 t CO_2/t lime (from its ETS) across the time series (1990–2019). It explained in the NIR (p.140) only the changes made to AD (i.e. for improving time-series consistency, the pure chemical content of the lime produced (CaO and MgO, net of impurities, is now reported for the entire time series), without explaining in the relevant NIR section how AD were made consistent, the changes in the EFs applied, the impact of the recalculations on the AD or why emissions remained unchanged across the time series after the recalculations. The Party continued to report in the NIR (p.138) that it applied a tier 1 method for lime production and used the default EF of 0.75 t CO_2/t lime for 1990–2009 and that AD for this period relate to burned lime. The ERT considers that the recommendation has not been resolved because the Party did not clearly explain why emissions remained unchanged, how the AD are consistent across the time series or the assumptions used for calculating AD based on pure lime and applying the EF from the ETS for 1990–2013 (considering that, before this recalculation, the AD for 1990–2013 referred to high-calcium lime and the Party applied a default EF of 0.75 t CO_2/t lime with an extra factor of 0.97 to account for hydrated lime, which resulted in an EF of 0.7275 t CO_2/t lime).
I.7	2.A.2 Lime production – CO_2 (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 CaO because the dust contains a mixture of CaO and MgO.	Not resolved. New Zealand did not revise the CO_2 EF for kiln dust. During the review, the Party clarified that it will review this matter for resolution for future submissions.
I.8	2.A.2 Lime production – CO_2 (I.25, 2019) Transparency	Explain in the NIR that burned lime was considered as high-calcium lime with an EF of 0.75 t CO_2/t lime and that the factor of 0.97 was the correction factor for hydrated lime for 1990–2013.	Resolved. New Zealand recalculated the AD and CO_2 emissions for this category and stopped using burned lime as the AD for 1990–2013 (see ID#s I.6 above and I.9 below).
I.9	2.A.2 Lime production – CO_2	Revert the changes in AD since 2014 to the original quantities of pure lime (CaO + MgO),	Resolved. New Zealand reverted the changes in AD for 2014 onward and is now using pure lime in accordance with the data from its ETS (the Party had previously converted

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(I.25, 2019) Comparability	noting that the IEF cannot be lower than 0.7848 according to the equation provided by the ETS regulation and presented in the NIR (p.123).	the AD for 2014 onward from pure to burned lime, to make them consistent with the AD for 1990–2013). In addition, the Party recalculated emissions and also applied pure lime as the AD for 1990–2013 (see ID# I.6 above), and the EF applied is 0.784 t CO_2/t lime.
I.10	2.A.2 Lime production – CO_2 (I.25, 2019) Comparability	Continue reporting the same emissions but revise the AD as pure lime by dividing such emissions by a single IEF (that of 2014) for 1990–2013.	Resolved. New Zealand revised the AD for pure lime across the time series (see ID# I.6 above).
I.11	2.B.1 Ammonia production – CO_2 (I.9, 2019) (I.24, 2017) Transparency	Clarify in the NIR (section 4.3.2) that urea used as fertilizer is reported under category 3.H (urea application).	Resolved. New Zealand reported in its NIR (section. 4.3.1, p.140) that emissions from urea used as fertilizer (both manufactured in New Zealand and imported) are reported under category 3.H (urea application).
I.12	2.B.1 Ammonia production – CO_2 (I.9, 2019) (I.24, 2017) Transparency	Either provide an estimate for urea use in selective catalytic reduction (under category 2.D.3) in line with the 2006 IPCC Guidelines or provide a justification for its exclusion in terms of the likely level of emissions, in accordance with the requirements in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. New Zealand updated the information in its NIR (section. 4.3.1, p.140) to reflect correctly that CO_2 emissions from the use of urea in selective catalytic reduction are reported under category 2.D.3. In the NIR (p.151), the Party also provided a description of the methodology used to estimate such CO_2 emissions.
I.13	2.B.1 Ammonia production – CO_2 (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.	Not resolved. New Zealand reported in its NIR (table 10.2.2, p.452) that it has not yet been feasible to make this change owing to concerns about data confidentiality, with all data coming from a single company, but noted that this issue and the associated confidentiality issue will be considered further for future submissions, subject to the confidentiality issue being resolved.
I.14	2.C.1 Iron and steel production – CO_2 (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. New Zealand did not estimate CO_2 emissions from electric steel production at the Pacific Steel plant. The Party reported in its NIR (table 10.2.1, p.447) that historical data are not available, but an estimate will be provided in the next annual submission.
I.15	2.C.4 Magnesium production – SF_6 (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. New Zealand did not explain in the NIR that it used a country-specific uncertainty value for SF_6 emissions from magnesium casting or the reasons for its use.
I.16	2.D.1 Lubricant use – CO_2	Improve the information on the CO_2 EF for lubricant use, including the source of the EF.	Addressing. New Zealand reported in its NIR (section 4.5.2, p.151) that for the CO_2 EF for lubricant use it used the default carbon content and “oxidized during use” factors.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(I.28, 2019) Transparency		However, the Party did not provide information concerning the country-specific factor of energy by weight or explain how the final CO_2 EF value was achieved. According to the Party during the previous review, the final value of the CO_2 EF considers the carbon content of 20 t C/TJ and the "oxidized during use" factor of 0.2 (2006 IPCC Guidelines, vol. 3, chap. 5.2.2.2), which, with its country-specific factor of energy by weight, resulted in an EF of 0.594 t CO_2/t lubricant used.
I.17	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.18, 2019) (I.30, 2017) Transparency	Explain, in NIR section 4.7.3, which approach (other than a combination of uncertainties) was used to derive the uncertainty of 35 per cent, presented in NIR table A.2.1.1.	Addressing. New Zealand updated its reporting on uncertainties for this category (see ID# I.3 (e) above). However, the uncertainty values reported in NIR tables 4.7.3 (p. 159) and A.2.1.1 of the annexes (p.27) refer only to subcategories under 2.F (product uses as substitutes for ODS) and no longer to the overall uncertainty of 35 per cent reported for category 2.F as a whole. In the NIR (p.158), the Party explained that the uncertainty for this category was estimated for each subapplication on the basis of expert judgment but did not explain the approach used to derive the uncertainty values. During the review, the Party clarified that, alongside expert judgment, it used IPCC default values and a sum of squares calculation to calculate these uncertainties. For refrigeration and air conditioning, uncertainties were estimated for each of the seven equipment types (±20 per cent for household refrigerators, 30 per cent for self-contained refrigerators, 30 per cent for remote cabinets, 40 per cent for dairy refrigerators, 70 per cent for cool stores, 50–80 per cent for three refrigerated transport components, and 30 per cent for other types of air conditioning), with the overall uncertainty recalculated for each annual submission should any of these uncertainties change. For the other subapplications, these estimates do not change from year to year.
I.18	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.29, 2019) Transparency	Explain the model used to estimate emissions in this category in more detail, including the assumptions made, in the NIR.	Addressing. New Zealand provided more information on the model used to estimate emissions in this category in the NIR (p.157), explaining how the lifetime of the equipment was estimated, and included a table showing the tiers used by subapplication. However, the ERT considers that the information provided is not sufficient for it to review the input and output data, parameters or underlying assumptions. During the review, the Party stated that its explanations on this matter will be improved in future submissions.
I.19	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.29, 2019) Transparency	Improve the 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 a clear comparison of the two results, as recommended by the 2006 IPCC Guidelines (vol. 3, chap. 7.1.4.1).	Not resolved. New Zealand did not provide a comparison of the results of the bottom-up model with the results of a top-down approach.
I.20	2.F.1 Refrigeration and air conditioning – HFCs (I.19, 2019) (I.17, 2017)	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	Not resolved. New Zealand did not include a description of the methodology in the NIR or demonstrate that it is in line with the splicing techniques from the 2006 IPCC Guidelines. During the review, the Party clarified that explanations will be provided in the next annual submission.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(I.37, 2016) Transparency	line with the splicing techniques in the 2006 IPCC Guidelines.	
I.21	2.F.1 Refrigeration and air conditioning – HFCs (I.21, 2019) (I.32, 2017) 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.	Not resolved. New Zealand reported in its NIR (p.155) the same reduction rate (2 per cent/year for 2010–2019) as in the previous NIRs (2017–2020). On the basis of a study performed by the Verum Group, New Zealand explained (NIR, p.155) that information on some imported car models (although limited) indicates that the ongoing trend towards reduced HFC-134a charges continued after 2009. During the review, the Party clarified that when the Verum Group updated its 2018 estimate of imported car models, it reviewed a range of information, including reports on the composition of the Australian vehicle fleet, and discussed this matter with importers. The Party also reported that there is no specific reference that can be provided to justify the estimate of an ongoing 2 per cent/year change in charges. New Zealand explained that this estimate will be updated in future submissions.
I.22	2.F.1 Refrigeration and air conditioning – HFCs (I.30, 2019) Transparency	Update the equation in box 4.1 of the NIR to clarify that all calculations of the total charge of new equipment include the charge for equipment that is later exported.	Resolved. New Zealand included text above box 4.1 of the NIR (p.154) explaining that the total charge of new equipment includes the charge for equipment that is later exported.
I.23	2.F.1 Refrigeration and air conditioning – HFCs (I.31, 2019) Transparency	Explain, for category 2.F.1.e mobile air conditioning, the trend of HFC-134a filled into new manufactured products, especially the decrease between 2003 and 2004, in the NIR.	Not resolved. New Zealand did not include this information in the NIR. During the review, the Party clarified that this matter will be reviewed, and the relevant information provided in the next annual submission.
I.24	2.G.2 SF_6 and PFCs from other product use – SF_6 (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 manufacture based on the information that was provided to the 2015 ERT as responses to questions and a background report.	Addressing. New Zealand reported in the NIR (section 4.8.2, p.161) that SF_6 is not used in the country for applications such as tyre and shoe manufacturing but did not include any information on double-glazed window manufacturing. During the review, the Party confirmed that SF_6 is not used for double-glazed window manufacturing and that this information will be included in the next annual submission.
Agriculture			
A.1	3. General (agriculture) – CH_4 and N_2O (A.4, 2019) Transparency	Improve the description in the NIR to demonstrate clearly that the procedures for the agricultural production census and survey are aligned and no significant deviations have occurred in the time series since 1990.	Resolved. New Zealand reported in the NIR (annex 3.1, p.33) supplementary information on the agriculture production census and surveys (regarding animal population data), detailing the statistical procedures used for the agricultural production survey and how it differs from the agricultural production census. The ERT considers that these procedures are consistent with those used by other Parties in relation to livestock population statistics.
A.2	3. General (agriculture) – CH_4 and N_2O (A.5, 2019)	Correct the uncertainty values reported for enteric fermentation and agricultural soils in NIR section 1.6 so that they are consistent	Resolved. The uncertainty values reported by New Zealand in NIR table A2.1.2 (annex 2, p.28) are consistent with those reported in NIR sections 5.2.3 and 5.5.3. Uncertainty

