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## **Report on the individual review of the annual submission of the Netherlands submitted in 2021\***

### **Note by the expert review team**

#### *Summary*

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2021 annual submission of the Netherlands, 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 27 September to 2 October 2021.

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\* In the symbol for this document, 2021 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	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	“Guidelines for review under Article 8 of the Kyoto Protocol”
CBS	Statistics Netherlands
CER	certified emission reduction
CH <sub>4</sub>	methane
CM	cropland management
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> 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”
CP	commitment period
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
DOC	degradable organic carbon
DOC <sub>f</sub>	fraction of degradable organic carbon that decomposes
EF	emission factor
EF <sub>3</sub>	emission factor for nitrous oxide emissions from urine and dung deposited by grazing animals on pasture, range and paddock
EFISCEN	European Forest Information Scenario (model)
ERT	expert review team
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
Eurostat	statistical office of the European Union
FM	forest management
FMRL	forest management reference level
Frac <sub>GRAZ</sub>	fraction of livestock nitrogen excreted and deposited onto soil during grazing
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
k	methane generation (decomposition) rate constant
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol

Kyoto Protocol Supplement	<i>2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol</i>
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MMS	manure management system(s)
N	nitrogen
N <sub>2</sub> O	nitrous oxide
NA	not applicable
NE	not estimated
NEMA	National Emission Model for Agriculture
Nex	nitrogen excretion
NF <sub>3</sub>	nitrogen trifluoride
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
NO <sub>x</sub>	nitrogen oxides
NR	not reported
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF <sub>6</sub>	sulfur hexafluoride
SIAR	standard independent assessment report
UNFCCC Annex I inventory reporting guidelines	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
UNFCCC review guidelines	“Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”
VS	volatile solid(s)
WDR	wetland drainage and rewetting
Wetlands Supplement	<i>2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands</i>

## I. Introduction

1. This report covers the review of the 2021 annual submission of the Netherlands, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the “UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention” (annex to decision 13/CP.20). The review took place from 27 September to 2 October 2021 and was coordinated by María José López (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for the Netherlands.

Table 1

**Composition of the expert review team that conducted the review for the Netherlands**

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Robert Sturgiss	Australia
	Hongwei Yang	China
Energy	Takashi Morimoto	Japan
	Giorgi Mukhigulishvili	Georgia
IPPU	Mark Hunstone	Australia
	Ole-Kenneth Nielsen	Denmark
Agriculture	Joel Gibbs	New Zealand
	Jacques Kouazounde	Benin
LULUCF and KP-LULUCF	Atsushi Sato	Japan
	Midori Yanagawa	Japan
Waste	Veronica Jakarasi	Zimbabwe
	Sirintornthep Towprayoon	Thailand
Lead reviewers	Robert Sturgiss	
	Hongwei Yang	

2. The basis of the findings in this report is the assessment by the ERT of the Party’s 2021 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that the Netherlands resolve identified findings, including issues<sup>1</sup> designated as problems.<sup>2</sup> Other findings, and, if applicable, the encouragements of the ERT to the Netherlands to resolve related issues, are also included in this report.

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

5. Annex I presents the annual GHG emissions of the Netherlands, including totals excluding and including LULUCF, indirect CO<sub>2</sub> emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.

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

<sup>1</sup> Issues are defined in decision 13/CP.20, annex, para. 81.

<sup>2</sup> 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 Party's 2021 annual submission

7. In accordance with paragraph 76 of the UNFCCC review guidelines and paragraphs 47 and 65 of the Article 8 review guidelines, the ERT has prioritized the review of issues and problems identified in previous review reports or in the initial assessment, recalculations that have changed the estimated emissions or removals for a category by more than 2 per cent or national total emissions by more than 0.5 per cent for any of the recalculated years, and supplementary information reported under the Kyoto Protocol. Table 2 provides the assessment by the ERT of the Party's 2021 annual submission with respect to the tasks undertaken during the desk review. Further information on the issues identified, as well as additional findings, may be found in tables 3, 5 and 6.

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

<i>Assessment</i>	<i>Issue/problem ID#(s) in table 3, 5 or 6<sup>a</sup></i>	
Dates of submission	Original submission: NIR, 15 April 2021; CRF tables (version 1), 15 April 2021; SEF tables (SEF-CP2-2020), 15 April 2021  Revised submissions: CRF tables (version 5), 30 September 2021  Unless otherwise specified, values from the most recent submission are included in this report	
Review format	Desk review	
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:	
	(a) Identification of key categories?	No
	(b) Selection and use of methodologies and assumptions?	Yes I.1, I.26, I.28, I.33, A.9, A.19, A.22, L.6, L.7, L.16, L.17, L.19
	(c) Development and selection of EFs?	Yes A.29
	(d) Collection and selection of AD?	Yes I.6, I.16, I.18, I.21, I.22, I.23, A.7, A.12, A.17, A.23, A.24, L.8, L.11, L.14, L.15, W.1, W.10, W.11, W.12
	(e) Reporting of recalculations?	Yes E.13, E.14, E.15, A.31
	(f) Reporting of a consistent time series?	Yes I.14, I.17, I.19, I.29, W.8
	(g) Reporting of uncertainties, including methodologies?	Yes G.5
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)
	(i) Missing categories, or completeness? <sup>b</sup>	Yes E.3, I.24, I.32, A.1, KL.14
	(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?	Yes
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes
Supplementary information	Have any issues been identified related to the following aspects of the national system:	

<i>Assessment</i>	<i>Issue/problem ID#(s) in table 3, 5 or 6<sup>a</sup></i>	
under the Kyoto Protocol	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No
	(b) Performance of the national system functions?	No
	Have any issues been identified related to the national registry:	
	(a) Overall functioning of the national registry?	No
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No
	Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR?	No
	Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:	
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	No
	(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.10, KL.11
(c) Reporting requirements of decision 6/CMP.9?	Yes KL.1, KL.4	
(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	No	
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	Yes
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	No
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No
Questions of implementation	Did the ERT list any questions of implementation?	No

<sup>a</sup> Further information on the issues identified, as well as additional findings, may be found in tables 3, 5 and 6.

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

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

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 22 April 2020,<sup>3</sup> and had not been resolved by the time of publication of the report on the review of the Party's 2019 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

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

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
General			
G.1	Uncertainty analysis (G.10, 2019) (G.1, 2017) (G.4, 2016) (G.4, 2015) Convention reporting adherence	Provide the level and trend uncertainty assessment as required by paragraphs 15 and 42 of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party reported in its NIR (pp.352–358, table 2.A.3) the level and trend uncertainty assessment as required by paragraphs 15 and 42 of the UNFCCC Annex I inventory reporting guidelines. It amended the information by including the uncertainty analysis for the base year, which was not included in the 2019 NIR.
G.2	Key category analysis (G.11, 2019) Convention reporting adherence	Provide a key category analysis for the base year in the NIR, in accordance with paragraphs 14 and 39 of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party reported in its NIR (annex A, table A1.3) the base-year key category level assessment for both approach 1 and 2, in accordance with paragraphs 14 and 39 of the UNFCCC Annex I inventory reporting guidelines.
Energy			
E.1	1.A.1.a Public electricity and heat production – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (E.6, 2019) (E.7, 2017) (E.13, 2016) (E.13, 2015) Transparency	Clarify, in the NIR, the allocation of emissions from incinerated waste oils and solvents and justify the applicable AD, EFs and emission trends.	Resolved. The Party reported in its NIR (p.82) that, since the closure of the waste incineration special combustion plant in 2002, which reported its emissions and AD directly for the inventory, the relevant residues have been exported for ecological processing, and the emissions from those residues have not been included in the Dutch inventory. Emissions from waste incineration are included in category 1.A.1.a because all waste incinerators recover heat and produce electricity. The ERT considers that the explanation provided in the NIR justifies the AD and EFs used as well as the emission trends.
E.2	1.A.1.c Manufacture of solid fuels and other energy industries –	Provide in the NIR the reasons behind the fluctuations in the CO <sub>2</sub> IEF throughout the gas combustion time series and explain how	Resolved. The Party reported in its NIR (p.85) that the CO <sub>2</sub> EFs for combustion of chemical waste gas are based on the emissions and AD of individual companies, and that company-specific data were used to derive a country-specific EF. As the same

<sup>3</sup> FCCC/ARR/2019/NLD. The ERT notes that the report on the individual inventory review of the Netherlands' 2020 annual submission has not been published yet owing to insufficient funding for the review process. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2019 annual submission.



<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	gaseous fuels – CO <sub>2</sub> (E.8, 2019) (E.10, 2017) (E.16, 2016) (E.16, 2015) Transparency	the consistency of the time series and EFs are ensured in estimating CO <sub>2</sub> emissions for this category.	information is used to calculate both the country-specific EF and the company-specific EFs, the Party considers that the EFs are consistent for the complete time series. The ERT considers that the rationale provided by the Party justifies the fluctuations in the CO <sub>2</sub> IEF.
E.3	1.A.1.c Manufacture of solid fuels and other energy industries – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (E.9, 2019) (E.16, 2017) Completeness	Include in the NIR the reason why emissions from liquid fuels are reported for 1990 only.	Addressing. The Party reported in its NIR (p.84) that a small amount of liquid fuel was used in this subsector in 1990 only, and that from 1991 onward, no liquid fuel use was recorded in the energy statistics for this subsector. However, the Party reported CO <sub>2</sub> emissions from liquid fuels for 1990–2013 in CRF table 1.A(a)s1. CH <sub>4</sub> and N <sub>2</sub> O emissions were reported in the same table but only for 1990 (they were reported as “NO” for 1991 onward). During the review, the Party explained that small amounts of gas and diesel oil were used in the combined iron and steel plant in the Netherlands for the period in question, and that it plans to update the NIR and include the missing CH <sub>4</sub> and N <sub>2</sub> O emissions from liquid fuels in its next annual submission.  The ERT considers that the issue will be deemed resolved if the Party includes the missing CH <sub>4</sub> and N <sub>2</sub> O emissions from liquid fuels and provides transparent information on the matter in its next annual submission.
E.4	1.A.2.a Iron and steel – gaseous fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (E.26, 2019) Comparability	Report CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from non-energy use in the IPPU sector.	Resolved. The Party reported in its NIR (p.92) that some waste gases are not directly emitted as process emissions but are combusted for energy purposes. Therefore, the oxidation of waste gases is accounted for in the energy statistics as the production and combustion of residual gases, and the corresponding CO <sub>2</sub> emissions are reported as combustion in category 1.A.2. and not as industrial process emissions in the IPPU sector. The Party also reported in the NIR (p.129) that for transparency and consistency reasons, GHG emissions from fuel combustion in industrial activities and product use, such as blast furnace gas combusted internally, are all reported in the energy sector and that all non-energy-related emissions from industrial activities (including from feedstocks) are reported in the IPPU sector. The Party acknowledges that this is not in line with the 2006 IPCC Guidelines because emissions from blast furnace gas combusted internally should be reported under the IPPU sector but notes that, for national policy reasons (the requirement for a clear division between combustion and process emissions), it must retain the current allocation. The ERT agrees with the justification provided by the Party in its NIR (see ID#s 1.8 and 1.9 below).
E.5	1.A.2.c Chemicals – gaseous fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (E.12, 2019) (E.11, 2017) (E.17, 2016) (E.17, 2015) Consistency	Use more up-to-date data from the most recently available data sources, such as annual environmental reports or EU ETS data, in order to improve the time-series consistency of CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emission estimates from chemical waste gases (if the data are suitable to use for previous years), or, if that is not possible, include in the NIR a	Resolved. The Party reported in its NIR (p.99) that the CO <sub>2</sub> EF for chemical waste gas was studied for earlier years. The EFs for combustion of chemical waste gas are based on the emissions and AD of individual companies. Company-specific data have also been used to derive a country-specific EF. As the same information is used to calculate both the country-specific EF and the company-specific EFs, the Party considers that the EFs are consistent for the complete time series. The ERT agrees with the rationale provided by the Party.

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
		detailed category-specific improvement plan and explain how the time-series consistency for the AD is ensured for the emission estimates for this category.	
E.6	1.A.2.c Chemicals – all fuels – CO <sub>2</sub> (E.27, 2019) Comparability	Allocate the non-energy use emissions to the IPPU category where they occur, if applicable, and provide in the NIR information on emissions resulting from the use of fossil fuels as feedstocks for the production of silicon carbide, carbon black, ethylene and methanol.	Not resolved. The Party reported in its NIR (p.92) that most industrial process emissions of CO <sub>2</sub> are reported in CRF sector 2 (IPPU). However, some waste gases are not directly emitted as process emissions but are combusted for energy purposes. Therefore, the oxidation of waste gases is accounted for in the energy statistics as the production and combustion of residual gases (e.g. in the chemical industry), and the corresponding CO <sub>2</sub> emissions are reported as combustion in category 1.A.2 and not as an industrial process emissions in the IPPU sector. The Party also reported in its NIR (p.98) and confirmed during the review that, for the chemical industry, CO <sub>2</sub> emissions from the production of silicon carbide, carbon black, methanol and ethylene from the combustion of residual gases (a by-product of the non-energy use of fuels) are included in category 1.A.2.c (chemicals). Although these CO <sub>2</sub> emissions are process-related, the Netherlands included them in category 1.A.2 to ensure consistency with energy statistics that account for the combustion of residual gases. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 3.9.4.2), particularly in terms of the allocation of fuels between energy and non-energy uses.
E.7	1.A.3.e.i Pipeline transport – gaseous fuels – CH <sub>4</sub> (E.15, 2019) (E.21, 2017) Comparability	Allocate combustion emissions of CH <sub>4</sub> from the natural gas transport network to subcategory 1.A.3.e.i (pipeline transport).	Not resolved. The Party reported in its NIR (p.106) that energy consumption for pipeline transport is not recorded separately in the national energy statistics but CO <sub>2</sub> and N <sub>2</sub> O combustion emissions for gas transport are included in category 1.A.3.e (other transportation). The CH <sub>4</sub> emissions are reported in category 1.B.2.b (gas transmission and storage) instead of category 1.A.3.e. During the review, the Party noted that reallocating these emissions is not a priority improvement for the Netherlands, as the emission data are correct, and asked the ERT to remove this issue from its list of recommendations. The Party explained that it has no plans to investigate whether it is possible to disaggregate data on CH <sub>4</sub> combustion emissions from the natural gas transport network, since doing so would not change the total estimate of emissions.  The ERT acknowledges that disaggregating the emissions in question would not change the total estimate of emissions but notes that doing so would enhance the comparability of the emission estimates in accordance with the 2006 IPCC Guidelines (vol. 2, table 3.1.1).
E.8	1.B.1.b Solid fuel transformation – solid fuels – CH <sub>4</sub> (E.28, 2019) Accuracy	Recalculate CH <sub>4</sub> emissions or explain that the revised AD used in the 2019 submission did not have an impact on CH <sub>4</sub> emissions.	Resolved. The Party reported in CRF table 1.B.1 CH <sub>4</sub> emissions. During the review, the Party clarified that relevant data were checked and corrected in the 2020 submission. Trends in CH <sub>4</sub> emissions over the time series are consistent and accurate.
E.9	1.B.2 Oil, natural gas and other emissions	Provide in the NIR a justification for using “NA” and “NE” in reporting AD and	Resolved. The Party reported in its NIR (p.123) that, in accordance with the Dutch emission regulation for volatile organic compounds, all possible sources included in

