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Report on the individual review of the annual submission of New Zealand submitted in 2019*

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 inventory review of the 2019 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 7 to 12 October 2019 in Wellington.

* In the symbol for this document, 2019 refers to the year in which the inventory was submitted, not to the year of publication.

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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 equivalent forest
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 of New Zealand
FM	forest management
FMRL	forest management reference level
$Frac_{LEACH}$	fraction of nitrogen input to managed soils that is lost through leaching and run-off
GDP	gross domestic product
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
k	decay rate constant
KP-LULUCF activities	activities under Article 3, paragraphs 3 and 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*
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
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NEFD	National Exotic Forest Description of New Zealand
NEU	non-energy use
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SF_6	sulfur hexafluoride
SOC	soil organic carbon
SOC_{REF}	reference soil organic carbon stocks
SWDS	solid waste disposal site(s)
UEF	unique emission factor
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]

1. This report covers the review of the 2019 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" (decision 13/CP.20). The review took place from 7 to 12 October 2019 in Wellington and was coordinated by Roman Payo (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of New Zealand.

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

Area of expertise	*Name*	*Party*
Generalist	Ioannis Sempos	Greece
Energy	Hiroshi Ito	Japan
IPPU	Mauro Meirelles de Oliveira Santos	Brazil
Agriculture	Braulio Pikman	Brazil
LULUCF and KP-LULUCF activities	Sandro Federici	San Marino
Waste	Tatiana Tugui	Republic of Moldova
Lead reviewers	Mauro Meirelles de Oliveira Santos	
	Ioannis Sempos	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2019 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines. The ERT notes that the individual inventory review of New Zealand's 2018 annual submission did not take place in 2018 owing to insufficient funding for the review process.

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

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 shows annual GHG emissions for New Zealand, including totals excluding and including the LULUCF sector, indirect CO_2 emissions, and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, if elected by New Zealand, by gas, sector and activity.

[1] At the time of publication of this report, New Zealand had submitted its instrument of ratification of the Doha Amendment; however, the Amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, para. 6, pending the entry into force of the Amendment.

[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.

II. Summary and general assessment of the 2019 annual submission

6. Table 2 provides the assessment by the ERT of the 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 inventory of New Zealand

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
Dates of submission	Original submission: 11 April 2019 (NIR), 10 April 2019 (CRF tables) version 1, 10 April 2019 (standard electronic format tables)		
Review format	In country		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	L.10, L.14, L.19
	(c) Development and selection of EFs?	Yes	I.24, A.16, A.15, L.4, L.14, L.24, L.27
	(d) Collection and selection of AD?	Yes	E.2, E.3, E.12, E.15, I.21, A.9, A.13, L.3, L.16, L.28, L.30, W.21, W.23
	(e) Reporting of recalculations?	Yes	I.28
	(f) Reporting of a consistent time series?	No	
	(g) Reporting of uncertainties, including methodologies?	Yes	G.7, I.3, A.5
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories/completeness?[b]	Yes	E.15, I.11, L.6, L.18, L.21, L.22, L.29, L.31, KL.19, KL.20, KL.22
	(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?	No	E.26, E.32
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	
	Have any issues been identified related to the national registry:		

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
	(a) Overall functioning of the national registry?	No	
	(b) Performance of the functions of the national registry and the technical standards for data exchange?	No	
	Have any issues been identified related to reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the standard independent assessment report?	No	
	Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of 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?	Yes	G.3
	Have any issues been identified related to the following reporting requirements for KP-LULUCF activities:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes	KL.5
	(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.9, KL.11, KL.13, KL.14, KL.15, KL.16
	(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 and 34?	Yes	KL.10
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	NA	
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	NA	
	Did the Party submit 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 the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	

Assessment			*Issue or problem ID#(s) in table 3 and/or 5*[a]
Questions of implementation	Did the ERT list any questions of implementation?	No	

[a] The ERT identified additional issues and/or problems in all sectors as well as issues and/or problems related to reporting on KP-LULUCF activities that are not listed in this table but are included in table 5.
[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex II.

III. Status of implementation of issues and/or problems raised in the previous review report

7. Table 3 compiles all the recommendations made in previous review reports that were included in the previous review report, published on 6 April 2018.[4] For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2019 annual submission and provided the rationale for its determination, which takes into consideration the publication date of the previous review report and national circumstances.

Table 3
Status of implementation of issues and/or problems raised in the previous review report of New Zealand

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Inventory planning (G.1, 2017) (G.2, 2016) (G.3, 2015) Transparency	Prioritize resources to resolve the issues related to improving the transparency of the NIR in accordance with the detailed recommendations given under the different sectors.	Resolved. New Zealand prioritized resources and provided new information on AD, EFs and methodologies in the NIR to improve its transparency; for example, additional tables (e.g. table 3.2.1, which shows energy use and NEU for natural gas, and table 7.2.2, which provides a more transparent account of AD for solid waste deposited to municipal and uncategorized landfills), notes on the use of ETS data, and notes on cement and glass production in the IPPU sector. The ERT noted that, of the transparency issues identified in the original recommendation in the 2015 review report that had still not been addressed in the 2017 submission, the Party satisfactorily addressed ID#s E.6, E.7, I.2, I.4, I.6, W.1, W.3 and W.6 in the 2019 submission, with only three remaining unresolved (see ID#s I.1, I.15 and I.20 below). The ERT therefore considers that transparency has improved significantly.
G.2	QA/QC and verification (G.2, 2017) (G.5, 2016) (G.8, 2015) Convention reporting adherence	Strengthen QA/QC procedures related to consistency checks between information reported in the CRF tables and the NIR.	Resolved. New Zealand strengthened its QA/QC procedures, developing customized, automated QC tools that were applied to all inventory sectors. The Party also revised the inventory approval process at the sectoral and cross-sectoral level by including mandatory checks for CRF data integrity. In addition, checks for consistency between the NIR and the CRF tables were integrated into the inventory

[4] FCCC/ARR/2017/NZL. The ERT notes that the report on the individual inventory review of New Zealand's 2018 annual submission has not been published yet. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2017 annual submission.

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			QC process. The ERT considers that the QA/QC procedures were sufficiently strengthened.
Energy			
E.1	1. General (energy sector) (E.22, 2017) Convention reporting adherence	Correct the following inconsistencies from the 2017 annual submission: (a) In the NIR (p.57), the Party indicated that the data for international bunkers are in CRF table 1.C. However, the correct reference to international aviation and international navigation (international bunkers) and multilateral operations is in CRF table 1.D; (b) In the NIR (p.73), the key category identified in the trend assessment for manufacturing industries and construction, among others, is not food processing, beverages and tobacco (liquid fuels), but food processing, beverages and tobacco (gaseous fuels), according to table 3.1.1; (c) In the NIR (p.79), the category cars (gasoline) was not indicated in the text on the trend assessment for the category transport, but according to table 3.1.1 this category was identified; (d) In the NIR (p.88), the category residential (gaseous fuels) was not indicated in the text on the level and trend assessments for other sectors; however, according to table 3.1.1 this category was identified.	Resolved. The ERT concludes that New Zealand corrected all the inconsistencies identified in the previous review report, as follows: (a) NIR page 75 refers to CRF table 1.D; (b) NIR page 74 refers to gaseous fuels; (c) NIR page 96 refers to the category cars (gasoline); (d) NIR page 103 refers to the category residential (gaseous fuels).
E.2	Fuel combustion – reference approach – liquid fuels – CO_2 (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.	Not resolved. New Zealand continues to report naphtha and crude oil together in CRF table 1.A(b) and did not include in the NIR an indication of its progress in addressing this recommendation. During the review, the Party explained that naphtha and crude oil are combined in the current data system but will be separated in the new data system. Operationalizing the new system involves migrating legacy systems from Excel into R programming language, and is expected to occur during 2019. A complicating factor is the limitations of the reported data, in which naphtha and enhanced condensate are combined as full range condensate.
E.3	Fuel combustion – reference approach – liquid fuels – CO_2 (E.3, 2017) (E.9, 2016) (E.7 and E.22, 2015) (24, 2014) (27, 2013) Comparability	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.	Not resolved. New Zealand continues to report lubricants, petroleum coke and bitumen together in CRF table 1.A(b), and did not include in the NIR an indication of its progress in addressing this recommendation. During the review, the Party explained that estimates of emissions from these fuels are combined in the current data system but will be separated in the new data system. Operationalizing the new

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			system involves migrating legacy systems from Excel into R programming language, and is expected to occur during 2019.
E.4	Fuel combustion – reference approach – liquid fuels – CO_2 (E.23, 2017) Comparability	Clarify whether AD for other oil occur in the country and, if so, report the notation key "IE" in CRF table 1.A(b), or correct the information in the documentation box by excluding the mention that emissions from other oil are grouped under bitumen, since these emissions are not occurring.	Resolved. New Zealand reported AD for other oil as "IE" in CRF table 1.A(b) and explained, in the documentation box to that table, that emissions from other oil are reported under bitumen.
E.5	Fuel combustion – reference approach – all fuels – CO_2 (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.	Not resolved. New Zealand did not include 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. During the review, the Party indicated that the sum of stock changes for oil and gas are the same in CRF table 1.A(b) and the energy balance; however, the allocation is different. For example, in CRF table 1.A(b) crude and refinery feedstocks are separated, while in the energy balance they are combined; also, the energy balance table includes indigenous production of liquefied petroleum gas, while CRF table 1.A(b) does not allow this to be entered as production, so it is included in natural gas production and allocated to liquefied petroleum gas via stock change.
E.6	Feedstocks, reductants and other NEU of fuels – natural gas – CO_2 (E.4, 2017) (E.10, 2016) (E.23, 2015) Transparency	Improve the transparency of reporting on NEU of fuels by adding a table on energy uses and NEU of fuels for natural gas, together with associated emissions and the categories where these are reported.	Resolved. New Zealand included in the NIR further explanation of (p.76) as well as a figure (3.2.1) and a table (3.2.1) showing energy and NEU for natural gas, together with associated emissions and the categories where these are reported.
E.7	Feedstocks, reductants and other NEU of fuels – CO_2 (E.5, 2017) (E.11, 2016) (E.23, 2015) Transparency	Review the notation keys reported for emissions from the different categories in the energy and IPPU sectors.	Resolved. During the review, New Zealand explained that it reviewed the notation keys reported for the energy and IPPU sectors and decided that they were appropriate and did not need to be changed. The ERT agrees with the Party.
E.8	International aviation – liquid fuels – CO_2, CH_4 and N_2O (E.25, 2017) Convention reporting adherence	Evaluate the differences between AD reported in CRF table 1.D and CRF table 1.A(b) for jet kerosene (international aviation bunkers) for all years and correct the identified discrepancies.	Resolved. New Zealand did not include in the NIR any information on the differences between AD for jet kerosene (international aviation bunkers) reported in CRF table 1.D and CRF table 1.A(b). However, The ERT noted that there are no differences for most years (e.g. 2008–2012 and 2015–2017) and for the remaining years, the differences are small and no greater than 0.09 per cent (e.g. 0.03 and 0.008 per cent for 2013 and 2014, respectively).
E.9	1.A.1.c Manufacture of solid fuels and other energy industries – solid fuels – CO_2, CH_4 and N_2O (E.7, 2017) (E.12,	Estimate and report emissions from on-site coal use in the coal mining industry 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	Resolved. New Zealand reported emissions and AD for this subcategory (manufacture of solid fuels and other energy industries) as "NO" in CRF table 1.A(a)s1. The NIR has been updated to clarify that this activity is not occurring for the entire time series (p.89).

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	2016) (E.24, 2015) Completeness	Annex I inventory reporting guidelines in order for the ERT to be able to assess whether the sum of all gases and categories considered insignificant remains below 0.1 per cent of the national total GHG emissions.	
E.10	1.A.2 Manufacturing industries and construction – solid fuels – CO_2 (E.8, 2017) (E.4, 2016) (E.11, 2015) (28, 2014) Consistency	Critically assess whether the ETS EFs reviewed in 2009 are more appropriate for the estimation of emissions from solid fuels and report on this assessment.	Resolved. During the review, New Zealand explained that ETS EFs are no longer used for the estimation of emissions from solid fuels. The Party now uses EFs sourced from CRL Energy Ltd. (2009).
E.11	1.A.3.a Domestic aviation – liquid fuels – CO_2 (E.9, 2017) (E.13, 2016) (E.25, 2015) Accuracy	Estimate CO_2 emissions from domestic aviation using a tier 2 or 3 methodology, in accordance with the 2006 IPCC Guidelines.	Resolved. For estimating emissions from domestic aviation, New Zealand used a country-specific CO_2 EF for jet kerosene. For gasoline, the Party used the default CO_2 EF from the 2006 IPCC Guidelines (vol. 2, table 3.6.4). The ERT noted that the Party estimates CO_2 emissions on the basis of fuel consumption and origin and destination, and that taking into account landing and take-off cycles would not improve the accuracy.
E.12	1.A.3.b Road transportation – liquid and gaseous fuels – CO_2 (E.10, 2017) (E.14, 2016) (E.26, 2015) Convention reporting adherence	Continue to estimate the CO_2 emissions on the basis of fuel sold, but report the CO_2 emissions disaggregated by vehicle mode 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; if discrepancies occur between the top-down and bottom-up approaches and cannot be solved in the submission, continue to report CO_2 emissions aggregated, but investigate and describe in the NIR the possible reasons for the discrepancy in the results of the comparison.	Resolved. Data for 2001 onward were disaggregated where possible (e.g. emissions for categories 1.A.3.b.i (cars), 1.A.3.b.ii (light-duty trucks), 1.A.3.b.iii (heavy-duty trucks and buses) and 1.A.3.b.iv (motorcycles)) (NIR, pp.96–99). During the review, the Party explained that disaggregated data for before 2000 were not available. The ERT noted that New Zealand disaggregated CO_2 emissions by vehicle mode using data on vehicle-kilometres travelled for the years for which such data were available (see ID# E.30 in table 5 for information on the treatment of emissions for 1990–2000 for which data on vehicle-kilometres travelled were not available).
E.13	1.A.3.b Road transportation – liquid fuels – CH_4 and N_2O (E.11, 2017) (E.19, 2016) Accuracy	Apply the procedure for validating vehicle-kilometres travelled with fuel statistics before estimating CH_4 and N_2O emissions with the COPERT IV model (a software tool for calculating road transport emissions), and describe this procedure in the NIR.	Resolved. New Zealand described the procedure it uses for validating vehicle-kilometres travelled with fuel statistics (NIR, p.101).
E.14	1.A.4.c Agriculture, forestry and fishing – liquid fuels – CH_4 and N_2O (E.13, 2017) (E.22, 2016) Accuracy	Collect separate AD for off-road vehicles and other machinery, fishing and stationary combustion activities in this category, and estimate CH_4 and N_2O emissions by applying appropriate EFs for mobile combustion and stationary combustion.	Resolved. New Zealand reported CO_2, CH_4 and N_2O emissions from liquid fuels for subcategories 1.A.4.c.i (stationary combustion), 1.A.4.c.ii (off-road vehicles and other machinery) and 1.A.4.c.iii (fishing) separately. The Party used default CH_4 and N_2O EFs from the 2006 IPCC Guidelines (vol. 2, table 2.5, for stationary combustion, and vol. 2, table 3.3.1, for off-road mobile sources and machinery).
E.15	1.B.1.a Coal mining and handling –	Estimate CH_4 emissions from abandoned underground mines	Addressing. New Zealand reported CH_4 emission estimates for 2012–2016 and "NE"

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	solid fuels – CH_4 (E.14, 2017) (E.17, 2016) (E.31, 2015) Completeness	(subcategory under category 1.B.1.a.i (underground mines)) 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.	for the other years of the time series for the subcategory abandoned underground mines under category 1.B.1.a.i (underground mines). During the review, the Party explained that data were available for one mine only for 2012–2016 (the mine has been flooded since 2017), and that data for other mines for 1990–2017 were not available.
E.16	1.B.1.a Coal mining and handling – solid fuels – CO_2 (E.26, 2017) Accuracy	Clarify in the NIR whether there are any emissions relating to CH_4 recovery/flaring under subcategory 1.B.1.a.i (abandoned underground mines) that are not estimated. If emissions from recovery/flaring do occur, estimate the amount of CH_4 recovered in accordance with the 2006 IPCC Guidelines (vol. 2, section 4.1.5.3). If such emissions do not occur, change the notation key in CRF table 1.B.1 from "NE" to "NO".	Resolved. New Zealand clarified in the NIR that recovery or flaring under subcategory 1.B.1.a.i (abandoned underground mines) does not occur (p.106). The Party reported CH_4 recovery or flaring as "NO" in CRF table 1.B.1.
E.17	1.B.1.a Coal mining and handling – solid fuels – CH_4 (E.16, 2017) (E.26, 2016) Transparency	Improve transparency by describing in the NIR the rationale for the choice of CH_4 EFs for underground mining of bituminous and sub-bituminous coal, as well as by providing a description of the number and types of coal mines active in New Zealand.	Resolved. New Zealand reported that a country-specific CH_4 EF is used for sub-bituminous coal and the IPCC default for bituminous coal (NIR, p.106). The NIR (p.105) includes the number and types of active coal mines, which are obtained from the MBIE coal production survey.
E.18	1.B.2.c Venting and flaring – gaseous fuels – CO_2 (E.18, 2017) (E.27, 2016) Transparency	Improve comparability by reporting CO_2 venting from natural gas processing in subcategory 1.B.2.c.ii (venting (gas)).	Resolved. New Zealand reported CO_2 emissions from venting during natural gas processing under subcategory 1.B.2.c.ii (venting (gas)) in the NIR (p.111) and CRF table 1.B.2.
E.19	1.B.2.c Venting and flaring – gaseous fuels – CH_4 (E.19, 2017) (E.28, 2016) Transparency	If CH_4 emissions from the Kapuni gas treatment plant are not reported, change the notation key used for fugitive CH_4 emissions from natural gas processing (category 1.B.2.b.3) from "NO" to "NE", and describe these emissions in the NIR as well as provide a justification for their insignificance in accordance with decision 24/CP.19, annex, paragraph 37(b).	Resolved. New Zealand reported emissions for subcategory 1.B.2.b.3 (fugitive CH_4 emissions from natural gas processing) as "NE" in CRF table 1.B.2. In the NIR (p.107), the Party stated that, while emissions from the Kapuni plant may include traces of CH_4, the level of these emissions has been determined to be insignificant in comparison with national emissions: a conservative estimate (using the default EF from the 2006 IPCC Guidelines) gives approximately 1.5 kt CO_2 eq/year. The ERT considers that this information is sufficient to justify that the emissions are below the significance threshold established in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
IPPU			
I.1	2. General (IPPU) (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 included in the NIR some information from the ETS regulation on how plant-specific data are estimated (e.g. on p.123). Nevertheless, the ERT considers there is room to improve by including more methodological descriptions (e.g. for iron, steel and aluminium production) from the ETS regulation. During the review, the Party