ID#	*Issue/problem classification[a, b]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
	Convention reporting adherence	with the values reported in NIR sections 5.2.3 and 5.5.3.	estimates in the current NIR are presented in table A2.1.2 rather than in table 1.6, as was the case in the 2019 NIR.
A.3	3. General (agriculture) – CH_4 and N_2O (A.9, 2019) Transparency	Revise the text that refers to the year for which provisional population data are used in the NIR (p.158).	Resolved. New Zealand revised the corresponding text in the NIR (p.175), correctly indicating 2019 as the year used for provisional population data. The Party also reported in both the agriculture chapter (p.175) and in section 10.1.3 of the NIR (p.441) additional information on agricultural statistics, explaining the use of provisional population data from the agriculture production survey.
A.4	3. General (agriculture) – CH_4 and N_2O (A.9, 2019) Accuracy	Update the animal populations for 2018 and revise the estimates reported for 2017 in the CRF tables and explain this recalculation in the NIR.	Resolved. New Zealand updated the animal populations for 2017 and 2018 and recalculated the corresponding emissions. During the review, it explained that because official animal population statistics are presented as estimated as at June each year, provisional population estimates are required for the second half of each year. The Party explained how these provisional estimates are calculated in the NIR (pp.175 and 441), showing in figure 10.1.4 (p.441) the effects of the recalculations after receiving final animal numbers and data for 1990–2018.
A.5	3. General (agriculture) – CH_4 and N_2O (A.10, 2019) Transparency	Provide additional information on the assumption that all growing beef animals are slaughtered at two years of age and refer to the MPI (2018) report on animal live weights in the NIR.	Resolved. New Zealand reported additional information, including a reference to the MPI technical report (2021) and Clark et al. (2003) to justify the assumption that all growing beef animals are slaughtered at two years of age in NIR section 5.1.4 (p.179).
A.6	3.A.1 Cattle – CH_4 (A.11, 2019) Transparency	To improve the transparency of the comparison between the country-specific CH_4 EF and the IPCC default values, report, in that comparison, the EF calculated for milking cows only.	Resolved. New Zealand updated the information in NIR table 5.2.5 (p.196) (comparison of IPCC default EFs with country-specific EFs) to include the country-specific EF for 2019 (96.8 CH_4/head/year) for maturing milking cows. In addition, the Party included in NIR table 5.2.3 (p.192) the EFs for milking dairy cattle across the time series.
A.7	3.A.2 Sheep – CH_4 (A.12, 2019) Convention reporting adherence	Correct the reference to the population of sheep older than one year in the equation describing the method used to estimate emissions from enteric fermentation for sheep of less than one year of age reported in the NIR (p.172).	Resolved. New Zealand amended the corresponding reference (NIR section 5.2.2, p.191) to correctly refer to the population of sheep of less than one year of age in the first equation (total production of enteric CH_4 for sheep less than one year).
A.8	3.A.4 Other livestock – CH_4 (A.2, 2019) (A.5, 2017) Transparency	Provide in the NIR information on the breeding of rabbits and fur-bearing animals.	Resolved. New Zealand reported in its NIR (sections 1.4, p.37, and 5.1.4, p.180) that, according to expert opinion (R Sanson, personal communication, 2019), rabbits are considered an agricultural pest and as such only a very small number are farmed in New Zealand, meaning that associated emissions are insignificant and reported as "NE". The Party also stated (p.37) that there is no known farming of fur-bearing animals in the country.
A.9	3.A.4 Other livestock – CH_4	Implement the planned methodological changes regarding revising the assumptions	Addressing. New Zealand reported in NIR table 10.2.2 (p.454) that revised dairy goat populations had been used to calculate emissions since its 2020 submission. However,

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(A.13, 2019) Accuracy	about the population of dairy goats and the total goat population, recalculate the emissions and explain them in the NIR.	the ERT noted that the population of goats was not updated in the CRF tables and that the AD in the 2019, 2020 and 2021 submissions are the same for all years of the time series except 2017 (for which the AD in the 2021 submission differ from those in the 2020 and 2019 submissions) and 2018 (for which the AD in the 2021 submission differ from those in the 2020 submission). The Party reported in the NIR (p.193) that it assumed, in calculating the EFs for 1990–2009 and 2010–2017, that the dairy goat population remained constant across the time series, but that the overall goat population declined over time. During the review, New Zealand stated that further methodological changes had not been implemented, following advice from the Agriculture Inventory Advisory Panel and considering that the market for dairy goats has remained largely stable and that New Zealand does not collect national statistics on the number of dairy goats.
A.10	3.B Manure management – CH_4 and N_2O (A.14, 2019) Convention reporting adherence	Correct the references to CRF tables on pages 180 and 182 of the NIR to read "Methane from manure management systems (CRF table 3.B(a))" and "Nitrous oxide from manure management systems (CRF table 3.B(b))".	Resolved. New Zealand corrected the section title and changed the references to CRF tables for methane and nitrous oxide emissions from manure management in the NIR (pp.201 and 203).
A.11	3.B Manure management – N_2O (A.15, 2019) Accuracy	Review the N intake for dairy cattle, non-dairy cattle, sheep and deer to check if it is still applicable to the most recent years of the time series and, if necessary, revise the estimates.	Resolved. New Zealand revised the N intake for dairy cattle, non-dairy cattle, sheep and deer to take into account the most recent national study on pasture quality, which provided new values on metabolizable energy content, N content and digestibility of pasture across the time series (1990–2019) (see NIR, p.438). The Party also reported (pp.183 and 198) on the improvements and the recalculations resulting from the above-mentioned revisions.
A.12	3.B.4 Other livestock – CH_4 (A.16, 2019) Accuracy	Revise the calculation procedures for the CH_4 EF for deer and explain the revisions in the NIR. If the three studies from 2003 continue to be used as the basis for the calculation, (1) 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 (2) justify that the obtained value is more appropriate that the IPCC default value.	Not resolved. New Zealand did not revise the calculation procedures for the CH_4 EF for deer or use a more appropriate average value. During the review, the Party indicated its intention to review the corresponding calculation procedure for future submissions.
A.13	3.D.a.1 Inorganic N fertilizers – N_2O (A.17, 2019) Transparency	Explain in more detail in the NIR how the country-specific N_2O EF for urea was obtained by including a reference to the report that forms the basis for country-specific values (0.0059 and 0.01 kg N_2O-N/kg N for urea and other synthetic fertilizer,	Resolved. New Zealand included in its NIR (p.216) more detailed information on how the country-specific N_2O EF for urea was obtained, including references to the reports that formed the basis for the country-specific value used. The Party explained that the Agricultural Inventory Advisory Panel agreed that the value of 0.0059 kg N_2O-N/kg N was more representative of the country's farming practices and conditions, where only small urea dressings are applied (30–50 kg N/ha/application) but on several occasions

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		respectively) and summarizing how the Agricultural Inventory Advisory Panel endorsed its application to the inventory.	during a year. The lower urea EF compared with the IPCC default of 0.01 kg N_2O-N/kg N is similar to the urea fertilizer value referenced in studies conducted in Australia and the Netherlands of approximately 0.005 kg N_2O-N/kg N.
A.14	3.D.a.2 Organic N fertilizers – N_2O (A.18, 2019) Transparency	Explain in more detail how the country-specific N_2O EFs for organic fertilizers (urine and dung) were obtained, summarize to what extent the studies conducted can be deemed comprehensive and describe how the Agricultural Inventory Advisory Panel endorsed their application to the inventory.	Resolved. New Zealand included in its NIR (p.218) additional information on how the country-specific N_2O EFs for organic fertilizers (from dairy cattle) were obtained, including a description of how the Agricultural Inventory Advisory Panel endorsed their application to the inventory and a comparison of the country-specific N_2O EFs with the IPCC default values.
A.15	3.D.b Indirect N_2O emissions from managed soils – N_2O (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. New Zealand improved the description of the country-specific $Frac_{LEACH}$ values in its NIR (p.228) and reported in section 5.5.6 (p.237) on the improvement plans to undertake a project to review the $Frac_{LEACH}$ parameter with a view to determining whether it should be changed to improve the accuracy of emission estimates. The Party also provided in the NIR (p.228) a description of how $Frac_{GASM}$ is estimated.
LULUCF			
L.1	4. General (LULUCF) – CO_2 and N_2O (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 by the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1).	Not resolved. New Zealand explained during the review that it has not implemented this recommendation. The ERT noted that the Party also did not report on any plans on how it will address this issue (NIR, p.455).
L.2	4. General (LULUCF) – CO_2 (L.11, 2019) Convention reporting adherence	Provide a comparison across the available time series of data of roundwood statistics reported by MPI and the quantities estimated by the LUCAS model based on the harvested area as allocated to age classes and provide justification for any discrepancies.	Not resolved. New Zealand did not provide a comparison between the data on roundwood statistics reported by the MPI and the quantities estimated using the LUCAS model, or any justification for any discrepancies. The Party provided such a comparison during the review, identifying substantial discrepancies between the two time series, and an explanation for these inconsistencies. It also indicated that further work is under way to clarify and resolve the reasons for these discrepancies.
L.3	4. General (LULUCF) – CO_2 (L.12, 2019) Convention reporting adherence	Replace “IE” with estimates of biomass carbon stock losses only in the year in which an area conversion occurs, and with “NO” in any year in which conversion of additional	Not resolved. New Zealand reported biomass losses as “IE” for several land conversion categories in CRF tables 4.A and 4.B, clarifying during the review that this was because it included losses from crop mortality or thinning under net gains. While the ERT considers that this clarification applies to land converted to forest land (since harvest losses, which are estimated separately from gains, never occur before age 20, the only losses for this category are indeed the result of thinning (unless stands are

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		areas does not occur, in CRF tables 4.A and 4.B.	affected by wildfire)), the ERT notes that use of "NO" could be equally justified for years in which conversion of additional areas does not occur. The ERT does not understand, however, the rationale applied for land converted to annual cropland, as the biomass pool is assumed to reach its equilibrium one year after the transition, after which both gains and losses should be reported as "NO" (assumed to be equal to "0"), as is the case for annual cropland remaining annual cropland. The ERT considers that the recommendation has not yet been addressed because biomass losses should be reported as "NO" in any year in which conversion of additional areas does not occur, at least for transitions to annual cropland and non-woody grassland (e.g. cells G19 and M19 in CRF table 4.B for 2017–2019).
L.4	4. General (LULUCF) – CO_2 (L.13, 2019) Transparency	Report updated information regarding the country-specific wood carbon content value used in the harvested wood products model in the NIR.	Resolved. New Zealand reported in its NIR (p.345) that it uses a country-specific value of 50 per cent for the carbon content per tonne of dry wood, which is equal to the default value in table 12.4 of the 2006 IPCC Guidelines (vol. 4, chap. 12)
L.5	Land representation – CO_2, CH_4 and N_2O (L.14, 2019) Accuracy	Either report information that demonstrates that the biomass carbon pool of radiata pine plantations achieves its steady state at 28 years or, if not at 28 years but at over 20 years, provide information that demonstrates that this longer period is needed to achieve equilibrium of carbon stocks. Otherwise, apply the IPCC default conversion period of 20 years and explain the recalculations in the NIR.	Resolved. New Zealand reported in its NIR (p.302) that it uses a default value of 20 years as the transition period for the biomass carbon pool of radiata pine plantations. The associated recalculations are explained in the NIR (p.321), which resulted in areas and removals being moved from the land converted to forest land category to the forest land remaining forest land category.
L.6	Land representation – CO_2, CH_4 and N_2O (L.15, 2019) Comparability	Compile CRF table 4.1 using annual area change data.	Resolved. New Zealand compiled CRF table 4.1 using annual area change data consistent with NIR table A3.2.1.
L.7	Land representation – CO_2, CH_4 and N_2O (L.16, 2019) Accuracy	Plan to undertake an accuracy assessment of the national land-use maps, with a focus on determining the accuracy of mapping changes between mapping dates.	Resolved. New Zealand reported in its NIR (p.283) the results of several accuracy assessments of its national land-use maps, including an assessment of mapping changes between mapping dates.
L.8	Land representation – CO_2, CH_4 and N_2O (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. New Zealand undertook an accuracy assessment of its national land-use maps (see ID# L.7 above). However, the Party has not yet provided an accuracy assessment of the most important land-use changes, including a confusion matrix. During the review, the Party provided a confusion matrix for the 2012 map, demonstrating that mapping errors and biases were very limited for all land categories except grassland and grassland with woody biomass. It also explained that given the required dimension of a confusion matrix for land-use changes (144 x 144), this would