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	from energy production – liquid fuels – CO <sub>2</sub> and CH <sub>4</sub> (E.29, 2019) Comparability	emissions for this category (1.B.2.a.5 (distribution of oil products) and 1.B.2.a.6 (other)).	category 1.B.2.a.5 (distribution of oil products – refineries, distributors, filling stations) are equipped with abatement measures to capture any fugitive emissions. Therefore, these emissions are reported as “NA” and the corresponding AD as “NE”. There are also no relevant emissions in the Netherlands for categories 1.B.2.a.6 (other) (reported as “NE”) and 1.B.2.d (other) (reported as “NO”).
E.10	1.B.2.a Oil – liquid fuels – CO <sub>2</sub> and CH <sub>4</sub> (E.19, 2019) (E.26, 2017) Comparability	Correct the CO <sub>2</sub> and CH <sub>4</sub> emission estimates for 2015 to remove the combustion-related CO <sub>2</sub> and CH <sub>4</sub> emissions and enhance QA/QC procedures to ensure correct reporting.	Resolved. During the review, the Party clarified that the 2015 data were checked and corrected. Trends in CO <sub>2</sub> and CH <sub>4</sub> emissions over the time series are consistent and accurate. The ERT checked CRF category 1.B.2.a.4 (refining/storage) and considers that the recommendation has been addressed as the Party has corrected the estimates for 2015 in the 2020 submission.
E.11	1.B.2.a Oil – Refining and storage – liquid fuels – CO <sub>2</sub> (E.20, 2019) (E.25, 2017) Consistency	Report CO <sub>2</sub> emissions for the whole time series or, if that is not possible, change the notation keys applied to report these CO <sub>2</sub> emissions from “NA” to “IE” for 1990–2001 and include the explanation that CO <sub>2</sub> fugitive emissions from oil refining were included in subcategory 1.A.1.b (petroleum refining) for 1990–2001.	Resolved. The Party changed the notation keys applied to CO <sub>2</sub> emissions in CRF table 1.B.2 from “NA” to “IE” for 1990–2001. It also explained in its NIR (p.123) that CO <sub>2</sub> fugitive emissions from oil refining are included in subcategory 1.A.1.b (petroleum refining) for 1990–2001, as they cannot be separated from the total emissions reported under subcategory 1.A.1.b.
E.12	1.B.2.b Natural gas – gaseous fuels – CO <sub>2</sub> and CH <sub>4</sub> (E.21, 2019) (E.27, 2017) Comparability	Report the appropriate notation keys in CRF table 1.B.2 for AD and CO <sub>2</sub> and CH <sub>4</sub> emissions, ensuring time-series consistency.	Not resolved. The Party reported in its NIR (p.126) that a consistent methodology was used to calculate emissions for the entire time series, relying on, among other things, energy statistics (which are based on the same data sources as the national energy balance). The Party used incorrect notation keys in CRF table 1.B.2 for category 1.B.2.b.6 (“IE” for AD and “NO” for CO <sub>2</sub> and CH <sub>4</sub> emissions).  The ERT considers that “IE” should be reported for both CO <sub>2</sub> and CH <sub>4</sub> emissions.  During the review, the Party confirmed that the appropriate notation keys will be used for both CO <sub>2</sub> and CH <sub>4</sub> emissions in the next annual submission.
IPPU			
I.1	2.A.4 Other process uses of carbonates (2.A.4.b soda ash) – CO <sub>2</sub> (I.6, 2019) (I.7, 2017) (I.13, 2016) (I.13, 2015) Accuracy	Conduct further research and consultation with industry and/or statistical agencies on other process uses of carbonates to either access additional AD and EFs or seek verification of the current method and emission estimates in order to ensure the completeness and accuracy of the estimates.	Not resolved. The ERT noted that the description of the methodology for this category in the NIR (p.131) is the same as that in previous NIRs and no further information is provided about actions taken to improve the completeness and accuracy of the estimates. The time series for 1990–2000 and from 2003 onward is based on data on imports and exports for 2001 and 2002 and a production volume of 400 kt. During the review, the Party confirmed that data for 2001 have been taken from the 2003 NIR and extrapolated using the Dutch chemical industry index. The ERT considers that estimating the entire time series on the basis of data for two years results in high uncertainty and potential under- or overestimates. The ERT considers that this recommendation should be addressed as a matter of priority and noted that the previous ERT suggested that the Party investigate the use of EU ETS data for resolving this issue.

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
I.2	2.B.1 Ammonia production – CO <sub>2</sub> (I.8, 2019) (I.8, 2017) (I.14, 2016) (I.14, 2015) Accuracy	Estimate emissions from ammonia production, taking into account CO <sub>2</sub> emissions and sequestration from urea production by collecting new AD (annual urea production, urea imports and exports, and urea application to soils) through research and/or consultation with industry and statistical agencies in order to improve the accuracy and comparability of emission estimates.	The ERT believes that this issue should be considered further in future reviews to confirm that there is no underestimation of emissions.  Resolved. The CO <sub>2</sub> emissions from ammonia were recalculated across the time series, resulting in a decrease in estimated emissions of between 22.3 and 37.0 per cent. The Netherlands reported in its NIR (p.138) that CO <sub>2</sub> captured and stored in urea is now subtracted from the emissions from ammonia production.
I.3	2.B.1 Ammonia production – CO <sub>2</sub> (I.10, 2019) (I.10, 2017) (I.16, 2016) (I.16, 2015) Comparability	Report CO <sub>2</sub> emissions from ammonia production using a method that is consistent with the 2006 IPCC Guidelines, reporting emissions from all natural gas uses (i.e. both fuel and feedstock use) in this category.	Resolved. The Netherlands reported in its NIR (p.138) that it used a method consistent with the tier 3 requirements set out in the 2006 IPCC Guidelines. During the review, the Party clarified that ammonia production is an exception to the general statement made in the NIR (p.129) that the Netherlands does not follow the 2006 IPCC Guidelines regarding allocations between the IPPU and energy sectors.
I.4	2.B.8 Petrochemical and carbon black production – CO <sub>2</sub> (I.13, 2019) (I.13, 2017) (I.19, 2016) (I.19, 2015) Transparency	Document the QA/QC activities and outcomes for the chemical and petrochemical sources in the IPPU sector.	Not resolved. The ERT noted that no changes were made compared with previous reporting. During the review, the ERT asked the Party to provide the document containing the outcomes of the QA/QC checks for this category. The Netherlands explained that, while little detailed information is available, efforts will be made to address this issue for the next annual submission, including analysing data reported under the EU ETS.
I.5	2.B.8 Petrochemical and carbon black production – CO <sub>2</sub> and CH <sub>4</sub> (I.24, 2019) Comparability	Use “NO” for reporting the AD in CRF table 2(I).A-Hs1 for subcategory 2.B.8.c (ethylene dichloride and vinyl chloride monomer) for the years in which emissions were not occurring.	Resolved. The Netherlands reported “NO” for AD under this subcategory in CRF table 2(I).A-Hs1 for the entire time series.
I.6	2.B.9 Fluorochemical production – HFCs (I.15, 2019) (I.21, 2017) Transparency	Report the HFC-23 load in the untreated flow based on flow meter results and stream composition in the NIR or in the energy, industry and waste management report, and report the type of HFCs separately in the CRF tables, or, if it is difficult to implement this recommendation soon, investigate ways to present information on AD in the NIR that demonstrate the completeness of reporting until the recommendation can be implemented.	Not resolved. The ERT noted that no changes were made compared with previous reporting. It also noted that data on the production of hydrochlorofluorocarbons are reported to the Montreal Protocol on Substances that Deplete the Ozone Layer (see <a href="https://ozone.unep.org/countries/profile/nld">https://ozone.unep.org/countries/profile/nld</a> ). The Netherlands indicated during the review that this issue will be investigated for the next annual submission.

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I.7	2.C.1 Iron and steel production – CO <sub>2</sub> (I.16, 2019) (I.22, 2017) Comparability	(1) Report CO <sub>2</sub> emissions from electric arc furnace steel production under subcategory 2.C.1.a (steel) and clearly explain in the NIR that CO <sub>2</sub> emissions from electric arc furnace steel production are reported under that category in order to avoid misunderstanding;  (2) Report CO <sub>2</sub> emissions from direct reduced iron as “NO” because there are no CO <sub>2</sub> emissions from iron produced using that technology in the country.	Resolved. The Netherlands (1) reported in its NIR (p.143) and CRF table 2(I).A-Hs2 that emissions from electric arc furnaces are included under subcategory 2.C.1.a; and (2) changed the notation key used for direct reduced iron to “NO”.
I.8	2.C.1 Iron and steel production – CO <sub>2</sub> (I.17, 2019) (I.23, 2017) Transparency	(1) Assess the carbon flow and carbon balance in each process in the iron and steel industry in order to ensure the completeness and transparency of reporting;  (2) Conduct QA/QC activities for the AD, as described in the 2006 IPCC Guidelines (vol. 3, chap. 4.2.4.1), provide a quantitative summary of QA/QC activities in order to demonstrate that the reporting is correct (e.g. QA/QC procedure for subcategories 2.C.1.d (sinter) and 2.C.1.e (pellet) (see document FCCC/ARR/2017/NLD, ID# I.24) and for reporting the allocation to the energy sector subcategories 1.B.1.b, 1.A.1.a, 1.A.2.a and 1.A.1.c) and report a summary of the results of QA/QC activities (see document FCCC/ARR/2017/NLD, ID# I.25).	Not resolved. The ERT noted that (1) the transparency of the reporting of emissions from iron and steel production has not improved; and (2) a quantitative summary of QA/QC activities to demonstrate that the reporting is correct has not been provided. During the review, the Netherlands clarified that the emissions related to iron and steel production are reported under CRF categories 1.A.1.c, 1.A.2.a, 1.B.1.b, 2.C.1 and 2.A.4.d. The ERT noted that the sum of the emissions reported under these categories is consistent with the total reported under the EU ETS.
I.9	2.C.1 Iron and steel production – CO <sub>2</sub> and CH <sub>4</sub> (I.18, 2019) (I.24, 2017) Comparability	Ensure that all emissions are reported under iron and steel production subcategories in the IPPU sector, in accordance with the 2006 IPCC Guidelines.	Not resolved. During the review, the Party explained that CO <sub>2</sub> emissions are reported as “IE” for pellet production and included in sinter production for confidentiality reasons. The ERT agreed with this explanation but noted that the comparability of the reporting of emissions under all iron and steel production subcategories, in accordance with the 2006 IPCC Guidelines, could not be assessed as no information on the flaring of coke oven gas is reported in the NIR.
I.10	2.C.6 Zinc production – CO <sub>2</sub> (I.25, 2019) Convention reporting adherence	Use notation keys in a consistent manner and use “NO” for reporting AD and IEFs for this category in CRF table 2(I).A-Hs2.	Not resolved. The Netherlands reported the AD as “NA” in CRF table 2(I).A-Hs2 even though the activity did not occur. During the review, the Netherlands stated that the recommendation will be implemented in the next annual submission.

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I.11	2.F.1 Refrigeration and air conditioning – HFCs (I.22, 2019) (I.15, 2017) (I.21, 2016) (I.21, 2015) Comparability	Correct the notation key “NA” to “IE” for industrial refrigeration and mobile air conditioning in accordance with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Netherlands corrected the notation keys used in CRF table 2(II).B-Hs2 so that emissions from the manufacture and disposal of industrial refrigeration and mobile air-conditioning equipment are reported as “IE” rather than “NA”.
I.12	2.F.1 Refrigeration and air conditioning – HFCs, PFCs and SF <sub>6</sub> (I.23, 2019) (I.16, 2017) (I.22, 2016) (I.22, 2015) Accuracy	Conduct QA/QC and verification of the method used to estimate emissions from refrigeration and air conditioning, in accordance with paragraph 41 of the UNFCCC Annex I inventory reporting guidelines, and report on the outcomes thereof.	Resolved. The Netherlands has changed the methodology used to estimate emissions for the category. Since the 2019 submission, the Party has used the Refrigerants Registration System, which contains plant-level data (amounts of leakage, filling of (new) installations and dismantling) provided by the installation companies and checked by the inspection authorities. After approval, the figures are aggregated and used by the Party to estimate the emissions. The Netherlands explained in the NIR (p.155) why a previously applied QC approach can no longer be used. Specifically, decision 24/CP.19, annex I, paragraph 41, relates to tier 3 models, whereas the Netherlands applied a tier 2 methodology. Furthermore, the 2006 IPCC Guidelines (vol. 3, chap. 7, p.7.58) state that, in conducting QC for a tier 2 method, “it is possible, but not necessary in order to satisfy the requirements of good practice, to compare the annual national HFC refrigerant market as declared by the chemical manufacturers or the refrigerant distributors with the annual HFC refrigerant needs as derived by the tier 2 method”.
I.13	2.F.1 Refrigeration and air conditioning – HFCs (I.26, 2019) Transparency	Include in the NIR an explanation of why HFC emissions from domestic refrigeration (subcategory 2.F.1.b) have not occurred in the country since 1990.	Resolved. The Netherlands provided in its NIR (p.150) an explanation for why HFC emissions from domestic refrigeration have not occurred in the country since 1990.
I.14	2.F.1 Refrigeration and air conditioning – HFCs (I.27, 2019) Consistency	(1) Report HFC emissions for subcategories 2.F.1.a (commercial refrigeration), 2.F.1.d (transport refrigeration) and 2.F.1.f (stationary air conditioning) for 1990–2012 in the country in order to improve time-series consistency;  (2) Revise the description in the NIR of the data-collection methods such that clear information on the method currently being used is provided.	Addressing. (1) The ERT noted that the data reported continued to be aggregated for 1990–2012; (2) however, the Party provided a more detailed description of the data-collection methods, particularly in NIR annex 7 (ENINA methodology report, Honig et al., 2021). During the review, the Netherlands stated that data are unavailable for the years prior to 2013.
I.15	2.F.1 Refrigeration and air conditioning – HFCs (I.28, 2019) Comparability	Report emissions from operating stock and disposal separately in CRF table 2(II).B-Hs2, or report “IE” rather than “NA” for years in which emissions occurred and “NO” for years in which emissions were not occurring, if reporting separate emissions from disposal is	Addressing. The Netherlands still did not report manufacturing and disposal emissions separately, but did change the notation key used to “IE” in most instances. During the review, the Netherlands stated that it will consider separately reporting operating stock and disposal emissions for the next annual submission.