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			referred to the ETS regulation, showing the ERT, as an example, the equation for estimating emissions from steel production. A carbon balance was indicated, although it excluded the use of coal as a reducing agent, referred to as "obligation coal". The Party explained that obligation coal would be reported by the supplier on a different, energy-related, part of New Zealand Steel's ETS return. This division is unclear to the ERT, as the emissions from coal as a reducing agent are to be reported together under category 2.C.1 (iron and steel production).
I.2	2. General (IPPU) (I.2, 2017) (I.12, 2016) (I.15, 2015) Transparency	Incorporate in the NIR the information available in the ETS regulation, including on coverage and methodologies used for reporting, as well as the additional information not included in the ETS regulation but provided to the ERT during the review on, for example, the frequency of measurement.	Resolved. The ERT considers that the information requested in this recommendation is also requested in the more general recommendation in ID# I.1 above. In addition, the ERT noted that reporting on the frequency of measurements is not a requirement of the UNFCCC Annex I inventory reporting guidelines.
I.3	2.A Mineral industry – CO_2 (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.	Not resolved. Tables 4.2.1 and A2.1.1 in the 2019 submission were the same as those reported in the 2017 submission. The Party reported AD uncertainty of 2 per cent and EF uncertainty of 7 per cent for CO_2 emissions reported for category 2.A in NIR table A2.1.1. The Party continues to report lower uncertainty values for cement and lime in NIR table 4.2.1: 1 per cent for AD for CaO content of clinker and kiln dust and 2 per cent for AD for lime; and 1 per cent for the CO_2 EF for CaO, 5 per cent for the CO_2 EF for kiln dust and 2 per cent for the CO_2 EF for lime. During the review, the Party explained that this issue would be reviewed for the next submission.
I.4	2.A.1 Cement production – CO_2 (I.3, 2017) (I.2, 2016) (I.3, 2015) (36, 2014) (40, 2013) (60, 2012) Transparency	Continue with efforts to improve the transparency of the reporting regarding information on cement production by providing more detailed information in the NIR while maintaining the confidentiality of the sensitive data.	Resolved. The ERT noted that the original recommendation (FCCC/ARR/2012/NZL, para. 60) referred to the Party's reporting of AD and IEFs for cement production as confidential (the original recommendation also referred to the reporting of AD and IEFs for steel production as confidential, but this was addressed in the 2017 submission; see ID# I.12 in document FCCC/ARR/2017/NZL). New Zealand continues to report the AD and IEFs as confidential. However, it explained in its NIR that there were only two companies ever producing clinker in the country, and currently there is just one company (p.121), and that there are only two companies producing steel (p.129). The ERT considers that the Party has justified its reporting.
I.5	2.A.2 Lime production – CO_2 (I.23, 2017) Accuracy	Report in CRF table 2(I).A-Hs1 a consistent type of AD for lime production for all years (e.g. by converting "pure CaO" to "burnt lime" using an appropriate conversion factor) and apply the default EF from	Resolved. New Zealand has been converting the AD for lime production from pure CaO to burned lime since 2014, making the whole time series consistent (see also ID# I.25 in table 5). During the review, the Party provided the ERT with confidential data showing that the AD

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		the 2006 IPCC Guidelines for 1990–2013 accordingly.	considered for 1990–2013 were for high-calcium lime, with a default EF of 0.75 t CO_2/t lime and an extra factor of 0.97 added to account for hydrated lime (2006 IPCC Guidelines, vol. 3, section 2.3.1.3), which demonstrated that the IPCC default EF was applied correctly for 1990–2013.
I.6	2.A.2 Lime production – CO_2 (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. The Party still reported in its NIR (p.123) an EF of 0.75 t/t burned lime produced, not 0.7275 t CO_2/t lime as in CRF table 2(I).A-Hs1 for 1990–2013 (see ID# I.25 in table 5).
I.7	2.A.3 Glass production – CO_2 (I.5, 2017) (I.3, 2016) (I.4, 2015) (36, 2014) (40, 2013) (60, 2012) Transparency	Continue with efforts to improve the transparency of the reporting regarding information on glass production by providing more detailed information in the NIR while maintaining the confidentiality of the sensitive data.	Resolved. The ERT noted that the original recommendation (FCCC/ARR/2012/NZL, para. 60) referred to the Party's reporting of AD and IEFs for glass production as confidential. New Zealand continues to report the AD as confidential (the IEF is reported as "NA"), and it reported CO_2 emissions as "IE". However, the Party explained in its NIR that there are only two companies producing glass in the country and that CO_2 emissions are reported under 2.A.4 (other process uses of carbonates) to protect confidentiality (p.122). The ERT considers that the Party has justified its reporting.
I.8	2.B Chemical industry – CO_2 (I.25, 2017) Convention reporting adherence	Review the calculation of the uncertainties for category 2.B and correct the values given in NIR table A2.1.1, if necessary.	Resolved. New Zealand reviewed the calculation of uncertainties in CO_2 emissions and provided separate uncertainty estimates for all subcategories of category 2.B. New Zealand reported uncertainty for hydrogen production and calcium carbide use in NIR table 4.3.2. The uncertainty reported is 50 per cent for both the AD and EF for calcium carbide use and 2 and 6 per cent, respectively, for the AD and EF for hydrogen production.
I.9	2.B.1 Ammonia production – CO_2 (I.24, 2017) Transparency	(a) Clarify in the NIR (section 4.3.2) that urea used as fertilizer is reported under category 3.H; (b) Either (1) provide an estimate for urea use in selective catalytic reduction (under category 2.D.3) in line with the 2006 IPCC Guidelines or (2) 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.	(a) Not resolved. Regarding urea used as a fertilizer, although New Zealand stated in the NIR (p.126) that it follows the 2006 IPCC Guidelines, the ERT considers that the text should be complemented with the information that the related emissions are reported under category 3.H (urea application); (b) Addressing. Regarding urea used in catalytic reduction, New Zealand reported in its NIR (p.125) that the emissions from the use of urea for the catalytic reduction of diesel exhaust emissions are insignificant. During the review, the Party explained that the emissions are accounted for under category 2.D.3 (other (non-energy products from fuels and solvent use)), as indicated on page 134 of the NIR. New Zealand acknowledged that the sentence on page 125 of the NIR has not been updated and indicated that it would be reviewed in the next submission.
I.10	2.B.5 Carbide production – CO_2 (I.11, 2017) (I.30,	Include the category carbide production in the NIR under chemical industry, including information on the methodology used, choice of EF and	Resolved. New Zealand included this category (2.B.5 (carbide production)) in its NIR with information on the methodology used, choice of EF and source of AD for estimating emissions

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	2016) Transparency	source of AD for this category, and review QA/QC checks related to this category.	(p.126). Regarding QA/QC checks for this category, the Party stated in the NIR (section 4.3.4) that it follows a tier 1 approach.
I.11	2.C.1 Iron and steel production – CO_2 (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 reported in its NIR (p.436) that data from Pacific Steel, which stopped steel production in October 2015, are unlikely to become available. During the review, the Party acknowledged that electrode consumption was not accounted for in the inventory and the provision of a rough estimation could be investigated. The ERT believes that future ERTs should consider this issue further to ensure that emissions from these activities are not underestimated, noting that adjustments cannot be applied to New Zealand's annual submission.
I.12	2.C.3 Aluminium production – PFCs (I.27, 2017) Transparency	Improve the description in the NIR of the reasons for choosing to use a tier 1 method for 1990–1991, explaining that operational practices changed and that up to 1992–1993 the operational strategy allowed the occurrence of frequent anode effects, while after 1993 a better monitoring and control technology in aluminium production allowed for a change in operational practice, which reduced the occurrence of anode effects and which explains the decrease in emissions and in the EF between 1990–1991 and later years.	Resolved. New Zealand reported the reason for using a tier 1 method for estimating PFC emissions from aluminium production for 1990–1991 (NIR, p.132).
I.13	2.C.4 Magnesium production – SF_6 (I.28, 2017) Convention reporting adherence	Correct NIR table 4.4.2 to reflect that AD uncertainty is 100 per cent and EF uncertainty is reported as zero.	Resolved. New Zealand corrected NIR table 4.4.2, reporting 100 per cent uncertainty for AD and zero uncertainty for the EF.
I.14	2.C.4 Magnesium production – SF_6 (I.28, 2017) Convention reporting adherence	State in the NIR that for SF_6 emissions from magnesium casting, a country-specific uncertainty is used rather than the IPCC default uncertainty, and explain the reason for its use.	Not resolved. The Party did not explain in the NIR that it used a country-specific uncertainty or the reasons for its use.
I.15	2.D Non-energy products from fuels and solvent use – CO_2 (I.15, 2017) (I.33, 2016) Convention reporting adherence	Describe the AD for paraffin wax use and lubricant use in CRF table 2(I).A-Hs2 consistently with the description in the NIR, and reassess the QA/QC checks for these sources in order to ensure the consistency of information between the NIR and CRF table 2(I).A-Hs2.	Resolved. New Zealand described the AD for lubricant use and paraffin wax use (NIR, p.135). The description matches that in CRF table 2(I).A-Hs2. As the NIR and the CRF table are consistent, the ERT concludes that the QA/QC checks are appropriate.
I.16	2.D.1 Lubricant use – CO_2 (I.29, 2017) Consistency	(a) If an outlier is found in the CO_2 IEF for estimating emissions from lubricant use, consider averaging the AD before estimating emissions, rather than averaging the emission data; (b) Revise the estimates for 2011–2014 to improve consistency of the time series and include 2015 data in	(a) Resolved. New Zealand reported the same CO_2 IEF (0.594 t/t) for the entire time series for estimating emissions from lubricant use; (b) Resolved. New Zealand reported recalculations for AD, including for 2011–2014, in its NIR (p.137), and reported a revised time series in CRF table 2(I).A-Hs2. NIR section 4.5.5 explains the recalculations. NIR

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		the assumption to avoid significant changes in the CO_2 IEF.	section 4.5.2 on AD explains how the AD were estimated.
I.17	2.E Electronics industry 2.F Product uses as substitutes for ozone-depleting substances 2.G Other product manufacture and use – HFCs, PFCs and SF_6 (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 these categories.	Addressing. New Zealand reported little further information on categories 2.F and 2.G compared with that in the 2017 submission and did not include all the information indicated in the 2006 IPCC Guidelines (vol. 3) for categories 2.E (electronics industry) (section 6.4.2), 2.F (product uses as substitutes for ozone-depleting substances) (sections 7.1.4.2, 7.2.4.2, 7.3.4.2, 7.4.4.2, 7.5.4.2, 7.6.4.2 and 7.7.4.2) and 2.G (other product manufacture and use) (sections 8.2.4.2, 8.3.4.2 and 8.4.4).
I.18	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.30, 2017) Transparency	Explain, in section 4.7.3 of the NIR, which approach (other than a combination of uncertainties) was used to derive the uncertainty of 35 per cent, presented in NIR table A.2.1.1.	Addressing. New Zealand reported that expert judgment was used in estimating uncertainties for category 2.F (product uses as substitutes for ozone-depleting substances) (NIR, p.142). However, it did not explain how the 35 per cent uncertainty for AD, reported in NIR table A.2.1.1, was calculated.
I.19	2.F.1 Refrigeration and air conditioning – HFCs (I.17, 2017) (I.37, 2016) Transparency	Describe in the NIR the methodology used to derive the 2 per cent decline in refrigerant charge in vehicle air-conditioning systems, and demonstrate that this methodology is in line with the splicing techniques in the 2006 IPCC Guidelines.	Not resolved. New Zealand did not report in its NIR any explanation for the 2 per cent decline in refrigerant charge in vehicle air-conditioning systems. During the review, the Party indicated that a description of the methodology used to derive the decline would be explained in the next submission.
I.20	2.F.1 Refrigeration and air conditioning – HFCs (I.31, 2017) Accuracy	(a) Review the data underlying the estimation of HFC emissions from commercial and industrial refrigeration, in particular the development of average annual stocks in recent years; (b) Provide, in section 4.7.2 of the NIR, a brief explanation for the exceptionally high product life factors of HFC-143a in commercial refrigeration and HFC-134a in industrial refrigeration.	Resolved. (a) New Zealand reviewed the average annual stocks of HFCs in recent years and recalculated the emissions accordingly; (b) Regarding the exceptionally high product life factors of HFC-143a and HFC-134a, the ERT noted that the Party stated that it revised them to ensure that the total results for all sub-applications were consistent with the much more complete and accurate data available to estimate the total mass balance (for all five sub-applications) for each chemical (NIR, p.141).
I.21	2.F.1 Refrigeration and air conditioning – HFCs (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 did not update in its inventory the average charge of HFC-134a for 2010 onward. The Party did not provide any information on the planned survey for vehicle importers referred to in the previous review report. During the review, the Party explained that this information would be provided in the next submission. The ERT believes that future ERTs should consider this issue further to ensure that emissions for this category are not underestimated, noting that adjustments cannot be applied to New Zealand's annual submission.
I.22	2.G.2 SF_6 and PFCs from other product use – SF_6 (I.21, 2017) (I.23,	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	Addressing. New Zealand reported in its NIR that SF_6 is not used in the country for tyre and shoe manufacturing (p.144) but it did not include any information on double-glazed

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	2016) (I.26, 2015) Transparency	that was provided to the 2015 ERT as responses to questions and a background report.	window manufacturing. During the review, the Party explained that no use of SF_6 in double-glazed windows was identified in the country, and indicated that the 2020 NIR would be updated accordingly.
Agriculture			
A.1	3. General (agriculture) – CH_4 (A.4, 2017) Transparency	Provide in the NIR the list of livestock species included in the category other poultry and provide explanations regarding the methodology used to estimate emissions and EFs for ostriches and emus.	Resolved. New Zealand reported in its NIR (p.163) a list of species included under other poultry and information on the methodology used for estimating the population of other poultry: namely that the livestock included in the estimation for poultry are chickens (subcategorized to broilers and layers), ducks, turkeys, emus and ostriches; and that emissions from poultry were estimated using tier 1 methods from the 2006 IPCC Guidelines and default EFs for Oceania. Manure management emissions from other poultry are reported in CRF table 3.B(a)s1. The methodology is described in the NIR (p.184) and the applicable manure management systems are also described in the NIR (annex 17). The Party reported in the documentation box to CRF table 3.A that the 2006 IPCC Guidelines (vol. 4, p.10.27) do not include a tier 1 method for estimating CH_4 emissions from the enteric fermentation of poultry and that, on the basis of table 10.10 of the 2006 IPCC Guidelines, that there are insufficient data to establish a CH_4 EF. The ERT considers that the issue is resolved regarding the estimation of the population and the manure management emissions of other poultry (CRF table 3.B(a)s1). The ERT understands that reporting CH_4 emissions from enteric fermentation of ostriches and emus is not mandatory.
A.2	3.A.4 Other livestock – CH_4 (A.5, 2017) Transparency	Provide in the NIR information on the breeding of rabbits and fur-bearing animals.	Addressing. New Zealand reported that it is investigating the issue and would report on it in its next submission (NIR table 10.2.2). In the meantime, the Party continues to categorize rabbits and fur-bearing animals as agricultural pests in its NIR (p.163).
A.3	3.B.1 Cattle – CH_4 (A.1, 2017) (A.5, 2016) Transparency	Include more detailed information in the NIR on possible reasons for the significant inter-annual changes in the CH_4 IEF (e.g. the variability of typical climate events in New Zealand, the distribution of agricultural industries across New Zealand, commodity prices and improvements in breeding/genetics).	Resolved. New Zealand reported in NIR table 5.2.3 inter-annual variability in the CH_4 IEF. The variability is detailed and explained, including its correlation with climatic conditions, in the NIR (section 5.1.1, p.152).
LULUCF			
L.1	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.1, 2017) (L.2,	Review and, where necessary, update the carbon fractions of biomass applied in all categories using the appropriate values in the 2006 IPCC Guidelines.	Resolved. New Zealand reported that a wood carbon content value of 50 per cent was used in the HWP model to maintain consistency with the planted forest model (table 4.3 of the 2006 IPCC Guidelines) (NIR, p.311). The ERT noted that such a value does not correspond to values

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	2016) (L.6, 2015) Accuracy		contained in table 4.3 of the 2006 IPCC Guidelines (vol. 4). During the review, the Party explained that carbon fractions for planted forests have been updated using country-specific data, and therefore it considers the issue to be resolved. The ERT noted, however, that the NIR text needs to be updated (see ID# L.13 in table 5).
L.2	4.A Forest land – CO_2 (L.3, 2017) Accuracy	Reanalyse the harvesting age assumption on the average harvest age and recalculate the emissions if a justification that emissions are not overestimated or underestimated cannot be provided, noting the risk of inaccurate estimation of emissions/ removals resulting from, for example, a voluntary decision to harvest before the average age (e.g. owing to wood and land market fluctuations), and report the outcomes of this exercise in the NIR.	Resolved. New Zealand reported that in its forest plantations the harvesting age is assumed to be 28 years (NIR, p.273), and that in post-1989 plantations longer rotation crops are assumed to be harvested at the oldest possible age in a given year (e.g. the age of 27 years in 2017) (NIR, p.231). During the review, the Party explained that the finding has been implemented in the inventory, as follows: (a) The early harvest of forests is recognized in the inventory and is described in the NIR (p.272); (b) The harvest area in planted forests is profiled to accurately reflect the actual ages at which harvesting takes place; (c) The harvest profile is derived from NEFD; (d) The profiled harvesting approach is used because harvesting at a single age (e.g. 28 years) can lead to the harvest area exceeding the available area in a single age class; (e) The profiling of harvest maintains the integrity of the underlying age class by preventing over-mature forest from growing on unharvested forests, and the profiling does not affect emissions because the average harvest age remains consistent between the single age class and the profiled harvesting approach; (f) The area of post-1989 forest harvesting is estimated from the harvested area mapped between 2008 and 2017. Further, the 2017 NEFD reports that (1) work is being planned to reconcile discrepancies between NEFD statistics and data on total roundwood removal contained in the national forestry production statistics, (2) radiata pine is typically harvested between 26 and 32 years of age and (3) the area-weighted average clear-fell age of radiata pine decreased from 29.1 years in 2016 to 28.4 years in the year ended 31 March 2017. The ERT considers the issue to be resolved because the age of harvest is profiled according to information on actual age at harvesting collected through NEFD for areas of harvest of 40 ha or more. However, the ERT notes that information reported in the NIR does not allow a clear understanding of the actual age at harvesting and of the age of harvest input in the LUCAS model (see ID# L.17 in table 5).