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			be challenging to produce. The ERT acknowledged the difficulties involved but noted that the dimension of the matrix could be reduced by focusing on those transitions that were most important (e.g. grassland to settlements) and most surprising (e.g. other land to forest land).
L.9	4.A Forest land – CO_2 (L.3, 2019) (L.4, 2017) Accuracy	Consider ways to reduce uncertainties in the stock change estimates when further developing the methods for estimating CSC in pre-1990 natural forests.	Resolved. Uncertainties in the stock change estimates for pre-1990 natural forests were reduced by applying the methods described in NIR section 6.4.2. New Zealand clarified during the review that it has undertaken four of the seven ways to reduce uncertainties mentioned in the 2006 IPCC Guidelines (vol. 4, chap. 3.1.6, p.3.12).
L.10	4.A Forest land – CO_2 (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.	Addressing. New Zealand reported in its NIR (p.351) that the average national harvest age is 28 years, but noted (p.301) that assuming that all plantations are harvested at this stage is problematic, which is why it has created a "harvest age profile" to more accurately reflect the age at which forests are harvested. During the review, the Party provided a table containing the areas harvested per age (harvest age profiles) for each year since 1990. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet transparently described how these profiles were created, noting that this issue would be resolved by the Party reporting equations explicitly showing how total harvest area and average harvest age are combined to derive harvest age profiles based on average harvest age.
L.11	4.A.1 Forest land remaining forest land – CO_2 (L.4, 2019) (L.5, 2017) Accuracy	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 overestimation of removals from forest land remaining forest land, or, while that update is not possible, report in the NIR on the progress on the ongoing work to update the below-ground biomass ratios.	Not resolved. New Zealand reported in its NIR (p.305) that its below-ground biomass to total biomass ratios are sourced from two published articles. However, the relationship between the forest subcategories reported in the NIR and the species for which below-ground biomass ratios are provided in the articles is not clear. The ERT noted that the Party providing a table in the NIR indicating the actual below-ground biomass ratios per forest subcategory (and possibly other land-use subcategories such as grassland with woody biomass), with corresponding references, would fully address this issue.
L.12	4.A.1 Forest land remaining forest land – CO_2 (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.	Not resolved. New Zealand clarified during the review that in its next annual submission it will start reporting all emissions and removals related to pre-1990 natural forests (tall and regenerating), regardless of statistical significance. The ERT considers that this planned change from the assumption that CSC in the biomass of tall forests is null, together with a transparent description of how emissions from transitions from tall forests to regenerating forests and vice versa are estimated, would fully address this issue.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
L.13	4.A.1 Forest land remaining forest land – CO_2 (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 estimate to SOC changes in mineral soils of tall natural forest remaining tall natural forest.	Not resolved. New Zealand reported in its NIR (p.294) that undertaking a comprehensive soil inventory in forest land would exceed its annual research budget for the LULUCF sector fivefold, making it impracticable. The ERT acknowledged that this could make it difficult to undertake this improvement in the near future, but noted that this does not lessen the importance of collecting the data needed to apply a tier 2 estimate to SOC changes in mineral soils of tall natural forest. The ERT considers that the recommendation has not yet been addressed because the Party neither included this item in its improvement plan (NIR, p.264) for forest land nor indicated which timeline and level of priority it would be attributed compared with other planned improvements.
L.14	4.A.2 Land converted to forest land – CO_2 and N_2O (L.20, 2019) Transparency	Report disaggregated information for the two subcategories of post-1989 natural forest and post-1989 plantations.	Addressing. Although the Party reported disaggregated information for post-1989 natural and planted forests, it made errors when renaming them, so the distinction is not clear. During the review, the Party clarified that information on post-1989 forest has been disaggregated in CRF table 4.A, that post-1989 forest refers to post-1989 planted forest (row 14) and that there is also a row labelled post-1989 natural forest (row 17).
L.15	4.B.1 Cropland remaining cropland – CO_2 (L.21, 2019) Completeness	Identify the main subdivisions for 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.	Not resolved. New Zealand reported during the review that this issue has not been resolved (see also NIR p.456).
L.16	4.B.1 Cropland remaining cropland – CO_2 (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. New Zealand reported in its NIR (p.456) that a longitudinal agricultural land soils study is currently under way. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet prepared estimates of SOC changes in cropland remaining cropland or explained which data will be collected and how this will enable the ongoing reporting of SOC changes in cropland remaining cropland over time.
L.17	4.C.2 Land converted to grassland – CO_2 (L.23, 2019) Convention reporting adherence	Use "NE" for biomass carbon stock losses in 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.	Addressing. New Zealand reported in CRF table 4.C conversions from vegetated wetlands to grassland as "NE". However, conversions from open water wetlands to grassland are still reported as "IE". During the review, the Party clarified that this would be changed to "NE" in the next annual submission. The Party also indicated that work is currently under way to provide estimates of carbon stocks and stock changes in biomass in wetlands, the results of which will be reflected in the 2023 submission.
L.18	4.D Wetlands – CO_2 (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	Addressing. New Zealand has reported estimates of CSCs for subcategory 4.D.1.1 (peat extraction remaining peat extraction) since the 2019 submission. For category 4.D.2.1 (land converted to peat extraction), the Party continued to report "NE". The ERT noted

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		extraction remaining peat extraction) and 4.D.2.1 (land converted to peat extraction).	that in the NIR (p.336) the Party reported that a study published in 2019 allowed it to estimate the area of peat extraction and concluded that it had remained static since 1990, justifying the use of "NO" for category 4.D.2.1.
L.19	4.D Wetlands – CO_2 (L.24, 2019) Accuracy	Revise the biomass carbon stock of vegetated wetlands using data available in literature (e.g. Morrisey et al., 2010).	Resolved. New Zealand clarified during the review that there is no method for estimating the biomass pool of wetland conversion in the 2006 IPCC Guidelines (default value for initial biomass), noting that it did not want to use the value from the Wetlands Supplement or other available literature specific to New Zealand. Given that New Zealand reported biomass losses in the associated "wetland converted to" categories as "NE", the ERT considers that its reporting for these categories, although representing a possible area for improvement, is in line with the UNFCCC Annex I inventory reporting guidelines.
L.20	4.F Other land – CO_2, CH_4 and N_2O (L.27, 2019) Accuracy	Reclassify all other land with significant SOC content under the most appropriate land-use category and recalculate land representation and SOC changes for the revised area of conversion to and from other land.	Not resolved. The Party did not reclassify other land with significant SOC content under a more appropriate land-use category (e.g. low-producing grassland), or propose a revised SOC reference level for other land using a large and representative sample, or provide an assumption consistent with relevant literature or the composition of the other land-use category described in the NIR (p.341).
L.21	4.F.2 Land converted to other land – CO_2 (L.28, 2019) Accuracy	Verify the occurrence of the conversion of land with organic soils to other land and, if SOC losses in organic soils converted to other land are not reported, use "NA" in the CRF table.	Not resolved. New Zealand reported in its NIR (p.457) that it resolved this issue by reporting "NO" for conversions from settlements to other land. However, the ERT noted that "NO" was already reported for this category for 2017 in the 2019 submission, and that "NO" is now reported for more subcategories than in the 2019 submission (e.g. vegetated wetlands to other land, low-producing wetlands to other land), but not for all subcategories (e.g. pre-1990 natural forests, pre-1990 planted forests). During the review, the Party indicated that the 2016 land-use map showed that 7.3 ha land on organic soil has changed from either forest or grassland in 1990 to other land in a subsequent mapping year, with each land-use change being mapped soon after conversion, with the removal of the topsoil in preparation for development. In some cases, there is subsequent evidence of settlement expansion, indicating that, at the next remapping, settlements would be a more appropriate land-use classification. The ERT considers that this shows either that other land is not the appropriate land category or that all soil carbon should be considered as emitted following these conversions. The ERT considers that the recommendation has not yet been addressed because the area of organic soils in other land should be reported as zero, and not all SOC should be considered lost when a conversion to other land occurs on organic soil.
L.22	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – N_2O	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.	Not resolved. New Zealand continued to report N_2O emissions for this source as "NE" in its CRF tables. During the review, the Party acknowledged the method in the 2006 IPCC Guidelines for estimating N_2O emissions from drainage of forest land (equation 11.1), but not the method for estimating N_2O emissions from drainage of wetlands and drainage of settlements (no default EF). The Party also presented an estimate showing that N_2O emissions from drainage of forest land were below the 500 kt CO_2 eq threshold referred to in paragraph 37(b) of the UNFCCC Annex I inventory reporting

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(L.29, 2019) Completeness		guidelines. The ERT noted that, while there is no default method for estimating emissions from drained wetlands other than managed peatland or drained settlements, New Zealand considers most of its settlement areas as being similar to grassland when it comes to SOC (NIR, p.287). The ERT considers that the recommendation has not yet been addressed because the Party has not yet justified and included in its NIR (a) that N_2O emissions from drainage of forest land are below the thresholds provided in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines and (b) why soil carbon dynamics in settlements were at the same time sufficiently close to grassland (so that the SOC reference value for grassland could be applied to settlements) and sufficiently different (so that the default EF for drained organic soils in grassland could not be applied to settlements).
L.23	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O (L.7, 2019) (L.9, 2017) Convention reporting adherence	Correct the C/N ratio to 15:1 in the NIR (p.300).	Resolved. New Zealand reported in its NIR (p.348) that it used the default C/N ratio of 15:1.
L.24	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O (L.30, 2019) Accuracy	Revise the information reported in CRF table 4(III), ensuring that the area of each category reported corresponds to the area of the category where a SOC loss, resulting from a change of land use or management, actually occurred.	Resolved. New Zealand revised the areas reported in CRF table 4(III), ensuring that the area of each category reported corresponds to the area of the category where a SOC loss occurred.
L.25	4(IV) Indirect N_2O emissions from managed soils – N_2O (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).	Not resolved. New Zealand reported as "IE" indirect N_2O emissions from leaching and run-off of N mineralization associated with SOC losses in mineral soils in CRF table 4(IV). In its NIR (p.458) and CRF table 4(IV), the Party stated that these emissions were reported under the agriculture sector. However, in the agricultural section of the NIR (p.225), New Zealand reported that "most of New Zealand's emissions from nitrogen mineralized during the loss of soil organic matter are covered under the LULUCF sector. The exception is for activities under the cropland remaining cropland land-use category, which are reported under the agriculture sector". The ERT considers that the recommendation has not yet been addressed because it is not clear from the NIR or CRF tables whether emissions are reported and, if so, under which sector.
Waste			
W.1	5. General (waste) – CO_2, CH_4 and N_2O (W.17, 2019) Transparency	Include more information on current waste management, such as an overview of MSW generation and its treatment method (recycling, composting, incineration or	Addressing. New Zealand included in NIR section 7.1.1 (p.362) a figure showing the flows of solid waste generation, treatment and disposal in New Zealand. However, the Party did not indicate how management practices impact the composition of waste disposed of at landfills (see also ID# W.13 in table 5).

ID#	*Issue/problem classification[a, b]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
		disposal) in NIR section 7.1.1, and its impact on the composition of waste disposed of at landfills.	
W.2	5. General (waste) – CO_2, CH_4 and N_2O (W.17, 2019) Accuracy	Consider whether the potential changes in the composition of landfilled waste are appropriately reflected in the estimated emissions for category 5.A and if not, recalculate the emissions and explain those recalculations in the NIR.	Resolved. New Zealand recalculated emissions from SWDS using a composition of waste that is no longer constant after 2012. The Party updated the composition of waste in municipal landfill sites, as shown in NIR table 7.2.5 (p.375), on the basis of an unpublished study by Eunomia, explaining (NIR, p.375) that changes in the composition over time lead to varying amounts of decomposable degradable organic carbon entering into landfill over time.
W.3	5.A Solid waste disposal on land – CH_4 (W.4, 2019) (W.5, 2017) (W.4, 2016) (W.7, 2015) Accuracy	Provide substantive justification for the country-specific default values on CH_4 recovery efficiency, including justification for the factors that can enhance the recovery, or revise 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 guidance in the 2006 IPCC Guidelines.	Addressing. New Zealand revised its CH_4 recovery efficiency values on the basis of the unpublished study by Eunomia, which provides gas recovery rates for similar landfills in the United Kingdom of Great Britain and Northern Ireland. According to the Party (NIR, p.377), the choice of recovery rate depends only on whether or not the site is currently open. This is because the values are representative of average recovery rates over the lifetime of the landfill: 68 per cent for sites that were open in the latest reporting year and 52 per cent for sites that were closed in the latest reporting year. The Party justified the country-specific CH_4 recovery efficiency rate in the NIR (p.377), reporting that using a higher recovery rate for open sites reflects that most open sites are modern, large and well-managed facilities that have more efficient systems than older, less well-managed sites, an approach chosen owing to the limited data available in New Zealand. The Party also explained in the NIR that data on gas capture in New Zealand landfills are not reported and have been subject to numerous recommendations by ERTs to justify the previous recovery rates of up to 90 per cent with very limited quantities of direct capture data and rates of CH_4 generation. The ERT commends the Party for its efforts but considers that the values are still significantly higher than the IPCC default values (20 per cent), also noting that some gas capture monitoring reports show that the percentages could be lower than those reported by the Party (NIR table 7.2.7). It also noted that, as landfill gas recovery is not monitored in New Zealand, the Party could consider using a value from the lower end of the range specified in the Eunomia study (45–70 per cent) and justify this value using technical parameters between New Zealand and the United Kingdom for the operationalization of biogas capture.
W.4	5.A Solid waste disposal on land – CO_2 (W.18, 2019) Convention reporting adherence	Correct the value for carbon storage for managed landfills without landfill gas capture.	Resolved. New Zealand corrected the value for carbon storage for managed landfills without landfill gas capture and accordingly reported CO_2 estimates for the long-term storage of carbon in waste disposal sites in CRF table 5 across the time series for the 2020 submission (e.g. 9,360.40 kt CO_2 in 2015). During the review, the Party explained that the numbers were revised again for the current submission (e.g. 9,185.33 kt CO_2 in 2015). The ERT checked and agreed with the values reported.
W.5	5.A Solid waste disposal on land – CH_4	Explain how many landfills are currently reporting under the ETS and how data on CH_4	Resolved. New Zealand included in NIR table 7.2.2 (p.369) information showing the number of landfills currently reporting under the EU ETS, separated by sites with (18)