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		not possible owing to confidentiality concerns of the operators.	
I.16	2.G.3 N <sub>2</sub> O from product uses – N <sub>2</sub> O (I.29, 2019) Comparability	Report the AD for category 2.G.3.b (other (N <sub>2</sub> O from aerosol cans)) in kt in the next submission.	Not resolved. The Netherlands continued to report the AD in the wrong unit (number of cans rather than kt) in CRF table 2(I).A-Hs2. During the review, the Party stated that this recommendation will be implemented for the next annual submission.
Agriculture			
A.1	3. General (agriculture) – CH <sub>4</sub> and N <sub>2</sub> O (A.1, 2019) (A.8, 2017) Completeness	Collect livestock data and estimate emissions associated with mules and asses for the period 1990–2009, or, alternatively, use an extrapolation technique to ensure time-series consistency.	Not resolved. The Party reported “NO” in its NIR (p.165) for the population of mules and asses for 1990–2009 and “NO” in CRF tables 3.As1 and 3.B(b) for CH <sub>4</sub> and N <sub>2</sub> O emissions from mules and asses for 1990–2009. However, the ERT noted that emissions of CH <sub>4</sub> and N <sub>2</sub> O from mules and asses are reported for 1990–2009 as “IE” in the 2020 NIR. During the review, the Party clarified that emissions from mules and asses for 1990–2009 were not estimated and that “NO” was reported in error. It added that emissions from mules and asses will be included for the entire time series in the next annual submission.
A.2	3. General (agriculture) – CH <sub>4</sub> and N <sub>2</sub> O (A.12, 2019) Transparency	Improve transparency by providing, preferably in the overview section of the agriculture chapter of the NIR, an explanation of how the model (NEMA) and methods (tier 2 and 3) used for estimating emissions for the agriculture sector work together.	Resolved. The Party reported in its NIR (p.162) that the methods used to calculate emissions in the agriculture sector are described in van der Zee et al. (2021), as reflected in a NEMA document on emissions from agricultural activities for 1990–2019 submitted by the Party during the review. During the review, the Party clarified that the requested information was not provided in the NIR to avoid repeating the submitted NEMA document. The ERT considers the issue to have been addressed as the NEMA document is not a separate model per se, but a report summarizing and describing the methods used to estimate GHG emissions for the agriculture sector.
A.3	3. General (agriculture) – CH <sub>4</sub> and N <sub>2</sub> O (A.13, 2019) Transparency	Include the methodology reports referred to during the review, or links to them, in relevant sections of the NIR, and, when the updated paper on standardized calculation methods for animal manure and nutrients (CBS, 2012) is available, include it in future submissions.	Resolved. The Party reported in its NIR (p.167) and during the review that data on the composition of cattle feed are available for 2014–2019 and are updated annually in a CBS report on livestock manure and minerals (see <a href="http://www.cbs.nl/nl-nl/longread/aanvullende-statistische-diensten/2021/dierlijke-mest-en-mineralen-2020/3-graasdieren">www.cbs.nl/nl-nl/longread/aanvullende-statistische-diensten/2021/dierlijke-mest-en-mineralen-2020/3-graasdieren</a> (in Dutch)). The Party noted that annex 23 to the NEMA document provided during the review on emissions from agricultural activities for 1990–2019 contains additional information on the calculation of CH <sub>4</sub> from enteric fermentation.
A.4	3. General (agriculture) – CH <sub>4</sub> and N <sub>2</sub> O (A.15, 2019) Transparency	Include in the NIR an explanation for the decreasing trend in the number of rabbits; namely, that demand for rabbit meat and fur has decreased.	Resolved. The Party reported in its NIR (p.164) that the number of rabbits decreased by 55 per cent between 1990 and 2019 owing to a decrease in demand for rabbit meat.
A.5	3. General (agriculture) – CH <sub>4</sub> and N <sub>2</sub> O (A.16, 2019) Transparency	(1) Include in the NIR the explanation of how the two data sets on milk production (i.e. that based on CBS dairy statistics and that based on Dutch Dairy Board data) have been	Resolved. (1) The Party reported in its NIR (p.403) that the only difference between the data set on milk production from CBS and that from the Dutch Dairy Board is that the data from

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
		<p>assessed or manipulated to ensure consistency in milk production data for the entire time series;</p> <p>(2) Confirm that the data set on milk production is updated yearly with the final production figures and that the previous year's estimates are recalculated accordingly, if appropriate.</p>	<p>CBS are provided directly by the Netherlands Enterprise Agency instead of through the Dutch Dairy Board;</p> <p>(2) The Party also reported in its NIR (p.403) that the data set on dairy production is updated yearly with the final production figures, noting that occasionally only preliminary figures are provided for milk consumed on the farm but that this is negligible as it accounts for less than 0.1 per cent of milk production. Statistics are reported through the Dutch Dairy Board for 1990–1999 and directly by the Netherlands Enterprise Agency for 2000 to present.</p>
A.6	<p>3. General (agriculture) – CH<sub>4</sub> and N<sub>2</sub>O (A.17, 2019) Transparency</p>	<p>Noting some evidence that there may now be alpaca farms in the Netherlands, investigate the issue of the existence of alpacas and llamas in the country and, if relevant, estimate emissions or, in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, justify that the emissions are insignificant.</p>	<p>Addressing. Information on alpacas and llamas was not included in the CRF tables or discussed in the NIR, despite the evidence noted by the previous ERT suggesting possible emissions from such animal species in the country. During the review, the Party clarified that according to CBS no alpacas are kept in the Netherlands for agricultural purposes; however, the ERT considers that the recommendation has not been fully addressed because the Party did not provide any actual evidence that there are no alpaca farms in the country.</p>
A.7	<p>3. General (agriculture) – CH<sub>4</sub> and N<sub>2</sub>O (A.18, 2019) Comparability</p>	<p>Investigate whether representative averages of cattle weight can be estimated and, if so, provide these estimates in the NIR and in CRF table 3.As2 in order to improve comparability.</p>	<p>Not resolved. The Party reported cattle weight as “NE” in CRF table 3.As2. The Party’s supposed response to the previous recommendation, in annex 10 to the NIR, does not relate to the issue raised in that recommendation. During the review, the Party provided the ERT with average cattle weights and noted that the required information will be included in the next annual submission.</p> <p>The ERT considers that the recommendation will have been fully addressed if the Party includes in its next NIR the information provided during the review and values for average cattle weights in CRF table 3.As2.</p>
A.8	<p>3. General (agriculture) – CH<sub>4</sub> and N<sub>2</sub>O (A.19, 2019) Convention reporting adherence</p>	<p>(1) Develop a QA/QC plan in accordance with the 2006 IPCC Guidelines (vol. 1, section 6.5) for agriculture and include in the NIR details of all the QA/QC procedures; and, if they do not already occur, develop a timeline to include:</p> <p>(a) Procedures to ensure the accuracy of data transcription to the calculations used;</p> <p>(b) Comparisons of emissions estimated using tier 2 and 3 methods with those estimated using a tier 1 method, providing in the body of the NIR explanations of any differences;</p> <p>(c) Comparisons of country-specific EFs and other variables with those of other countries,</p>	<p>Addressing. The Party reported in its NIR (pp.269 and 406) that efforts were made to include more sector-specific QA/QC information in the methodology report for agriculture (van der Zee et al., 2021, pp.38–39). The ERT noted that the information provided in the methodology report for agriculture provides an overview of the different steps that are taken every year for QA/QC purposes in the sector. During the review, the Party clarified that while there is an overall QA/QC programme, there is no specific QA/QC plan for the agriculture sector. It noted that it will continue to improve documentation and will consider the added value of a more detailed QA/QC report.</p>



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A.9	3.A.1 Cattle – CH <sub>4</sub> (A.20, 2019) Transparency	<p>providing in the body of the NIR explanations of any differences;</p> <p>(d) Reviews of country-specific EFs, parameters, variables and allocations that are not updated annually and are used in the estimation of emissions;</p> <p>(e) Peer review of the NIR before submission to the secretariat to ensure references are accurate;</p> <p>(f) Peer review of the methodology report for the agriculture sector submitted with the NIR by an external agriculture inventory expert to ensure transparency, completeness and consistency;</p> <p>(2) As carrying out an extensive QA/QC process may be resource intensive and not feasible in the first year following this recommendation, document in the QA/QC plan when each procedure is expected to be implemented, and submit the QA/QC plan as a supplementary document to the NIR in future submissions and update it regularly.</p> <p>(1) Provide in the methodology report submitted with the 2019 NIR the following details on the tier 3 method used for estimating emissions from mature dairy cattle:</p> <p>(a) The assumptions made concerning the degradation characteristics of starch, crude protein and fibre, and where any data used are sourced from;</p> <p>(b) The calculations for manure and mineral data prepared by the working group on uniformity of calculations to determine dry matter intake, including the equations and variables and where these have been sourced from;</p>	<p>Addressing. The Party reported in its NIR (p.162) that the methods used to calculate the emissions for the agriculture sector are described in van der Zee et al. (2021). The ERT noted that, while van der Zee et al. (2021) contains most of the information to be provided by the Party in response to this recommendation (items (a–d)), it does not include an explanation of how the variables used in the enteric fermentation calculations are related to those used for estimating CH<sub>4</sub> and N<sub>2</sub>O emissions from manure management (item (e)). During the review, the Party clarified that the CH<sub>4</sub> EFs for manure storage and treatment are calculated on the basis of the VS supply (van Bruggen et al., 2021, table 5.1), which is also used in the enteric fermentation calculations, and that the N<sub>2</sub>O emissions are based on the IPCC EFs (2006 IPCC Guidelines, vol. 4, chap. 10, table 10.11, p.10.29). The Party also reported in the NIR (p.162) that the AD used to calculate the emissions are summarized in van Bruggen et al. (2021).</p>

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
		<p>(c) The variables informing the recorded production level and where these are sourced from;</p> <p>(d) The internal parameters (and therefore those parameters that do not change each year) and how they were determined;</p> <p>(e) How the variables used in the enteric fermentation calculations relate to those used for estimating CH<sub>4</sub> and N<sub>2</sub>O emissions from manure management;</p> <p>(2) Include in the NIR references to external sources where the information is presented, if the Party considers it is not practical to include all the information above in the NIR.</p>	
A.10	3.A.1 Cattle – CH <sub>4</sub> (A.21, 2019) Transparency	Review the methodology report for agriculture submitted with the NIR to remove the ambiguity about feeding requirements for male cattle.	Resolved. The ERT noted that the relevant sentence of the methodology report (van der Zee et al., 2021, p.47) has been revised as appropriate.
A.11	3.A.1 Cattle – CH <sub>4</sub> and N <sub>2</sub> O (A.22, 2019) Accuracy	<p>(1) Reassess the dairy cow average weight to determine if it has increased over time, and either revise the weight data in the inventory or justify the applicability of the current values;</p> <p>(2) Include in the NIR the results of the assessment of average dairy cow weight as well as a description of how the average weight was determined from such an assessment.</p>	Resolved. The Party explained the trends in the dairy cow average weight in the NIR (pp.175–177) and reported in CRF table 3.B(a) the average weights for dairy cows for reference. During the review, the Party also clarified that the tier 3 method used to derive feed intake does not require animal weights (see ID# A.7 above).
A.12	3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O (A.4, 2019) (A.1, 2017) (A.2, 2016) (A.2, 2015) (41, 2014) (52, 2013) Accuracy	Continue and enhance efforts to improve the consistency between the CH <sub>4</sub> and N <sub>2</sub> O emission estimates and report correct values for the fractions of the different MMS in the NIR and the CRF tables.	Addressing. The Party corrected the values for the fractions of the different MMS in CRF table 3.B(a)s2 (e.g. for growing cattle, swine and poultry) for the 2020 submission. However, the Party continued to report “NO” or “NA” for the fractions of the different MMS for fur-bearing animals, rabbits, horses, goats, and mules and asses in CRF table 3.B(a)s2. During the review, the Party clarified that the fractions of MMS for fur-bearing animals, rabbits, horses, goats, and mules and asses were reported erroneously and that it plans to include all the required information in the CRF tables of its next annual submission.
A.13	3.B Manure management – CH <sub>4</sub>	Report in the NIR the VS values for the most recent year, if the methodology report	Resolved. The Party reported in CRF table 3.B(a)s1 the country-specific VS values for cattle, swine and poultry. During the review, the Party provided the methodology report

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	(A.23, 2019) Transparency	containing the most recent country-specific VS values is not publicly available at the time of the NIR submission.	(van Bruggen et al., 2021), which contains information on the country-specific VS values.
A.14	3.B Manure management – CH <sub>4</sub> (A.24, 2019) Transparency	Provide the missing CRF table values, reference the van Bruggen et al. (2018) paper in the section in the NIR on the CH <sub>4</sub> IEF for manure management, and describe the links between the sectoral methodology papers more clearly in the NIR.	Resolved. The Party included in its NIR (pp.162 and 171–172) references to the report containing AD that could not be included in the CRF tables (van Bruggen et al., 2021), VS (Bannink et al., 2018) and Nex (CBS, 2012). It also reported in CRF table 3.B(a)s2 MCF values and information on MMS and in CRF table 3.B(a)s1 country-specific VS values.
A.15	3.B Manure management – N <sub>2</sub> O (A.25, 2019) Transparency	Include in the NIR an explanation of the trend in Nex rate per animal type.	Resolved. The Party reported in its NIR (p.172) the trend in Nex rate per animal and the underlying rationale.
A.16	3.B Manure management – N <sub>2</sub> O (A.26, 2019) Transparency	Improve clarity by adjusting the statement that sheep, goats, horses, and mules and asses produce only solid manure (p.169 of the 2019 NIR) by including in the NIR the explanation that in the Dutch housing systems for these animal categories, the bedding material, which is used for the comfort of the animals, absorbs most of their urine, and that these animals spend most of their time on pasture.	Resolved. The Party updated the 2020 NIR (section 5.3.2) to draw a clear distinction between urine and dung (referring to excretion) and liquids and solids (referring to MMS). It also revised in its 2021 NIR (p.175) and 2020 NIR (pp.187–188) the statement made in the 2019 NIR (p.169) that sheep, goats, horses, and mules and asses produce only solid manure.
A.17	3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O (A.27, 2019) Transparency	Include in the NIR a description of each of the MMS used in the country, those being manure separation, nitrification or denitrification, the creation of mineral concentrates, the incineration of manure, and the drying and digesting of manure.	Addressing. The Party omitted from its 2021 NIR (p.175) the statement included in the 2020 NIR (section 5.3.2) that common manure treatments in the Netherlands include manure separation, nitrification/denitrification, the creation of mineral concentrates, incineration of manure, drying of manure and/or digesting of manure.
A.18	3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O (A.28, 2019) Transparency	Include in the NIR the information provided to the ERT during the 2019 review clarifying that the same animal population numbers are used to calculate CH <sub>4</sub> and N <sub>2</sub> O emissions from manure management.	Resolved. The Party reported in its NIR (p.166) that the methodology used to calculate the CH <sub>4</sub> and N <sub>2</sub> O emissions is based on different AD (see NIR sections 5.2–5.3) and occasionally different animal numbers, since for N <sub>2</sub> O the Nex data for female swine, sheep and goats and their young offspring/male animals are estimated on the basis of the number of female animals.
A.19	3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O (A.29, 2019) Transparency	Adjust the statement that if the manure is treated, it is assumed that the storage time is shortened since it is beneficial for the farmer (p.167 of the 2019 NIR), in order to clarify that manure digestion is assumed to occur within 24 hours after manure has been	Not resolved. The statement was omitted entirely from the 2021 NIR (p.174). During the review, the Party clarified that the statement was removed for the sake of concision and noted that in van Bruggen et al. (2020) – which is referenced in the NIR (p.31) – it is reported that emissions of N <sub>2</sub> O, NO <sub>x</sub> and dinitrogen are calculated for manure in