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
L.3	4.A Forest land – CO_2 (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.	Addressing. New Zealand reported the same information on this issue as that reported in the 2017 NIR. During the review, the Party explained that it still considers the explanation it gave to the previous ERT to be valid. However, further measurements and other data have been collected in pre-1990 natural forests, using a country-specific plot network measurement methodology, in order to update pre-1990 natural forest EFs. The Party indicated that the reanalysis would be included in the 2020 submission and the partial analysis of the third measurement cycle should be included in the 2022 submission. The ERT noted that such planned recalculations are included in the improvement plan reported in the NIR (p.234).
L.4	4.A.1 Forest land remaining forest land – CO_2 (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, and in the meantime, report in the NIR on the progress of this work.	Addressing. New Zealand reported the same information on this issue as that reported in the 2017 NIR (e.g. p.275). During the review, the Party confirmed that it provided no update in the 2019 submission regarding the below-ground biomass ratio used. The Party explained that biomass allocation to roots is likely to vary greatly among sites and emphasized the need for long-term data. New Zealand, in its 2019 submission, described how plot network measurements are carried out (NIR pp.274–281). Work is under way on reanalysing the existing field data to update the pre-1990 natural forest EFs; the Party indicated that these EFs should be ready by the 2020 submission. Furthermore, New Zealand has conducted a literature review on root biomass allocation in southern temperate forests and submitted it to the journal *Forest Ecology and Management*. The review includes the following values for below-ground biomass ratios: angiosperms and monocots (palms and cabbage trees), 0.234; tree ferns, 0.194; and gymnosperms, 0.245. The review indicates that root to shoot ratios are generally close to values given by previous assessments, which supports current approaches for biomass and carbon estimation but leaves room for refinement. The Party indicated that the results of the review would be included in the 2020 submission. The ERT noted that the single root to shoot ratio currently being used is planned to be replaced by three different values in the 2020 submission.
L.5	4.A.2 Land converted to forest land – CO_2 (L.6, 2017) Transparency	Include information on the reasons for the inter-annual changes in the net CSC in deadwood per area for category 4.A.2.4 (settlements converted to forest land), in particular the inter-annual changes observed for 2011 onward.	Resolved. New Zealand reported in the NIR (p.282) that plantation forests are actively managed, with thinning and pruning undertaken early in the rotation. The majority of these activities are completed before trees reach the age of 13 years. Thus the deadwood and litter pools from these management practices gradually increase leading up to this age. After the age of 13 years, when pruning and thinning

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			cease and decay exceeds inputs, these pools decline. Owing to the age-class structure of post-1989 forests in New Zealand, a rapid increase in the deadwood and litter pools can be seen over consecutive years, with a trend that first increases from 1990 to 2003 and thereafter decreases to negative values for the implied CSC factor of both deadwood and litter (CRF table 4.A). The ERT noted that the explanation justifies the observed trend.
L.6	4.D Wetlands – CO_2 (L.7, 2017) Completeness	Continue the ongoing work to improve estimates for wetlands and report the emissions for subcategories 4.D.1.1 (peat extraction remaining peat extraction) and 4.D.2.1 (land converted to peat extraction).	Addressing. New Zealand reported estimates for CSCs for subcategory 4.D.1.1 (peat extraction remaining peat extraction) but continued to report "NE" for subcategory 4.D.2.1 (land converted to peat extraction) in CRF table 4.D.
L.7	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O (L.9, 2017) Convention reporting adherence	Correct the C/N ratio to 15:1 in the NIR (p.300).	Not resolved. New Zealand reported in its NIR (p.314) that the IPCC default C/N ratio for soil organic matter (1:15) from the 2006 IPCC Guidelines was used. During the review, the Party confirmed that the correct C/N ratio of 15:1 from the 2006 IPCC Guidelines (vol. 4) was used in the calculation of emissions for this category. However, the ERT noted that the incorrect C/N ratio of 1:15 is still reported in the NIR (p.314). The Party indicated that the correct value would be reported in the 2020 submission.
Waste			
W.1	5. General (waste) – CH_4 (W.1, 2017) (W.2, 2016) (W.2 and W.5, 2015) Transparency	Provide, in the NIR, tables with information on AD (for the entire time series) at the level at which the estimates are calculated or, where this is not possible owing to large amounts of data or for confidentiality reasons, provide summaries of AD at an appropriate level.	Resolved. New Zealand reported in its NIR detailed AD on solid waste deposited at municipal, uncategorized and non-municipal landfills and farm fills (pp.334–340) and on waste incineration (section 7.4.2). The ERT considers that these AD improve the transparency of the estimates.
W.2	5. General (waste) – CO_2, CH_4 and N_2O (W.2, 2017) (W.10, 2016) Transparency	Noting the recommendation in ID# W.1 above (W.2, 2016) provide, in the NIR, tables with information on waste generation and various treatment options (for the entire time series).	Resolved. New Zealand reported in its NIR tables with information on waste generation and various treatment options for the entire time series (pp.334, 350 and 356–357).
W.3	5.A Solid waste disposal on land – CH_4 (W.4, 2017) (W.3, 2016) (W.6, 2015) Transparency	Provide a summary of AD (amount) for the entire time series by waste type and SWDS type as well as additional information on the source of the data.	Resolved. New Zealand reported AD for the entire time series by waste type and SWDS type as well as additional information on the source of the data. NIR table 7.2.2 contains data for 1950–2017 on solid waste disposed to municipal and uncategorized landfills, and NIR table 7.2.3 contains data on solid waste disposed to unmanaged landfills (non-municipal landfills and farm fills).
W.4	5.A Solid waste disposal on land – CH_4 (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	Addressing. New Zealand reported additional information on the country-specific default values for CH_4 recovery efficiency in its NIR (pp.341–343). The ERT noted that the Party referred to a report on estimates of landfill CH_4 recovered in New Zealand from 1990 to 2012

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		for which metered data are not available to 20 per cent, in order to be consistent with the guidance in the 2006 IPCC Guidelines.	(SKM, 2009). During the review, the Party provided the ERT with that report, which contains detailed information on each landfill where landfill gas is collected and actual recovery rates from historical metered data. The report found that collection efficiency varied from 42 to 90 per cent over the landfills depending on recovery technology used. The Party also provided the ERT with a report containing ETS landfill gas technical advice (Tonkin and Taylor Ltd., 2016), which confirmed that the high level of collection efficiencies currently reported under the ETS are either the actual rates or a result of the default model underestimating landfill gas generation rates. The study suggests that a regional k value based on rainfall could justify the 90 per cent collection efficiency reported for some sites. However, the study noted that a regional k value based on rainfall is likely to result in a lower collection efficiency for the facility in Southland than currently estimated. The study also suggests that using regional k values could improve the transparency of the reported collection efficiency. The ERT believes that future ERTs should consider the issue further to ensure that emissions are not underestimated, noting that adjustments cannot be applied to New Zealand's annual submission.
W.5	5.A Solid waste disposal on land – CH_4 (W.6, 2017) (W.5, 2016) (W.7, 2015) Accuracy	For the four sites where metered data are only available for one year, confirm the data used for each year, either by continuous monitoring of the CH_4 recovered from the sites or by using drivers such as electricity production from the recovered gas, in accordance with the 2006 IPCC Guidelines.	Resolved. New Zealand reported the methods of determining recovery rate and total amounts of CH_4 recovery in its NIR (table 7.2.6). The landfills in the country are divided into two groups: in one group recovery rate is calculated as a UEF from the ETS, and in the other group recovery rate is calculated for each site on the basis of the local conditions. During the review, the Party explained that the UEF calculations are confidential, but UEFs are required to be verified through a third party as part of the process of obtaining a UEF. Since 2014, UEFs have been published annually in the *New Zealand Gazette* (see https://gazette.govt.nz).
W.6	5.A Solid waste disposal on land – CH_4 (W.7, 2017) (W.6, 2016) (W.8, 2015) Transparency	Provide data on the SWDS at which it is confirmed that CH_4 recovery takes place and data on the amount of CH_4 recovered for which metered data on the recovery are available. Provide this information separately for energy recovery and flaring. The information can be provided as an aggregate value for the SWDS in question.	Resolved. New Zealand reported data on CH_4 recovery rate (NIR table 7.2.6) and amounts for landfill sites with landfill gas recovery for 2017 (NIR, p.342). For details, see ID#s W.4 and W.5 above.
W.7	5.A Solid waste disposal on land – CH_4 (W.8, 2017) (W.7, 2016) (W.9, 2015) Accuracy	Ensure consistency in the methodology and parameters used to estimate CH_4 generation across SWDS, and if the methodology and parameters are not from the 2006 IPCC Guidelines (1) justify that the methodology applies to the national	Resolved. New Zealand recalculated its estimates and reported a summary of parameters used for estimating CH_4 generation across SWDS (NIR table 7.2.7). The Party used an IPCC methodology and country-specific and IPCC default parameters, all of which are

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		circumstances and (2) improve the description in the NIR when SWDS-specific parameters are used in the estimation of the CH_4 emissions from SWDS by clarifying the sources for the parameters and providing the reasons for using different parameters.	described in the NIR (section 7.2.2, pp.334–346).
W.8	5.A.1 Managed waste disposal sites – CH_4 (W.9, 2017) (W.11, 2016) Transparency	Either provide a better justification for the country-specific rate constant for biodegradation in landfills for municipal solid waste, or calculate CH_4 generation for municipal landfills with the default rate constant k for biodegradation from the 2006 IPCC Guidelines.	Addressing. New Zealand reported a revised k value of 0.038–0.0627/year for landfills with CH_4 recovery (NIR table 7.2.7) and for non-municipal landfills and farm fills values of 0.030–0.185 and 0.09, respectively (NIR, pp.344–345). The ERT noted that the Party used a country-specific value for managed landfills with landfill gas recovery and the default value from the 2006 IPCC Guidelines (vol. 5, table 3.3) for managed landfills without landfill gas recovery and uncategorized landfills (i.e. non-municipal landfills and farm fills). During the review, the Party presented a study that justifies the revised k values for biodegradation in landfills for municipal waste (Tonkin and Taylor Ltd., 2016). The ERT considers that adding a summary of the study that justifies the country-specific k values to the NIR would resolve the issue.
W.9	5.A.1.a Anaerobic – general (W.14, 2017) Convention reporting adherence	Update the NIR and make reference to subcategory 5.A.1.a in the subheading "Municipal landfills" under NIR section 7.2.2.	Resolved. New Zealand updated the reference to subcategory 5.A.1.a in the subheading "Municipal landfills (5.A.1.a and 5.A.3)" under NIR section 7.2.2 (p.334).
W.10	5.A.2 Unmanaged waste disposal sites – CH_4 (W.10, 2017) (W.12, 2016) Accuracy	Improve the degradable organic carbon content of farm waste using the average waste composition of the various farm wastes determined from local studies.	Resolved. New Zealand reported in its NIR a degradable organic carbon content value of 0.184–0.331 kt C/kt waste for farm fills for organic waste, household waste and various types of farming waste (p.345). The ERT noted that these values are similar to the IPCC default values (0.20–0.43) from the 2006 IPCC Guidelines (vol. 5, table 2.4; 0.20 for garden and park waste and 0.43 for wood). During the review, the Party presented the study referenced in the NIR on GHG estimates from non-municipal landfills (Tonkin and Taylor Ltd., 2016) (p.368), which confirms the values for the degradable organic carbon content of farm waste. The ERT suggests that the Party include in the NIR a summary of the referenced study.
W.11	5.B.1 Composting – CH_4 and N_2O (W.15, 2017) Convention reporting adherence	Improve the consistency of reporting in NIR sections 7.1.2 and 7.3, including figure 7.1.2, to reflect that category 5.B.1 is "NE", and include (1) information on the exclusion of category 5.B.1 in terms of the likely level of emissions in the waste chapter (under the relevant section) and (2) a cross reference to NIR annex section A6.2.1.	Resolved. New Zealand reported CH_4 and N_2O emissions for category 5.B.1 (composting) for the first time in the NIR (p.347) and CRF table 5.B. The Party mentioned in the NIR (p.348) that no other biological treatment of solid waste occurs in the country.

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
W.12	5.B.1 Composting – CH_4 and N_2O (W.16, 2017) Transparency	Update the calculation in the NIR justifying the use of "NE" for CH_4 and N_2O emissions for category 5.B.1 in the NIR (annex section A6.2.1).	Resolved. New Zealand reported CH_4 and N_2O emissions for category 5.B.1 (composting) for the first time in the NIR (p.347) and CRF table 5.B.
W.13	5.C.1 Waste incineration – CH_4 and N_2O (W.17, 2017) Transparency	(a) Include in the NIR an explanation of how the CH_4 and N_2O EFs were selected and provide relevant references to the 2006 IPCC Guidelines; (b) If the default EFs are derived, explain the assumptions and how the EFs were obtained; (c) Check the value of the CH_4 EF for clinical waste in NIR table 7.4.1 (1.79 kg/kt) and correct it, as appropriate.	Resolved. New Zealand reported a summary of parameters used for estimating CH_4 and N_2O emissions from waste incineration in NIR table 7.4.4. The CH_4 and N_2O EFs are default values from the 2006 IPCC Guidelines (vol. 5, tables 5.3–5.6). The Party corrected the value of the CH_4 EF for clinical waste in NIR table 7.4.4 (the correct value being 17.86 kg/kt). Regarding the N_2O EF, the Party used the default value of 900 kg/kt from the 2006 IPCC Guidelines (vol. 5, table 5.6), as indicated in NIR table 7.4.4.
W.14	5.D.1 Domestic wastewater – CH_4 and N_2O (W.18, 2017) Accuracy	Apply an average population inflation factor to all known populations served by wastewater treatment plants to estimate emissions for category 5.D.1 and provide the associated justification of methods and assumptions in the NIR.	Resolved. New Zealand reported emissions from the population (0.4 million people) for which there are no data on the type of wastewater treatment used. CH_4 and N_2O emissions for the domestic wastewater source category have been increased by a fraction determined by the missing population as a proportion of the population for which emissions are known (NIR, p.355), as recommended by the previous ERT.
W.15	5.D.1 Domestic wastewater – N_2O (W.19, 2017) Convention reporting adherence	Report a value of 1.25 for the industrial and commercial co-discharged protein parameter and 1.40 for the fraction of non-consumed protein in CRF table 5.D.	Resolved. New Zealand reported a value of 1.25 for the industrial and commercial co-discharged protein parameter and a value of 1.40 for the fraction of non-consumed protein in CRF table 5.D.
W.16	5.D.1 Domestic wastewater – CH_4 (W.13, 2017) (W.15, 2016) Accuracy	Calculate emissions from septic tanks assuming a correction factor for additional industrial biological oxygen demand discharged into sewers of 1.	Resolved. New Zealand did not use a correction factor for emissions from septic tanks (NIR, p.361), which is equivalent to using a factor of 1.
KP-LULUCF activities			
KL.1	General (KP-LULUCF activities) – CO_2, CH_4 and N_2O (KL.3, 2017) Transparency	Enhance the internal coherence of the NIR and the adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol, by including the correct approaches and methods used.	Resolved. New Zealand reported information on approaches and reporting methods applied for land representation in its NIR (section 11.2.3). During the review, the Party explained that because of the use of surrogate data to estimate land-use change between mapping activities, it would be more accurate to say that the methodology is a combination of approaches 2 and 3 and reporting methods 1 and 2 (as coherently reported in NIR section 6.3). The ERT agrees that combining approaches and using surrogate data does not necessarily imply an inconsistency in the time series.
KL.2	AR – CO_2 (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	Addressing. The Party reported in NIR table 10.2.2 that it added table 11.3.1a to section 11.3.2 to provide this information in the NIR. During the review, the Party explained that

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		presented in CRF table 4.A) and AR areas reported in CRF table 4(KP-1)A.1.	post-1989 forests include a relatively small component of natural forests and that NIR table 11.3.1a provides synthesized information on the correspondence between forest land categories (i.e. the area of planted forest versus natural forest as presented in CRF table 4.A), and the areas of AR are reported in CRF table 4(KP-1)A.1. However, a table showing 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 was not added to the NIR.
KL.3	AR – CO_2 (KL.6, 2017) KP reporting adherence	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.	Addressing. New Zealand reported information on how surrogate data have been used to integrate information on AR derived from overlapping land maps in its NIR (section 6.2.2, figure 6.2.4, and associated information). During the review, the Party explained that the spatial extent of afforestation occurring between 1990 and 2007 was explicitly mapped in 2007 from satellite imagery. A comparison with 1990 satellite imagery was made to ensure that each area of forest was not present in 1990 and could therefore be classified as post-1989 forest (an illustration of this decision-making process can be found in NIR figure 6.2.4). Although the location and size of afforestation areas can be determined from satellite imagery dated 1990 and 2007, the year of planting cannot be determined. New Zealand has insufficient data to make this determination, so planting data from NEFD have been used to apportion the mapped afforestation into planting years. In this way, the planting trends of NEFD are applied to the inventory while retaining the total area of afforestation mapped as at 31 December 2007. The ERT noted that the information reported in the NIR does not clearly address issues (a) and (b) identified in the 2017 review. During the review the Party explained that: (a) Classification of land converted to forest land is done with a semi-automated method, which implies that land-cover changes are classified by an operator who applies consideration of the context (management, environmental factors) to discriminate between natural forests and woody grassland; (b) All lands converted to forest land are classified as AR because they are planted or fenced for forest regeneration and are subject to all protection provisions for forests that qualify for protection of seed sources (as per the AR definition in the annex to decision 16/CMP.1). The use of maps resolves issue (c).
KL.4	Deforestation – CO_2, CH_4 and N_2O	(a) Include in the NIR the additional information provided to the ERT during the 2017 review explaining	Resolved. New Zealand reported information on how surrogate data have been used to integrate information on deforestation derived

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(KL.7, 2017) Transparency	(1) how the forest definition is distinguishable from, for example, the subcategory grassland with up to 30 per cent woody biomass and (2) the geographical location of the boundaries of the areas that encompass lands subject to deforestation activities; (b) Include in the NIR the information contained in the spreadsheet provided to the ERT during the 2017 review on the split of the areas for deforestation.	from overlapping land maps in its NIR (section 6.2.2, figure 6.2.5, and associated information). The NIR section on distinction between afforestation and grassland with woody biomass (p.438) addresses the first recommendation of the previous ERT, and the ERT noted that grassland is distinguished, within a range of certainty, from forest through semi-automated image processing that includes visual interpretation; further, the geographical boundaries of deforestation are delineated in the map overlapping exercise. Regarding the second recommendation, NIR figure 11.3.1 contains information on the split of the areas of deforestation among the four forest subcategories (although post-1989 forest subcategories are reported in aggregate).
KL.5	FM – CO_2 (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. New Zealand reported in CRF table 4(KP-I)B.1 SOC changes in mineral soils, although the values include some of the subcategories under FM only, while SOC in pre-1990 natural forests is assumed to be in equilibrium. During the review, the Party explained that the land reported under FM has remained in the same land-use subdivision for more than 20 years, and mineral soil carbon stocks are assumed to have reached steady state. New Zealand models the effects of land use on mineral soil carbon on the basis of empirical measurements collected from each land-use subdivision in steady state, specifically to model land-use change and management effects. The pre-1990 forests are subdivided into natural and planted forest types, which allows the different management methods to be taken into account. Where the land reported under FM is no longer in its native land use, irrespective of how long it has been in that land use, if organic soil is present, the SOC pool is an ongoing source of emissions, and is reported. More detail is provided in section 6.3 of the NIR. New Zealand also explained that the LULUCF sector has a limited research budget each year. Long-term soil sampling in tall natural forests would consume most of the budget, which would significantly jeopardize the allocation of resources to work on categories of greater contribution to the key category analysis (e.g. above-ground biomass stocks in forest land remaining forest land). The ERT noted that although the reporting of SOC in mineral soils in land under FM is based on the IPCC default assumption (tier 1) that no changes in mineral soils occur once equilibrium is achieved for the specific combination of climate zone, soil type, land use, management system and level of carbon inputs, the Party reported no information to justify that SOC in

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			pre-1990 natural forests is in equilibrium. The ERT notes that many countries provide a justification based on reasoning supported by limited data. Considering that resources are limited, the ERT suggests that the Party use available information on SOC changes in mineral soils under FM to build such a justification.
KL.6	FM – CO_2 (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.	Not resolved. New Zealand reported that it plans to provide the required information in its next annual submission (NIR table 10.2.2). During the review, the Party explained that land converted to forest land and AR are not aligned. This is because AR has a base year of 1990, and all new forests established from this date remain in this category regardless of age, unless deforested. For example, a forest planted in 1990 will always be reported in AR, including over subsequent rotations; however, this same forest will only be reported under land converted to forest land for a 28-year period, at which point it will transition to land remaining forest land. Further, a forest established in 1989 will never be reported under AR, but will be reported under land converted to forest land for a 28-year period (i.e. until 2017), at which point it will transition to land remaining forest land. Although the information provided during the review is incomplete, the ERT noted that the Party plans to report complete information in the next annual submission.
KL.7	FM – CO_2 (KL.9, 2017) Comparability	(a) Report on the area subject to the carbon equivalent forest provision and associated emissions in CRF table 4(KP-1)B.1.2; (b) Provide additional information on the difference between the assumptions on carbon equivalent forest AD made in the original and revised FMRL submissions and the actual AD in the GHG inventory.	Resolved. New Zealand reported the required information in CRF table 4(KP-I)B.1.2. In NIR table A5.1.1, the areas of CEF applied in the technical correction of the FMRL are reported and the differences compared with the original FMRL are discussed in NIR section A5.1.2.