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(W.19, 2019) Transparency	recovery are estimated and reported for both active and closed landfills with gas recovery.	and without (21) landfill gas recovery, as well as the number of closed landfills (outside the EU ETS) still emitting (8). The Party changed the methodology for estimating gas recovery amounts for both active and closed landfills (see ID# W.3 above) and explained in the NIR the methodology for estimating CH_4 recovery.
W.6	5.A Solid waste disposal on land – CH_4 (W.20, 2019) Transparency	Include in the NIR further explanation of the specific approach to calculating the gas recovery rate, including the source of the waste composition data, EF and recovery rates, as well as a description of the ETS, providing relevant reference sources.	Resolved. New Zealand implemented in the current submission a new methodology for estimating CH_4 emissions in this category, including for gas recovery. The Party explained in NIR section 7.2.2 (p.377) the methodology and the new approach to calculating gas recovery rates (see ID#s W.3 above and W.7 below). The Party updated its waste composition data, as shown in NIR table 7.2.5 (p.375) and provided a summary of the parameters used in NIR tables 7.2.7 (p.377) and 7.2.8 (p.379).
W.7	5.A.1 Managed waste disposal sites – CH_4 (W.8, 2019) (W.9, 2017) (W.11, 2016) Transparency	Either provide a better justification for the country-specific rate constant for biodegradation in landfills for MSW or calculate CH_4 generation for municipal landfills with the default rate constant k for biodegradation from the 2006 IPCC Guidelines.	Resolved. New Zealand revised its methodology for estimating emissions from SWDS on the basis of the study by Eunomia, which provides the parameters used to determine the quantity and rate of CH_4 generation, differentiates the k values by climate and composition and takes into account international data, particularly from the United Kingdom, and their applicability to New Zealand landfills. The Party also considered factors that could influence the related parameters at the national and regional level and presented the k values for dry and wet sites in NIR table 7.2.6 (p.376). The ERT considered sufficient the justification of the k values in the NIR.
W.8	5.C.1 Waste incineration – CO_2 (W.21, 2019) Convention reporting adherence	Investigate historical data on waste incineration in schools and revise the estimates, if appropriate.	Addressing. New Zealand is still investigating historical data on waste incineration in schools. According to the NIR (annex 6, section A6.2), approximately 100–200 rural schools still incinerate their waste, with estimates indicating that this practice emits 0.04 kt CO_2 eq/year. The Party justified in table A.6.2.1 (annex 6, p.105) the exclusion of these emissions in terms of the likely level of emissions, as per paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. However, the ERT noted that paragraph 37(b) only applies at the category level (as per footnote 7 thereof) and not to sources of emissions that are part of a category. The Party explained that waste incineration in schools is a separate category (currently reported as "NO") and that "NE" should have been reported for category 5.C.1.2.a waste incineration, non-biogenic MSW instead of for category 5.C.2.2.a open burning, non-biogenic MSW, noting that this will be corrected for the next annual submission. The ERT considers that this issue will be resolved once the Party corrects its reporting of this source in CRF table 5.C so that it is in accordance with the explanation provided in the NIR.
W.9	5.C.1 Waste incineration – CO_2 (W.21, 2019) Transparency	Include a relevant description on waste incineration in schools in the NIR or revise the NIR text, as appropriate.	Resolved. New Zealand reported in the NIR (p.382) that the Ministry of Education indicates that waste incineration still takes place in a small number of primary schools in remote rural areas. Although information on the exact number of schools involved is not available, it is estimated that around 10 per cent of the total number of schools in New Zealand still incinerate their waste. The Party also clarified that emissions from this source are reported as "NE" and considered insignificant (see ID# W.8 above).

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
W.10	5.D Wastewater treatment and discharge – N_2O (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 recalculation in the NIR.	Not resolved. New Zealand did not address any of the elements in this recommendation. During the review, the Party explained that it will address these elements in future submissions.
W.11	5.D Wastewater treatment and discharge – CH_4 and N_2O (W.23, 2019) Accuracy	Clarify and report consistent information on the final treatment or disposal for sludge, including incineration and disposal in municipal landfills, review the estimates and explain any recalculation in the NIR.	Addressing. New Zealand continued to report in its NIR (p.388) sludge amounts as "IE", noting that as a result of implementing a new method for estimating emissions for category 5.A.1 (see ID# W.2 above), it updated the amount of sludge disposed of at landfills (NIR table 7.2.5, p.375) and recalculated the associated emissions, but did not provide any further clarification in the NIR related to the amount of sludge incinerated or the different treatments of sludge, for example sludge incinerated or sludge used as fertilizer in the agriculture sector. During the review, the Party explained that it plans to address this issue for future submissions.
W.12	5.D.2 Industrial wastewater – CH_4 (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.	Addressing. New Zealand reported in CRF table 5.D, under category 5.D.2, the amount of CH_4 for energy recovery as "IE" and included the corresponding emission estimates in the energy sector under subcategory 1.A.2.e (food processing, beverages and tobacco; biomass). However, the ERT considers that as a matter of transparency the AD for the amount of CH_4 for energy recovery in category 5.D.2 should be reported in CRF table 5.D, despite the emissions being accounted for under the energy sector. During the review, the Party clarified that no information is available on the AD and therefore "NE" is reported. It also reported the amount of CH_4 recovered for flaring as "NE" because no information is available.
KP-LULUCF			
KL.1	General (KP-LULUCF) – all gases (KL.8, 2019) KP reporting adherence	Ensure that the area reported under each KP-LULUCF activity at the end of an inventory year in CRF table NIR-2 is the same as that used for the calculation of the area of that KP-LULUCF activity at the beginning of the following year.	Addressing. The ERT considers that the recommendation has not yet been fully addressed because, for example, the area reported under FM at the end of inventory year 2018 is 9,204.68 kha, whereas the area reported under FM at the beginning of inventory year 2019 is 9,205.26 kha. During the review, the Party clarified that this inconsistency had been reported since 2014, when it first reported on carbon equivalent forests, and that it could not determine how to restore consistency in CRF table NIR-2 despite being able to demonstrate consistency in its own calculation sheets (see ID# KL.16 below).
KL.2	General (KP-LULUCF) – all gases (KL.9, 2019) KP reporting adherence	Update the information reported on factoring out in accounting for KP-LULUCF activities.	Resolved. New Zealand reported in its NIR (p.488) that the net-net approach to accounting for FM under the Kyoto Protocol eliminates the need to factor out natural FM processes as a matter of principle.
KL.3	General (KP-LULUCF) – all gases	Either provide evidence that a minimum level of historical emissions from forest fires allows the separation of non-anthropogenic events and circumstances that cause significant	Resolved. New Zealand provided during the review a calculation sheet demonstrating that its intended background level was calculated following guidance from the Kyoto Protocol Supplement for non-CO_2 gases.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(KL.10, 2019) KP reporting adherence	emissions and are beyond control from all those events and circumstances that are anthropogenic, not limiting such consideration to the causes of fires; or revise the approach and recalculate the background level and associated margin accordingly, for instance by applying the method described in the Kyoto Protocol Supplement.	
KL.4	General (KP-LULUCF) – all gases (KL.11, 2019) KP reporting adherence	Recalculate the background level and the associated margin for AR and FM, including all GHG emissions, that is CO_2, CH_4 and N_2O rather than only non-CO_2 emissions, and revise the FMRL with a technical correction.	Addressing. New Zealand reported in its NIR (p.459) that it resolved this issue by recalculating the background level and margin and applying a technical correction to the FMRL. The ERT noted that, on the basis of the calculation sheet provided during the review, the background level and its margin were calculated following guidance from the Kyoto Protocol Supplement for non-CO_2 gases. However, also according to the calculation sheet, CO_2 emissions from natural disturbances were not included in the AR or FM values reported in the NIR (pp.A95–A96). New Zealand clarified that these emissions were already implicitly included in the initial projection method for the FMRL, hence their exclusion here. The ERT considers that the recommendation has not yet been fully addressed because the Party has not demonstrated how CO_2 emissions from natural disturbances were implicitly included in the initial projection method for the FMRL or, as per the Kyoto Protocol Supplement (p.2.50), explained how this inclusion was limited to the annual average of the background group (i.e. excluding outlying years 1997, 2007 and 2009). If the Party does not apply the natural disturbance provision (even if the Party notified its intention to apply it in 2015), the ERT considers that if the Party can demonstrate that CO_2 emissions from natural disturbances are implicitly included in its FMRL, the technical correction would be in line with the Kyoto Protocol Supplement. For this the ERT would like to point out that the Party should then add the annual average of non-CO_2 emissions from natural disturbances for the entire reference period to its FMRL rather than only the annual average for the background group (excluding outlying years 1997, 2007 and 2009), as is currently the case. If, however, the Party does apply the natural disturbance provision, the ERT considers that the recommendation can be resolved by excluding CO_2 emissions from natural disturbances from the FMRL and then adding the annual average of all GHG emissions from natural disturbances for the background group.
KL.5	AR – CO_2 (KL.2, 2019) (KL.5, 2017) Transparency	Include in the NIR synthesized information on the correspondence between forest land (i.e. the area of planted forest versus natural forest as presented in CRF table 4.A) and AR areas reported in CRF table 4(KP-1)A.1.	Resolved. New Zealand reported the requested information in its NIR (table 11.3.2, p.470).
KL.6	AR – CO_2 (KL.3, 2019) (KL.6,	Include in the NIR the information provided to the 2017 ERT during the review	Addressing. New Zealand reported in its NIR the requested information on (a) and (c), that is, how it ensured that AR areas meet the forest definition (p.486) and how the

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	2017) KP reporting adherence	(FCCC/ARR/2017/NZL, table 5, ID# KL.6) on how surrogate data sets on AR used for the periods 1990–2007 and 2008–2012 are applied in order to demonstrate that: (a) The AR areas meet the forest definition; (b) AR is directly human-induced and differentiated from natural expansion and/or restocking; (c) The geographical location of the boundaries of the areas that encompass lands subject to AR activities are identifiable.	geographical location of the boundaries of the areas that encompass lands subject to AR activities are identifiable (pp.268–282). Regarding (b), the Party stated (NIR, pp.307 and 314) that all transitions to forest land are human-induced; however, the ERT could not find in the NIR an explanation demonstrating that AR is directly human-induced and differentiated from natural expansion and/or restocking. During the review, the Party clarified that, to be mapped as AR, evidence is required to support the claim that the vegetation is being managed to regenerate and has the potential to reach the definition of forest. Such evidence may include a physical barrier from grazing pressure or inclusion in a forestry scheme. If such evidence is not available, areas of shrubland are mapped as grassland with woody biomass rather than as post-1989 natural forest (which, the ERT notes, would result in a Convention reporting adherence issue). The ERT considers that the recommendation has not yet been fully addressed because this clarification is not included in the NIR or included in decision trees (e.g. NIR figure 6.2.5, p. 275) describing how land-use changes are detected in New Zealand. It is also unclear from the NIR whether all criteria listed (p.486) need to be met for AR to be deemed human-induced and meet the definition of forest.
KL.7	Deforestation – CO_2 (KL.12, 2019) Transparency	Revise the information reported in the information items of CRF table 4(KP-I)A.2 regarding deforested areas under the pre-1990 natural and planted forest subcategories.	Resolved. New Zealand clarified during the review that areas that are currently forested can belong to the pre-1990 forest categories if they were already forested in 1990 (see NIR p.266), such as areas that were deforested (e.g. in 1992), and then afforested (e.g. in 2007). Reporting pre-1990 forests under deforestation therefore only appears to be a paradox owing to the slightly confusing denomination “pre-1990 forests”. The ERT considers that the recommendation has been addressed because such areas are indeed classified as pre-1990 forest and yet should also be reported under deforestation.
KL.8	FM – CO_2 (KL.5, 2019) (KL.4, 2017) Transparency	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 section 2.3.1 of the Kyoto Protocol Supplement.	Not resolved. SOC changes in managed forest were not estimated and information demonstrating that the mineral soil pool under FM is not a source was not provided in the NIR. The Party reported in its NIR (p.450) that this issue has not yet been resolved.
KL.9	FM – CO_2 (KL.6, 2019) (KL.8, 2017) Transparency	Include information in the NIR on which areas and categories of forest land (as in CRF table 4.A) are related to the areas of FM in CRF table 4(KP-I)B.1.	Resolved. New Zealand reported the requested information in its NIR (table 11.3.3, p.471).
KL.10	FM – CO_2 (KL.13, 2019) KP reporting adherence	Use the actual age-class distribution of the planted forests as at 1 January 2010, on the basis of the data available, including data collected after 1 January 2010 that are deemed sufficiently accurately associated with that historical period, for projecting the FMRL technical corrections.	Resolved. New Zealand reported in its NIR (p.A87) that the actual age-class distribution as at 1 January 2010 is now used to project the technical correction to the FMRL, consistently with the age-class distribution used in inventory estimates.