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		produced, because digestion efficiency decreases when manure is stored for a longer time.	housing before manure treatment. The Party also clarified that the storage time before manure treatment is shorter and N <sub>2</sub> O emissions occur mostly after treatment. The ERT notes that while the NIR contains the information (p.174) that van Bruggen et al. (2020) includes an overview of the AD used to estimate emissions from manure management, the statement was not adjusted.
A.20	3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O (A.30, 2019) Transparency	Include in the NIR a discussion of the emission trends under manure management to ensure clarity regarding the factors affecting these trends, and also include information that explains the fluctuations in the trends, such as the increased N content in grass in 2017 due to a dry summer.	Addressing. The Party did not report in its NIR (pp.171–172) the fluctuations in emission trends under manure management. The ERT notes that emissions of CH <sub>4</sub> from manure management increased from 2013 to 2019 but that no explanation of the trend is provided. During the review, the Party explained that a more detailed explanation of the trends of CH <sub>4</sub> and N <sub>2</sub> O emissions is provided in a paragraph on source category description in the 2020 NIR (sections 5.2–5.5) but confirmed that it did not include this explanation in its 2021 NIR.
A.21	3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O (A.31, 2019) Transparency	Report in CRF table 3.B(a)s2 the MCF values for swine for digesters and other MMS and for poultry for other MMS for the entire time series.	Resolved. The Party reported in CRF table 3.B(a)s2 the MCF values for swine for digesters and other MMS and for poultry for other MMS for the entire time series.
A.22	3.B.1 Cattle – CH <sub>4</sub> and N <sub>2</sub> O (A.32, 2019) Convention reporting adherence	Review the methodology report for agriculture submitted with the NIR to ensure that information contained in it is internally consistent to ensure clarity, in particular when describing where manure was produced for cattle categories.	Not resolved. The Party reported in its NIR (p.413) that the requested information will be included in the 2021 update of the methodology report (van der Zee et al., 2021). During the review, the Party clarified that the information is provided in annexes 3 and 4 to van Bruggen et al. (2021) (available at <a href="http://www.wur.nl/web/file?uuid=07172ab9-80b5-46a5-9842-6e674a738fab&amp;owner=497277b7-cdf0-4852-b124-6b45db364d72&amp;contentid=575753&amp;elementid=17318115">www.wur.nl/web/file?uuid=07172ab9-80b5-46a5-9842-6e674a738fab&amp;owner=497277b7-cdf0-4852-b124-6b45db364d72&amp;contentid=575753&amp;elementid=17318115</a> (in Dutch)). The ERT considers that the recommendation has not yet been addressed because the Party did not provide in the NIR or in the methodology report consistent information on where manure was produced for cattle categories, in particular on fractions of manure produced in animal housing and on pasture for dairy and male cattle.
A.23	3.B.3 Swine – CH <sub>4</sub> (A.6, 2019) (A.4, 2017) (A.7, 2016) (A.7, 2015) Transparency	Include in the NIR an explanation for the different trends between CH <sub>4</sub> emissions and changes in the swine population.	Not resolved. The ERT noted that the information reported in the 2020 and 2021 NIRs is the same as that reported in the 2019 NIR. During the review, the Party indicated that the NIR states that the productivity of swine has increased over the years and agreed that the inclusion of information on litter size and thus the IEF would improve reporting. It added that it plans to include this information in the next annual submission.
A.24	3.D Direct and indirect N <sub>2</sub> O emissions from agricultural soils – N <sub>2</sub> O (A.8, 2019) (A.5, 2017) (A.8, 2016) (A.8, 2015) Transparency	Include in the NIR numeric data on annual removal of agricultural crop residues.	Not resolved. The Party did not report in its NIR numerical data on annual removal of agricultural crop residues or a clear reference to where the information is available. During the review, the Party clarified that for reasons of concision it avoided repeating in the NIR background information contained in the methodology report, and that the AD are provided in that report (van Bruggen et al., 2021).

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A.25	3.D Direct and indirect N <sub>2</sub> O emissions from agricultural soils – N <sub>2</sub> O (A.33, 2019) Transparency	Expand on the explanation in the NIR of the trends in direct N <sub>2</sub> O emissions from agricultural soils, in particular for the latest years, to include (1) the milk cooperatives' encouragement to farmers to have more animals on pasture, which resulted in increased emissions from grazing in pasture land, and (2) how the weather of the summer of 2017 resulted in different uses of synthetic N fertilizer in comparison with other years.	Resolved. The Party reported on trends in direct N <sub>2</sub> O emissions in the NIR (figure 5.3) and described important drivers of these trends (p.172). Further justification of the trends in direct N <sub>2</sub> O emissions from agricultural soils are also included in the NIR (pp.177–182).
A.26	3.D Direct and indirect N <sub>2</sub> O emissions from agricultural soils – N <sub>2</sub> O (A.34, 2019) Transparency	Include in the NIR an explanation for the reduction in grassland renewal, referencing the relevant policy measures explained to the ERT during the review, and its connection to the reduction in crop residues left on the field.	Not resolved. This information is not provided in the NIR. During the review, the Party clarified that information on policies reducing grassland renewal is not included in the methodology report and noted that it plans to update this information and include in its next annual submission a reference to the policies that have caused a reduction in grassland renewal.
A.27	3.D Direct and indirect N <sub>2</sub> O emissions from agricultural soils – N <sub>2</sub> O (A.35, 2019) Transparency	(1) Include in the NIR a reference for the country-specific EF for compost applied to soils; (2) If the EF is based on expert judgment, ensure that it is documented in accordance with the 2006 IPCC Guidelines (vol. 1, annex 2A.1).	Addressing. The Party reported in its NIR (p.181) that no experimental data on emissions are available for compost and that the EF for compost is equal to that of surface-applied manure because compost is also surface-applied.  The ERT concluded that the EF is based on expert judgment. However, it considers that the recommendation has not yet been fully addressed because the Party has not yet documented the expert judgment used in line with the 2006 IPCC Guidelines (vol. 1, annex 2A.1).
A.28	3.D.a Direct N <sub>2</sub> O emissions from managed soils – N <sub>2</sub> O (A.9, 2019) (A.6, 2017) (A.4, 2016) (A.4, 2015) (42, 2014) Transparency	Include in the NIR the method and related parameters used to derive country-specific Nex rate and Frac <sub>GRAZ</sub> .	Resolved. The Party included information in the NIR (annex 7, methodology report, van der Zee et al., 2021, pp.125–134) on the method and related parameters used to derive country-specific Nex rate and Frac <sub>GRAZ</sub> .
A.29	3.D.a.3 Urine and dung deposited by grazing animals – N <sub>2</sub> O (A.36, 2019) Accuracy	Noting that the Party has drained much of its soils over the years, resulting in a potentially very low groundwater level, review the research on the EF <sub>3</sub> for urine and dung deposited by grazing animals to determine if the current EF <sub>3</sub> is still applicable to the Party's agricultural systems, and, until such time as this review and any further research has been carried out, improve transparency by	Addressing. The Party reported in its NIR (p.182) that the EF used for urine and dung deposited by grazing animals is based on Velthof et al. (1996), in which the results of the research were published, but did not justify that the EF is still applicable. The Party also reported that the methodology report (van der Zee et al., 2021, annexes 10.1 and 10.7) describes how the findings contained in Velthof et al. (1996) were used to calculate the EFs used in the inventory.  The ERT notes that the methodology report (van der Zee et al., 2021) includes the approach used to estimate the EF for urine and dung deposited by grazing animals on the basis of Velthof et al. (1996).

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		explaining in the NIR how research results were used to calculate the current EF <sub>3</sub> .	
A.30	3.D.b Indirect N <sub>2</sub> O emissions from managed soils – N <sub>2</sub> O (A.37, 2019) Transparency	Include in the NIR the link to the Ministry of Infrastructure and Water Management web page presenting an overview of the measures in place to reduce indirect N <sub>2</sub> O emissions from managed soils.	Resolved. The Party reported in its NIR (p.64) that indirect N <sub>2</sub> O emissions have decreased because of reduced atmospheric deposition of ammonia and nitrous oxides, as a result of EU policies on air pollution (specifically the national emission reduction commitments directive (2016/2284/EU)) and the Gothenburg Protocol under the Convention on Long-Range Transboundary Air Pollution.
LULUCF			
L.1	4. General (LULUCF) – CO <sub>2</sub> (L.2, 2019) (L.2, 2017) (L.3, 2016) (L.3, 2015) Comparability	Correct the notation key “NE” to “NO” for those pools in which the Party considers no CSC occurs, provide estimates for those pools and categories for which it believes zero carbon change does not apply, or provide the justification for reporting “NE” for the pools in which the amount of CSC is insignificant in line with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines.	Resolved. In accordance with paragraph 27(e) of the conclusions and recommendations from the 16 <sup>th</sup> meeting of GHG inventory lead reviewers, the Party changed from “NE” to “NA” the notation keys reported in CRF tables 4.A–4.F for the carbon pools in which no CSC occurs on the basis of a tier 1 assumption from the 2006 IPCC Guidelines (e.g. figure 2.3 (p.2.22), chap. 2, vol. 4) (see also ID# L.3 below).
L.2	4. General (LULUCF) – CO <sub>2</sub> (L.4, 2019) (L.12, 2017) Transparency	(1) Add to the NIR an explanation for the lack of AD before 1990, and extend the description by adding graphs showing the problem of extrapolating the AD back from 1990;  (2) Make further efforts or explore alternative ways of deriving appropriate data (e.g. through extrapolation based on surrogate data).	Resolved. The Party included in its NIR (sections 6.1.3 (pp.196–197) and 6.3 (p.201)) a 1970 land-use map and updated land-use change data for 1970–1990. The ERT notes that this improvement resulted in a large recalculation in the LULUCF sector and did a great deal to improve the overall accuracy of the estimated emissions and removals for the LULUCF sector and the national total.
L.3	4. General (LULUCF) – CO <sub>2</sub> (L.18, 2019) Comparability	Report “NA” for cases where a tier 1 assumption of carbon stocks in equilibrium is applied.	Addressing. The Party reported “NA” in CRF tables 4.A–4.F for the carbon pools in which no CSC occurs based on a tier 1 assumption (see also ID# L.1 above). It also provided an overview of methodologies applied in NIR table 6.2 (pp.191–192); however, for mineral soils under remaining lands, “NO” is reported in the NIR and “NA” is reported in the CRF table (as a tier 1 assumption of carbon stocks in equilibrium is applied).  During the review, the Party agreed that “NA” should be reported in NIR table 6.2 for mineral soils under remaining lands in the next annual submission.
L.4	4.A.1 Forest land remaining forest land – CO <sub>2</sub> (L.8, 2019) (L.6, 2017)	Provide in the NIR (1) an explanation of the implications of CSC in forests and (2) the assumptions made for the estimates and provide references to justify this assumption.	Resolved. The Party provided in the NIR (sections 6.4.2.1, p.207, and 4.2, pp.37–39) and in annexes 4–5 to the methodology report (Arets et al., 2021) contained in NIR annex 7 an explanation of the change in growing stock volume, the amount of harvesting for 1990–2019 and historical background information on forest, forestry and forest

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	(L.7, 2016) (L.7, 2015) Transparency		management. The Party explained in its NIR that the significant increase in growing stock over time in the Netherlands compared with other countries is attributable to the low harvesting rate for 1990–2017 and that the total volume increment itself is not considered high.  The ERT considers that the explanation is reasonable. It also notes that the increasing trend of growing stock is relevant to the age class structure of forest (see also ID# L.15 in table 6).
L.5	4.A.1 Forest land remaining forest land – CO <sub>2</sub> (L.19, 2019) Comparability	Report “NA” for cases where a tier 1 assumption of carbon stocks in equilibrium is applied, in particular for CSC in mineral soils in CRF table 4.A for forest land remaining forest land instead of “NO”.	Addressing. The Party reported CSC in mineral soils for forest land remaining forest land as “NA” in CRF table 4.A but as “NO” in NIR table 6.2 (p.191). During the review, the Party clarified that “NA” should be reported in NIR table 6.2 in the next annual submission (see also ID# L.3 above). It provided information on its plans to estimate CSC in this pool, noting that assessing carbon stocks in mineral soils and litter is under consideration in the workplan for the eighth NFI. The plan to estimate CSC under forest land remaining forest land will be implemented taking into account data collected from new measurements as a part of NFI activities.
L.6	4.A.1 Forest land remaining forest land – CO <sub>2</sub> (L.20, 2019) Transparency	Provide in the NIR information regarding the use and calibration of EFISCEN, including evidence that the model is able to reproduce observed trends for before 2013 in the CSC of living biomass.	Addressing. The Party reported detailed information on EFISCEN, including on calibration, in annex 6 to the methodology report (Arets et al., 2021) contained in NIR annex 7 (pp.121–130). The model was used to calculate biomass stock change for years after the latest (sixth) NFI and was initialized using forest composition data from that NFI, covering 2012–2013. The ERT noted that the CSCs in living biomass under forest land remaining forest land used in the initialization of the model allowed for a seamless transition from the observed trend, calculated on the basis of stock difference methods using the NFIs, to the trend projected by the model for years after the sixth NFI. During the review, the Party explained that the model is calibrated to determine forest composition rather than to reproduce CSCs. The ERT, noting the comparison between the growing stock volume based on the sixth NFI and that projected by EFISCEN based on the fifth NFI, as contained in the 2019 National Forestry Accounting Plan of the Netherlands provided during the review, concluded that EFISCEN can reproduce growing stock data well, generally with a 95 per cent confidence interval. However, the NIR does not contain any information on the ability of the model to reproduce observed trends before 2013 (e.g. in the CSC of living biomass). The Party also explained during the review that, in its next annual submission, it plans to use data from the seventh NFI to estimate CSCs in biomass on the basis of the stock difference method, rather than the modelling projection. It noted that estimates will be updated annually on the basis of available NFI data.  The ERT notes that, if the Party implements this improvement for the next annual submission, this issue will be considered resolved.
L.7	4.B Cropland – CO <sub>2</sub> (L.10, 2019) (L.8, 2017)	Correct the errors in reporting land-use area data in the CRF tables and ensure complete	Addressing. The Party included the total areas of peat and peaty soils and the cultivated area of peat and peaty soils under grassland (excluding trees outside forest) in NIR table 6.11 (p.221). The ERT noted that the organic soil areas reported in CRF table 4.C are