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

[b] The report on the review of the 2018 annual submission of New Zealand was not available at the time of the 2019 review. Therefore, the previous recommendations reflected in table 3 are taken from the 2017 annual review report. For the same reason, 2018 is excluded from the list of review years in which the issue could have been identified.

IV. Issues identified in three 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 included in table 4 have been identified in three successive reviews, including

the review of the 2019 annual submission of New Zealand, and have not been addressed by the Party.

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

ID#	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed*[a]
General	No issues identified	
Energy		
E.2	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	6 (2013–2019)
E.3	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	6 (2013–2019)
E.15	Estimate CH_4 emissions from abandoned underground mines (subcategory under category 1.B.1.a.i (underground mines)) 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	4 (2015–2019)
IPPU		
I.1	Include in the NIR detailed information and methodological descriptions on how plant-specific data are estimated	6 (2013–2019)
I.17	Include in the NIR all the information indicated in the section "Reporting and documentation" of the 2006 IPCC Guidelines for these categories	4 (2015–2019)
I.19	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	3 (2016–2019)
I.22	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	4 (2015–2019)
Agriculture	No issues identified	
LULUCF	No issues identified	
Waste		
W.4	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	4 (2015–2019)
W.8	Either provide a better justification for the country-specific rate constant for biodegradation in landfills for municipal solid waste, or calculate CH_4 generation for municipal landfills with the default rate constant k for biodegradation from the 2006 IPCC Guidelines	3 (2016–2019)
KP-LULUCF activities	No issues identified	

[a] The report on the review of the 2018 annual submission of New Zealand has not yet been published. Therefore, 2018 was not included when counting the number of successive years in table 4.

V. Additional findings made during the individual review of the 2019 annual submission

9. Table 5 contains findings made by the ERT during the individual review of the 2019 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 2019 annual submission of New Zealand

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
General			
G.3	Article 3, paragraph 14, of the Kyoto Protocol	The Party did not provide information on changes in its reporting on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol in its annual submission. During the review, New Zealand explained it had made the following changes in its reporting under Article 3, paragraph 14: (a) Minor edits to NIR section 15.1 to improve readability and to clarify that all activities funded under the New Zealand Aid Programme are required to assess and respond to environmental and social impacts and risks; (b) Reallocation of the text about fossil fuel subsidies from NIR section 15.2 to 15.3 to better fit within the structure of chapter 15; (c) An update of the content of NIR section 15.3 to include advocacy activities on fossil fuel subsidy reform in 2017 (i.e. sharing a guidebook on reviews of fossil fuel subsidies with the 54th Asia-Pacific Economic Cooperation Energy Working Group (hosted in New Zealand); a ministerial-level event at the twenty-third session of the Conference of the Parties; a ministerial statement to the World Trade Organization, endorsed by 11 other members, encouraging it to address fossil fuel subsidies; and side events on fossil fuel subsidy reform on the margins of the 2017 World Bank and International Monetary Fund Spring Meetings); (d) The inclusion in NIR section 15.6 of further information on the power generation capacity of the solar photovoltaic systems that New Zealand provided as climate-related support for Samoa; (e) An update on New Zealand's participation in the International Renewable Energy Agency to support Pacific and small island developing States in promoting the widespread use of all forms of renewable energy (NIR section 15.6). The ERT, taking into account the confirmed changes in the reporting, concluded that the information provided is complete and transparent. The ERT recommends that New Zealand report in the NIR information on changes in its reporting on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.	Yes. KP reporting adherence
G.4	Methods	The Party did not include in the NIR a summary table to indicate the method (tier level) and type of EF (IPCC default, country-specific or plant-specific) applied for each key category. The ERT noted that a summary table would facilitate it in determining whether recommended methods from the appropriate decision tree in the 2006 IPCC Guidelines had been used for estimating emissions and removals for key categories, in line with paragraph 50(c) of the UNFCCC Annex I inventory reporting guidelines. During the review, the Party provided the ERT with a summary table that includes the method and type of EF applied for each key category. The ERT encourages New Zealand to improve the transparency of its reporting by including a summary table with the method (tier level) and type of EF (IPCC default, country-specific or plant-specific) applied for each key category, with a brief explanation or a reference to the external sources.	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
G.5	QA/QC and verification	The Party reported information on a number of QA activities, including external audits and bilateral meetings, for each sector in the NIR (e.g. p.30). New Zealand also reported that an in-depth review of sector inventories or their components is planned every 5 to 10 years (NIR, pp.30–31). During the review, the Party provided additional details of its plans regarding QA activities. For the agriculture sector, these comprise an external review of the NIR (to be completed in time for the 2020 GHG inventory submission); an external review and evaluation of the agriculture inventory research fund, which is used for improving the accuracy of the agriculture inventory (due for completion in the second half of 2020); and bilateral meetings with inventory compilers from Canada and the United Kingdom of Great Britain and Northern Ireland to discuss modelling software (planned for late 2019). For the LULUCF sector, New Zealand Forest Research Institute (Scion) conducts an analysis of the planted forest plot network every year and an analysis of the natural forest plot network every five years. For the waste sector, a budget has been assigned for reviewing the sector in the 2019/2020 financial year, but the focus of the review is yet to be determined. For the energy and IPPU sectors, there are no immediate plans. The ERT commends the Party for its QA plans. The ERT encourages New Zealand to report in the NIR on the outcomes of its planned QA activities, namely (1) for the agriculture sector, an external review of the NIR, an external review and evaluation of the agriculture inventory research fund used to improve the accuracy of the agriculture inventory, and bilateral meetings with inventory compilers from Canada and the United Kingdom of Great Britain and Northern Ireland to discuss modelling software; (2) for the LULUCF sector, the annual analysis of the planted forest plot network and any analysis of the natural forest plot network; (3) for the waste sector, the review budgeted in the 2019–2020 financial year.	Not an issue/problem
G.6	QA/QC and verification	The Party reported on the development and application of two automated QC tools (NIR, pp.29–30). The "CRF viewer and tools" are the primary means of cross-sectoral analysis of CRF data. They perform the custom key category analysis and generate data and graphs used in the cross-sectoral chapters of the NIR. The "QC10 CRF QC tools" perform automated checking of CRF tables for data integrity. They comprise a tool for identifying large variations in IEFs of each category; a completeness tool for identifying blank cells and "NE" and "IE" in the CRF tables; and a tool for identifying possible changes in the data type of a cell of the CRF tables (e.g. a change from quantitative data to a notation key). The ERT commends the Party for the development of the automated QC tools. The ERT encourages New Zealand to continue developing automated tools in order to enhance its QC; for example, a tool for detecting large variations in the time series of the growth rate of AD and emissions, a tool for comparing country-specific IEFs with IPCC default IEFs and other Party IEFs, and a recalculation tool for detecting any change in emissions of two consecutive submissions.	Not an issue/problem
G.7	Uncertainty analysis	The Party did not include in the NIR an uncertainty analysis for 1990 (the base year under the Convention). The ERT noted that, according to paragraph 15 of the UNFCCC Annex I inventory reporting guidelines, Parties shall report uncertainties for the base year. During the review, the Party indicated that the 1990 uncertainty analysis (level assessment) would be included in the NIR of the next submission. The ERT recommends that New Zealand include in the NIR an uncertainty analysis for 1990 (the base year under the Convention).	Yes. Convention reporting adherence

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
G.8	Uncertainty analysis	For most categories, the Party reported in the sectoral chapters of the NIR the reasoning behind the determination of uncertainties of AD and EFs and/or provided references to external studies. However, in some instances, no reasoning was provided (e.g. for fugitive emissions). The ERT noted that this omission is not in line with paragraph 15 of the UNFCCC Annex I inventory reporting guidelines, which states that the uncertainty of the data used for all source and sink categories should also be qualitatively discussed in a transparent manner in the NIR, in particular for categories that were identified as key categories. The ERT considers that including in the NIR a table that presents an overview of the reasoning behind the determination of the uncertainties of AD and EFs by category would help it understand the uncertainty assessment as well as improve the transparency of the uncertainty reporting. During the review, the Party explained that it intends to include a summary table on uncertainties in its 2020 submission. The ERT encourages New Zealand to improve the transparency of its inventory uncertainty reporting by including in the NIR a summary table with qualitative information on the selection and/or determination of the uncertainties of the AD and EFs by category, in line with paragraph 15 of the UNFCCC Annex I inventory reporting guidelines.	Not an issue/problem
Energy			
E.20	1. General (energy sector)	The Party reported blank cells (no quantitative data or notation keys) for indirect CO_2 and N_2O emissions for the energy sector in CRF table 6. The ERT noted that, in accordance with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines, cells of CRF tables should contain either emission estimates or notation keys. During the review, the Party explained that these indirect emissions should be reported as "NE", and indicated that it would report them as such for the 2020 submission. The ERT encourages New Zealand to report in CRF table 6 either emission estimates or notation keys for indirect CO_2 and N_2O emissions for the energy sector.	Not an issue/problem
E.21	Fuel combustion – reference approach – liquid fuels – CO_2	The Party reported information on biodiesel (fossil fraction) under category 1.A.3 (transportation) in its NIR (p.99) and in CRF table 1.A(a)s3. Biodiesel produced and consumed in New Zealand is generally fatty acid methyl ester. To produce it, vegetable oil or animal fat is trans-esterified with methanol, which the Party assumed to be of fossil origin. During the review, New Zealand explained that biodiesel (fossil fraction) is not currently included in the reference approach, although it is included and classified as other fossil fuels in the sectoral approach. The ERT noted that this led to inconsistency between the reference and sectoral approaches, with a 100 per cent difference between the estimates calculated using the approaches for other fossil fuels for 2017 (as reported in CRF table 1.A(c)). The ERT encourages New Zealand to investigate the source of methanol used to produce biodiesel in New Zealand and determine what portion is imported as a secondary fuel and what portion is produced domestically from natural gas.	Not an issue/problem
E.22	1.A.1 Energy industries – other fuels – CO_2, CH_4 and N_2O	In the official energy balance, the Party reported waste heat under cogeneration (e.g. 1.19 PJ gross calorific value for 2017; the energy balance is available at https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/energy-balances/). During the review, the Party explained that the waste heat originated from sulfuric acid production used for fertilizer manufacture.	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		The ERT encourages New Zealand to include the information on waste heat from sulfuric acid production used for fertilizer manufacture in the NIR.	
E.23	1.A.1.a Public electricity and heat production – liquid fuels – CO_2	The Party reported the consumption of liquid fuels for category 1.A.1.a (public electricity and heat production) for all years 1990–2017, except for 2001 (reported as "NO"), in CRF table 1.A(a)s1. Fuel consumption in 1992 and 2008 (2,517.43 and 1,435.17 TJ, respectively) was much higher than in other years (ranging from 0.05 to 757.85 TJ). During the review, New Zealand explained that there had been severe drought in 1992 and at the start of 2008 that had resulted in low hydroelectricity production, while electricity demand did not decrease. The unusually high use of fuel oil and diesel for electricity production to compensate for the low hydroelectricity production was the main reason for the increase in liquid fuel use in 1992 and 2008. The ERT noted that MBIE holds quarterly data on diesel and fuel oil used for electricity generation. No diesel had been used in the quarters from December 1992 to December 2001 inclusive (37 quarters). No fuel oil had been used in the quarters from June 2000 to June 2003 inclusive (13 quarters). Therefore, 2001 was the only year in which there had been no consumption of either of the two fuels (diesel and fuel oil). The ERT recommends that New Zealand 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).	Yes. Transparency
E.24	1.A.2 Manufacturing industries and construction – liquid fuels – CO_2, CH_4 and N_2O	The Party reported that its energy balance does not provide disaggregated data for liquid fuel for manufacturing industries and construction. New Zealand calculated this disaggregation by using category-specific GDP data from Statistics New Zealand and then calculating the implied energy intensities (PJ per unit of GDP) for each category (NIR, pp.92–94). During the review, the Party provided additional information on the category-specific GDP data and implied energy intensities (PJ per unit of GDP). The ERT recommends that New Zealand 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).	Yes. Transparency
E.25	1.A.2.b Non-ferrous metals – gaseous fuels – CO_2, CH_4 and N_2O	Fuel consumption from gaseous fuels in non-ferrous metals in 2013 was much higher than in other years in CRF table 1.A(a)s2. The Party reported 2,354.57 TJ for 2003 and between 152.81 and 1,281.40 TJ for all other years. During the review, New Zealand explained that the increase in the AD was reported to MBIE by companies selling natural gas and that the Party did not have any further information to explain the drivers behind the trend. The Party explained that, since that category was very small, transient business activities could result in significant fluctuations. The ERT encourages New Zealand to include information on the trend of fuel consumption from non-ferrous metals, especially on the significantly high consumption in 2013, in the NIR.	Not an issue/problem
E.26	1.A.2.c Chemicals – gaseous fuels – CO_2, CH_4 and N_2O	CO_2 emissions from gaseous fuels from chemicals decreased from 2,216 kt in 2002 to 438 kt in 2005 and increased from 866 kt in 2011 to 2,031 kt in 2014, as reported in CRF table 1.A(a)s2. During the review, the Party explained that the trend in emissions from chemicals could be explained partly by events in the methanol production industry in New Zealand. Methanex New Zealand operates methanol production plants in the country and is a major gas	Yes. Transparency

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		user. Methanex significantly reduced its production in 2004 following deficient gas supply in 2003. In 2004 it started to run at reduced capacity, but increased its capacity in 2008 and then further in 2012. Production at full capacity resumed in December 2013. The ERT recommends that New Zealand explain the trend in fuel consumption and emissions from chemicals in the NIR.	
E.27	1.A.2.f Non-metallic minerals – solid fuels – CO_2, CH_4 and N_2O	CO_2 emissions from solid fuels in non-metallic minerals almost doubled from 355 kt in 2012 to 683 kt in 2013, and then decreased to 459 kt in 2014, as reported in CRF table 1.A(a)s2. During the review, the Party explained that the increase was mainly attributed to increased imports of bituminous coal, which were assumed to be used for cement manufacture. New Zealand provided clinker and lime production data (lime is used in the production of clinker). However, the ERT noted that clinker and lime production did not increase between 2012 and 2013. The ERT encourages New Zealand to explain the trend of solid fuel consumption in non-metallic minerals, especially for 2012–2014, in the NIR.	Not an issue/problem
E.28	1.A.2.f Non-metallic minerals 1.A.2.g.i Manufacturing of machinery – gaseous fuels – CO_2, CH_4 and N_2O	CO_2 emissions from gaseous fuels from manufacturing of machinery (subcategory 1.A.2.g.i) reported in CRF table 1.A(a)s2 were higher in the period between 2010 (73.90 kt) and 2013 (88.99 kt) than in the rest of the time series (14.04–52.14 kt). During the review, New Zealand explained that emissions were high between 2010 and 2013 as a result of high levels of activity in those years. The AD are reported directly by natural gas sellers already aggregated to the corresponding New Zealand (and Australian) Standard Industrial Classification code level. The Party pointed out that subcategory 1.A.2.f (non-metallic minerals, gaseous fuels) showed the opposite trend over the same period, so it postulated that this could be an allocation issue originating from the company or companies supplying the sales data; however, it was unable to provide any supporting information. The Party explained that both categories used the same EFs, so there were no accuracy issues. The ERT recommends that New Zealand 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.	Yes. Comparability
E.29	1.A.3.b Road transportation – liquid and gaseous fuels – CO_2, CH_4 and N_2O	Emissions from liquefied petroleum gas for light- and heavy-duty trucks and buses and motorcycles were reported as "IE" for until 2000 but as "NO" for 2001 onward. Emissions from biomass for the same vehicle types were reported as "IE" for until 2000 and "NO" for 2001–2006, and estimated from 2007 onward. Diesel consumption of motorcycles was reported as "IE" for until 2000 and "NO" thereafter. During the review, New Zealand explained that biomass was not used for light- and heavy-duty trucks, buses or motorcycles before 2000, and that diesel and liquefied petroleum gas were not used for motorcycles before 2000. The ERT recommends that New Zealand 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.	Yes. Comparability
E.30	1.A.3.b Road transportation – liquid and gaseous fuels – CO_2	New Zealand reported CO_2 emissions for 2001 onward disaggregated by vehicle mode where possible (e.g. emissions for subcategories 1.A.3.b.i (cars), 1.A.3.b.ii (light-duty trucks), 1.A.3.b.iii (heavy-duty trucks and buses) and 1.A.3.b.iv (motorcycles)) (NIR, pp.96–99). However, CO_2 emissions for before 2000 were reported in aggregate. During the review, the Party explained that disaggregated data for before 2000 were not available.	Yes. Convention reporting adherence

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		The ERT recommends that New Zealand 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.	
E.31	1.A.3.b Road transportation – gaseous fuels – CO_2, CH_4 and N_2O	The Party reported in the NIR (pp.96–99) that the emissions from gaseous fuels of cars decreased from 1990 onward and ceased in 2000. However, the ERT noted that the consumption of gaseous fuels by heavy-duty trucks and buses was stable until 2000, had a generally increasing trend until 2011 and started to decrease in 2011. During the review, the Party explained that production and use of compressed natural gas was part of a government strategy to reduce New Zealand's dependence on imported oil. Government subsidies were removed in 1987. Together with falling oil prices, compressed natural gas was slowly squeezed out of the market. However, some buses using compressed natural gas continued to operate.	Yes. Transparency
		The ERT recommends that the Party include in the NIR the description of the trend of gaseous fuels for cars and heavy-duty trucks and buses.	
E.32	1.A.3.b Road transportation – biomass – CO_2, CH_4 and N_2O	The ERT noted that CO_2 emissions from biomass (biodiesel) from road transportation peaked in 2012 (273.01 TJ) and decreased to 155.55 TJ in 2013. During the review, the Party explained that the main driver of the decrease was the cessation of the biodiesel grant scheme in June 2012.	Yes. Transparency
		The ERT recommends that New Zealand explain the trend of biomass (biodiesel) used in road transportation, including the information that the biodiesel grant scheme ceased in June 2012.	
E.33	1.B.1.a Coal mining and handling – solid fuels – CO_2	For the subcategory abandoned underground mines, the Party reported CH_4 recovery or flaring as "NO" and CO_2 and CH_4 emissions as "NE" in CRF table 1.B.1. However, the Party indicated in the NIR (p.106) that there was no recovery or flaring of CH_4 from abandoned underground mines. The ERT noted that the 2006 IPCC Guidelines (vol. 2, section 4.1.5.3) indicate that CO_2 emissions should be accounted for only if CH_4 emissions are recovered or flared.	Yes. Convention reporting adherence
		The ERT recommends that New Zealand report CO_2 emissions for the subcategory 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.	
E.34	1.B.2.a Oil – liquid fuels – CO_2	The Party reported CO_2 emissions under subcategory 1.B.2.a.6 (oil (other)) in CRF table 1.B.2, without including an explanation in the NIR of the source of those emissions. During the review, New Zealand explained that it had included flaring of refinery gas under subcategory 1.B.2.a.6. The ERT notes that, according to the footnote 8 to CRF table 1.B.2, those emissions should be reported under subcategory 1.B.2.c (flaring).	Yes. Comparability
		The ERT recommends that New Zealand change the allocation of emissions from refinery flaring from subcategory 1.B.2.a.6 (oil (other)) to subcategory 1.B.2.c (flaring).	
E.35	1.B.2.c Venting and flaring – gaseous fuels – CO_2	The Party reported CO_2 emissions from venting in gas wells in CRF table 1.B.2 (e.g. 258.48 kt CO_2 for 2017). However, the AD were reported in CRF table 1.B.2 as "NA" and the Party indicates, in the documentation box of the same table, that the venting corresponds to the venting of pure CO_2 from the Kapuni gas treatment plant, as	Yes. Comparability