ID#	*Issue/problem classification[a, b]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
KL.11	FM – CO_2 (KL.13, 2019) KP reporting adherence	Use any other forest parameter (such as management practices, including harvest rotation, pruning and thinning age and densities, age/density associated current increment) representative of the pre-2010 historical period for projecting the FMRL technical corrections, even if data may have been collected after 1 January 2010, if deemed sufficiently accurately associated with that historical period.	Resolved. New Zealand reported in its NIR (p.A87) that the most up-to-date and accurate data on management practices prior to 2010 (e.g. yield tables) are used to project the technical correction to the FMRL, consistently with the data used in inventory estimates.
KL.12	FM – CO_2 (KL.14, 2019) 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.	Not resolved. New Zealand reported in its NIR (p.A89) that the FMRL is still technically corrected for overplanting, clarifying during the review that this "overplanting" refers to 1990–2013. The ERT agrees that omission of overplanting in the initial FMRL can justify a technical correction in the form of recalculated historical data (Kyoto Protocol Supplement, chap. 2.7.6.1, item 2(ii), p.2.100). In addition, better historical data are only relevant for the time period considered when establishing the initial FMRL, in this case until 2009 (see ID#s KL.10 and KL.11 above). As such, the ERT considers that the FMRL should only be corrected for overplanting occurring between 1990 and 2009, which would produce an up-to-date estimate of the respective areas of natural and planted forests in 2010. The ERT considers that the recommendation has not yet been addressed because it is not clear from the section of the NIR discussing "overplanting" whether it is projected to continue after 2009. The ERT considers that if the projection uses the latest estimate of the area of planted forest in 2010, namely by accounting for overplanting until 2009, then no further technical correction to the FMRL will be needed for overplanting and the issue can be considered resolved.
KL.13	FM – all gases (KL.15, 2019) 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 (1) 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 (2) the historical time series (1990–2009) of annual harvesting rates, biomass annual increment and GHG emissions from natural disturbances	Not resolved. New Zealand did not report in its 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. During the review, the Party clarified that the most important driver was a much lower area of harvest than projected under the FMRL assumptions (39 kha/year compared with 48 kha/year in the FMRL). It also noted that other drivers could play a role, such as higher-than-expected shares of harvest in AR forests and higher yields in post-2009 plantations. The ERT noted that a rough estimate based on yield tables shows that a harvested area 9 kha smaller than projected would correspond to removals of 8 Mt CO_2/year more than projected, that is a little more than half the observed discrepancy. The ERT considers that the recommendation has not yet been addressed because the Party has not yet provided in its NIR an interpretation of the discrepancy supported by quantitative information on the major drivers mentioned above.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		used for projecting the FMRL correction value.	
KL.14	FM – CO_2 (KL.16, 2019) KP reporting adherence	Recalculate the technical correction to the FMRL removing the projection of CEF.	Not resolved. New Zealand reported in its NIR (p.A92) a technical correction for the projection of CEF; however, the ERT noted that the Party did not remove the projection from the technical correction to the FMRL. During the review, the Party clarified that this technical correction only concerns the soil pool, which is assumed stable after a standard harvest, whereas it increases for CEF-hc and decreases for CEF-ne (assuming that these lands are converted to and from grassland). The ERT noted that the Party's decision to apply the CEF provision does not in itself trigger the need for a technical correction (Kyoto Protocol Supplement p.2.101), and that the establishment of a CEF constitutes a deviation from the 'business as usual' management of forest land, eliminating any need to include its impact in the FMRL, even for soil carbon.
KL.15	FM – CO_2 (KL.17, 2019) KP reporting adherence	Report an area of CEF-ne at least equivalent to that of CEF-hc.	Resolved. New Zealand reported in CRF table 4(KP-I)B.1.2 an area of CEF-ne higher than that of CEF-hc.
KL.16	FM – CO_2 (KL.18, 2019) Transparency	Report information on CEF-ne and CEF-hc in CRF table 4(KP-I)B.1.	Not resolved. All entries for CEF-ne and CEF-hc in CRF table 4(KP-I)B.1, rows 17 and 20, (e.g. for 2013 and 2019) are reported as "NA". During the review, the Party clarified that this is because the rows were entitled "Newly established forest in 2013", no matter the year of the CRF table, and that there were no new CEF-ne and CEF-hc areas in 2013, although there were in subsequent years. The ERT considers that New Zealand could check whether rows should be added for subsequent years so that there are seven rows for 2019 (one for each year of the second commitment period).
KL.17	FM – CO_2 (KL.19, 2019) 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 forest; and apply a technical correction to the FMRL.	Not resolved. New Zealand did not recalculate the FM estimates of the biomass CSCs or apply a technical correction to its FMRL. The Party reported in its NIR (p.461) that it is considering ways to revise its assumption that tall natural forests have null biomass CSC.
KL.18	FM – CO_2 (KL.20, 2019) Completeness	Either demonstrate that the national circumstances differ from those of other developed countries so that the Party is	Not resolved. New Zealand did not estimate SOC changes in mineral soils for managed forest or demonstrate that it is prevented from collecting information on SOC in forest land over time because its national circumstances differ from those of other developed

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		prevented from collecting 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 its FMRL when estimates of SOC changes in mineral soils become available.	countries. The Party reported in its NIR (p.461) that this issue has not yet been resolved.
KL.19	FM – CO_2 (KL.21, 2019) 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.	Not resolved. New Zealand reported in CRF table 4(KP-I)B.1.1 values that are 1,000 times smaller than those reported in the NIR (e.g. p.477).
KL.20	CH_4 and N_2O emissions from drained and rewetted organic soils – N_2O (KL.22, 2019) 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.	Not resolved. New Zealand reported data for all categories in CRF table 4(KP-II)2 as "NE", but, during the review, clarified that these emissions were occurring, at least in AR and FM land (see ID# L.22 above). The ERT considers that this recommendation has not yet been addressed because the Party has not yet reported N_2O emissions from drainage of non-agricultural organic soils or demonstrated that these emissions could be considered insignificant in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. The ERT notes that this issue is especially relevant for areas of AR and deforestation, where emissions would not be cancelled out by a technically revised FMRL.

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

[b] The report on the review of the 2020 annual submission of New Zealand was not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2019 annual review report. For the same reason, 2020 and 2018 are excluded from the list of review years in which issues could have been identified.

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

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 2021 annual submission of New Zealand, and had not been addressed by the Party at the time of publication of this review report.

Table 4
Issues and/or problems identified in three or more successive reviews and not addressed by New Zealand

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed* [a]
General	No issues identified.	
Energy		

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed* [a]
E.12	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 (2015–2021)
IPPU		
I.1	Include in the NIR detailed information and methodological descriptions on how plant-specific data are estimated.	7 (2013–2021)
I.2	Include in the NIR all the information indicated in the section "Reporting and documentation" of the 2006 IPCC Guidelines for categories (a) 2.E (electronic industry), (b) 2.F (product use as substitutes ODS); and (c) 2.G (other product manufacture and use).	5 (2015–2021)
I.6	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.	3 (2017–2021)
I.14	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.	3 (2017–2021)
I.15	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.	3 (2017–2021)
I.17	Explain, in NIR section 4.7.3, which approach (other than a combination of uncertainties) was used to derive the uncertainty of 35 per cent, presented in NIR table A.2.1.1.	3 (2017–2021)
I.20	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.	4 (2016–2021)
I.21	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.	3 (2017–2021)
I.24	Include in the NIR an explanation of the analysis of SF_6 emissions from SF_6 use in shoe and double-glazed window manufacture based on the information that was provided to the 2015 ERT as responses to questions and a background report.	5 (2015–2021)
Agriculture	No issues identified.	
LULUCF		
L.11	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 overestimation of removals from forest land remaining forest land, or, while that update is not possible, report in the NIR on the progress on the ongoing work to update the below-ground biomass ratios.	3 (2017–2021)
L.18	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).	3 (2017–2021)
Waste		

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed* [a]
W.3	Provide substantive justification for the country-specific default values on CH_4 recovery efficiency, including justification for the factors that can enhance the recovery, or revise 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 guidance in the 2006 IPCC Guidelines.	5 (2015–2021)
KP-LULUCF		
KL.6	Include in the NIR the information provided to the 2017 ERT during the review (FCCC/ARR/2017/NZL, table 5, ID# KL.6) on how surrogate data sets on AR used for the periods 1990–2007 and 2008–2012 are applied in order to demonstrate that: (a) The AR areas meet the forest definition; (b) AR is directly human-induced and differentiated from natural expansion and/or restocking; (c) The geographical location of the boundaries of the areas that encompass lands subject to AR activities are identifiable.	3 (2017–2021)
KL.8	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 section 2.3.1 of the Kyoto Protocol Supplement.	3 (2017–2021)

[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.

V. Additional findings made during the individual review of the Party's 2021 annual submission

9. Table 5 presents findings made by the ERT during the individual review of the 2021 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 2021 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.17	Fuel combustion – reference approach – solid fuels – CO_2, CH_4 and N_2O	The stock change value for coking coal reported in CRF table 1.A(b) is significantly lower (41 per cent) than that reported to IEA for 2019, and four times greater than that reported to IEA for 2018. During the review, the Party stated that the stock change values for coking coal are included under sub-bituminous coal in CRF table 1.A(b), with any differences between the values, as reported in the CRF table and to IEA, arising as a result of data revisions that occurred after a reporting company incorrectly classified coking coal as other bituminous coal in its production data in 2018, which was then revised to sub-bituminous coal in late 2019. The Party explained that this revision will flow through to IEA in due course. The ERT encourages New Zealand to follow up on this issue with IEA and correct and harmonize the data reported to this international organization.	Not an issue/problem