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	(L.9, 2016) (L.9, 2015) Accuracy	and consistent coverage of land areas within the country.	consistent with the total areas of peat and peaty soils under grassland reported in NIR table 6.11; however, there are small differences (maximum 18 ha) between the areas reported under LULUCF (in CRF tables 4.B and 4.C) and those reported under the agriculture sector (in CRF table 3.D). During the review, the Party clarified that the areas reported in CRF table 3.D are based on land-use and soil input data (maps), while the information provided in NIR table 6.11 is based on outputs from the bookkeeping model, under which land converted to grassland over the past 20 years continues to be erroneously allocated to grassland remaining grassland where a transition between “nature” and “grassland vegetation” occurred (see ID# L.8 below). The Party confirmed that this issue will be resolved through an operational review of the new bookkeeping model.
L.8	4.C.1 Grassland remaining grassland – CO <sub>2</sub> (L.13, 2019) (L.10, 2017) (L.10, 2016) (L.10, 2015) Accuracy	Correct the errors in the allocation of areas and the estimates of emissions/removals between grassland remaining grassland and land converted to grassland, and enhance the QA/QC procedures to ensure accurate reporting on this issue in the NIR and the CRF tables.	Not resolved. The misallocation of areas between grassland remaining grassland and land converted to grassland and the related errors in the estimates of emissions and removals persist in CRF table 4.C. The Party provided information on the status of the misallocation in section 6.6.1 of its NIR (p.218), explaining that an updated version of the bookkeeping model used to calculate CSCs in the LULUCF sector was tested in 2021 and will be applied for 2022.  The ERT considers that the application of the updated bookkeeping model will resolve this issue.
L.9	4.D.1.1 Peat extraction remaining peat extraction – CO <sub>2</sub> and N <sub>2</sub> O (L.23, 2019) Completeness	Estimate the emissions arising from peat extraction between 1990 and 1992 and report CO <sub>2</sub> and N <sub>2</sub> O emissions in CRF table 4(II) under peat extraction lands and provide in the NIR information regarding the history of peat extraction practices in the country, including when this practice is last known to have occurred.	Resolved. The Party reported CO <sub>2</sub> and N <sub>2</sub> O emissions from peat extraction for 1990–1992 as “NO” in CRF tables 4.D and 4(II) and provided an explanation in the NIR (section 3.5 of annex 7, p.30) for its use of that notation key. The ERT considers that the reporting of this source as “NO” for 1990–1992 is reasonable.
L.10	4.G HWP – CO <sub>2</sub> (L.24, 2019) Accuracy	Include, in the tier 2 methods and reporting for HWP under the Convention, the accumulation and decay of wood products in use arising from activities that would be defined as deforestation under the Kyoto Protocol.	Resolved. The Party continued to report CSCs from HWP under the Convention using the same methods as those used for HWP under the Kyoto Protocol, on the basis of the Kyoto Protocol Supplement, to maintain consistency between the reporting under the Kyoto Protocol and the Convention. The ERT notes that footnote 12 to CRF table 4.Gs1 states: “Production approach. Refer to equations 12.1, 12.3 and 12.A.6 of volume 4 of the 2006 IPCC Guidelines or any other IPCC methodological guidance reflecting this approach”. The ERT also notes that the 2006 IPCC Guidelines (p.12.8, chap. 12, vol. 4) allow the HWP contribution to be reported as zero if the inventory compiler judges that the annual change in carbon in HWP stocks is insignificant. The ERT considers that applying the same methodology is not prohibited by the UNFCCC Annex I inventory reporting guidelines because deforestation-origin wood is calculated on the basis of instantaneous oxidation; however, excluding data from years before 1990, which is allowed in accounting under the Kyoto Protocol where the FMRL is based on a



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L.11	4.G.2 Paper and paperboard – CO <sub>2</sub> (L.25, 2019) Convention reporting adherence	(1) Apply QC procedures to the source data for HWP to ensure that recycling practices are consistently accounted for in the balance of production, exports and imports of paper and paper products;  (2) Include in the NIR a table of statistical information showing the balance of produced, imported and exported wood pulp, and explain the industrial and trade practices that justify accumulation of carbon stocks in the paper pool being reduced to zero for 1994 onward.	projection (decision 2/CMP.7, annex, para. 16), results in an underestimation of emissions from existing HWP for the years after 1990 (see also ID# L.19 in table 6).  Addressing. The Party reported “NO” for carbon inflow of paper and paperboard products pool for 1994 onward in CRF table 4.Gs1, although the domestic production of paper and paper products is reported in CRF table 4.Gs2. The Party explained in the NIR (p.228) that “NO” was reported because the share of domestically manufactured products became negative in the calculation based on equation 2.8.2 from the Kyoto Protocol Supplement and, as a consequence, the domestic production of paper and paper products was set to zero for 1994 onward in accordance with the Kyoto Protocol Supplement. NIR table 6.12 (p.228) contains production, import and export data for three semi-finished product categories and production data for other industrial roundwood. The Party also explained that the country-specific data and information collected by Probos as part of the joint forest sector questionnaire and used for the 2021 submission took into account recalculations for 2017–2018. During the review, the Party clarified that Probos data are used as a basis for reporting to the statistical database of the Food and Agriculture Organization of the United Nations and are the same as in previous submissions for most of the time-series production, import and export data.  The ERT considers that the Party has addressed recommendation (2) through the improvement mentioned above, but did not provide enough information in the NIR on recycling practices to address recommendation (1).
L.12	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – N <sub>2</sub> O (L.16, 2019) (L.18, 2017) Completeness	Provide estimates of the areas of forest land on organic soils where drainage might still be occurring, report the associated N <sub>2</sub> O emissions in the CRF tables using IPCC default or country-specific EFs, and describe the applied methodology and IEF transparently in the NIR.	Resolved. The Party included N <sub>2</sub> O emissions associated with drainage of organic soils in forest land in CRF table 4(II) and reported the methodology used in both the NIR (p.195) and the methodological report (Arets et al. (2021), p.66) contained in NIR annex 7.
L.13	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO <sub>2</sub> (L.26, 2019) Transparency	Provide in the NIR further information on the nature of the disturbances and other activities causing the decline in the area of organic soils, including evidence to support the claim that the excavation of organic soils is not occurring in the country.	Resolved. Two soil maps representing the state of soil in 1977 and 2014, provided by the Party in the NIR, show a declining trend of organic soil areas due to a combination of ongoing oxidation and disturbance. The Party revised the assumption regarding the area of organic soils after 2014 to reflect that it has declined rather than remained constant since that year. Information on organic soils, including an explanation for the declining trend, the established EFs and the fact that peat extraction (excavation) is considered not to be occurring, is provided in the NIR (pp.193–195) and the methodological report (pp.30–31, 62–69 and 98–99) contained in annex 7 to the NIR.

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L.14	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO <sub>2</sub> and CH <sub>4</sub> (L.27, 2019) Transparency	Update the NIR to include a correct description of rewetting activities in the country.	Not resolved. The Party reported in the 2020 NIR (p.481) that possible data sources for rewetted areas were being explored; however, no information on rewetting activities was provided in the 2021 NIR. During the review, the Party confirmed that possible data sources for rewetted areas are being explored as a part of a larger inventory on data sources, as well as possibilities for improving the reporting on wetlands in the Netherlands. As this is linked to a research programme under the Dutch Climate Agreement, this activity has not yet been completed and will likely only result in improvements from the 2023 NIR onward.
Waste			
W.1	5.A Solid waste disposal on land – CH <sub>4</sub> (W.1, 2019) (W.1, 2017) (W.2, 2016) (W.2, 2015) (52, 2014) Transparency	Include important AD, such as the amount and composition of disposed waste, in the NIR.	Addressing. The Netherlands included the amount and composition of disposed waste in the NIR (table 7.3). The ERT noted that the Party provided the amount of waste landfilled and the DOC value for each waste group for 2019 but did not provide these values for the composition of each waste group for the entire time series. During the review, the Party reported that NIR table 7.3 was updated using the most recent AD (amount of landfilled waste groups and DOC).  The ERT considers that the recommendation has not yet been fully addressed because the Party has yet to provide AD on the composition of important waste groups (like household waste) according to the 2006 IPCC Guidelines (vol. 5, chap. 2, p.2.11).
W.2	5.A Solid waste disposal on land – CH <sub>4</sub> (W.4, 2019) (W.5, 2017) (W.10, 2016) (W.10, 2015) Consistency	Provide justifications for (1) the default value of fraction of CH <sub>4</sub> in generated landfill gas being used for the years 2005–2014; (2) the interpolation between country-specific and default values for fraction of CH <sub>4</sub> in generated landfill gas for the years 2001–2004 being considered the best approach to estimate the CH <sub>4</sub> emissions and to maintain time-series consistency; and (3) the correspondence of approaches to estimating CH <sub>4</sub> emissions from solid waste disposal sites to the guidance provided in the 2006 IPCC Guidelines. If unable to provide the justifications and if unable to obtain a country-specific value for the fraction of CH <sub>4</sub> in generated landfill gas for the period 2001–2014, continue to use the country-specific value (57.4 per cent) and recalculate the CH <sub>4</sub> emissions from waste disposal on land using this country-specific value for the entire time series 1990–2014.	Resolved. The Party provided in the NIR (pp.239–240) the data sources (Coop et al., 1995; Oonk et al., 2016) for the value of the fraction of CH <sub>4</sub> in generated landfill gas for 2005–2014. The ERT noted that the fraction of CH <sub>4</sub> in landfill gas has declined. During the review, the Netherlands clarified that the information provided on recovered landfill gas refers to the percentage of CH <sub>4</sub> in recovered landfill gas and not the CH <sub>4</sub> percentage in formed landfill gas. The amount of CH <sub>4</sub> in formed landfill gas is 57.4 per cent for 1990–2004 and 50 per cent for 2005 onward in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.15).

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W.3	5.A.1 Managed waste disposal sites – CH <sub>4</sub> (W.9, 2019) (W.15, 2017) Transparency	Report in the NIR the reasons for the decrease in DOC values throughout the time series, in particular between 2000 and 2001, and explain the low values reported for the period 2000–2015.	Resolved. An explanation for the decrease in DOC values throughout the time series, in particular between 2000 and 2001, and for the low values reported for 2000–2015 is provided in the NIR (section 7.2.2, pp.236–237).
W.4	5.A.1 Managed waste disposal sites – CH <sub>4</sub> (W.10, 2019) (W.16, 2017) Consistency	(1) Apply country-specific k values for the period 2001 onward in order to ensure time-series consistency;  (2) Until the studies for obtaining these country-specific k values are concluded, apply the country-specific value for k (0.0693) for the period 1990–2004 and the IPCC default value for k (0.05) for 2005 onward;  (3) Explain in the NIR the use of the k values throughout the time series.	Resolved. The Netherlands provided information in the NIR (section 7.2.2, pp.240–241) on the use of k values throughout the time series. During the review, the Party explained that the IPCC default k value of 0.05 is used because the Netherlands has a temperate and wet climate and the waste that is landfilled is for the most part slowly degradable waste. It also explained that while the country-specific k value for 1990–2004 (0.0693) was determined using a validated landfill gas model (Oonk et al., 1994), a more recent attempt to validate the landfill gas model to derive improved parameters (Tauw, 2011) was unsuccessful, so the IPCC default k value (0.05) and DOC <sub>f</sub> value (0.5) are used for 2005 onward.
W.5	5.A.1 Managed waste disposal sites – CH <sub>4</sub> (W.11, 2019) (W.17, 2017) Consistency	(1) Derive country-specific DOC <sub>f</sub> values for the period 2001 onward in order to ensure time-series consistency;  (2) Until the studies for obtaining these country-specific DOC <sub>f</sub> values are concluded, apply the country-specific value for DOC <sub>f</sub> (0.58) for the period 1990–2004 and the IPCC default value for DOC <sub>f</sub> (0.5) for 2005 onward;  (3) Explain in the NIR the use of the DOC <sub>f</sub> values throughout the time series.	Addressing. The Netherlands provided the following description for the parameterization of the DOC <sub>f</sub> value in the NIR (p.235): “Fraction of DOC actually dissimilated (DOC <sub>f</sub> ): 0.58 until 2004 (Oonk et al., 1994) and 0.5 from 2005 (IPCC default parameter)”. The Party explained in the NIR (p.240) that according to Tauw (2011) it is not possible to validate the country-specific value used until 2004.
W.6	5.A.1 Managed waste disposal sites – CH <sub>4</sub> (W.12, 2019) (W.18, 2017) Consistency	(1) Derive country-specific fraction of CH <sub>4</sub> in generated landfill gas values for the period 2001 onward in order to ensure time-series consistency;  (2) Until the studies for obtaining these country-specific values are concluded, apply the country-specific value (57.4 per cent) for the period 1990–2004 and the IPCC default value (50 per cent) for 2005 onward;  (3) Explain in the NIR the use of the fraction of CH <sub>4</sub> in generated landfill gas value throughout the time series from 1990.	Resolved. The Netherlands provided an explanation in the NIR (table 7.5, p.239) for the use of the country-specific fraction of CH <sub>4</sub> in generated landfill gas. It also provided in the NIR (table 7.4) the average percentage of CH <sub>4</sub> for the entire time series. During the review, the Netherlands informed the ERT that the overview of recovered landfill gas gives the percentage of CH <sub>4</sub> in recovered landfill gas rather than the CH <sub>4</sub> percentage in formed landfill gas, and that the percentage of CH <sub>4</sub> in recovered landfill gas is in most cases measured (see also ID# W.2 above).

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
W.7	5.A.1 Managed waste disposal sites – CH <sub>4</sub> (W.18, 2019) Transparency	Provide in the NIR more detailed information on the sources of CH <sub>4</sub> recovery and flaring data for the entire time series, as well as explanatory information on the amount of recovered CH <sub>4</sub> that is estimated, calculated or measured.	Resolved. The Netherlands provided in the NIR (table 7.4) detailed information on the total amount of recovered landfill gas, the amount combusted in flaring, the amount used for energy purposes and the average percentage of CH <sub>4</sub> calculated for the time series, including references to sources (see also ID#s W.2 and W.6 above).
W.8	5.B.1 Composting – CH <sub>4</sub> (W.14, 2019) (W.7, 2017) (W.11, 2016) (W.11, 2015) Consistency	Ensure the consistency of the reported time series for the CH <sub>4</sub> EF and include in the NIR the reason for the decrease in the CH <sub>4</sub> EF after 2009.	Addressing. The Party reported in the 2021 NIR (p.242) that the AD and EF can be found in paragraph 2.3.2.3 of Honig et al. (2021). During the review, the Netherlands clarified that the consistency of the reported time series was addressed during the national peer review conducted for the waste sector for the draft 2020 NIR (Oonk, 2020), in accordance with which it was recommended to use a single EF for the whole time series. As a result, the decision was made to use, for the 2021 and subsequent annual submissions, an EF of 750 g/t CH <sub>4</sub> for the whole time series for the composting of organic waste from households. For the years prior to 2008, the emissions were recalculated, as shown in CRF table 8s3. However, the information in paragraph 2.3.2.3 of Honig et al. (2021) is not consistent with the chosen EF of 750 g/t and the EF of 790 g/t used for 2019.  The ERT considers that the recommendation has not been fully addressed because the Netherlands did not justify its use of the EF of 750 g/t for the composting of organic waste from households for the time series 1990–2018 and the use of the EF of 790 g/t for 2019.
W.9	5.D Wastewater treatment and discharge – N <sub>2</sub> O (W.19, 2019) Comparability	Report “NA” for all the parameters in the additional information table of CRF table 5.D, and provide in the documentation box of that CRF table a reference to the section of the NIR that contains an explanation of why the AD are not applicable to the national circumstances.	Resolved. The Party provided information in its NIR (pp.252–253) on the use of country-specific AD, using a pollution equivalent value to represent the total load of biodegradable substances in the mixture of domestic and industrial wastewater treated in urban wastewater treatment plants. During the review, the Party clarified that, since it does not use protein consumption as AD to estimate the emissions of N <sub>2</sub> O from wastewater treatment and wastewater discharge, the recommended parameters are not relevant and reporting them could be confusing. For N <sub>2</sub> O emissions from advanced urban wastewater treatment, the Netherlands uses a pollution equivalent value representing the total load of biodegradable substances in the mixture of domestic and industrial wastewater treated in urban wastewater treatment plants. For the calculation of (indirect) N <sub>2</sub> O emissions from surface water as a result of N discharges via wastewater treatment plant effluents, industrial discharges and sewer overflows, the Netherlands uses actual measured loads as AD. In CRF table 5.D (for the AD needed for estimating N <sub>2</sub> O emissions from wastewater treatment and discharge), the notation key “NA” is reported and a reference is provided in the NIR (para. 7.5.2, pp.252–253) and methodology report (paras. 2.3.2.4.2 and 2.3.2.4.6).