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		reported by the operator, and that no AD are available. However, during the review, New Zealand explained that the AD from the Kapuni gas treatment plant were confidential. The ERT recommends that the Party report the AD for CO_2 venting from the Kapuni gas treatment plant for subcategory 1.B.2.c.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.	
E.36	1.B.2.c.ii Venting and flaring – venting – gaseous fuels – CH_4	The ERT noted that the Party reported AD and CH_4 emissions for subcategory 1.B.2.c.ii (venting–gas) as "NA". The ERT recommends that New Zealand report the AD and emissions as confidential, "IE" or "NE", as appropriate.	Yes. Comparability
IPPU			
I.23	2. General (IPPU)	The ERT identified some inconsistencies in the reporting of key categories and uncertainties within the NIR. During the review, the Party acknowledged that there had been some problems with updating the NIR. The ERT understands that this is a QA/QC issue and recommends that New Zealand 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 table 4.1.2 of the NIR (p.117), but as a key category in the level assessment only in section 4.2.1 of the NIR 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 table 4.1.2 of the NIR (p.117), 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 table 4.7.3 of the NIR (p.142) were not reflected in table A.2.1.1 of the annexes to the NIR.	Yes. Convention reporting adherence
I.24	2.A.2 Lime production – CO_2	Emissions from lime production were calculated using the formula based on CaO content, MgO content and kiln dust produced (NIR, p.123). For the CO_2 EFs, the Party used 0.7848 t/t for CaO and kiln dust, and 1.0919 t/t for MgO. However, the ERT noted that kiln dust can be a mixture of CaO and MgO, and that its CO_2 EF should also reflect this as otherwise this could lead to an underestimation of emissions. During the review, New Zealand acknowledged the issue but explained that companies were required to follow the methodology provided by the ETS regulation. The ERT believes that future ERTs should consider this issue further to ensure that emissions are not underestimated, noting that adjustments cannot be applied to New Zealand's annual submission.	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		The ERT recommends that New Zealand 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.	
I.25	2.A.2 Lime production – CO_2	The Party used 0.7275 t CO_2/t lime as the CO_2 EF for 1990–2013 (NIR p.123), instead of using the default IPCC EF for high-calcium lime of 0.75 t CO_2/t lime produced (2006 IPCC Guidelines, vol. 3, table 2.4), meaning that a correction factor of 0.97 was used (CO_2 EF used by the Party = default IPCC CO_2 EF × 0.97). During the review, the Party provided confidential data to the ERT to show that burned lime has always been considered to be high-calcium lime with an EF of 0.75 t CO_2/t lime, and that 0.97 is the default correction factor for hydrated lime (2006 IPCC Guidelines, vol. 3, section 2.3.1.3). The Party explained that for 2014 onward AD for pure lime were available but such AD were converted and reported as burned lime. The ERT considers that this is inappropriate because the Party is changing figures that are, in principle, more reliable.	Yes. Comparability
		The ERT recommends that New Zealand 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. The ERT also recommends that the Party revert the changes in AD since 2014 to the original quantities of pure lime (CaO + MgO), 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). In order to maintain time-series consistency of the AD, the ERT recommends that New Zealand 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.	
I.26	2.B Chemical industry 2.C Metal industry	The Party reported in its NIR (p.118) that, for the chemical industry and metal industry categories, data (including AD) are provided to MBIE in response to an annual survey. During the review, the ERT asked to see the responses to the survey to view the information provided. New Zealand explained that there were no specific questionnaires used for data collection in those categories. All emissions for the chemical industry category were related to the consumption of fuels reported to MBIE along with other information used for energy statistics. Companies in the metal industry category, which fall under the ETS, submitted their returns directly to the ETS through an online reporting tool.	Yes. Transparency
		The ERT recommends that New Zealand explain how the AD for the chemical and metal industries provided in the NIR are obtained.	
I.27	2.B.1 Ammonia production – CO_2	The Party reported that the carbon content of natural gas used as feedstock determines the country-specific CO_2 EFs for ammonia production (NIR, p.127), indicating that only feedstock use was reported for the IPPU sector. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 3, box 3.2), which indicate that the total quantities of oil and gas used (fuel plus feedstock) in ammonia production must be subtracted from the quantity reported under energy use in the energy sector and consequently included in the emission estimates in the IPPU sector. During the review, New Zealand acknowledged that this methodology should be applied in the inventory and stated that it would correct the figures in the next submission.	Yes. Comparability
		The ERT recommends that New Zealand 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.	