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
E.18	1.A.1.a Public electricity and heat production – gaseous fuels – CO_2	The CO_2 IEF for gaseous fuels for this subcategory for 2005 was reported inconsistently between the 2020 and 2021 submissions. When comparing both submissions, the CO_2 IEFs match in both submissions for the entire time series, except for 2005 (52.42 and 51.67 t/TJ respectively). During the review, the Party acknowledged this inconsistency and informed the ERT that a quick check had not revealed the reasons for the change, but that it will investigate this matter further. The ERT recommends that New Zealand check the value of the CO_2 IEF for gaseous fuels in 2005 and either justify the inconsistency in the NIR or correct its value for the emission estimates in 2005.	Yes. Convention reporting adherence
E.19	1.A.2.e Food processing, beverages and tobacco – gaseous fuels – CO_2	The CO_2 IEF for gaseous fuels for this subcategory for 2003 differs from the other values reported in the time series (a decrease of 3.2 per cent compared with the 2002 value). Values for 2002, 2003 and 2004 are 49.57, 48.00 and 49.54 t/TJ respectively. In addition, recalculations performed for this subcategory resulted in reduced CO_2 emissions from gaseous fuels across the time series, but these reductions were more significant between 1996 and 2007 (6 per cent). When comparing the 2020 and 2021 submissions, while the AD are consistent for all years of the time series (except 2013, for which there is a 6.05 per cent difference), the CO_2 IEF between 1996 and 2012 was significantly lower in the 2021 submission. The Party did not report in the NIR the reasons for the recalculations or their effects on emission estimates due to the changes (in the AD or CO_2 EFs), or explain the inconsistent CO_2 IEF in 2003. During the review, the Party stated that it will investigate this matter further. The ERT recommends that New Zealand explain in the NIR 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 by the Party. The ERT also recommends that the Party report in the NIR why the CO_2 IEF was lower for 2003.	Yes. Transparency
E.20	1.A.4 Other sectors – gaseous fuels – CO_2	The CO_2 IEFs for gaseous fuels for 2003 for subcategories 1.A.4.a commercial/institutional, 1.A.4.b residential and 1.A.4.c agriculture/forestry/fishing differ from the other values in the time series (a decrease of 3.2 per cent compared with the 2002 value). The values for 2002, 2003 and 2004 are 49.57, 48.00 and 49.54 t/TJ respectively. In addition, recalculations performed for these subcategories resulted in reduced CO_2 emissions from gaseous fuels for 1996–2007 (e.g. a reduction of 8.75 per cent for 2003). When comparing the 2020 and 2021 submissions, while the AD and CO_2 emissions under these subcategories follow the same trend, the CO_2 IEFs for 1995–2012 are significantly lower in the 2021submission. The Party did not report in the NIR the reasons for the recalculations or their effect on the changes. During the review, the Party explained that it will investigate this matter further. The ERT recommends that New Zealand explain in the NIR the reasons for the lower CO_2 IEFs between 1996 and 2012 after the recalculation performed by the Party. The ERT also recommends that the Party report in the NIR the reason for the lower value in the CO_2 IEF for 2003.	Yes. Transparency
E.21	1.A.4.a Commercial/ institutional – liquid fuels – CO_2	The ERT noted that recalculations performed for liquid fuels for this subcategory resulted in significantly reduced AD and CO_2 emissions for 2009–2018 when comparing the 2020 and 2021 submissions, in some cases resulting in differences of 200 per cent. The Party did not explain the reasons for these recalculations or their effects on changes in the NIR. In addition, a comparison of the 2019, 2020 and 2021 submissions revealed that the AD, CO_2 IEFs and CO_2 emissions for liquid fuels in the 2019 and 2021 submissions were similar in value and followed the same trends. However, in the 2020 submission, values and trends were completely different. During the review, the Party explained that the 2020 submission took into account the reallocation of diesel oil AD (supplied by the	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		upstream oil data system) from subcategory 1.A.4.a to subcategory 1.A.3.b (road transportation). Since this was merely a reallocation, it did not affect the overall level of CO_2 emissions in the energy sector. This reallocation was subsequently reversed in the oil data system, resulting in the 2021 submission matching the 2019 submission. The Party provided a link to the current oil statistics (https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/oil-statistics/), where these values can be checked. The ERT recommends that New Zealand, when performing recalculations, report fully and transparently on these recalculations in the NIR in accordance with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines.	
IPPU			
I.25	2.C.1 Iron and steel production – CH_4	New Zealand reported in the NIR (section 4.4.1, p.144) that, for 2016 onward, steel has been produced by one company (New Zealand Steel) at a single site using an alternative ironmaking process. The CO_2 emissions were estimated using a carbon mass balance method, with all carbon transformed into CO_2 emissions. CH_4 emissions were reported as "NO" and "NA" in the relevant CRF tables, despite the 2006 IPCC Guidelines providing methodologies (vol. 3. chap. 4.2.2.2, p.4.17) and default CH_4 EFs for some processes. The ERT noted that converting all carbon into CO_2 emissions may result in an underestimation in total GHG emissions, considering the higher global warming potential of CH_4. During the review, New Zealand clarified that the potential source of significant CH_4 emissions from New Zealand Steel plant may be the combustion of off-gas in afterburners. These CH_4 emissions are reported as "NO" because New Zealand Steel reports that CH_4 is undetectable in these gases. The ERT recommends that New Zealand investigate all 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, figure 4.8, p.4.20). The ERT also recommends that the Party include a description of the methodologies, AD and EFs used for the estimates. Alternatively, if the Party considers these emissions to be insignificant, the ERT recommends that the Party report them 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.	Yes. Completeness
I.26	2.C.1 Iron and steel production – CO_2	New Zealand reported CO_2 emissions from iron and steel production as a key category (NIR table 4.1.2, p.133). Since 2016, steel (category 2.C.1.a) has been produced by one company (New Zealand Steel) at a single site using an alternative ironmaking process. The Party reported only CO_2 emissions, with AD (i.e. steel production) and CO_2 IEFs reported as confidential in CRF table 2(I).A-Hs2 and in the NIR (section 4.4.2, p.145). The ERT estimated the CO_2 IEFs for 2016–2019 on the basis of steel production data provided by the World Steel Association, concluding that the IEFs decreased from 2.97 t CO_2/t steel in 2016 to 2.49 t CO_2/t steel in 2019 (thus by 16 per cent). During the review, the Party clarified that it does not have any information that might explain the variation in CO_2 IEFs during this time, noting that there has been no major change in plant operations that might explain it. The Party further explained that CO_2 IEFs for New Zealand Steel also varied within a similar range in past years, going back to the start of the time series, and that these variations resulted from changes in the product mix, shutdowns, maintenance work and other operational issues. The Party therefore noted that the fact that the 2018 and 2019 values are lower than those for 2016 and 2017 may not indicate a significant trend, as variations in	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		the order of ±10 per cent or more are not unusual for a single site. The ERT considers, however, that the 16 per cent decrease in the CO_2 IEF is significant. The ERT recommends that New Zealand investigate the source of the significant changes in the CO_2 IEFs for steel production across the time series and include in the NIR information concerning the trend and the reasons for the changes. The ERT encourages New Zealand to review the confidentiality status of the AD for subcategory 2.C.1.a (steel) considering that steel production data are provided by New Zealand Steel to international organizations (e.g. World Steel Association).	
Agriculture			
A.16	3.A Enteric fermentation – CH_4	New Zealand made reference in its NIR (p.176) to the MPI technical report which contains the methodology for calculating GHG emissions for the agriculture sector (https://www.mpi.govt.nz/science/open-data-and-forecasting/greenhouse-gas-reporting/). The ERT noted that, according to sections 3.1 and 3.13 of this technical report, fixed death rate values are used in the characterization of the monthly livestock population of dairy cattle, beef cattle, sheep and deer; and that death rate of zero is assumed for growing heifers. During the review, New Zealand stated that limited data is available on death rates; however, a previous review of this information was published in 2011 and a number of updates were made at that time. With regard to growing heifers, the Party sated that the death rate for this type of animal is close to zero and indicated that no information is currently available to model trends or changes in death rates over the time series. The Party further clarified that it is conducting research to address these issues. The ERT recommends that New Zealand, using the data and results of the research, improve the model trends or changes in death rates over the time series used for estimating emissions from enteric fermentation from dairy cattle, beef cattle, sheep and deer, and document any recalculations in the NIR.	Yes. Accuracy
A.17	3.A.1 Cattle – CH_4, N_2O	New Zealand reported in its NIR (p.179) that the milk yield for beef cows in the country is 800 l/year, based on national research (Clark et al., 2003). However, the ERT noted that this value is low compared with those reported by other Parties with similar livestock practices for beef cows, where the quantity of milk produced can be double that reported by New Zealand. During the review, the Party stated that the milk composition for beef cows is assumed to be the same as that for dairy cows and that a total lactation yield of 800 l/breeding beef cow and heifer has been adopted. The ERT also noted that the lactation length described in annex A3.1.2 to the NIR is six months, which may explain the relatively low milk yield for beef cows. In addition, the ERT checked the research published by Clark et al. (2003) and noted that the total lactation yield of 800 l/breeding beef cow and heifer is based on the estimated milk yield of an Angus cow from a 1980 study by the Ministry of Agriculture and Forestry. The ERT considers that the milk yield for beef cows should be revised or justified properly, noting that any recalculations resulting from an updated milk yield will also affect estimates of emissions of CH_4 and N_2O under category 3.B (manure management). The ERT recommends that New Zealand review whether a lactation length of six months and milk yield of 800 l for beef cows are appropriate for the emission estimates and either provide justification for these values in the NIR or recalculate emissions using more appropriate values for the milk yield for beef cows.	Yes. Accuracy
A.18	3.A.1 Cattle – CH_4	New Zealand reported in its NIR (p.177) that since 2004 productivity data for milk production from dairy cattle have been collected by the Livestock Improvement Corporation “at a similar terrestrial authority level as livestock	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		population". The ERT sought clarification during the review on how such productivity data for milk production compare with terrestrial-level livestock data, to which the Party responded that productivity data are collected at the same geographical level as livestock population data so that population and production data can be matched. The Party further explained that the Livestock Improvement Corporation sometimes combines data from geographically close regions (e.g. Hawke's Bay and Gisborne) to obtain a single value (productivity data) for livestock population that is then reported for both regions. The ERT recommends that New Zealand 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 the Livestock Improvement Corporation data combine geographically close regions to obtain a single value (productivity data) that is then used for the livestock population in these regions.	
A.19	3.A.1 Cattle – CH_4 and N_2O	New Zealand made reference in its NIR (p.176) to the MPI technical report which contains the methodology for calculating GHG emissions for the agriculture sector (https://www.mpi.govt.nz/science/open-data-and-forecasting/greenhouse-gas-reporting/). The ERT noted that the Party reported in this technical report (section 3.1, p.13) the population model used for dairy cattle. In explaining the parameter $POPdnmc_t$ ("total number of dairy cows and heifers not in milk or calf in year t", from equation 3.3 of the MPI technical report), the Party states that "this parameter, which counts the number of dairy cows and heifers, is an annual number provided by the annual Agricultural Production Survey (APS)" and that "it is assumed (based on 1990–1996 data) that 53 per cent of the animals making up this parameter are dry cows". The ERT asked how the proportion of 53 per cent is derived and whether the resulting number of animals is taken into account when estimating the number of female animals slaughtered. During the review, New Zealand stated that, between 1990 and 1996, Statistics New Zealand collected disaggregated data on the number of dry adult cows and heifers, and that since 1996 a combined total has been provided for the number of dry cows and dry heifers. Based on the 1990–1996 data, dry cows made up 53 per cent of the combined population on average and has formed the basis of the proportion since then. Acknowledging, however, that this proportion (53 per cent) was calculated using historical data, New Zealand stated that it is currently conducting research into the matter with a view to updating the assumptions currently used. It also clarified that slaughter statistics used in the inventory are not estimated through calculations but stem from actual slaughter data. The ERT noted that any recalculations performed under this category will also have consequences for emissions of CH_4 and N_2O for category 3.B (manure management). The ERT recommends that New Zealand incorporate the data and results of its 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 emission estimates and explain the recalculation in the NIR.	Yes. Accuracy
A.20	3.A.1 Cattle – CH_4	New Zealand made reference in its NIR (p.176) to the MPI technical report which contains the methodology for calculating GHG emissions for the agriculture sector (https://www.mpi.govt.nz/science/open-data-and-forecasting/greenhouse-gas-reporting/). The Party stated in section 4.7.1.1 (p. 82) of this technical report that live weight gain of growing heifers in the country is assumed to increase linearly from 9 per cent when born to 90 per cent when mature (as shown in equation 4.43 of the technical report), and after 638 days it is assumed to then instantaneously gain 10 per cent of the weight of a mature cow. The ERT asked on how the energy requirements associated with this instantaneous jump in weight should be accounted for in the estimation of emissions from	Yes. Accuracy