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
KL.1	General (KP-LULUCF) – CO <sub>2</sub> (KL.12, 2019) Comparability	Report “NE” for cases where emissions are not reported on the basis of the justification that they are not a net source.	Addressing. The Party reported litter from AR as “NE” in CRF table 4(KP-1)A.1 but litter from FM as “NO” in CRF table 4(KP-1)B.1. The ERT notes that the NIR contains verifiable information that this pool is not a source of litter from AR (section 11.3.1.2, pp.287–288), as well as information on litter from FM (section 4.2.1 of Arets et al., 2021, contained in NIR annex 7 (pp.39–41)), and considers that “NE” should be reported for litter from AR and FM. (See also ID# KL.3 below regarding the reporting of these pools in CRF table NIR-1, where reporting “NE” is technically not possible and “NR” is reported.)
KL.2	General (KP-LULUCF) – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (KL.13, 2019) Accuracy	<p>(1) Correct the calculation methods for natural disturbances, report updated estimates for the background level and margin (subject to other improvements to the calculations of fire emissions) and identify the required technical correction to the FMRL in the NIR;</p> <p>(2) Reconsider the choice of calibration period and/or the scope of wildfire for the purpose of natural disturbances in order to avoid the expectation of net credits and debits, giving consideration to the availability of AD on wildfire occurrence and associated calculations of emissions from fires;</p> <p>(3) Provide information in accordance with decision 2/CMP.7, annex, paragraph 34, demonstrating that natural disturbance occurrences were or are beyond the control of, and not materially influenced by, the Party in the commitment period by demonstrating practicable efforts to prevent, manage or control the occurrences. This would include providing information on both the strategies for managing the threat of major windstorms and the efforts to suppress and prevent fires.</p>	<p>Resolved.</p> <p>(1) The Party corrected in the NIR (section 11.4.4, p.292) the calculation for natural disturbances and reported the corrected background levels (2.77 Gg CO<sub>2</sub> eq for FM and 0.0077 Gg CO<sub>2</sub> eq for AR) and margins (0.27 Gg CO<sub>2</sub> eq for FM and 0.0014 Gg CO<sub>2</sub> eq for AR). The background level values are reported in CRF tables 4(KP-1)A.1.1 and 4(KP-1)B.1.3;</p> <p>(2) The Party provided a discussion on the calibration period and the potential effect of using current European Forest Fire Information System data on the numbers and areas of wildfires in chapter 12 of the methodology report (Arets et al., 2021) contained in annex 7 to the NIR (pp.71–72);</p> <p>(3) The Party provided a reference to a report containing detailed information on efforts to prevent, manage and control the occurrence of natural disturbances in section 13.4.3 of the methodology report (Arets et al., 2021) contained in annex 7 to the NIR (p.78). The Party also explained that the use of the natural disturbance provision is unlikely to be required when accounting for LULUCF activities under the second commitment period, as natural disturbances occur infrequently and to a limited extent and, moreover, the required information on spatially explicit location and extent are missing because the current monitoring structure does not meet the requirements set out in decision 2/CMP.7, annex, paragraph 34.</p> <p>The ERT notes that the background level for AR is inconsistent with the value given in the previous review report (0.077 Gg CO<sub>2</sub> eq) and is rather low. During the review, the Party clarified that the value of 0.0077 Gg CO<sub>2</sub> eq reported in the NIR is correct and does not take into account the effect of the increasing area of AR land, which is discussed in the Kyoto Protocol Supplement (pp.2.50–2.53).</p> <p>The ERT considers that the required information has been provided in the NIR and further elaborating the background level and margin for AR and FM will not lead to more accurate accounting as it is unlikely to involve the application of the natural disturbance provision by the Party owing to the difficulties in meeting the monitoring requirements set out in decision 2/CMP.7.</p>
KL.3	AR – CO <sub>2</sub> (KL.2, 2019) (KL.9,	Correct the use of the notation keys and use them consistently throughout the NIR (i.e. use	Resolved. The Party reported “NR” in CRF table NIR-1 for litter from AR and FM.

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	2017) KP reporting adherence	“NR” for pools where the tier 1 “not a source principle” applies and for which a justification has been given in the NIR).	
KL.4	Deforestation – CO <sub>2</sub> (KL.14, 2019) Completeness	Estimate and report the CO <sub>2</sub> emissions associated with the loss of dead organic matter from deforested lands previously classified under AR where the forest is less than 20 years old, or, if this is not possible, justify why the exclusion of these emissions would not result in an underestimation of emissions from deforestation for the litter and deadwood pools.	<p>Addressing. The Party reported in the NIR (section 11.3.1.2, pp.287–288) that it does not estimate carbon accumulation in litter and deadwood where the forest is less than 20 years old under AR and considers this a conservative assumption given the lack of reliable data and high uncertainties. The Party reported in the NIR (table 11.1, p.278) and CRF table NIR-2 that deforestation occurred on AR land. The relevant emissions due to carbon losses of litter and deadwood pools were estimated only where the deforested forest was over 20 years old; emissions for forests aged under 20 years were not estimated because the appropriate carbon stock was not set for the reason mentioned above. The Party explained that this potentially results in an underestimation of emissions under deforestation; however, the removals for these pools for AR land less than 20 years old were not included, so it does not result in an overall underestimation in the accounting of removals for activities under Article 3, paragraph 3, of the Kyoto Protocol (pp.510–511 of the 2020 NIR). During the review, the Party clarified that it is difficult to report exact deforested areas on AR land less than 20 years old because emission and removal estimates are made using the Party’s bookkeeping model, which concerns all unique land-use trajectories and does not output exact information on the age of AR land at the time of deforestation. However, the deforested area is assumed to be roughly 11 kha on the basis of input data from the model.</p> <p>The ERT considers that the Party could provide further supporting information, including additional quantitative data on the areas concerned, for the justification that the underestimation of removals for carbon accumulation in litter and deadwood on AR land less than 20 years old and the underestimation of emissions for losses in litter and deadwood due to deforestation on AR land less than 20 years old do not result in an underestimation of emissions for activities under Article 3, paragraph 3, of the Kyoto Protocol.</p>
KL.5	FM – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (KL.5, 2019) (KL.5, 2017) (KL.6, 2016) (KL.6, 2015) Accuracy	In conducting technical corrections of the FMRL, address the recommendation made in the report of the technical assessment of the FMRL (FCCC/TAR/2011/NLD) and reflect historical emissions from natural disturbances (see also document FCCC/IRR/2016/NLD, table 3).	<p>Resolved. The Party provided the required information on technical corrections in the NIR (section 11.5.2.3, pp.296–297) and in section 13.4.2 of the methodology report (Arets et al., 2021) contained in NIR annex 7 (pp.76–78) and reported the FMRL following technical corrections as 360 kt CO<sub>2</sub> in the CRF accounting table. This included the improvement addressing the recommendation made in the report of the technical assessment of the FMRL.</p> <p>The ERT considers that the recommendation has been addressed in terms of accuracy. However, an issue of transparency in relation to this recommendation is raised under ID# KL.10 in table 6.</p>
KL.6	FM – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	Correctly report the FM cap as 62,495.51 kt CO <sub>2</sub> eq, consistent with the information in the report on the review of the report to facilitate	Resolved. The Party reported the FM cap as 62,495.51 kt CO <sub>2</sub> eq in the CRF accounting table.

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	(KL.15, 2019) KP reporting adherence	the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of the Netherlands.	
KL.7	HWP – CO <sub>2</sub> (KL.7, 2019) (KL.6, 2017) (KL.7, 2016) (KL.7, 2015) Transparency	Provide in the NIR information on the adherence to IPCC guidance in terms of the exclusion of imports and deforestation, inherent HWP, and the relationship between reporting under the Convention and the projection of HWP in the FMRL.	Resolved. The Party reported in the NIR (section 11.4.5, pp.293–295) and in chapter 10 of the methodology report (Arets et al., 2021, pp.57–58) the HWP-related elements listed in decision 2/CMP.8, annex II, paragraph 2(g)(i–vii).
KL.8	HWP – CO <sub>2</sub> (KL.16, 2019) Accuracy	Consider full implementation of Probos as a country-specific data source or explain in the NIR why it was concluded that data from the Food and Agriculture Organization of the United Nations remain the superior source.	Resolved. The Party reported in the NIR (section 11.3.2, p.290) that data on production, import and export of wood is directly taken from Probos and that this change resulted in a recalculation of the HWP estimates for 2017–2018. The Party also provided updated figures for production, import and export for 2017–2018 in CRF table 4.Gs2.
KL.9	CH <sub>4</sub> and N <sub>2</sub> O emissions from drained and rewetted organic soils – N <sub>2</sub> O (KL.11, 2019) (KL.14, 2017) Completeness	Provide estimates of the areas of afforestation and FM on organic soils where drainage might still be active, report the associated N <sub>2</sub> O emissions in the CRF tables using IPCC default or country-specific EFs, and describe the applied methodology and EF transparently in the NIR.	Resolved. The Party reported N <sub>2</sub> O emissions from drainage for AR and FM in CRF table 4(KP-2)II with a decreasing trend in annual areas and emissions, as the total organic soil area of the Party is decreasing, and multiplied a constant share of area subject to drainage by this decreasing trend (see also ID# L.13 above).

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

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

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

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2021 annual submission of the Netherlands, and had not been addressed by the Party at the time of publication of this review report.

Table 4

##### Issues and/or problems identified in three or more successive reviews and not addressed by the Netherlands

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed<sup>a</sup></i>
General	No issues identified.	
Energy		
E.3	Include in the NIR the reason why emissions from liquid fuels are reported for 1990 only.	3 (2017–2021)
E.7	Allocate combustion emissions of CH <sub>4</sub> from the natural gas transport network to subcategory 1.A.3.e.i (pipeline transport).	3 (2017–2021)
E.12	Report the appropriate notation keys in CRF table 1.B.2 for AD and CO <sub>2</sub> and CH <sub>4</sub> emissions, ensuring time-series consistency.	3 (2017–2021)
IPPU		
I.1	Conduct further research and consultation with industry and/or statistical agencies on other process uses of carbonates to either access additional AD and EFs or seek verification of the current method and emission estimates in order to ensure the completeness and accuracy of the estimates.	4 (2015/2016–2021)
I.4	Document the QA/QC activities and outcomes for the chemical and petrochemical sources in the IPPU sector.	4 (2015/2016–2021)
I.6	Report more information related to HFC emissions associated with the production of hydrochlorofluorocarbons.	3 (2017–2021)
I.8	Ensure transparency and QC of the iron and steel sector.	3 (2017–2021)
I.9	Ensure that all emissions are reported under iron and steel production subcategories in the IPPU sector, in accordance with the 2006 IPCC Guidelines.	3 (2017–2021)
Agriculture		
A.1	Collect livestock data and estimate emissions associated with mules and asses for the period 1990–2009, or, alternatively, use an extrapolation technique to ensure time-series consistency.	3 (2017–2021)
A.12	Continue and enhance efforts to improve the consistency between the CH <sub>4</sub> and N <sub>2</sub> O emission estimates and report correct values for the fractions of the different MMS in the NIR and the CRF tables.	6 (2013–2021)
A.23	Include in the NIR an explanation for the different trends between CH <sub>4</sub> emissions and changes in the swine population.	4 (2015/2016–2021)



<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed<sup>a</sup></i>
A.24	Include in the NIR numeric data on annual removal of agricultural crop residues.	4 (2015/2016–2021)
LULUCF		
L.7	Correct the errors in reporting land-use area data in the CRF tables and ensure complete and consistent coverage of land areas within the country.	4 (2015/2016–2021)
L.8	Correct the errors in the allocation of areas and the estimates of emissions/removals between grassland remaining grassland and land converted to grassland and enhance the QA/QC procedures to ensure accurate reporting on this issue in the NIR and the CRF tables.	4 (2015/2016–2021)
Waste		
W.1	Include important AD, such as the amount and composition of disposed waste, in the NIR.	5 (2014–2021)
W.8	Ensure the consistency of the reported time series for the CH <sub>4</sub> EF for the composting of organic waste from households and include in the NIR the reason for the decrease in the CH <sub>4</sub> EF after 2009.	4 (2015/2016–2021)
KP-LULUCF	No issues identified.	

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

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

10. Tables 5–6 present findings made by the ERT during the individual review of the 2021 annual submission of the Netherlands that are additional to those identified in table 3. In accordance with paragraph 76(b) of the UNFCCC review guidelines, the ERT has prioritized in table 5 recalculations that changed the estimated total emissions or removals for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent for any of the recalculated years.

Table 5

### Additional findings made during the individual review of the 2021 annual submission of the Netherlands related to recalculations