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I.28	2.D.1 Lubricant use – CO_2	Emissions from lubricant use were recalculated in the 2019 submission. In the 2017 submission, the EFs were 0.66 t CO_2/t lubricant used for 1990–2010, and 0.45–0.67 t/t for other years. In the 2019 submission, the Party used a constant CO_2 EF (0.594 t CO_2/t lubricant used) for all years but did not explain this recalculation in the NIR. During the review, New Zealand explained that the CO_2 EF used was the IPCC default EF for the tier 1 method for carbon content of 20 t C/TJ and the "oxidized during use" factor of 0.2 (2006 IPCC Guidelines, vol. 3, section 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. The EFs used in the 2017 submission had been the result either of an error or of an inappropriate application of the methodology. The ERT recommends that New Zealand improve the information on the CO_2 EF for lubricant use, including the source of the EF.	Yes. Transparency
I.29	2.F Product uses as substitutes for ozone-depleting substances – HFCs	The Party estimated HFC emissions from product uses as substitutes for ozone-depleting substances using a spreadsheet model that uses data from imports and applies a bottom-up calculation. New Zealand provided the ERT with this model during the review and the ERT noted that the model includes many complex assumptions not stated in the NIR. Moreover, the NIR does not include a clear comparison of the results obtained using a simple top-down approach with the results obtained through the bottom-up approach of the model, as recommended by the 2006 IPCC Guidelines (vol. 3, section 7.1.4.1). The ERT recommends that New Zealand explain the model used to estimate emissions in this category in more detail, including the assumptions made, in the NIR. The ERT also recommends that New Zealand improve its 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, section 7.1.4.1).	Yes. Transparency
I.30	2.F.1 Refrigeration and air conditioning – HFCs	The Party reported in the NIR (box 4.1) that chemicals contained in factory-charged exported equipment were excluded from the calculation of charge in new equipment. The ERT understands that this quantity should not be excluded because the loss in the process of filling any equipment, regardless of whether it is exported, occurs at the factory and should be accounted for. For the same reason, chemicals contained in factory-charged imported equipment, which were included, should have been excluded because the related emissions would have occurred abroad. During the review, New Zealand reported that all subapplication calculations of the total charge of new equipment were carried out by including chemicals contained in factory-charged exported equipment and excluding chemicals contained in factory-charged imported equipment. The Party confirmed that the estimates in the CRF tables were correct, despite the incorrect information in the NIR. The ERT recommends that New Zealand 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.	Yes. Transparency
I.31	2.F.1.e Mobile air conditioning – HFCs	The Party reported a large decrease in the amounts of HFC-134a filled into new manufactured products from 2003 (3.58 t HFC-134a) to 2004 (0.90 t HFC-134a) in CRF table 2(II)B-Hs2. During the review, New Zealand explained that a large decrease had occurred in the number of New Zealand assembled buses, cars and light-duty trucks registered in 2004. The industry was winding down at that time.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		The ERT recommends that New Zealand explain the trend of HFC-134a filled into new manufactured products, especially the decrease between 2003 and 2004, in its NIR.	
Agriculture			
A.4	3. General (agriculture) – CH_4 and N_2O	The Party reported in its NIR (p.34) that animal population census data are collected every five years (agricultural production census) and that annual population surveys (agricultural production survey) are conducted in the intervals. However, the ERT noted that the procedure used to ensure consistency in animal population AD between the agricultural production census and survey was not described in the NIR. During the review, New Zealand explained that the methodologies used for the two studies, which were both run under the same system by Statistics New Zealand, were very similar, the difference being that the census is sent to all farms in New Zealand, while the survey is sent to approximately 50 per cent of farms in New Zealand. The ERT recommends that New Zealand 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.	Yes. Transparency
A.5	3. General (agriculture) – CH_4 and N_2O	The Party reported in section 1.6 of its NIR (p.47) that uncertainty relating to enteric fermentation was 55.3 per cent and uncertainty relating to agricultural soils was 16.3 per cent (95 per cent confidence interval for both). However, in section 5.2.3 of the NIR (pp.175–176), the uncertainty relating to enteric fermentation was 16 per cent and, in section 5.5.3 of the NIR (p.206), the uncertainty relating to N_2O from agricultural soils was 55.3 per cent. During the review, the Party explained that the figures in section 1.6 were incorrect and confirmed that uncertainty relating to enteric fermentation was 16.3 per cent and uncertainty relating to agricultural soils was 55.3 per cent. The Party reported that the error will be corrected in the 2020 submission. The ERT recommends that New Zealand correct the uncertainty values reported for enteric fermentation and agricultural soils in section 1.6 of the NIR so that they are consistent with the values reported in sections 5.2.3 and 5.5.3 of the NIR.	Yes. Convention reporting adherence
A.6	3. General (agriculture) – CH_4 and N_2O	The Party reported in its NIR (figure 5.1.9) that the approval process for recalculations and improvements required a review to be carried out by an independent external contractor. The ERT sought evidence that the improvement, implemented in the 2019 submission, to the methodology for estimating the proportion of Nex partitioned between dung and urine was subject to an independent external review, as prescribed in figure 5.1.9, acknowledging that all other stages of the approval process were described in the NIR. During the review, New Zealand explained that the change to the N partitioning methodology was discussed at the 2018 Agricultural Inventory Advisory Panel meeting and approved for inclusion into the inventory (see https://www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/greenhouse-gas-reporting/agricultural-inventory-advisory-panel/2018-agricultural-inventory-advisory-panel-meeting/). The Party also provided the external verification report to the ERT as evidence that it was fully in line with the guidelines and procedures for incorporating new EFs. The ERT encourages New Zealand, when discussing the approval process for recalculations and improvements, to explicitly refer to each individual approval process implemented in a specific year of submission and provide general comments on any issues discussed during the approval process.	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
A.7	3. General (agriculture) – CH_4 and N_2O	The Party reported that planned improvements include a review of the methodology used to estimate livestock weight (NIR, section 5.1.7). The ERT sought clarification on this methodological review and on whether the uncertainties relating to livestock weight would be reduced. During the review, New Zealand explained that the results from a recent methodological review on live weights had been documented but not included in the submission. The Party shared the documentation with the ERT and explained that it plans to include the new methodology (alongside an enhanced monthly population model) in the 2021 or 2022 inventory submission, providing that the new methodology and model are deemed to be robust and accurate enough for inclusion in the inventory. It was unclear how the uncertainty values would be affected by this change. The ERT encourages New Zealand to provide key information and updates on the progress of the review of livestock weights referred to in section 5.1.7 of the NIR.	Not an issue/problem
A.8	3. General (agriculture) – CH_4 and N_2O	The Party reported that planned improvements include using inverse modelling techniques (NIR section 5.1.7). The ERT sought clarification on this planned improvement. During the review, New Zealand explained that two research projects had been commissioned on this topic. The first project (completed in 2018) had evaluated how well an inverse modelling approach could potentially estimate New Zealand's CH_4 emissions, and included an analysis of how well the Party's atmospheric measurements would be able to detect changes in atmospheric CH_4 owing to mitigation efforts and which additional observations would be most beneficial to support such an approach to estimating CH_4 emissions. New Zealand shared the research findings with the ERT. The second project is currently under way, and aims to implement a plan to estimate CH_4 emissions independently (using inverse modelling techniques) and include a breakdown by region. The ERT encourages New Zealand to provide key information and updates on the two research projects on CH_4 emissions referred to in section 5.1.7 of the NIR.	Not an issue/problem
A.9	3. General (agriculture) – CH_4 and N_2O	The Party reported in its NIR (section 5.1.4) that Statistics New Zealand did not have provisional data for 2017 on the livestock population and, as a result, MPI had to estimate those data. The ERT sought clarification on how MPI had estimated these data. During the review, the Party explained that the sentence had not been updated from previous NIRs and should have read that provisional data for 2018 from Statistics New Zealand were not available, and that the 2018 animal population numbers for major livestock categories had therefore been estimated by MPI. New Zealand also explained that official animal population data were presented as estimated as at June each year, and so, in order to estimate monthly populations for the second half of 2017, the 2018 June population estimate was required. To estimate the 2018 populations in the inventory, MPI used outputs from the Pastoral Supply Response Model database, which was used to forecast agricultural production. More information on the model can be found on page 119 of New Zealand's seventh national communication. Since the submission of the inventory in April 2019, the final population figures have been updated and shared with the ERT, which has allowed for a comparison between the model estimates and the final population data. The population estimates for 2018 for dairy and beef cattle used in the 2019 annual submission differed from the final population estimates by less than 3 per cent. The Party reported that the 2018 livestock population estimates reported in the NIR will be updated with final figures from Statistics New Zealand in the 2020 submission.	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		The ERT recommends that New Zealand (1) revise the text that refers to the year for which provisional population data are used in the NIR (p.158), (2) update the animal populations for 2018 and revise the estimates reported for 2017 in the CRF tables and (3) explain this recalculation in the NIR.	
A.10	3. General (agriculture) – CH_4 and N_2O	The Party reported in its NIR (p.161) the assumption that all growing beef animals were slaughtered at two years of age. The ERT sought clarification as to whether that was an accurate representation of the population of New Zealand's cattle herds. During the review, New Zealand explained that the current assumptions for beef slaughter age were based on a report prepared for the Ministry of Agriculture and Forestry (Clark, Brookes and Walcroft, 2003), namely that all growing beef animals were assumed to be slaughtered at two years of age, but in reality age at slaughter will vary and growth rates will not be linear; however, it was considered that not enough data were available to attempt to develop a more complex model that took into account differences in birth dates, rates of growth and times of slaughter. The Party also explained that the MPI (2018) report on animal live weight calculations in the New Zealand agricultural GHG inventory model included more information on the assumptions used to estimate live weight and slaughter age.	Yes. Transparency
		The ERT recommends that New Zealand 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.	
A.11	3.A.1 Cattle – CH_4	The Party reported in its NIR (pp.176–177) and CRF table 3.As1 that the CH_4 IEF for dairy cows was 83.16 kg/head/year. However, the IEF includes animals that do not produce milk but are part of the dairy herd in this category (namely calves, young growing non-lactating heifers, dry cows and bulls). New Zealand's IEF differs from the IPCC default values (90 kg/head/year for Oceania and 128 kg/head/year for North America, as reported in the 2006 IPCC Guidelines (vol. 4, table 10.11)), although the IPCC values refer to dairy cows only.	Yes. Transparency
		During the review, New Zealand explained that it had used a tier 2 inventory model. In that model, dairy cattle encompasses all cattle that are required to support the milking dairy herd, including calves, young growing non-lactating heifers, dry cows and bulls. This is because young calves and heifers being raised as replacements for the dairy milking herd and dairy breeding bulls are counted as dairy cattle in the official statistics recorded by Statistics New Zealand. The statistics allow for the separation of dairy cattle into (1) mature milking cows, (2) growing heifers 0–1 year old, (3) growing heifers 1–2 years old and (4) breeding bulls. Because the emissions from these animals are included in the IEF calculations, the IEF will be lower than if only mature milking cows had been included. The Party also explained that it would consider adding additional text to explain the EF in the 2020 submission.	
		To improve the transparency of the comparison between the country-specific CH_4 EF and the IPCC default values, the ERT recommends that New Zealand report, in that comparison, the EF calculated for milking cows only. Additionally, the ERT invites New Zealand to discuss, or provide a link to relevant papers on, the quality of the experimental data used to develop the CH_4 EFs for dairy and non-dairy cattle obtained using various methodologies (e.g. respiration chambers as opposed to SF_6 tracer methods).	
A.12	3.A.2 Sheep – CH_4	The Party reported that enteric fermentation for sheep was calculated following a model derived from a peer-reviewed paper (Swainson, Muetzel and Clark, 2016) and provided two equations, one for sheep of less than one year of age and one for those older than one year of age, in the NIR (p.172). However, the ERT noted that the equation for sheep of less than one year old referred to the population of sheep older than one year. During the	Yes. Convention reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		review, New Zealand explained that the first equation on page 172 of the NIR (emissions from sheep of less than one year of age) had been written incorrectly but confirmed that the reported emission estimates were correct. The variable for the population of sheep older than one year should be replaced with a variable that refers to the population of sheep of less than one year of age. The Party also stated that more information on the calculation of enteric fermentation CH_4 emissions from sheep (with the correct equations) can be found in section 6.3 of the technical paper on methodology for calculation of New Zealand's agricultural GHG emissions (version 4) (MPI, 2018). The ERT recommends that New Zealand 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).	
A.13	3.A.4 Other livestock – CH_4	The Party reported in its NIR (section 5.2.1, p.174) that the dairy goat population was considered to have been nearly constant in the emission estimates since 1990, while the non-dairy goat population declined. New Zealand noted that the assumption that the dairy goat population had remained constant since 1990 probably led to an overestimation of emissions from dairy goats, because the total goat population declined between 1990 and 2017 from 1 million to 100,000. The ERT sought clarification on whether this was a reasonable assumption for 2016 and 2017, when the population experienced substantial variation (up to 50 per cent). Further, the ERT sought clarification on the accuracy of the variation in population numbers for these years. During the review, the Party explained that the variation in estimated goat numbers was likely due to several factors, including differences in the number of slaughtered goats from year to year, statistical variability and uncertainty, and farms misclassifying domestic goats as wild goats and vice versa. New Zealand also explained that it planned to update the assumptions about dairy goats in the 2020 submission. The ERT recommends that New Zealand implement the planned methodological changes regarding revising the assumptions about the population of dairy goats and the total goat population, recalculate the emissions and explain them in the NIR.	Yes. Accuracy
A.14	3.B Manure management – CH_4 and N_2O	In the NIR (pp.180 and 182) the Party referred to CRF tables 3.B.1 and 3.B.2 as the corresponding tables for manure management for all animal species (CH_4 and N_2O, respectively). The ERT noted that those references are incorrect, as the CRF tables for CH_4 and N_2O emissions from manure management are 3.B(a) and 3.B(b), respectively. During the review, New Zealand acknowledged that the references were incorrect and stated that it would correct them. The ERT recommends that New Zealand 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))".	Yes. Convention reporting adherence
A.15	3.B Manure management – N_2O	The Party reported that the N intake for dairy cattle, non-dairy cattle, sheep and deer was based on dry matter intake and a tier 3 model from 2003, with the N content of feed based on 6,000 samples described in an unpublished study (NIR, p.183). The Party also reported that Nex constituted the main source of uncertainty in N_2O emissions, both direct and indirect (NIR, p.187). The ERT sought clarification as to whether the studies are still representative, given the recent changes in fertilization products that include the intensification of the use of enhanced urea, resulting in a potential increase in the N content of the pasture. During the review, New Zealand	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		shared two unpublished reports, one from 2002 on which the inventory was based and one from 2019 on pasture quality that had only been made available in July 2019, after the inventory had been submitted. The Party stated its view that the current estimates of metabolizable energy and N for pasture are robust, although it was aware that those estimates will become dated because they are based on a study from 2002. New Zealand also explained that the above-mentioned 2019 report recently commissioned by MPI to gather new data on pasture quality would be combined with other pasture data to obtain updated estimates of energy and N content for pasture for the 2021 submission. The ERT recommends that New Zealand 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 its estimates. The ERT encourages New Zealand to use the most recent national studies when reviewing the N intake estimates.	
A.16	3.B.4 Other livestock (deer) – CH_4	The Party reported that the EF for CH_4 from manure for deer was 0.91 g CH_4/kg, noting that this figure was reached on the basis of studies for sheep (0.69 g CH_4/kg) and cattle (0.98 g CH_4/kg) (NIR, p.182). The ERT sought clarification on the criteria adopted to decide on the proposed value. During the review, New Zealand explained that further information on the calculation of the manure CH_4 EF for deer was contained in section 7.1.4 of the technical paper on methodology for calculation of New Zealand's agricultural GHG emissions (version 4) (MPI, 2018). The CH_4 yield value of 0.000915 kg CH_4/kg faecal dry matter was determined by calculating the arithmetic average of three studies from 2003. However, the ERT considered that using an arithmetic average might not be appropriate because it would not account for the mass of the animals or feed intake of each species, or any other criteria influencing the variation of the EF. The ERT recommends that New Zealand revise the calculation procedures for the CH_4 EF for deer and explain the revisions in the NIR. If the Party continues to use three studies from 2003 as the basis for its calculation, the ERT recommends that the Party (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.	Yes. Accuracy
A.17	3.D.a.1 Inorganic N fertilizers – N_2O	The Party reported that the default N_2O EF for synthetic fertilizer from the 2006 IPCC Guidelines (0.01 kg N_2O–N/kg N) for urea and other synthetic fertilizer (vol. 4, table 11.1) had been replaced by country-specific values (0.0059 and 0.01 kg N_2O-N/kg N for urea and other synthetic fertilizer, respectively) on the basis of a study published in 2014 (NIR table 5.5.2). The ERT sought clarification on the difference between the IPCC default values and the results obtained by New Zealand, given the significant differences. During the review, New Zealand explained that the changes resulting from the 2014 study had been discussed at the 2016 Agricultural Inventory Advisory Panel meeting and recommended for inclusion in the inventory (more information on the meeting is available at https://www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/greenhouse-gas-reporting/agricultural-inventory-advisory-panel/2016-agricultural-inventory-advisory-panel-meeting). The Party had calculated (NIR, p.191) that direct N_2O emissions from urea fertilizer in 2017 (using the EF of 0.0059) amounted to 1,365.60 kt CO_2 eq. If the IPCC default EF had been used, the estimated direct N_2O emissions from urea fertilizer would have been approximately 2,314 kt CO_2 eq. The ERT recommends that New Zealand 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	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		0.01 kg N_2O-N/kg N for urea and other synthetic fertilizer, respectively) and summarizing how the Agricultural Inventory Advisory Panel endorsed its application to the inventory. The ERT encourages New Zealand to refer to similar studies conducted internationally that would arrive at similar results and that are being used in other inventory submissions.	
A.18	3.D.a.2 Organic N fertilizers – N_2O	The Party reported in its NIR (table 5.5.2) and in the documentation box to CRF table 3.D that a country-specific value (0.01 kg N_2O-N/kg N and 0.0025 kg N_2O-N/kg N for manure (urine) and manure (dung), respectively, from grazing animals in pasture, range and paddock systems) was adopted for the N_2O EF for organic fertilizer. The N_2O EF from the 2006 IPCC Guidelines (vol. 4, table 11.1) is 0.02 kg N_2O-N/kg N for manure (urine and dung) from grazing animals in pasture, range and paddock systems. The new values were adopted for dairy cattle manure (dung), grazing cattle, sheep and deer in pasture, range and paddock systems on the basis of a study by van der Weerden et al. (2014). The ERT sought clarification from New Zealand on the results obtained by New Zealand, given the significance of the difference between the IPCC and country-specific values. During the review, the Party explained that further information on the study by van der Weerden et al. (2014) could be found in the MPI (2015) recommendations for country-specific EF1 values for farm dairy effluent and urea fertilizer. The changes proposed in the latter had been discussed at the 2016 Agricultural Inventory Advisory Panel meeting and recommended for inclusion in the inventory. The Party calculated in the NIR (pp.191–193) that direct N_2O emissions from organic fertilizer (dairy cattle manure) in 2017 (using the EF of 0.0025) were 0.147 kt N_2O. If the IPCC default EF had been used, estimated direct N_2O emissions from organic fertilizer (dairy cattle manure) would have been 0.588 kt N_2O. The ERT recommends that New Zealand 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. The ERT encourages New Zealand to revise its comparison of estimates obtained using country-specific EFs with those obtained using the IPCC default EF (2006 IPCC Guidelines, vol. 4, table 11.1).	Yes. Transparency
A.19	3.D.b Indirect N_2O emissions from managed soils – N_2O	The Party reported the adoption of country-specific N_2O EFs, which resulted in a substantial reduction in emissions than would have been achieved by using the EFs from the 2006 IPCC Guidelines (NIR, p.202). The ERT commends New Zealand for developing country-specific EFs and sought clarification on how it determined the EFs and on the difference between the default values from the 2006 IPCC Guidelines (vol. 4, table 11.3) and the Party's values provided in table 5.5.3 of the NIR, which were substantially smaller. During the review, New Zealand clarified that it used the IPCC default EFs for indirect N_2O, namely EF_4 and EF_5. New Zealand used country-specific values 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 (0.1 as opposed to 0.2 in the 2006 IPCC Guidelines), for the fraction of synthetic fertilizer N that volatilizes as ammonia and nitrogen oxides in kg N volatilized per kg N applied (0.1, the same as the value provided in the 2006 IPCC Guidelines) and for $Frac_{LEACH}$ (0.07 as opposed to 0.3 in the 2006 IPCC Guidelines), referred to in the NIR as country-specific EFs determined through research undertaken in New Zealand. The Party explained that it had commissioned research which would review the current $Frac_{LEACH}$ value and make recommendations as to whether	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		the value should be changed or disaggregated in order to improve the accuracy of the inventory and that it plans to incorporate the findings of the research in the 2021 inventory submission. The ERT recommends that New Zealand 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. The ERT encourages New Zealand to report on new developments in the review of the $Frac_{LEACH}$ value in the NIR.	
LULUCF			
L.8	4. General (LULUCF) – CO_2, CH_4 and N_2O	During the review, the Party explained that it would not be able to use the Wetlands Supplement in preparing its inventory for CO_2, CH_4 and N_2O emissions from drained organic soils for the 2020 submission. The ERT encourages New Zealand to use the Wetlands Supplement in preparing its annual inventories for CO_2, CH_4 and N_2O emissions from drained organic soils for the 2021 submission.	Not an issue/problem
L.9	4. General (LULUCF)	The ERT noted that the section on the LULUCF sector in the NIR contained a large number of references to research conducted but not published (e.g. for the source of CSC values for grassland with woody biomass and for perennial cropland). The ERT encourages New Zealand to publish the research conducted and referred to in the NIR to enhance the transparency of the inventory.	Not an issue/problem
L.10	4. General (LULUCF) – CO_2 and N_2O	The Party applied a tier 2 methodological approach to estimate SOC changes in mineral soils associated with changes in the use of land (NIR section 6.3.1) by calculating a single average SOC content for the land-use category and subcategories reported in the CRF tables. The ERT noted that the method differs from the IPCC default methodology in terms of how the entire population (SOC across the entire national territory) is stratified since it does not stratify SOC values by climate zone, soil type and management practice, as per good practice, meaning that the uncertainty is not reduced as far as practicable. The ERT further noted that a method that uses the average SOC values of national conditions for each category or subcategory reported can only be valid if land-use conversions are assumed to occur for each land category in equal proportion to the distribution of the SOC content within that land category. The ERT noted that New Zealand did not provide evidence for the assumption that the distribution of SOC values, and associated mean, in each land category corresponds to the distribution, and associated mean, of the relevant land-use change category. It is therefore not possible to state that the SOC change estimates are accurate, as is the case when land-use changes occur preferentially in a subset of the land category population; for example, the conversion of forest land to cropland is very likely to occur on land with high fertility and therefore with a SOC content that differs from the average across the entire forest land-use area. The ERT also drew attention to the inconsistency of SOC values assigned to settlements and calculated for other land in ID#s L.26 and L.27 below, respectively. During the review, New Zealand acknowledged the issue. The ERT recommends that New Zealand 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, section 2.3.3.1). For instance, New Zealand could calculate a set of	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		SOC_{REF} values stratified by climate zone and soil type using SOC measurements taken in forest land and grassland under natural conditions and, if the SOC_{REF} values are within the uncertainty range of IPCC default values, it could apply the IPCC default stock change factors to the SOC_{REF} values. It could therefore derive the SOC content for each combination of land use and management system as stratified by climate and soil type, and then apply formulation B of equation 2.25 from the 2006 IPCC Guidelines (vol. 4, box 2.1) to the derived SOC values to determine the annual net SOC change associated with each change in the use and/or management of land.	
L.11	4. General (LULUCF) – CO_2	The Party reported that harvested quantities in the LUCAS model were estimated by assigning the harvested area to age classes of the planted forest distribution, and therefore that the amount of carbon stock losses from harvested wood were derived by applying the per hectare carbon stock of the planted forest yield table (NIR, pp.271–272). The ERT noted that the verification of a model output, which in this case could be the yield table for planted forest, is a requirement in the UNFCCC Annex I inventory reporting guidelines (para. 41) but that New Zealand only reported roundwood statistics, sourced annually from MPI (NIR, p.271). During the review, the Party acknowledged the issue. The ERT recommends that New Zealand 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.	Yes. Convention reporting adherence
L.12	4. General (LULUCF) – CO_2	The Party reported some biomass carbon losses in land subject to conversion as "IE" in CRF table 4.A and 4.B. For instance, biomass carbon stock losses in the following land under conversion were reported as "IE" for 2017: annual and perennial cropland converted to post-1989 forest; high-producing and woody biomass grassland converted to pre-1990 planted forest; settlements converted to post-1989 forest; pre-1990 natural forest and post-1989 forest converted to annual cropland; and pre-1990 planted forest and post-1989 forest converted to perennial cropland. Further, New Zealand reported that, in any land conversion, all biomass and dead organic matter from the previous use was assumed to be lost in the year in which the conversion occurred. However, the ERT noted that, in table 6.2.6 of the NIR, no area conversions were reported for 2017 for any of the categories listed above. The ERT recommends that New Zealand 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 areas does not occur, in CRF tables 4.A and 4.B.	Yes. Convention reporting adherence
L.13	4. General (LULUCF) – CO_2	The Party reported in the NIR (p.311) that a wood carbon content value of 50 per cent was used in the HWP model to maintain consistency with the planted forest model (2006 IPCC Guidelines, vol. 4, table 4.3), although that value does not correspond to values in the 2006 IPCC Guidelines. During the review, New Zealand explained that the carbon fractions for planted forests have in fact been updated using country-specific data and that the NIR text needs to be updated accordingly. The ERT recommends that New Zealand report updated information regarding the country-specific wood carbon content value used in the HWP model in the NIR.	Yes. Transparency
L.14	Land representation – CO_2, CH_4 and N_2O	The Party applied a 28-year conversion period, instead of the default 20-year period, with the justification that 28 was the average age at which the majority of planted radiata pine forests were harvested (NIR, p.273), and therefore this is the maturity period that New Zealand used for its lands to reach steady state (i.e. equilibrium) (NIR, pp.292–	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		293). The Party reported that it applied a transition period of 20 years to SOC changes on the basis of IPCC default values (NIR, p.232). The ERT noted that the IPCC conversion period is the time period assumed for carbon stocks to come to equilibrium (2006 IPCC Guidelines, vol. 4, p.2.13), and that, for New Zealand, as reported in the NIR (section 6.1), the period is 20 years. The ERT also noted that there was no information reported in the NIR that demonstrated that biomass stocks achieved equilibrium in radiata pine in 28 years, or that plantations achieved their average carbon stock across the harvesting cycle within 28 years (the average carbon stock can be assumed to be the same as a steady state, since it represents the mean carbon content of the plantation across the entire lifetime). During the review, the Party acknowledged the issue. The ERT recommends that New Zealand 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, the ERT recommends that the Party apply the IPCC default conversion period of 20 years and explain the recalculations in the NIR.	
L.15	Land representation – CO_2, CH_4 and N_2O	In CRF table 4.1, the Party reported the 28-year cumulative area changes instead of the annual area changes. The ERT noted that, unlike CRF tables 4.A–F where cumulative area changes are reported, CRF table 4.1 is designed to report the areas and changes in areas between the previous and the current inventory year. During the review, the Party acknowledged the issue. The ERT recommends that New Zealand compile CRF table 4.1 using annual area change data.	Yes. Comparability
L.16	Land representation – CO_2, CH_4 and N_2O	The Party reported in the NIR (p.255) that the QC checks performed on the 1990 and 2008 land-use maps included checking approximately 28,000 randomly selected points in areas mapped as forest and grassland with woody biomass and that independent assessors agreed with the original classification in 91 per cent of cases. During the review, the Party explained that an accuracy assessment had been carried out following the completion of the 2012 land-use map, which showed an overall map accuracy of 95.2 per cent. Errors of omission and commission had been calculated and used to determine error-adjusted areas for each main class in 2012. Areas of AR that had occurred between 2008 and 2012 were also assessed. Error-adjusted areas for those change classes were within a 4 per cent margin for the mapped change areas. The ERT therefore noted that a small error margin (such as 4 per cent) in each map used to identify land-use changes could, through overlap, result in up to 8 per cent of the country area being erroneously reported as under land-use conversion. The ERT noted that it was reported in the NIR (p.255) that two distinct QC checks had been performed on the 2012 land-use map. The first QC checked every polygon where land-use change had occurred in non-forest land use between 2008 and 2012 (the acceptance criterion for this check was that the land-use classification had to be correct at both mapping dates in at least 90 per cent of cases). The second QC checked the accuracy of destock detection in areas that were in forest land use in 2008, in order to ensure that at least 90 per cent of the destocking had been detected at a confidence level of 95 per cent. However, the confusion matrix and its results were not reported and the statistics were not corrected on the basis of the results, although the QC results were used to improve the 1990 and 2008 land-use maps (NIR, p.255). During the review, New Zealand acknowledged that the accuracy assessment results were not used to correct existing land-use change statistics, although they were used as part of the continuous mapping improvement process to reduce mapping errors. In order to undertake a compete verification of the time series, the Party would need new higher-resolution imagery at each mapping date, which did not seem practical for the earlier mapping	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		dates. The Party indicated that it could, however, explore the possibility of changing its mapping verification process for more recent periods and deriving error-adjusted statistics which could be used in its inventory submission. The ERT recommends that New Zealand plan to undertake an accuracy assessment of its national land-use maps, with a focus on determining the accuracy of mapping changes between mapping dates. The ERT also recommends that the Party then investigate how to use the results of the accuracy assessment, once available, to adjust the reported AD for the land representation.	
L.17	4.A Forest land – CO_2	The ERT noted that the 2017 NEFD (p.13) states that radiata pine is typically harvested between 26 and 32 years old, and that the area-weighted average clear-fell age of radiata pine decreased from 29.1 years in 2016 to 28.4 years in the year ended 31 March 2017. The ERT also noted that the NEFD survey collects information on plantations regarding the actual area of each age class of each species, which means that a comparison among consecutive annual NEFDs reveals the actual area harvested in each age class. The ERT recommends that New Zealand provide information on the actual age of harvest of forest plantations, as derived from information collected through NEFD. Such information would be most appropriately reported in the annexes to the NIR.	Yes. Transparency
L.18	4.A.1 Forest land remaining forest land – CO_2	The Party assumed equilibrium for the biomass carbon stocks of the subcategory tall pre-1990 natural forest and reported that its national forest inventory collected information for that subcategory and that the estimates elaborated using those data had shown insignificant CSCs across the time series (NIR, section 6.4.2). During the review, New Zealand explained that tall forests were losing carbon stocks from the biomass pools at a rate of approximately 0.8 Mt CO_2/year. The ERT noted that it was not consistent with good practice to assume equilibrium for above-ground woody biomass stock, as the IPCC default methodology (2006 IPCC Guidelines, vol. 4, section 2.3.1) requires either an estimation of all carbon stock gains and losses (gain and loss approach) or the direct estimation of the net CSCs (stock-difference approach). The ERT recommends that New Zealand 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.	Yes. Completeness
L.19	4.A.1 Forest land remaining forest land – CO_2	The Party reported forest land remaining forest land as a key category for both the level and trend assessment (NIR tables A1.3.1(a), A1.3.2(a) and A1.3.3(a)) but applied the tier 1 assumption of equilibrium to SOC changes in mineral soils for tall natural forest. The ERT noted that it is good practice (2006 IPCC Guidelines, vol. 4, figure 2.4) to apply a tier 2 approach to SOC changes because forest land remaining forest land is a key category. During the review, while New Zealand acknowledged the ERT finding, it also noted that it had followed the decision tree in the 2006 IPCC Guidelines (vol. 1, figure 4.1) that allows for a tier 1 approach where limited resources are available, as is the case for the LULUCF sector, which has a limited research budget each year. Long-term soil sampling in tall natural forest would use up most of the budget, significantly jeopardizing the allocation of	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		resources to work on categories of greater contribution to the key category analysis, such as above-ground biomass stocks in forest land remaining forest land. The ERT recommends that New Zealand provide evidence that its 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, that the Party 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.	
L.20	4.A.2 Land converted to forest land – CO_2 and N_2O	The Party reported all the information relating to two of the subcategories used to prepare estimates for forest land, namely post-1989 natural forest and post-1989 plantations, in a single subcategory, namely post-1989 forest. The ERT noted that the underlying methods and factors used for the two subcategories were different. During the review, the Party acknowledged the issue. However, it explained that it would not be able to implement the change in time for the 2020 submission. The ERT recommends that New Zealand report disaggregated information for the two subcategories of post-1989 natural forest and post-1989 plantations.	Yes. Transparency
L.21	4.B.1 Cropland remaining cropland – CO_2	The Party did not report either biomass carbon gains or losses in perennial cropland remaining perennial cropland in CRF table 4.B ("NA" was reported for gains and zero for losses). The ERT noted that, according to the IPCC tier 1 methodology (2006 IPCC Guidelines, vol. 4, section 5.2.1.1), it is good practice to report biomass carbon stock gains and losses from perennial cropland according to their harvesting cycle and annual net biomass accumulation rate, as averaged out across the harvesting cycle. During the review, New Zealand acknowledged the issue. However, it explained that it would not be able to implement the change in time for the 2020 submission. The ERT recommends that New Zealand identify the main subdivisions for its 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.	Yes. Completeness
L.22	4.B.1 Cropland remaining cropland – CO_2	The Party did not report any information on management changes in cropland or any estimates of SOC changes associated with management changes, apart from conversions of annual cropland to perennial cropland and vice versa. The ERT noted that, according to the IPCC tier 1 methodology (2006 IPCC Guidelines, vol. 4, sections 5.2.3.1–5.2.3.2), it is good practice to report SOC changes associated with changes in crop use and the management system, including in the rate of organic carbon inputs. During the review, the Party acknowledged the issue. The ERT recommends that New Zealand plan the activities needed to collect data and prepare estimates of SOC changes in cropland associated with changes in management practices.	Yes. Completeness
L.23	4.C.2 Land converted to grassland – CO_2	The Party reported biomass carbon stock losses as "IE" in all wetlands converted to grassland subcategories in CRF table 4.C. The ERT noted that in table 6.1.3 of the NIR the Party reported a value of zero for biomass carbon stocks for all wetlands categories before conversion to any other land use. During the review, New Zealand acknowledged the issue. The ERT recommends that New Zealand use "NE" for biomass carbon stock losses in wetlands converted to grassland, providing relevant references to the 2006 IPCC Guidelines for justification, or revise its methodology by	Yes. Convention reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		assigning a biomass carbon stock value to wetlands before conversion, in particular for the subcategory vegetated wetlands.	
L.24	4.D Wetlands – CO_2	The Party reported as zero the biomass carbon stock in vegetated wetlands in table 6.1.3 of its NIR, although, according to table 6.2.2 of the NIR, this category includes land with vegetation including mangroves. The ERT noted that country-specific data are available in literature (e.g. Morrisey et al., 2010) and that the Wetlands Supplement provides default factors for mangroves vegetation that can be used by Parties on a voluntary basis. The ERT recommends that New Zealand revise the biomass carbon stock of vegetated wetlands using data available in literature (e.g. Morrisey et al., 2010). The ERT also encourages the Party to consider reporting mangroves under forest land where mangroves meet the forest definition.	Yes. Accuracy
L.25	4.D.1 Peat extraction lands – N_2O	New Zealand did not report N_2O emissions from drained organic soils associated with peat extraction in CRF table 4(II). The ERT notes that the 2006 IPCC Guidelines (vol. 4, section 7.2.2.2) refers to a default methodology for estimating N_2O emissions for nutrient-rich peatlands, and that the Wetlands Supplement provides a methodology (equation 2.7) and an EF applicable to all peat types (table 2.5). The ERT also noted that New Zealand's peatlands largely comprise oligotrophic *Sphagnum* peat, which is nutrient poor (NIR, section 6.7.2). The ERT encourages the Party to estimate N_2O emissions from drained organic soils associated with peat extraction using the methodology and EF included in the Wetlands Supplement (equation 2.7 and table 2.5).	Not an issue/problem
L.26	4.E Settlements – all GHGs	The Party reported that settlements included grassland within settlements, including recreational areas, urban parklands and open spaces (NIR, p.237). New Zealand reported conversion of settlements to forest land, high-producing and woody biomass grassland and even to perennial cropland. Furthermore, the Party assigned a SOC value to settlements that was greater than that of any other land-use category apart from vegetated wetlands (being 105.98 t C/ha (NIR, table 6.3.2)), because of the presence within settlements of grassland in recreational areas, urban parklands and open spaces (NIR, p.259), although those grasslands in settlements account for just a fraction of the total area of settlements. The ERT noted that grassland within settlements, including recreational areas, urban parklands and open spaces, has carbon stocks and a carbon stock dynamic that are significantly different from that of built-up areas and infrastructure. The ERT encourages New Zealand to report grassland within settlements, including recreational areas, urban parklands and open spaces, as a subcategory of settlements.	Not an issue/problem
L.27	4.F Other land – all GHGs	The Party reported in its NIR (p.237) that other land includes montane rock and/or scree, river gravels, rocky outcrops, sand dunes and beaches, coastal cliffs, mines (including spoil), quarries, permanent ice and/or snow and glaciers, and any other remaining land that does not fall into any of the other land-use categories. However, as reported elsewhere in the NIR (p.307), according to the IPCC definition, other land includes land without significant carbon stocks or any unmanaged land that does not meet any other use definition. Furthermore, New Zealand assigned a significant SOC value to the other land-use category (being 58.37 t C/ha (NIR table 6.3.2)), although the value was calculated on the basis of only three samples (NIR, p.258). Considering that the Party reported its entire territory as managed, with the exception of natural rivers and lakes (NIR, p.301), the ERT expected that only land with no significant carbon stocks would be included within the other land category and that consequently conversions from other land would only be very sporadic and likely limited to	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		land uses that might have insignificant carbon stocks, such as built areas or reservoirs. However, New Zealand reported other land converted to forest land, high-productivity grassland, woody grassland, and even to annual and perennial cropland, which are all land uses that imply the presence of significant SOC content. The ERT noted that the three samples collected for SOC content in other land are not representative of the average condition of other land, since most other land would have no SOC content, and that therefore the assigned values affect the accuracy of the calculation of SOC changes in land converted to and from other land. The ERT also noted that the reporting of other land converted to land uses with significant SOC content and the assignment of significant SOC content to other land indicate a misclassification of land, which is likely to be low-producing grassland, under the other land category. During the review, the Party acknowledged the issue. The ERT recommends that New Zealand reclassify all other land with significant SOC content under the most appropriate land-use category and recalculate its land representation and SOC changes for the revised area of conversion to and from other land.	
L.28	4.F.2 Land converted to other land – CO_2	The Party reported land with organic soils converted to other land (namely pre-1990 natural forest, pre-1990 forest plantations, high-producing grassland, low-producing grassland, woody biomass grassland and vegetated wetlands converted to other land) but no SOC losses were reported (net CSCs in organic soils were reported as "NE" and "NO" in CRF table 4.F). The ERT noted that New Zealand reported its entire territory as managed, with the exception of natural rivers and lakes (NIR, p.301), which means that only land with insignificant carbon stocks is expected to be included within the other land category and that, consequently, organic soils are very unlikely to be present in land converted to other land, as otherwise that conversion would result in a complete loss of SOC. During the review, the Party acknowledged the issue. However, it explained that it would not be able to implement the change in time for the 2020 submission. The ERT recommends that New Zealand verify the occurrence of the conversion of land with organic soils to other land and encourages it to report a complete loss of SOC in any land with organic soils converted to other land. If the Party does not report SOC losses in organic soils converted to other land, the ERT recommends that it use "NA".	Yes. Accuracy
L.29	4(II) Emissions and removals from drainage and rewetting and other management of organic/mineral soils – N_2O	The Party did not report N_2O emissions from drainage of non-agricultural organic soils in CRF table 4(II) ("NO" and "NE" were used). The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 4, equation 11.1) because New Zealand reported SOC losses in organic soils in CRF tables 4.A, 4.D and 4.E. During the review, the Party acknowledged the issue. However, it explained that it would not be able to implement the change in time for the 2020 submission. The ERT recommends that New Zealand report N_2O emissions from drainage of non-agricultural organic soils in CRF table 4(II) for each land category for which it reports a SOC loss in organic soils in CRF tables 4.A, 4.D and 4.E.	Yes. Completeness
L.30	4(III) Direct N_2O emissions from N mineralization or	The Party reported in CRF table 4(III) the total area with mineral soils of each land-use category. The ERT noted that the area reported in CRF table 4(III) should be the area of each land-use category where a change in the use or management has caused a SOC loss rather than the total area of the land-use category. During the review, New Zealand acknowledged the issue.	Yes. Accuracy