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		growing heifers. During the review, New Zealand acknowledged that these energy requirements (for live weight for the final 10 per cent of growth) are not directly accounted for in the current methodology, but noted the movement of growing heifers in the mature milking cow category means that these cattle are subject to higher energy requirements for maintenance and production than they would have been if they were still growing. New Zealand's data suggest that, overall, this has an insignificant impact on the calculation of gross emissions as the higher maintenance and production requirements for mature milking cows effectively cancel out the energy required for live weight gain from the final 10 per cent of growing heifers. Furthermore, New Zealand stated that current research on this matter will be completed in 2022 with the aim of identifying options for resolving this issue. The ERT recommends that New Zealand improve the methodology related to the instantaneous gain of 10 per cent in the weight of mature cows to account for their higher energy requirements and recalculate the associated emission estimates. The ERT also recommends that the Party document clearly these recalculations in the NIR.	
A.21	3.B.1 Cattle – N_2O	New Zealand made reference in its NIR (p.171) to the MPI technical report which contains the methodology for calculating GHG emissions for the agriculture sector (https://www.mpi.govt.nz/science/open-data-and-forecasting/greenhouse-gas-reporting/). The Party stated in section 5.1 (p.97) of this technical report that "for dairy cattle in the first two months of their life, nitrogen excretion is set to zero", but indicated in section 5.1.1.2 of the same technical report (pp.97–98) that "for dairy cattle less than one year old, Nex is calculated on the basis of N intake in the form of milk powder and its protein content" (as per equation 5.3 of the MPI technical report). The ERT asked how Nex in the first year of life is estimated, in particular for the stage from birth to weaning, when the animal is fed with milk derived from milk powder. The Party responded that the methodology described in section 5.1.1.2 is correct and that the description in section 5.1 is incorrect. The Party clarified that the next version of the MPI technical report will be updated to make the information on the methodology for calculating Nex consistent. The ERT recommends that New Zealand correct the description of nitrogen excretion in the first two months of life for dairy cattle in section 5.1 of the MPI technical report in order to resolve the inconsistency with section 5.1.1.2 of the same technical report.	Yes. Transparency
A.22	3.D.a.2.a Animal manure applied to soils – N_2O	New Zealand reported in its NIR (p.218) 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)" and reported in CRF tables 3.B(a)s2 and 3.B(b) "NO" for dairy cattle for the manure management system daily spread. The ERT sought clarification on these inconsistent descriptions of the use of daily spread as a manure management system in New Zealand. The Party responded that a recent report by Rollo et al. (2017) found that 8 per cent of dairy farms in the country use land application of manure with direct pumping from a sump, with this manure stored for at least one or two days before being applied through irrigation, thus not meeting the definition of a manure management system daily spread. New Zealand stated that it will remove the reference to the use of the manure management system daily spread for dairy manure in its next annual submission. The ERT recommends that New Zealand provide additional information describing the manure management systems used for dairy cattle in the NIR, including the information from Rollo et al. (2017).	Yes. Transparency
A.23	3.D.a.2.c Other organic fertilizers	New Zealand reported in its NIR (p.218) that N_2O emissions from non-manure components of organic fertilizers are not estimated and have been found to be not significant, accounting for 0.025 per cent of the total national emissions. However, the ERT could not establish the significance of the emissions on the basis of the information	Yes. Completeness

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
	applied to soils – N_2O	provided in the NIR. During the review, New Zealand provided the ERT with a report by van der Weerden et al. (2014), which provides a yearly breakdown of the contribution of organic amendments as a percentage of total GHG emissions, using data from the 2014 submission. For all years, it calculated the contribution range as 0.01–0.025 per cent. The ERT noted that the study suggests that a five-yearly review of AD related to N applied to soil as an organic amendment should be undertaken. The ERT asked the Party whether such a follow-up study has been undertaken, to which New Zealand responded that owing to year-to-year funding limits it had not been prioritized but would be kept in mind as a priority for the 2022 funding round. The ERT recommends that New Zealand undertake an updated analysis of the AD related to N applied to soil for non-manure components of organic fertilizers and estimate and report N_2O emissions for this subcategory. In case New Zealand considers such emissions to fall below the threshold of significance, the ERT recommends that the Party report in the NIR information in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines on the likely level of N_2O emissions, demonstrating that they account for less than 0.05 per cent of the total national emissions and do not exceed 500 t CO_2 eq.	
LULUCF			
L.26	4.A Forest land – CO_2	New Zealand reported in the NIR (p.260) that "pre-1990 natural forests" are subdivided into tall and regenerating forests. However, there was no explanation of how these forests (tall and regenerating forests) are defined. During the review, New Zealand clarified that tall forests consist of the indigenous forest and broadleaved indigenous hardwood classes from the Land Cover Database, while regenerating forests consist of all other classes, including gorse, broom, manuka, kanuka and mixed exotic shrubland. The Party also clarified that the area of regenerating forest in 2019 was 1,184,794 ha and the area of tall forest was 6,571,153 ha. The ERT recommends that New Zealand include in its NIR 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 (see ID# L.12 in table 3).	Yes. Transparency
L.27	4.E.2 Land converted to settlements – CO_2	New Zealand reported in its NIR (p.287) that the SOC reference level for settlements is assumed to be the same as that for low-producing grasslands because "settlements do not contain only impervious surfaces". The ERT noted that, while this is true, impervious surfaces generally constitute a substantial share of settlements, and that the 2006 IPCC Guidelines recommend assuming a 20 per cent loss compared with the original land use (vol. 4, chap. 8.3.3.2, p.8.24) when land is converted to impervious surfaces. The ERT also noted that land converted to settlements is not a key category but considers that this cannot be accurately assessed until an accurate SOC reference level is attributed to settlements. The ERT recommends that New Zealand assess the share of impervious surfaces within the settlement category and estimate soil CSC for land converted to settlements on the basis of this share and in accordance with the 2006 IPCC Guidelines.	Yes. Accuracy
L.28	4(V) Biomass burning – CO_2	New Zealand reported in its NIR (p.349) that CO_2 emissions from wildfires are captured by the general stock change calculation. However, it was not clear from the NIR how such emissions from wildfires are captured in the estimates. During the review, the Party clarified that when wildfires occur in planted forests the remaining standing timber is assumed to be harvested as soon as possible afterwards. Consequently, any CO_2 emissions are assumed to be captured in the carbon losses from harvesting. This approach is used to avoid any double counting	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		from CO_2 emissions as a result of wildfire burning and CO_2 emissions from harvesting. The Party further explained that where wildfires occur in natural forests, these are expected to be picked up in the national forest inventory plot network, which forms the basis of the CSC calculations for this forest type. The ERT noted that the method used by the Party to estimate biomass CSC in planted forests is based directly on inventory plots and will implicitly capture CO_2 emissions from wildfires without the need for detailed explanation. The ERT recommends that New Zealand transparently describe in its NIR how CO_2 emissions from wildfires are captured in its 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.	
L.29	4(V) Biomass burning – CH_4, N_2O	New Zealand reported in its NIR (p.350) that wildfire AD are obtained from the Fire and Emergency New Zealand database. However, it was not clear to the ERT how this database was fed, whether by satellite images or by field reports. During the review, the Party clarified that the raw data for this database, including field delineation for areas affected by fire, are field reports by fire officers. The Party explained that, for exceptionally large fires, remote-sensing data could be used instead of field delineation. The ERT recommends that New Zealand provide explanations in its 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 areas.	Yes. Transparency
Waste			
W.13	5.A Solid waste disposal on land – CH_4	New Zealand reported in its NIR (p.368) that "in 2019, 39 significant municipal landfill sites were active in comparison with 317 in 1995 and 563 in 1971". The ERT noted that the decline in municipal landfill sites is significant, but the NIR does not provide additional descriptions of the trends in waste generation or of the management of waste disposed of at landfills. During the review, the Party clarified that policy initiatives have resulted in solid waste being treated in fewer, better-managed landfills. The overall volume of waste has generally been increasing, especially for non-municipal landfills. Since activity is increasing but the number of landfills is decreasing, this means that operating landfills are larger in size, and it is easier to manage fewer, larger landfills at higher standards. The ERT recommends that New Zealand include in the NIR information on the consolidation of MSW landfill sites – from numerous small and poorly-managed landfills 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.	Yes. Transparency
W.14	5.A.3 Uncategorized waste disposal sites – CH_4	New Zealand reported in its NIR (p.367) that "all currently operational municipal landfill sites are managed sites" but noted in NIR table 7.2.1 (p.367) that non-municipal landfills and farm fills are "unmanaged". The Party also reported in the NIR (p.367) that "there are some emissions also coming from uncategorized municipal landfill sites which were in operation before 2010". This statement is reinforced in NIR table 7.2.1, which indicates that uncategorized landfill sites are reported for "prior to 2010 only". However, the ERT noted that in CRF table 5, CH_4 emissions from uncategorized waste disposal sites are reported for years after 2010 (e.g. 1.07 kt CH_4 for 2019). During the review, the Party clarified that NIR figure 7.1.1 (p.362) shows how waste generation sources in New Zealand are related to the disposal categories reported in the GHG inventory. Municipal landfills are reported under category 5.A.1.a (managed waste disposal sites) and non-municipal landfills and farm fills are reported	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		under category 5.A.2 (unmanaged waste disposal sites). The Party also clarified that emissions are reported for years after 2010 for category 5.A.3 owing to the ongoing first-order decay of waste disposed of before 2010, resulting in the continuing decline in associated emissions despite this activity having been stopped in 2010. The ERT commends the Party for the clarification and notes that the resolution of figure 7.1.1 is low, preventing it from obtaining a clear overview of the process. The ERT recommends that New Zealand provide additional information in NIR section 7.1.1 on its 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 of at landfills.	
W.15	5.B.1 Composting – CH_4	New Zealand reported in its NIR (p.381) that "activities data have been estimated based on expert judgment, using evidence from large-scale commercial composting operating in New Zealand" and "it is estimated that an equivalent of 1 per cent of total MSW was composted (refer to the total solid waste reported in table 7.2.2, p.369)", with this assumption applicable across the time series. However, the ERT noted that table 7.2.2 does not include any relevant information on the total MSW value used to estimate waste composted. During the review, the Party clarified that the text of the NIR should instead refer to table 7.2.3 (p.369), which reports the total amount of MSW and from which the 1990 value can be multiplied by 1 per cent to determine the starting value for compost. The Party reported that this mistake will be corrected for the 2022 submission. The ERT recommends that New Zealand 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.	Yes. Convention reporting adherence
W.16	5.C.1 Waste incineration – CO_2, CH_4 and N_2O	New Zealand reported in its NIR (p.386) that "quarantine waste composition is closest to clinical waste". The ERT noted that in NIR table 7.4.2 (p.383) the total waste incinerated is 5.4 kt (2019), consisting of clinical waste (0.6 kt), hazardous waste (0.3 kt) and sewage sludge (4.5 kt). However, the NIR does not clearly indicate whether the clinical waste in this table includes quarantine waste. During the review, the Party clarified that quarantine waste is included in clinical waste, noting that the parameters used for estimating emissions from incineration of quarantine waste are the same as those for clinical waste. As such, quarantine waste is called clinical waste. The Party also clarified that there is no additional quarantine waste besides clinical waste; there is just one waste stream. The Party acknowledged the potential confusion caused by using several terms to refer to the same type of waste (clinical, medical and quarantine), and noted that it will update the wording in its next NIR to improve clarity. The ERT recommends that New Zealand include information in the NIR to clarify how it defines clinical waste in line with national circumstances, and encourages the Party to use a single, common term in line with the 2006 IPCC Guidelines in defining this type of waste.	Yes. Transparency
W.17	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O	New Zealand reported in its NIR (p.384) that "activity data for open burning are the same as those for farm landfilling in table 7.2.4". In NIR table 7.2.4 (p.372), the Party reported solid waste disposed of at unmanaged landfills from 1950 to 2019, which included farm fills and non-municipal landfills. It was unclear to the ERT whether the farm fills referred to in table 7.2.4 were treated by open burning or if the same amount of waste was treated in unmanaged landfills. During the review, the Party clarified that the amount of waste disposed of at farm fills reported in table 7.2.4 is additional and equal to the amount that is disposed of by open burning. Therefore, the total amount of farm waste disposed of at farm fills or by open burning in 2019 was 957.8 kt, twice the value reported in table 7.2.4. The text prior to table 7.2.4 specifies that the data do not include open burning or other	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		disposal methods. The Party indicated that it will update its next NIR to clarify that the amount of farm waste disposed of by open burning is additional to that reported in table 7.2.4. The ERT recommends that the Party clarify in the NIR that farm fills are disposed of using two different treatment pathways (i.e. unmanaged landfills and open burning) and that the AD for both pathways have the same value. The ERT also recommends that the Party provide some basis on which to justify why the same value of AD is applied for both farms fills and open burning.	
KP-LULUCF			
KL.21	FM – CO_2	The ERT noted that part of the FMRL technical correction implemented by New Zealand consists in applying the revised yield tables in the inventory to the FMRL in order to maintain consistency (table 10.1.11, p.446). According to table 10.1.11, the Party revised the FMRL considering the yield tables between 1990–2009 for pre-1990 planted forests. However, the ERT noted that specific post-2009 yield tables were also applied to the inventory estimates and should therefore also have been considered in the FMRL revision. The NIR (p.A91) reports that the reason for using yield tables for 1990–2009 only is that the 2010–2019 yield tables capture the effect of new management practices which were not in place historically. During the review, the Party explained that the confidence intervals associated with the predicted yields at a given age were reflected within plot-level yield table variance rather than variance between plot-level yield tables. In addition, the Party provided the actual plot measurements showing that, at any given age, there was no statistically significant difference between forests planted between 1990 and 2009 and forests planted after 2009, in terms of either average standing biomass or average yield. The ERT recommends that the Party clarify in its next 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.	Yes. Transparency
KL.22	FM – all gases	The NIR (pp.A95–A96) reports background levels for natural disturbances for AR and FM and mentions that they were estimated in accordance the Kyoto Protocol Supplement. During the review, the Party provided a calculation sheet showing the time series of natural disturbances over 1990–2009, as well as their estimated impact on GHG emissions and the background level and associated margin. The ERT recommends that, if the Party applies the natural disturbance provision and therefore continues to report a background level and margin (see ID# KL.4 in table 3), it report in its NIR the time series of natural disturbances and indicate which years are excluded from the background group used to calculate the background level.	Yes. Transparency
KL.23	FM – all gases	The ERT noted that at least five successive technical corrections to the FMRL have been implemented (NIR, p.A92). This makes it difficult to assess whether the FMRL model's outputs are still capable of reproducing historical data before 2010, as recommended by the Kyoto Protocol Supplement (chap. 2.7.6.1, p.2.101). The ERT recommends that the Party provide in its NIR a comparison of the FMRL model's outputs with the historical data over the period for which the consistency between the FMRL and the inventory estimates had initially been assessed (e.g. 2000–2009). In the event of a substantial inconsistency between the two time series, the ERT recommends that the Party implement a last technical correction by applying the methods to ensure time-series consistency as recommended by the Kyoto Protocol Supplement (chap. 2.7.6.1, p.2.101).	Yes. Accuracy