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?<sup>a</sup></i>
General		Recalculations made for the general sector changed the estimated emissions for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
Energy			
E.13	1.A.2.c Chemicals – all fuels – CO <sub>2</sub>	<p>Recalculations made for this category resulted in changes in estimated AD and emissions for 2012–2018 (e.g. a decrease of 3.87 per cent (302.00 kt) in CO<sub>2</sub> emissions and an increase of 0.49 per cent (591.34 TJ) in liquid fuel consumption for 2017). However, the information provided in the NIR was not sufficient to explain the inter-annual changes (e.g. for 2017). It is stated in the NIR (paras. 3.2.5.5 and 4.3.5) that some of the emissions from chemical waste gas in CRF category 1.A.2.c were reallocated to category 2.B.10 for 2012–2018, and that the time series was recalculated as a result of the decision no longer to assume CO<sub>2</sub> storage in gas products. It is also stated in the NIR (para. 4.3.2) that, with natural gas as an input (chemical feedstock), industrial gases such as hydrogen and carbon monoxide are produced; that, originally, emissions were calculated on the assumption that CO<sub>2</sub> is stored in gas products, for which a storage factor of 80 per cent was derived, but that for 2012 and subsequent years, on the basis of more accurate data from emissions trading scheme reports to the Dutch Emission Authority, it is assumed that no storage of CO<sub>2</sub> has occurred in the production of industrial gases, and the storage factor approach was incorrect; and that following a recent re-examination of these emissions trading scheme reports, the latest submission of the time series (1990–2018) was recalculated, as a result of which emissions were recalculated for 1990–2012 and reallocated from combustion (1.A.2.c) to process emissions (2.B.10) for 2012 onward.</p> <p>During the review, the Party provided calculations and clarified that the differences for 2017 can be explained by:</p> <p>(a) The reallocation of a proportion of emissions from waste gas from category 1.A.2.c to 2.B.10, resulting in a reduction in estimated CO<sub>2</sub> emissions of 301 kt (3.9 per cent);</p> <p>(b) The increase in AD of 610 TJ for waste gas (0.5 per cent);</p> <p>(c) Small changes in energy statistics (other kerosene and residual fuel oil are now included in this sector), resulting in an increase in AD (6.1 TJ), CO<sub>2</sub> (438 t), N<sub>2</sub>O (3.65 kg) and CH<sub>4</sub> (20.6 kg).</p> <p>The ERT recommends that the Party transparently present the different reasons affecting the recalculations for each subcategory, as well as the impact of the recalculations separately along with the aggregated category-level information in future annual submissions.</p>	Yes. Transparency
E.14	1.A.4.a Commercial/ institutional – biomass – CO <sub>2</sub> and CH <sub>4</sub>	<p>Recalculations made for this category for the 2020 submission for the entire time series led to increases of 54.94 and 98.00 per cent in estimated CO<sub>2</sub> and CH<sub>4</sub> emissions, respectively, and a decrease of 47.37 per cent in estimated biomass fuel consumption for 1990.</p> <p>During the review, the Party clarified that the differences can be explained by:</p> <p>(a) The correction of double counting in the AD for biogas;</p> <p>(b) The reallocation of emissions from landfill gas to this sector. Only the emissions were added because the AD were not available in TJ (only in m<sup>3</sup>);</p> <p>(c) The inclusion of emissions from biogenic natural gas in this sector. The EFs for the combustion of biogenic natural gas are much lower than the EFs for solid wood combustion.</p> <p>The ERT recommends that the Party include the AD for landfill gas in the CRF tables and present transparently the different reasons affecting the recalculations for each subcategory, as well as the impact of the recalculations separately along with the aggregated category-level information in future annual submissions.</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
E.15	1.A.4.b Residential – biomass – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>Recalculations made for this category for the 2020 submission led to decreases in estimated CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions of 15.56, 15.66 and 15.75 per cent, respectively, and a decrease in estimated biomass fuel consumption of 15.56 per cent for 2017. It is stated in the 2020 NIR (para. 3.2.7.5) that residential wood combustion statistics were updated for the complete time series. New statistics from CBS for 2018 were used to improve the model for calculating AD. On the basis of the new statistics, AD for fireplaces were updated for the complete time series and AD for wood stoves were updated for 2012–2017. Under the old model, it was expected that wood combustion would further increase, but the new statistics demonstrate that wood combustion remained relatively stable. Therefore, estimated emissions fell for 2012–2017. Changes for 1990–2011 were attributable to the adjustment of model parameters for fireplaces to bring wood combustion statistics for fireplaces into line with the observed trend for wood combustion for 2006–2007, 2012 and 2018. This results in a reduction of estimated (biogenic) CO<sub>2</sub> emissions of 41.15 Gg for 1990 and 339.89 Gg for 2017. Estimated CH<sub>4</sub> emissions were reduced by 0.11 Gg for 1990 and 0.91 Gg for 2017, while estimated N<sub>2</sub>O emissions were reduced by 0.001 Gg for 1990 and 0.012 Gg for 2017. It is explained in the 2021 NIR (para. 3.2.7.5) that the previous CH<sub>4</sub> EF of 300 g/GJ used for all types of wood stove (from the 2006 IPCC Guidelines) was changed to 10 g/GJ for pellet stoves, 100 g/GJ for improved stoves and 300 g/GJ for open fireplaces and conventional stoves. The estimated CH<sub>4</sub> emissions were therefore decreased by 0.17 kt for 1990 and 2.42 kt for 2018.</p> <p>During the review, the Party clarified that the differences for 2017 can be explained by:</p> <ul style="list-style-type: none"> <li>(a) The update of the AD for wood combustion for the complete time series;</li> <li>(b) The update of the EF for CH<sub>4</sub> for residential wood combustion, which, together with the decrease in AD, results in a decrease in estimated CH<sub>4</sub> emissions;</li> <li>(c) The inclusion of emissions from biogenic natural gas in this sector. The EFs for the combustion of biogenic natural gas are much lower than the EFs for solid wood combustion.</li> </ul> <p>The ERT recommends that the Party transparently present the different reasons affecting the recalculations for each subcategory, as well as the impact of the recalculations separately along with the aggregated category-level information in future annual submissions.</p>	Yes. Transparency
IPPU		<p>Recalculations made for the IPPU sector changed the estimated emissions for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.</p>	
Agriculture			
A.31	3.D Direct and indirect N <sub>2</sub> O emissions from agricultural soils – N <sub>2</sub> O	<p>The Party reported in its NIR (p.183) that it recalculated the N<sub>2</sub>O emissions from agricultural soils mainly as a result of changing the model used for the distribution of different manure types and artificial fertilizers over land types. Specifically, the MAMBO model was replaced with the INITIATOR model for estimating N<sub>2</sub>O emissions for 2000 onward. To prevent time-series inconsistency for 1990–1999, the Party decided to apply the splicing overlap technique as described in 2006 IPCC Guidelines (vol. 1, chap. 5, table 5.1, p.5.14). The ERT noted that the Party provided no explanation for the impact of the recalculations on the trend in emissions at the category level. During the review, the Party clarified that, comparing the time series 1990–2018 and 1990–2019 demonstrates that the trend has changed by 2.5 per cent from –44.4 to –41.9 per cent (1990–2018). This is due to the change from the MAMBO to the INITIATOR model and the use of separate EFs for fertilizers applied to different types of soil and usage (mineral or peat and grassland or arable land), instead of one average EF.</p>	Yes. Transparency

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?<sup>a</sup></i>
		The ERT recommends that the Party transparently present the different reasons affecting the recalculations for each subcategory, as well as the impact of the recalculations separately along with the aggregated category-level information in future annual submissions.	
LULUCF		Recalculations made for the LULUCF sector changed the estimated emissions or removals for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	
Waste		No recalculations made for the waste sector changed the estimated emissions for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent.	
KP-LULUCF		Recalculations made for KP-LULUCF changed the estimated emissions or removals for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	

<sup>a</sup> 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.

11. Table 6 contains additional findings made by the ERT during the individual review of the 2021 annual submission that are not covered in table 3 or 5, but are within the scope of the desk review as specified in paragraph 76 of the UNFCCC review guidelines or paragraph 65 of the Article 8 review guidelines and are findings that the ERT wishes to convey to the Party.

Table 6

**Additional findings made during the individual review of the 2021 annual submission of the Netherlands**

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?<sup>a</sup></i>
General			
G.3	QA/QC and verification	The Party committed to meet its emission reduction targets for the second commitment period of the Kyoto Protocol jointly with the EU under Article 4 of the Kyoto Protocol (FCCC/IRR/2016/EU). The ERT noted that the Party mentions in the NIR (in the sections on the energy and IPPU sectors) that it utilizes information from the EU ETS for some sources, but these sources are not specified. During the review, the Party indicated that it utilizes emission estimates from the EU directive on the improvement and extension of the greenhouse gas emission allowance trading scheme of the Community (directive EC/2009/29) for all sources covered by the directive for reporters that meet the minimum reporting thresholds specified therein on every occasion, with the exception of ceramics production and other uses of carbonates.  The ERT encourages the Party to include summary information on the categories for which EU ETS data are used in its next annual submission.	Not an issue/problem
G.4	QA/QC and verification	The Party committed to meeting its emission reduction targets for the second commitment period under the Kyoto Protocol jointly with the EU under Article 4 of the Kyoto Protocol (FCCC/IRR/2016/EU). The ERT noted that QC	Yes. Convention reporting adherence

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
		<p>procedures implemented by the Party for data collected under directive EC/2009/29 did not identify obvious errors in reporting for a source (in relation to emissions of CO<sub>2</sub> from aluminium production) covered by the directive over several years. During the review, the Party acknowledged the errors in the estimates obtained under directive EC/2009/29 and resubmitted the estimates for the relevant source and for the inventory.</p> <p>The ERT recommends that the Party review the QC procedures used to verify the input inventory data collected under directive EC/2009/29 and report the results of this verification in future annual submissions.</p>	
G.5	Uncertainty analysis	<p>The Party reported in the NIR (table A2.3, p.352) uncertainty estimates for the inventory that contained errors in relation to information on AD and EF uncertainties for fugitive emissions from natural gas (category 1.B.2.b). During the review, the Party confirmed that table A2.3 contains an error in the uncertainty of the AD and EFs, although the uncertainty for the emissions is correct. The Party clarified that the uncertainty of the emissions is based on the following uncertainty estimates: venting CH<sub>4</sub>: AD 50 per cent, EF 20 per cent; flaring CH<sub>4</sub>: AD 50 per cent, EF 50 per cent; gas transport CH<sub>4</sub>: emissions 40 per cent (not assessed for AD and EF separately); and gas distribution CH<sub>4</sub>: AD 2 per cent, EF 50 per cent (the length of the network is well established, hence the AD uncertainty is very low).</p> <p>The ERT recommends that the Party report the correct information in NIR table A2.3 for AD and EF uncertainties for category 1.B.2.b in future annual submissions.</p>	Yes. Convention reporting adherence
Energy			
E.16	Comparison with international data –AD	<p>The ERT observed the following inconsistencies in stock changes for liquid fuels between the national energy balances of the Netherlands in the reference approach and IEA energy statistics for the country: crude oil (+34 per cent for 2019 and +197 per cent for 2018), gasoline (+51 per cent for 2019 and –106 per cent for 2018) and petroleum coke (+35 per cent for 2019 and +29 per cent for 2018). For both 2018 and 2019, the trade figures for residual fuel oil in the CRF tables are higher than those reported to IEA, and large differences were observed in the apparent consumption figures. The value for the production of waste (non-biomass fraction) given in the CRF tables is higher than that reported to IEA (+44 per cent for 2019 and +41 per cent for 2018). For 2019, for gasoline, the import value is higher in the CRF tables (+16,861 TJ) and the export value is lower (–25,175 TJ). As a result, the apparent consumption reported in the CRF tables is significantly higher than that reported to IEA (+45,004 TJ). Likewise, for 2018, for gasoline, the import value is higher in the CRF tables (+28,564 TJ) and the export value lower (–22,367 TJ). As a result, the apparent consumption reported in the CRF tables is significantly higher than that reported to IEA (+38,793 TJ). During the review, the Party noted that it is not sure how IEA uses the data from the energy questionnaire delivered by the Netherlands.</p> <p>The ERT encourages the Party to explore the differences between the national statistics and IEA data and provide an appropriate explanation in its NIR.</p>	Not an issue/problem
E.17	1.B.2.b Natural gas – CH <sub>4</sub>	<p>The Party applies a tier 3 method to estimate fugitive CH<sub>4</sub> emissions from natural gas (category 1.B.2.b) based on plant-specific data provided by relevant companies. However, only emissions for subcategories 1.B.2.b.4 (transmission and storage) and 1.B.2.b.5 (distribution) are reported separately, while the other emissions from the category are reported as “IE”. An aggregate estimate of emissions is provided with fugitive CH<sub>4</sub> leakage emissions included in venting. The ERT notes that it is good practice under the 2006 IPCC Guidelines (vol. 2, p.4.36; table 4.2.2, p.4.42) to estimate fugitive emissions of CH<sub>4</sub> at a disaggregated level and transparently report them in the CRF tables. During the review, the Party explained that since the EFs used by the companies to estimate emissions are considered confidential, they were unavailable to the Party and could not be provided to the ERT.</p>	Yes. Comparability

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>94</sup>
IPPU			
I.17	2.A.1 Cement production – CO <sub>2</sub>	<p>The ERT recommends that the Party include in the next NIR further information on the methods and EFs used to estimate fugitive emissions of CH<sub>4</sub> from natural gas (category 1.B.2.b), as well as the verification processes used by the Party, and report in the CRF tables disaggregated estimates to the extent possible while maintaining confidentiality (e.g. for the following subcategories: 1.B.2.b.1 natural gas: exploration; 1.B.2.b.2 natural gas: production; and 1.B.2.b.3 natural gas: processing) in order to increase the transparency and comparability of its reporting under this category.</p> <p>The Netherlands reported in NIR annex 7 (containing Honig et al., 2021) (p.50) that detailed data are available for 2002 onward and data for 1990–2001 are calculated using the IEF for 2002–2003. When analysing the IEF time series, the value is more or less constant for 2002–2004, after which there are significant inter-annual fluctuations. The IEF for every year from 2005 onward is lower than for 2002–2004. During the review, the Netherlands stated that it is unable to provide an explanation for this, since past efforts to do so demanded considerable time and capacity.</p> <p>The ERT recommends that the Netherlands provide more information in the NIR on time-series consistency, including an explanation for why the IEF is constant for 2002–2004, considering that the same detailed methodology is applied for the monthly testing of every batch. The ERT also recommends that the Netherlands provide information on the changes in the raw materials used or the process followed that led to the increase in the variability of the IEF for 2005 onward.</p>	Yes. Consistency
I.18	2.A.2 Lime production – CO <sub>2</sub>	<p>The Netherlands reported in its NIR (p.130) that lime production occurred at only two sugar production plants. The AD for lime production are reported in CRF table 2(1).A-Hs1, but the source of the AD used across the time series is not provided in the NIR. The ERT noted that lime production can occur in a variety of industries and the NIR only specified that it does not occur in the paper industry. In addition, the AD time series follows an unusual trajectory for 1990–2004 (a linear decrease followed by a fluctuating but generally increasing trend). During the review, the Netherlands clarified that lime production occurs only at the two sugar production plants mentioned, and that the AD were interpolated for 1990–2004. The ERT noted that no information is provided in the NIR on the time-series consistency and that the significant decrease in activity for 1990–2004 followed by a fluctuating but general increase in activity requires further explanation.</p> <p>The ERT recommends that the Netherlands provide information on the source of the AD in the NIR, including a discussion on time-series consistency in its NIR.</p>	Yes. Transparency
I.19	2.A.3 Glass production – CO <sub>2</sub>	<p>The Netherlands reported in NIR annex 7 (containing Honig et al., 2021) (pp.50–51) that it interpolated emissions for 1990–2005, rather than interpolating between the EF for 1990 and the IEF for 2005. The ERT noted that the plant-specific EF for 1997 (0.18 t/t) is not being used and that the IEF currently reported for 1997 is approximately half of that value (0.09 t/t). During the review, the Netherlands stated that it is unable to provide an explanation for this, since past efforts to do so demanded considerable time and capacity.</p> <p>The ERT recommends that the Netherlands provide more information in the NIR on time-series consistency for glass production, including on the decision to interpolate emissions rather than EFs and the rationale for not applying available plant-specific data.</p>	Yes. Consistency
I.20	2.A.4 Other process uses of carbonates – CO <sub>2</sub>	<p>The Netherlands did not provide any information in the NIR on mineral wool production, which would usually be a source of carbonate consumption and process-related CO<sub>2</sub> emissions. During the review, the Netherlands confirmed that mineral wool production is occurring in the Netherlands, but that all related emissions are reported in the energy sector.</p>	Yes. Comparability