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	immobilization – N_2O	The ERT recommends that New Zealand 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.	
L.31	4(IV) Indirect N_2O emissions from managed soils – N_2O	The Party did not 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). The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 4, equation 11.10) because New Zealand reported SOC losses in mineral soils associated with changes in land use in CRF tables 4.A–F, and the associated direct N_2O emissions in CRF table 4(III). During the review, the Party acknowledged the issue. However, it explained that it would not be able to implement the change in time for the 2020 submission. The ERT recommends that New Zealand 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).	Yes. Completeness
Waste			
W.17	5. General (waste) – CO_2, CH_4 and N_2O	The Party reported (NIR, p.328) a short description on waste management practices in the country. The composition of waste disposed of at landfill sites is assumed to be constant from 2012 onward, in the absence of more recent data. However, the ERT considers that since new or improved initiatives have been implemented regarding waste management, such as waste recycling and composting, the composition of waste disposed of at landfill sites may have changed. During the review, the Party explained that waste composition would be updated with more recent data. The ERT noted that the organic fraction of waste disposed of at landfills is probably lower now than in 2012, as a result of waste recycling and composting, and that CH_4 emissions are probably overestimated. New Zealand also provided more information on waste management systems, indicating an increasing trend in resource recovery, including both recycling and composting. The ERT noted that implementation of a waste management policy for waste recycling, in particular the separate collection of municipal waste such as packaging waste (cardboard and paper), might affect the composition of waste disposed of at landfill sites and, as a consequence, landfill gas emissions, but this was not considered in the estimates. The ERT recommends that New Zealand include more information on current waste management, such as an overview of municipal solid waste generation and its treatment method (recycling, composting, incineration or disposal) in section 7.1.1 of the NIR, and its impact on the composition of waste disposed of at landfills. The ERT also recommends that the Party 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, that the Party recalculate the emissions and explain those recalculations in the NIR.	Yes. Accuracy
W.18	5.A Solid waste disposal on land – CO_2	The Party reported that estimates for the memo item of long-term storage of carbon in waste disposal sites had been recalculated for the 2019 annual submission. The annual change in total long-term carbon storage and in total long-term carbon storage in HWP waste had also been recalculated. The ERT noted that, according to CRF table 5, CO_2 estimates had decreased by 2,529 kt (24.6 per cent) for 2015 as a result of these recalculations. During the review, New Zealand confirmed that an error had been introduced in the 2019 submission for the calculation of	Yes. Convention reporting adherence

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		carbon storage for managed landfills without landfill gas capture. The Party reported that the error will be corrected in the 2020 submission and the amount for 2015 in the 2019 submission should be 9,360 kt CO_2. The ERT recommends that New Zealand correct the value for carbon storage for managed landfills without landfill gas capture.	
W.19	5.A Solid waste disposal on land – CH_4	The Party reported that, since 1990, solid waste management has substantially improved owing to the implementation of several initiatives (NIR, p.333). The number of landfills decreased from 327 in 1995 to 39 modern regional municipal landfill sites in 2019. In addition, most landfills are now mandatory participants in the ETS and are obliged to report their CH_4 emissions. However, it was not clear to the ERT how many landfills are currently reporting under the ETS and what method is used for reporting data on CH_4 recovery. During the review, New Zealand explained that it has 39 class 1 landfills, of which 25 with landfill gas recovery report CH_4 recovery rates under the ETS, as indicated in table 7.2.6 of the NIR. Of those 25 landfills, 11 had an active UEF under the ETS (see ID# W.20 below) in 2017 and some are closed for disposal but still operate a gas recovery system. The ERT recommends that New Zealand explain how many landfills are currently reporting under the ETS and how data on CH_4 recovery are estimated and reported for both active and closed landfills with gas recovery.	Yes. Transparency
W.20	5.A Solid waste disposal on land – CH_4	The Party reported an overview on how the gas recovery rate was calculated (NIR, pp.341–343). As landfill gas data are considered confidential under the ETS, a UEF and the default bulk waste EF were used to calculate the gas recovery rate. For those sites that participate in the ETS, the UEF is published each year. For all other landfills, recovery rates were estimated by each landfill on the basis of local site conditions, taking into consideration the landfill capping, lining and gas control system. However, the NIR did not explain clearly the recovery rate calculation or how the default bulk waste EF had been established. During the review, New Zealand explained that the gas recovery rate serves as a basis for the payment under the ETS for landfills with a landfill gas recovery system. The default bulk waste EF is a value established periodically by the Environmental Protection Authority of New Zealand on the basis of the IPCC default EF (2006 IPCC Guidelines, vol. 5, table 2.4) and the waste composition data provided by the landfill. Assuming an amount of waste being instantaneously and completely converted into CH_4, using default values, this would mean a factor of 1.19 t CO_2 eq/t waste. This was the nominal factor for the country's carbon tax. If a company applies to the ETS, it requests an assessment of its recovery rate, meaning that the nominal factor would be reduced accordingly. The Party also shared its calculation spreadsheet, as well the references for the composition data showing the calculation of the EF. The Party agreed that the description of the ETS, including the country-specific approach to calculating the gas recovery rate, should be improved in the NIR. The ERT recommends that New Zealand include in the NIR further explanation of its 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.	Yes. Transparency
W.21	5.C.1 Waste incineration – CO_2	The Party stated that a national environmental standard was introduced in 2004 that requires authorization to be obtained for all existing low-temperature incinerators, such as those used in schools (NIR, p.349). The ERT noted that there was no evidence of the type of waste incinerated in those incinerators. During the review, New Zealand confirmed that, historically, incinerators in schools would burn the general municipal waste generated at schools. The ERT noted that it was not clear whether those emissions had occurred between 1990 and 2004, and, if so,	Yes. Accuracy

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		whether they had been included in the NIR (table 7.4.2 of the NIR does not contain any data on municipal waste) or in the CRF tables. The ERT believes that future ERTs should consider the issue further to ensure that the emissions are not underestimated, noting that adjustments cannot be applied to New Zealand's annual submission. The ERT recommends that New Zealand further investigate historical data on waste incineration in schools and revise its estimates, if appropriate. The ERT also recommends that the Party include a relevant description on waste incineration in schools in the NIR or revise the NIR text, as appropriate.	
W.22	5.D Wastewater treatment and discharge – N_2O	In section 7.5.1 of the NIR (p.354), the Party reported that small amounts of industrial wastewater and sewage sludge are applied as organic amendments to agricultural soils, but emissions from the practice are assumed to be insignificant. Section 7.5.1 also refers to section 5.5.2 of the NIR. However, the Party stated in section 5.5.2 (p.197) that the application of sewage sludge to agricultural land is reported under the waste sector and that non-manure components of organic N applied to agricultural soils, such as compost, sewage sludge and rendering waste, are included under organic fertilizers. The Party also stated in section 5.5.2 (p.197) that it had commissioned research on sources of organic waste and found that non-manure components of organic N applied to agricultural soils were insignificant for the country (van der Weerden et al., 2014) and accounted for approximately 0.025 per cent of national gross GHG emissions and, therefore, the Party reported the category as "NE". However, the ERT noted that the Party reported AD and N_2O emissions for category 3.D.a.2.b (sewage sludge applied to soils) as "IE" in CRF table 3.D. New Zealand explained, in the documentation box to that table, that direct N_2O emissions from sewage sludge are reported under subcategory 5.A.1.a in the waste sector. During the review, New Zealand confirmed that the inconsistency would be corrected in the next submission. The ERT recommends that New Zealand 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.	Yes. Accuracy
W.23	5.D Wastewater treatment and discharge – CH_4 and N_2O	The Party reported in its NIR (p.354) sludge amounts as "IE" because most sludge is sent to landfills. The ERT noted that there are also data on the amount of incinerated sewage sludge in table 7.4.2 of the NIR (p.350). It was also stated in the NIR (p.342) that the ETS includes 5 per cent sludge in the composition of waste at municipal landfill sites. The ERT found this information unclear. During the review, New Zealand provided the spreadsheet used by the ETS, which contained a different amount of sludge (3.9 per cent) in the composition of waste at municipal landfill sites. Conversely, in the inventory, a fixed amount of sludge (5.2 kt) was assessed to have been disposed to SWDS in 2017. The ERT recommends that New Zealand 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.	Yes. Accuracy
W.24	5.D.2 Industrial wastewater – CH_4	The Party reported in the NIR (p.361) that CH_4 recovery via flaring or for energy production might occur at eight plants for industrial wastewater treatment. However, "NE" was used for the flared CH_4 amount and "NO" for the amount of CH_4 for energy recovery in CRF table 5.D. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 5, p.6.9), as it is good practice to distinguish between flaring and CH_4 recovery for energy generation, which should be reported in the energy sector. During the review, New Zealand confirmed that some	Yes. Comparability