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

VI. Application of adjustments

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 2021 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 2021 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–2019
(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								11.15
Base year[e]	41 111.61	65 126.06	NA	NA	NA		NE, NA	
1990	41 111.61	65 126.06	NA	NA				
1995	44 568.47	68 909.98	NA	NA				
2000	48 578.78	75 394.14	NA	NA				
2010	48 619.82	78 311.89	NA	NA				
2011	52 379.85	78 144.69	NA	NA				
2012	55 245.78	80 442.01	NA	NA				
2013	56 079.46	79 824.25	NA	NA		–9 444.87	NE, NA	–21 534.98
2014	54 884.47	80 670.51	NA	NA		–12 771.99	NE, NA	–20 286.41
2015	53 827.13	80 721.01	NA	NA		–14 876.18	NE, NA	–19 189.12
2016	53 279.12	78 674.91	NA	NA		–16 157.69	NE, NA	–16 394.02
2017	54 349.66	80 278.47	NA	NA		–16 260.67	NE, NA	–16 866.95
2018	53 818.32	80 574.67	NA	NA		–14 927.68	NE, NA	–18 509.34
2019	54 888.49	82 313.58	NA	NA		–12 905.44	NE, NA	–20 665.27

Note: Emissions and removals reported in 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.

[e] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. New Zealand has not elected 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.

Table I.2
Greenhouse gas emissions and removals by gas for New Zealand, excluding land use, land-use change and forestry, 1990–2019
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	25 648.01	32 793.50	5 754.62	NO, NA	909.95	NO, NA	19.97	NO, NA
1995	28 147.47	34 026.40	6 533.91	24.51	153.28	NO, NA	24.42	NO, NA
2000	32 337.97	35 769.64	6 965.75	233.61	67.61	NO, NA	19.56	NO, NA
2010	35 028.74	34 516.75	7 642.83	1 053.16	47.56	NO, NA	22.84	NO, NA
2011	34 494.46	34 590.67	7 823.06	1 182.41	35.15	NO, NA	18.94	NO, NA
2012	36 135.59	35 076.05	7 931.63	1 230.38	47.46	NO, NA	20.91	NO, NA
2013	35 303.06	35 200.57	7 961.94	1 292.37	48.13	NO, NA	18.19	NO, NA
2014	35 529.73	35 506.39	8 228.53	1 315.64	73.41	NO, NA	16.81	NO, NA
2015	36 069.67	34 992.15	8 146.04	1 438.09	58.59	NO, NA	16.47	NO, NA
2016	34 302.98	34 560.29	8 171.98	1 573.60	48.69	NO, NA	17.37	NO, NA
2017	35 853.03	34 479.41	8 197.65	1 673.12	60.46	NO, NA	14.80	NO, NA
2018	35 787.33	34 534.12	8 325.70	1 840.41	72.40	NO, NA	14.71	NO, NA
2019	37 491.96	34 619.82	8 363.13	1 733.83	89.13	NO, NA	15.71	NO, NA
Percentage change 1990–2019	**46.2**	**5.6**	**45.3**	**NA**	**–90.2**	**NA**	**–21.4**	**NA**

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

[a] New Zealand did not report indirect CO2 emissions in CRF table 6.

Table I.3
Greenhouse gas emissions and removals by sector for New Zealand, 1990–2019
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	23 744.53	3 579.92	33 840.28	–24 014.45	3 961.32	3.17
1995	25 668.79	3 174.43	35 814.01	–24 341.52	4 252.75	3.14
2000	29 779.45	3 443.22	37 719.31	–26 815.36	4 452.16	3.49
2010	32 057.51	4 543.71	37 803.95	–29 692.07	3 906.71	4.52
2011	31 300.18	4 632.15	38 457.73	–25 764.84	3 754.63	4.54
2012	32 816.53	4 672.93	39 307.10	–25 196.23	3 645.45	4.27

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2013	32 025.91	4 819.44	39 384.71	–23 744.79	3 594.19	3.52
2014	32 124.13	4 987.28	40 010.00	–25 786.05	3 549.10	3.48
2015	32 527.83	5 189.65	39 493.48	–26 893.88	3 510.05	3.42
2016	31 040.41	5 037.53	39 115.28	–25 395.80	3 481.69	3.45
2017	32 600.49	5 136.06	39 106.18	–25 928.80	3 435.73	3.53
2018	32 551.92	5 186.91	39 470.54	–26 756.36	3 365.29	3.64
2019	34 263.06	5 115.91	39 617.71	–27 425.09	3 316.91	4.30
Percentage change (average for 1990–2019)	**44.3**	**42.9**	**17.1**	**14.2**	**–16.3**	**35.7**

Notes: New Zealand did not report indirect CO_2 emissions in CRF table 6; emissions and removals reported in the sector other (sector 6) are included in this table.

Table I.4

Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year–2019, for New Zealand

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[a]	*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				11.15				
Technical correction				–21.86				
1990[b]	NA				–	–	–	–
2013		–17 929.84	8 484.97	–21 534.98	NE, NA	NE, NA	NE, NA	NE, NA
2014		–18 154.06	5 382.06	–20 286.41	NE, NA	NE, NA	NE, NA	NE, NA
2015		–18 346.87	3 470.69	–19 189.12	NE, NA	NE, NA	NE, NA	NE, NA
2016		–17 976.49	1 818.79	–16 394.02	NE, NA	NE, NA	NE, NA	NE, NA
2017		–18 130.50	1 869.83	–16 866.95	NE, NA	NE, NA	NE, NA	NE, NA
2018		–17 197.56	2 269.88	–18 509.34	NE, NA	NE, NA	NE, NA	NE, NA
2019		–15 812.07	2 906.63	–20 665.27	NE, NA	NE, NA	NE, NA	NE, NA
Percentage change base year–2019					**NA**	**NA**	**NA**	**NA**

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

[a] The value reported in this column relates to 1990.

[b] 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 relevant data from New Zealand's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5
Key relevant data for New Zealand under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2021 annual submission

Parameter	*Data values*
Periodicity of accounting	NA
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None
Election of application of provisions for natural disturbances	Yes, for AR and FM
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 AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA

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.i.3 abandoned underground mines (CH_4) (see ID# E.12 in table 3);

(b) 2.C.1 iron and steel, electric steel production (CO_2) (see ID# I.14 in table 3);

(c) 2.C.1 iron and steel production (CH_4) (see ID# I.25 in table 5);

(d) 3.D.a.2.c other organic fertilizers applied to soils (N_2O) (see ID# A.23 in table 5);

(e) 4.A.1 above-ground biomass CSCs in forest land remaining forest land (CO_2) (see ID# L.12 in table 3);

(f) 4.B.1 biomass CSCs in perennial cropland remaining perennial cropland (CO_2) (see ID# L.15 in table 3);

(g) 4.B.1 SOC stock changes associated with changes in management practices in cropland remaining cropland (CO_2) (see ID# L.16 in table 3);

(h) 4.D.2.1 emissions from land converted to peat extraction under wetlands (CO_2) (see ID# L.18 in table 3);

(i) 4(II) N_2O emissions and removals from drainage and rewetting and other management of organic/mineral soils (N_2O) (see ID# L.22 in table 3);

(j) 4(IV) indirect N_2O emissions from leaching and run-off of N mineralization associated with SOC losses in mineral soils (N_2O) (see ID# L.25 in table 3);

(k) FM – biomass CSCs (CO_2) (see ID# KL.17 in table 3);

(l) FM – SOC stock changes (CO_2) (see ID# KL.18 in table 3);

(m) KP-LULUCF activities – N_2O emissions from drained and rewetted organic soils (N_2O) (see ID# KL.20 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 2013, 2014, 2015, 2016, 2017 and 2019 annual submissions of New Zealand, contained in documents FCCC/ARR/2013/NZL, FCCC/ARR/2014/NZL, FCCC/ARR/2015/NZL, FCCC/ARR/2016/NZL, FCCC/ARR/2017/NZL and FCCC/ARR/2019/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/sites/default/files/resource/AGI_2021_Final%20Version.pdf.

Annual status report for New Zealand for 2021. Available at https://unfccc.int/sites/default/files/resource/asr2021_NZL.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Andrea Brandon (Ministry for the Environment of New Zealand), 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:

Ministry for Primary Industries (2021). Technical Paper - Methodology for calculation of New Zealand's agricultural greenhouse gas emissions. Version 7.

MPI (2018). Methodology for calculation of New Zealand's agricultural greenhouse gas emissions, version 4. MPI technical paper 2018/69. Available at https://www.mpi.govt.nz/dmsdocument/13906-detailed-methodologies-for-agricultural-greenhouse-gas-emission-calculation.

MPI (2018). Animal live weight calculations in the NZ Agricultural GHG Inventory Model. MPI technical paper 2018/73. Available at https://www.mpi.govt.nz/dmsdocument/32863-animal-live-weight-calculations-in-the-nz-agricultural-ghg-inventory-model.

MPI (Ministry for Primary Industries). 2021. Livestock slaughter statistics for sheep, cattle, goats, horses and pigs. Retrieved from www.mpi.govt.nz/dmsdocument/1018-Livestock-slaughter-statistics-forsheep-cattle-goats-horses-and-pigs (25 January 2021).

MPI technical report (2021). Methodology for calculation of New Zealand's agricultural greenhouse gas emissions (version 7). Available at https://www.mpi.govt.nz/science/open-data-and-forecasting/greenhouse-gas-reporting/.

Morrisey DJ, Swales A, Dittmann S, Morrison MA, Lovelock CE and Beard CM (2010). The ecology and management of temperate mangroves. Pp. 43-160 in Oceanography and Marine Biology: An annual review, 2010, vol.48 (edited by Gibson RN, Atkinson RJA and Gordon JDM). Available at http://www.aucklandcity.govt.nz/council/documents/regionalplans/coastal/Morrisey%20et%20al%202010%20Temperate%20Mangroves%20OMBAR.pdf.

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. MPI Technical Report. Wellington: Ministry for Primary Industries.

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

Clark H, Brookes I, Walcroft A. 2003. Enteric Methane Emissions from New Zealand Ruminants 1990-2001 Calculated using an IPCC Tier 2 Approach. Report prepared for the Ministry of Agriculture and Forestry by AgResearch and Massey University.