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		wastewater treatment plants have CH_4 recovery systems and that the inconsistencies would be corrected in the next submission. The ERT recommends that New Zealand 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.	
KP-LULUCF activities			
KL.8	General (KP-LULUCF activities) – all GHGs	There were some inconsistencies in the land representation for KP-LULUCF activities reported by the Party in CRF table NIR-2. The ERT noted, for instance, that for AR, the area reported at the beginning of 2017 (676.37 kha) does not correspond to that reported at the end of 2016 (675.57 kha); for FM, the area reported at the beginning of 2017 (9,247.73 kha) does not correspond to that reported at the end of 2016 (9,246.18 kha); and for the total of all AR and deforestation and FM activities, the area reported at the beginning of 2017 (10,121.31 kha) does not correspond to that reported at the end of 2016 (10,118.96 kha). During the review, New Zealand explained that the reason could be an incorrect handling of CEFs. However, it explained that it would not be able to implement the required change in time for the 2020 submission. The ERT recommends that New Zealand 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.	Yes. KP reporting adherence
KL.9	General (KP-LULUCF activities) – all GHGs	The Party reported that it did not factor out from reporting either emissions or removals from elevated CO_2 concentrations above pre-industrial levels; indirect N deposition; or the dynamic effects of age structure resulting from activities prior to 1 January 1990; these are factored out of accounting by the FMRL (NIR section 11.6.2). The ERT noted that the Kyoto Protocol Supplement (section 2.3.7) states that for the purpose of accounting under the Kyoto Protocol 'factoring out' has been addressed through a so-called net-net approach where net change in GHG emissions and removals is accounted by comparing GHG emissions and removals during the commitment period with a benchmark under either a base year or a 'business as usual' scenario, which could also be a scenario in which emissions and removals are assumed to sum to zero. During the review, the Party acknowledged the issue. The ERT recommends that New Zealand update the information reported on factoring out in accounting for KP-LULUCF activities.	Yes. KP reporting adherence
KL.10	General (KP-LULUCF activities) – all GHGs	The Party reported that the background level of emissions associated with annual natural disturbances is the minimum annual level of emissions from forest fires observed during the calibration period (1990–2009) and that all emissions exceeding that background level would be excluded from accounting during the commitment period (annexes to the NIR, pp.90 (AR) and 92 (FM)). The ERT noted that, as defined in decision 2/CMP.7, annex, paragraph 1(a), natural disturbances are non-anthropogenic events or non-anthropogenic circumstances that cause significant emissions in forests and are beyond the control of, and not materially influenced by, a Party, and that the minimum annual level of emissions associated with natural disturbances applied by the Party is judged not to comply with that definition because it is influenced by natural conditions (such as a wetter season) and the variable degree of control of forest fires across	Yes. KP reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		the entire national territory based on a number of natural and anthropogenic factors. Among factors for forest fires, the ERT noted that the accessibility of areas, the intensity and frequency of fires and their concurrent occurrence could exceed the capacity of the fire suppression system for keeping disturbances under control. The origin of forest fires is another element included in the definition of natural disturbances, which means that fires used as a management practice, such as prescribed burning or slash and burn, do not qualify as natural disturbances; however, fires of human origin that are then further affected by non-anthropogenic circumstances, such as an extreme dry season and/or windy conditions, might lead to those fires being beyond the control of the fire suppression system and would therefore qualify as natural disturbances. However, management systems that determine the presence of species more prone to fires, such as conifers, and/or canopy structures more prone to fire damage and/or that increase the amount of deadwood in forests, are all anthropogenic circumstances that have an impact on emissions from fires and on the capacity of the fire suppression system to keep fires under control. For those reasons, the default approach should be statistical and recognize a variability within which disturbances are impacted by human activities and can be controlled by human systems (such as fire suppression) and then set a margin above the background level that triggers the application of the provision for natural disturbances. The ERT recommends that New Zealand provide evidence that a minimum level of historical emissions from forest fires allows the separation of non-anthropogenic events and circumstances that cause significant emissions and are beyond the control of the Party from all those events and circumstances that are anthropogenic, not limiting such consideration to the causes of fires. Alternatively, the ERT recommends that New Zealand revise its approach and recalculate its background level and associated margin accordingly, for instance by applying the method described in the Kyoto Protocol Supplement.	
KL.11	General (KP-LULUCF activities) – CO_2, CH_4 and N_2O	The Party reported "IE" for CO_2 emissions associated with wildfires in land under AR and FM (CRF table 4(KP-II)4), as they were reported as CSCs in CRF tables 4(KP-I)A.1 and 4(KP-I)B.1. Consequently, New Zealand calculated the background level of emissions associated with disturbances using non-CO_2 emission data only. The Party stated in the NIR (p.90), for example, that the background level is set by calculating the minimum non-carbon emissions that occurred from natural disturbances during the calibration period. The ERT noted that the background level of emissions associated with disturbances and its margin are calculated using a total of all GHG emissions, including CO_2 (Kyoto Protocol Supplement, section 2.3.9.6). The ERT recommends that New Zealand 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.	Yes. KP reporting adherence
KL.12	Deforestation – CO_2	The Party reported deforested areas under the pre-1990 natural and planted forest subcategories in the information items of CRF table 4(KP-I)A.2. The ERT noted that this is not in accordance with the reporting guidelines of the Kyoto Protocol, as the current land use of deforested areas should be reported in the information items. Therefore, only areas under the post-1989 forest subcategory may be reported in the information items if established on previously deforested land. The ERT recommends that New Zealand 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.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
KL.13	FM – CO_2	The Party reported that the age-class distribution (as at 2013, based on the 2013 inventory) needed to be altered to ensure enough area was present to maintain the 2011 FMRL harvest rate assumptions; while the result of forcing the harvest profile to match the 2011 FMRL creates an improbable age class, it has limited impact on emissions because average age harvested each year is maintained; and the creation of a more realistic age class is an issue the Party will look to correct in future technical corrections" (annexes to the NIR, p.81). New Zealand also reported that the rate of carbon change used for this technical correction is consistent with that reported for 1990–2013 in the 2015 inventory (annexes to the NIR, p.85). The ERT noted that this is not in accordance with the Kyoto Protocol Supplement (section 2.7.5.1) nor with the guidance provided in appendix II to decision 2/CMP.6 because the historical data to be projected are those associated with the estimates of FM and/or forest land emissions and removals in the pre-2010 historical period. During the review, the Party acknowledged the issue. The ERT recommends that New Zealand use the actual age-class distribution of its 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 its FMRL technical corrections. The ERT further recommends that the Party 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 its FMRL technical corrections, even if data may have been collected after 1 January 2010, if deemed sufficiently accurately associated with that historical period.	Yes. KP reporting adherence
KL.14	FM – CO_2	The Party reported that the 2011 FMRL did not model emissions from overplanting that occurs on FM land, which occurs when pre-1990 natural forest is converted to planted forest; the system used for national GHG reporting for the sector reports the area and emissions associated with that practice within the FM category; and to maintain consistency with the FM reporting, a technical correction needed to be applied, which resulted in the addition of 0.039 kt CO_2 emissions to the annual estimate of emissions in the FMRL (annexes to the NIR, p.84). The ERT noted that this is not in accordance with the Kyoto Protocol Supplement (section 2.7.5.1) nor with guidance provided in appendix II to decision 2/CMP.6 because changes in management practices, as is the case when natural forest is converted to a forest plantation, should not be projected within the FMRL. During the review, the Party acknowledged the issue. The ERT recommends that New Zealand exclude from its 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.	Yes. KP reporting adherence
KL.15	FM – all GHGs	The Party did not report information on the main factors responsible for the higher net sink during the commitment period reported in the relevant CRF accounting table (i.e. –22,258.66 kt CO_2 eq in 2013, –20,552.23 kt CO_2 eq in 2014, –18,331.88 kt CO_2 eq in 2015, –15,731.40 kt CO_2 eq in 2016, –14,553.91 kt CO_2 eq in 2017) compared with the FMRL (i.e. the FMRL correction of –9.42 Mt CO_2 eq, as reported on p.429 of the NIR). The ERT noted that, according to the Kyoto Protocol Supplement (section 2.7.5.2), it is good practice to provide information in the NIR on the main factors responsible for a higher (or lower) sink during the commitment period, as compared with the FMRL. It is also good practice to provide information on whether the accounting quantity (accounting quantity = FM – FMRL) is consistent with these factors, with the aim of showing that the accounting	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		quantity can be explained as deviations from applied management elements, practices or policies compared with the 'business as usual' management practices and policies included in the FMRL, rather than as differences in the harvesting rates or in the increment functions applied in the actual GHG emissions and removals to the same management elements, practices or policies used in projecting the FMRL. During the review, the Party acknowledged the issue. The ERT recommends that New Zealand 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 used for projecting the FMRL correction value.	
KL.16	FM – CO_2	The Party reported that a technical correction to the FMRL had been implemented to align CEF emission calculation methods (annexes to the NIR, p.81). The ERT noted that, according to the Kyoto Protocol Supplement (p.2.101), a technical correction to the FMRL is not required for CEF implementation unless there are methodological changes to the estimations of emissions and removals in the FMRL. The ERT also noted that the methods applied by the Party to estimate CSCs in AR and deforestation lands are identical to those applied to planted forest. The ERT further noted that the establishment of a CEF is a deviation from the 'business as usual' management of forest land, in other words remaining within forest use, and that it should therefore be credited or debited according to its impact on actual GHG emissions and removals, as compared with the GHG emissions and removals of the forest land replaced. The ERT lastly noted that the impact is expected to be null because of the requirement to replace the CEF-hc with a carbon-equivalent CEF-ne. During the review, the Party acknowledged the issue. However, it explained that it would not be able to implement the change in time for the 2020 submission. The ERT recommends that New Zealand recalculate the technical correction to the FMRL removing the projection of CEF.	Yes. KP reporting adherence
KL.17	FM – CO_2	The Party reported a total area of CEF-ne (2.35 kha) that was smaller than that of CEF-hc (2.85 kha) for 2017 in CRF table 4(KP-I)B.1.2. However, the totals provided in table 11.3.4 of the NIR and table A5.3.1 of the annexes to the NIR were different: 1.56 kha for CEF-ne and 1.06 kha for CEF-hc. The ERT noted that, according to the provisions in decision 2/CMP.7, annex, paragraph 37(b), the reported area of CEF-ne should be larger than that of CEF-hc. The ERT recommends that New Zealand report an area of CEF-ne at least equivalent to that of CEF-hc.	Yes. KP reporting adherence
KL.18	FM – CO_2	The Party did not report information on CEF-ne and CEF-hc in CRF table 4(KP-I)B.1. During the review, the Party acknowledged the issue. However, it explained that it would not be able to implement the change in time for the 2020 submission. The ERT recommends that New Zealand report information on CEF-ne and CEF-hc in CRF table 4(KP-I)B.1.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
KL.19	FM – CO_2	The ERT noted that ID# L.18 above (natural tall forest estimates) also applies to the FM estimates. The ERT recommends that New Zealand (1) 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; (2) and apply a technical correction to its FMRL.	Yes. Completeness
KL.20	FM – CO_2	The ERT noted that ID# L.19 above (natural tall forest SOC) is also relevant to the FM estimates. The ERT recommends that New Zealand either demonstrate that its national circumstances differ from those of other developed countries so that the Party is 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.	Yes. Completeness
KL.21	FM – CO_2	The Party reported 11.15 kt CO_2 eq and –20.57 kt CO_2 eq for the FMRL and the technical correction to the FMRL in the CRF accounting table. The ERT noted that the values are a thousand times smaller than they should be (decision 2/CMP.7, annex, appendix, indicates that the FMRL for New Zealand is 11.15 Mt CO_2 eq, or 11,150.00 kt CO_2 eq; the NIR indicates that the technical correction to the FMRL is –20.57 Mt CO_2 eq (p.430), or –20,570.00 kt CO_2 eq). The ERT recommends that New Zealand 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.	Yes. KP reporting adherence
KL.22	CH_4 and N_2O emissions from drained and rewetted organic soils – N_2O	The Party did not report N_2O emissions from drainage of non-agricultural organic soils in CRF table 4(KP-II)2 ("NE" was reported). The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 4, equation 11.1) because New Zealand reported SOC losses in organic soils in CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1. During the review, the Party acknowledged the issue. However, it explained that it would not be able to implement the change in time for the 2020 submission. The ERT recommends that New Zealand 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 it reports a SOC loss in organic soils in CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1.	Yes. Completeness

[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 in 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 in the second commitment period of the Kyoto Protocol and does not account for KP-LULUCF activities.

VIII. Questions of implementation

12. No questions of implementation were identified by the ERT during the individual review of the Party's 2019 annual submission.

Annex I

Overview of greenhouse gas emissions and removals for New Zealand for submission year 2019 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by New Zealand in its 2019 annual submission

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

Table 1
Total greenhouse gas emissions for New Zealand, base year[a]–2017
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions[b]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c]*	*KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)[d]*	*KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR[e]*	*FM*
FMRL								11.15
Base year	34 502.84	65 664.61	NA	NA	NA		–	
1990	34 502.84	65 664.61	NA	NA				
1995	38 667.56	69 408.13	NA	NA				
2000	45 111.56	76 175.92	NA	NA				
2010	47 801.35	78 961.20	NA	NA				
2011	52 109.25	78 675.42	NA	NA				
2012	55 461.86	81 051.19	NA	NA				
2013	57 439.80	80 537.89	NA	NA		–7 294.85	NE, NA	–22 258.66
2014	55 367.84	81 307.34	NA	NA		–12 475.60	NE, NA	–20 552.23
2015	55 874.46	81 199.21	NA	NA		–13 853.85	NE, NA	–18 331.88
2016	54 301.70	79 133.27	NA	NA		–15 759.92	NE, NA	–15 731.40
2017	56 892.15	80 850.60	NA	NA		–15 953.01	NE, NA	–14 553.91

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

[a] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. 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.

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

[c] The value reported in this column refers to 1990.

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

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

Table 2
Greenhouse gas emissions by gas for New Zealand, excluding land use, land-use change and forestry, 1990–2017
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	25 452.28	32 149.29	7 133.11	NO, NA	909.95	NO, NA	19.97	NO, NA
1995	28 007.74	33 366.06	7 835.21	21.43	153.28	NO, NA	24.42	NO, NA
2000	32 295.44	35 222.77	8 354.48	216.05	67.61	NO, NA	19.56	NO, NA
2010	34 993.91	34 220.38	8 630.63	1 045.88	47.56	NO, NA	22.84	NO, NA
2011	34 310.85	34 348.09	8 791.37	1 171.04	35.15	NO, NA	18.92	NO, NA
2012	35 983.17	34 811.17	8 963.87	1 224.13	47.46	NO, NA	21.38	NO, NA
2013	35 308.44	34 899.20	8 963.10	1 300.26	48.13	NO, NA	18.75	NO, NA
2014	35 620.29	35 149.63	9 083.28	1 363.77	73.41	NO, NA	16.95	NO, NA
2015	35 836.96	34 635.50	9 114.58	1 536.91	58.59	NO, NA	16.68	NO, NA
2016	34 258.05	34 195.57	9 090.36	1 523.04	48.69	NO, NA	17.56	NO, NA
2017	36 021.79	34 131.51	9 116.43	1 505.42	60.46	NO, NA	15.00	NO, NA
Per cent change 1990–2017	**41.5**	**6.2**	**27.8**	**NA**	**–93.4**	**NA**	**–24.9**	**NA**

Note: Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions.
[a] New Zealand did not report indirect CO_2 emissions in CRF table 6.

Table 3
Greenhouse gas emissions by sector for New Zealand, 1990–2017
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	23 785.67	3 579.87	34 257.22	–31 161.77	4 041.86	3.64
1995	25 735.69	3 171.28	36 108.81	–30 740.56	4 392.35	3.63
2000	29 947.83	3 425.57	38 060.44	–31 064.35	4 742.08	3.60
2010	32 170.44	4 536.01	37 728.70	–31 159.85	4 526.05	3.69
2011	31 260.08	4 620.32	38 377.16	–26 566.17	4 417.86	3.70
2012	32 801.56	4 666.82	39 222.46	–25 589.32	4 360.36	3.48
2013	32 133.70	4 828.03	39 290.96	–23 098.09	4 285.19	2.78
2014	32 318.91	5 035.05	39 734.27	–25 939.50	4 219.11	2.79
2015	32 395.89	5 288.36	39 335.92	–25 324.75	4 179.04	2.81
2016	31 103.81	4 987.13	38 925.85	–24 831.57	4 116.48	2.84

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2017	32 876.58	4 968.56	38 880.72	–23 958.45	4 124.75	2.86
Per cent change 1990–2017	**38.2**	**38.8**	**13.5**	**–23.1**	**2.1**	**–21.3**

Notes: (1) Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions; (2) New Zealand did not report indirect CO_2 emissions in CRF table 6.

Table 4

Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year[a]–2017, for New Zealand

($kt\ CO_2\ eq$)

	Article 3.7 bis as contained in the Doha Amendment[b]	*Activities under Article 3, paragraph 3, of the Kyoto Protocol*		*FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				11.15				
Technical correction				–20.57				
Base year	NA				–	–	–	–
2013		–17 405.69	10 110.84	–22 258.66	NE, NA	NE, NA	NE, NA	NE, NA
2014		–17 591.36	5 115.76	–20 552.23	NE, NA	NE, NA	NE, NA	NE, NA
2015		–17 766.72	3 912.87	–18 331.88	NE, NA	NE, NA	NE, NA	NE, NA
2016		–17 810.37	2 050.45	–15 731.40	NE, NA	NE, NA	NE, NA	NE, NA
2017		–17 610.00	1 656.99	–14 553.91	NE, NA	NE, NA	NE, NA	NE, NA
Per cent change base year–2017					**NA**	**NA**	**NA**	**NA**

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

[a] New Zealand has elected not to report on any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol, and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

[b] The value reported in this column refers to 1990.

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

Table 5
Key relevant data for New Zealand under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the 2019 annual submission

Key parameters	*Values*
Periodicity of accounting	NA
Election of activities under Article 3, paragraph 4	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
4. CM	NA
5. GM	NA
6. RV	NA
7. WDR	NA

Annex II

Additional information to support findings in table 2 in this report

Missing categories that may affect completeness

The categories for which 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 reporting in the Party's inventory are the following:

(a) 1.B.1.a.i CH_4 emissions from abandoned mines (see ID# E.15 in table 3 in this report);

(b) 2.C.1 CO_2 emissions from electric steel production (see ID# I.11 in table 3 in this report);

(c) 4.A.1 above-ground biomass CSCs in forest land remaining forest land (see ID# L.18 in table 5 in this report);

(d) 4.B.1 biomass CSCs in perennial cropland remaining perennial cropland (see ID# L.21 in table 5 in this report);

(e) 4.B.1 SOC stock changes associated with changes in management practices in cropland remaining cropland (see ID# L.22 in table 5 in this report);

(f) 4.D.2.1 CO_2 emissions from land converted to peat extraction under wetlands (see ID# L.6 in table 3 in this report);

(g) 4(II) N_2O emissions and removals from drainage and rewetting and other management of organic/mineral soils (see ID# L.29 in table 5 in this report);

(h) 4(IV) indirect N_2O emissions from leaching and run-off of N mineralization associated with SOC losses in mineral soils (see ID# L.31 in table 5 in this report);

(i) FM – biomass CSCs (see ID# KL.19 in table 5 in this report);

(j) FM – SOC stock changes (see ID# KL.20 in table 5 in this report);

(k) KP-LULUCF activities – N_2O emissions from drained and rewetted organic soils (see ID# KL.22 in table 5 in this report).

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 http://www.ipcc-nggip.iges.or.jp/public/kpsg.

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 http://www.ipcc-nggip.iges.or.jp/public/wetlands/.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015, 2016 and 2017 annual submissions of New Zealand, contained in documents FCCC/ARR/2013/NZL, FCCC/ARR/2014/NZL, FCCC/ARR/2015/NZL, FCCC/ARR/2016/NZL and FCCC/ARR/2017/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%202019.pdf.

Annual status report for New Zealand for 2019. Available at https://unfccc.int/sites/default/files/resource/asr2019_NZL.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Bridget McNeill (Ministry for the Environment of New Zealand), including additional material on the methodology and assumptions used. The following references are reproduced as received:

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. Wellington: Ministry of Agriculture and Forestry.

CRL Energy Ltd. (2009). *Reviewing Default Emission Factors in Draft Stationary Energy and Industrial Processes*. Contract report prepared for the Ministry for the Environment. Wellington: Ministry for the Environment. Available at www.climatechange.govt.nz/consultation/energy/review-default-emissions-factors.pdf.

T. Clough and F. Kelliher (2014). Literature Review of EF5. The review forms part of a contract on Indirect Nitrous Oxide Emissions EF5 for the Ministry for Primary Industries (16365) and aims to collate and assess information on nitrous oxide emissions from waterways.

MPI (2015). Recommendations for country-specific EF1 values for farm dairy effluent (FDE) and urea fertiliser. MPI Agreement Number 16801. Prepared by AgResearch.

Available at https://www.mpi.govt.nz/dmsdocument/20960-recommendations-for-country-specific-ef1-values-for-farm-dairy-effluent-and-urea-fertiliser.

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.

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.

New Zealand's Seventh National Communication to the UNFCCC. Available at https://unfccc.int/documents/198280.

SKM (2009). Estimates of Landfill Methane Recovered in New Zealand 1990 to 2012. Report commissioned by the Ministry for the environment (unpublished).

SM Thomas, SF Ledgard and GS Francis (2005). Improving estimates of nitrate leaching for quantifying New Zealand's indirect nitrous oxide emissions. Nutrient Cycling in Agroecosystems, vol. 73, issue 2–3, pp.213–226. Available at https://link.springer.com/article/10.1007/s10705-005-2476-8.

Swainson, N, Muetzel, S, Clark, H. 2016. *Updated predictions of enteric methane emissions from sheep suitable for use in the New Zealand national greenhouse gas inventory*. Animal Production Science vol. 58, pp.973–979. Retrieved from www.publish.csiro.au/?act=view_file&file_id=AN15766.pdf (18 February 2019).

Tonkin and Taylor Ltd. (2016). Emissions Trading Scheme Landfill Gas Technical Advice. Report commissioned by the Ministry for the Environment in 2016. Unpublished.

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.