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
I.21	2.A.4 Other process uses of carbonates – CO <sub>2</sub>	<p>The ERT noted that sufficient information should be available from EU ETS reports to differentiate between combustion and process emissions.</p> <p>The ERT recommends that the Netherlands include the process emissions associated with mineral wool production in the IPPU sector as per the 2006 IPCC Guidelines (vol. 3, chap. 2, p.2.27).</p> <p>The Netherlands reported in CRF table 2(I).A-Hs1 the IEF for ceramics production (0.048 t CO<sub>2</sub>/t clay used). The ERT noted that the IEF is constant for all years (1990–2018) except for 2017 (0.049 t CO<sub>2</sub>/t clay used), for which it is higher. According to the NIR (p.131), the estimates follow tier 1 and AD on national production from the ceramics trade organization. The ERT also noted that ceramics production would typically be covered by the EU ETS and that, on the basis of verified emissions reported for the Netherlands, there were 38 producers of ceramics for 2019. During the review, the Netherlands clarified that the AD for this category are based on information from the ceramics industrial association and default EFs and assumptions. It noted that the IEF should be the same for all years and that it would be time-consuming to analyse the EU ETS reports.</p> <p>The ERT recommends that the Netherlands investigate the reporting for 2017 and explain the slightly higher IEF for this year compared with all other years of the time series. It also recommends that the Netherlands provide a comparison in the NIR between the process emissions reported for ceramics producers under the EU ETS and the current inventory estimates.</p>	Yes. Accuracy
I.22	2.B Chemical industry – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The Netherlands reported AD in CRF table 2(I).A-Hs1 as confidential for most subcategories and “IE” for a number of emissions. The ERT acknowledges the need to protect confidential data but notes that this makes it very difficult to review AD and emissions for this sector. It also notes that Eurostat reports data for ethylene production in the Netherlands, indicating that these data are not confidential and could be reported in the CRF tables. During the review, in response to a request from the ERT for information on the number and overall capacity of the plants whose data is considered confidential, the Netherlands explained that general production figures are used for ethylene and carbon black production and that an update planned for the next annual submission is expected to include general AD. However, the Party did not provide the ERT with the requested overview of the chemical industry in the Netherlands.</p> <p>The ERT recommends that the Netherlands implement the planned update and consider the possibility of reporting in CRF table 2(I).A-Hs1 more detailed AD and emissions (e.g. for ethylene production, for which AD are available from Eurostat). Additionally, the ERT recommends that the Netherlands include more information in the NIR on the chemical industry, such as the number of plants in operation and the overall production capacity for each chemical industry subsector (caprolactam, silicon carbide, titanium dioxide production, methanol, ethylene, ethylene oxide, acrylonitrile, carbon black, industrial gas, carbon electrodes, activated carbon, ethylene dichloride and vinyl chloride monomer).</p>	Yes. Transparency
I.23	2.B.8 Petrochemical and carbon black production – CO <sub>2</sub> and CH <sub>4</sub>	<p>The Netherlands reported “NO” in CRF table 2(I).A-Hs1 for AD and emissions for the whole time series for production of ethylene dichloride and vinyl chloride monomer (category 2.B.8.c). However, the ERT noted that according to a European Commission reference document for the production of large volume organic chemicals (available at <a href="https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC109279_LVOC_Bref.pdf">https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC109279_LVOC_Bref.pdf</a>), there is a plant operating in the Netherlands (Shin-Etsu plant in Botlek). During the review, the Party clarified that ethylene dichloride and vinyl chloride monomer are indeed produced in the Netherlands at the plant mentioned. It also clarified that the related emissions were reported under category 2.B.8.g and that progress was being made in updating information on AD for the next annual submission.</p>	Yes. Comparability

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>94</sup>
I.24	2.C.1 Iron and steel production – CO <sub>2</sub> and CH <sub>4</sub>	<p>The ERT recommends that the Netherlands either report AD and emissions under category 2.B.8.c or, if this is not possible for confidentiality reasons, change the notation key used from “NO” to “IE”.</p> <p>The Netherlands reported in its NIR (p.145) that sinter and pellet production data are confidential and reported in CRF table 2(I).A-Hs2 “IE” for CO<sub>2</sub> emissions and “NO” for CH<sub>4</sub> emissions from sinter and “IE” for pellet production. The Party clarified during the review that emissions are reported under category 2.C.1.f; however, the ERT noted that only CO<sub>2</sub> emissions are reported under category 2.C.1.f for 1990–2016. The ERT also noted that the 2006 IPCC Guidelines include default CH<sub>4</sub> EFs for sinter production and coke production (vol. 3, chap. 4, p.4.26), whereas no CH<sub>4</sub> emissions are reported under any subcategory of category 2.C.1 for any year of the time series. During the review, the Netherlands clarified that emissions of CH<sub>4</sub> from iron production are reported under category 1.B.1.b and that no relevant emissions from sinter production occur. The ERT notes that there was no justification in the NIR for the absence of such emissions in the country or their insignificance. CH<sub>4</sub> emissions from sinter production may occur even if they are below the significance threshold of 0.05 per cent of the national total.</p> <p>The ERT recommends that the Netherlands either justify why CH<sub>4</sub> emissions from sinter production do not occur or estimate and report these emissions or change the notation key used to “NE” and provide information in the NIR to justify the likely level of emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. It also recommends that the Netherlands explain the reporting of “NO” for CO<sub>2</sub> emissions for category 2.C.1.f, given that sinter and pellet production are reported as “IE”. The ERT further recommends that the Netherlands check and correct the use of notation keys for all subcategories of category 2.C.1.</p>	Yes. Completeness
I.25	2.C.3 Aluminium production – CO <sub>2</sub>	<p>The Netherlands reported in CRF table 2(I).A-Hs2 the CO<sub>2</sub> IEF for aluminium production. The ERT noted that the CO<sub>2</sub> IEF trend is atypical for later years of the time series. For 1990–2017, the IEF is relatively constant at around 1.4–1.5 t/t; however, for 2018 and 2019 it falls to 0.000097 and 0.000032 t/t, respectively. During the review, the Netherlands clarified that this was an error and the emissions for 2018 and 2019 were underestimated. In response to the list of potential problems and further questions raised by the ERT, the Party resubmitted a complete set of CRF tables for 2018 and 2019 with corrected estimates that resolved the issue. The ERT recommends that the Netherlands include a check of the IEFs as part of its QC procedures prior to reporting.</p>	Yes. Convention reporting adherence
I.26	2.C.3 Aluminium production – CO <sub>2</sub>	<p>The Netherlands reported in its NIR (p.145) that it uses a tier 1a method and a country-specific EF of 0.00145 t CO<sub>2</sub> per t aluminium to estimate CO<sub>2</sub> emissions in line with the IPCC default EF. The ERT noted that there is only a tier 1 method in the 2006 IPCC Guidelines (not tier 1a or 1b) and that the tier 1 EFs are 1.6 t CO<sub>2</sub> per t aluminium for prebake cells and 1.7 t CO<sub>2</sub> per t aluminium for Söderberg cells (vol. 3, chap. 4, table 4.10, p.4.47). During the review, the Netherlands clarified that it now uses data reported under the EU ETS, rather than the above-mentioned EFs, to estimate CO<sub>2</sub> emissions.</p> <p>The ERT recommends that the Netherlands correct the information provided in the NIR to reflect the current methodology used (i.e. the estimation of CO<sub>2</sub> emissions on the basis of data reported under the EU ETS) and also provide information on the methodology used for the years before EU ETS data became available.</p>	Yes. Transparency
I.27	2.D.1 Lubricant use – CO <sub>2</sub>	<p>The Netherlands reported the AD for the use of lubricants as confidential in CRF table 2(I).A-Hs2. The ERT noted that it is unusual for these data to be confidential. During the review, the Netherlands clarified that the data were not confidential, provided the ERT with a link to the data and indicated that the next annual submission would be updated accordingly.</p>	Yes. Transparency



ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
I.28	2.D.2 Paraffin wax use – CO <sub>2</sub>	<p>The ERT recommends that the Netherlands report the AD in CRF table 2(I).A-Hs2 in the annual submission.</p> <p>The Netherlands reported the AD for the use of paraffin wax as confidential in CRF table 2(I).A-Hs2 and no information was provided in the NIR on the estimates for this category. The ERT noted that it is unusual for these AD to be confidential. During the review, the Netherlands clarified that the AD are based on demographic statistics and the average number of candles used per person and are not confidential and will be reported in the next annual submission.</p> <p>The ERT recommends that the Netherlands include in its NIR the AD for the use of paraffin wax and a description of the methodology and data used to derive them.</p>	Yes. Transparency
I.29	2.F.1 Refrigeration and air conditioning – HFCs	<p>The Netherlands reported in its NIR (p.150) that a range of different methods are used to estimate emissions from refrigeration and air conditioning. The Party used the overlap splicing method to ensure time-series consistency, as described in the NIR (pp.153–154). The ERT noted a sharp increase in the time series from 2012 (1,389 kt CO<sub>2</sub> eq) to 2013 (1,582 kt CO<sub>2</sub> eq). It also noted that the increase in emissions from 2014 to 2015 is an outlier. During the review, the Netherlands referred to the information provided in the NIR.</p> <p>The ERT recommends that the Netherlands provide explanations for the increases in emissions observed for 2013 and 2015 or revise the estimates.</p>	Yes. Consistency
I.30	2.F Product uses as substitutes for ozone-depleting substances – HFCs	<p>The Netherlands reported in its NIR (p.149) that CRF category 2.F.6 includes emissions for categories 2.F.2 (foam blowing), 2.F.3 (fire protection), 2.F.4 (aerosols) and 2.F.5 (solvents). It also reported emissions as an unspecified mix of HFCs, rather than as individual gases. The emissions are reported in an aggregated manner in CRF table 2(II).B-Hs2. During the review, the Netherlands explained that an important source of data, namely the trade flow study on fluorinated gases, has been unavailable since 2014. It provided a breakdown of the total emissions in CO<sub>2</sub> eq for 2019 for the main CRF categories (foam blowing: 0.11 Mt CO<sub>2</sub> eq; aerosols: 0.03 Mt CO<sub>2</sub> eq; fire extinguishers: 0.02 Mt CO<sub>2</sub> eq; and cleaning and degreasing: 0.02 Mt CO<sub>2</sub> eq). Furthermore, it indicated that efforts would be made to update the information provided on HFC sources in the NIR.</p> <p>The ERT recommends that the Netherlands improve the transparency of the reporting of emissions for categories 2.F.2–2.F.5 as a matter of urgency by disaggregating the data for each gas and subcategory as far as possible. Additionally, the ERT recommends that the Party include the following information in the NIR to allow a better understanding of the reporting:</p> <ul style="list-style-type: none"> <li>(a) The number of companies producing hard foam in the Netherlands;</li> <li>(b) Information on whether production of open-cell foam occurs or has previously occurred in the Netherlands;</li> <li>(c) Information about whether hard foam is currently or has previously been exported (e.g. by obtaining data from the Netherlands association of polyurethane hard foam manufacturers);</li> <li>(d) Information on the importation of hard foam, which will lead to emissions during use and decommissioning;</li> <li>(e) Information on the number of fire extinguishing systems using HFCs in operation in the Netherlands and the rationale for the reporting as confidential of the corresponding AD and emissions;</li> <li>(f) Information on the number of importers of methylene diphenyl diisocyanates in the Netherlands and a justification for the reporting of these data as confidential;</li> </ul>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>94</sup>
I.31	2.G.1 Electrical equipment – SF <sub>6</sub>	<p>(g) Information on the number of companies using HFCs in aerosols (it is stated in the NIR that less than 10 per cent of companies in the Dutch aerosol association use HFCs);</p> <p>(h) Information on how imports and exports are considered in estimating emissions from aerosols;</p> <p>(i) Information on the number of companies using HFCs as solvents and the rationale for the reporting of these emissions as confidential.</p> <p>The Netherlands reported in its NIR (p.155) and in CRF table 2(II).B-Hs2 that emissions from electrical equipment are reported under category 2.G.2 (SF<sub>6</sub> and PFCs from other product use) rather than under category 2.G.1 as prescribed by the 2006 IPCC Guidelines. The ERT noted that information on emissions from electrical equipment is publicly available via a 2019 Netbeheer Nederland report (available at <a href="https://www.netbeheernederland.nl/upload/Files/SF6-emissie_netbeheerders_elektriciteit_2019_(rapport)_184.pdf">https://www.netbeheernederland.nl/upload/Files/SF6-emissie_netbeheerders_elektriciteit_2019_(rapport)_184.pdf</a>). In addition, this report indicates that emission data for 2007–2008 were obtained using a different methodology. During the review, the Netherlands explained that emissions of SF<sub>6</sub> are reported under category 2.G.2 because a number of processes related to the use of SF<sub>6</sub> occur in only one or two companies, and that the data for 2007–2008 from the 2019 Netbeheer Nederland report were not used because they had not been included in the first version of the report, published in 2011. The ERT considered that, as the data are publicly available, there is no justification for not reporting them separately in the CRF tables.</p> <p>The ERT recommends that the Netherlands report emissions from electrical equipment separately under category 2.G.1. in future annual submissions and either use the same data source for 2007–2008 or explain in the NIR why a different methodology has been used for those years.</p>	Yes. Comparability
I.32	2.G.2 SF <sub>6</sub> and PFCs from other product use – SF <sub>6</sub>	<p>The Netherlands reported in its NIR (p.155) several uses for SF<sub>6</sub> (soundproof windows, electron microscopes and the electronics industry generally). However, it is unclear whether emissions from the following uses of SF<sub>6</sub> are considered in the inventory: in equipment in university and research particle accelerators; in equipment in industrial and medical particle accelerators; in adiabatic applications for its low permeability through rubber (e.g. car tyres and sports shoe soles); and other uses (e.g. gas-air tracer in research and leak detectors). Furthermore, it is stated in NIR annex 7 (p.86) that contributions from other sources are currently not considered to be substantial (&lt; 0.2 t SF<sub>6</sub>/year (DHV, 2000)) and are therefore not included in the determination of total SF<sub>6</sub> emissions. During the review, in response to a request from the ERT, the Party provided a copy of DHV (2000) and the calculation sheet for soundproof windows and clarified that the sources of SF<sub>6</sub> emissions were analysed some time ago and that an update is required. It indicated that it aimed to make progress in this regard before the next annual submission. The ERT noted that the methodology for estimating emissions from soundproof windows assumed a lifetime of 15 years and not the default duration of 25 years indicated in the NIR (annex 7, p.87). The Netherlands clarified that the assumed lifetime was incorrect and will be corrected in the next annual submission. The ERT observed that while this correction will have a significant impact on the time series, it will not lead to an underestimation of emissions for 2019. It also noted that DHV (2000) includes a projection for various SF<sub>6</sub> uses, including an expected increase in its use in tracer gas and its potential use in magnesium production in the Netherlands. However, the report does not cover possible uses in particle accelerators, whether in universities, industry or medical facilities.</p> <p>The ERT recommends that the Netherlands verify any potential uses of SF<sub>6</sub> in particle accelerators in universities, industry and medical facilities and in magnesium production, referred to in DHV (2000), across the time series and</p>	Yes. Completeness

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>24</sup>
		include any related emissions in future annual submissions. The ERT also recommends that the Netherlands correct the error in the lifetime in the calculation of emissions from soundproof windows.	
I.33	2.H Other (IPPU) – CO <sub>2</sub>	<p>The Netherlands reported in NIR annex 7 (containing Honig et al., 2021) (p.47) that CO<sub>2</sub> emissions under category 2.H.2 (food and drink) stem from sugar whitening. During the review, the Netherlands clarified that the emissions reported under category 2.H.2 were actually based on the non-energy use of fuels (coke) reported in the energy statistics and a national CO<sub>2</sub> EF assuming full oxidation. The ERT is not aware of examples of the food and drink industry using coke for non-energy purposes in a way that would lead to CO<sub>2</sub> emissions.</p> <p>The ERT recommends that the Netherlands provide further information in the NIR of the non-energy use of fuels in this sector and the processes leading to CO<sub>2</sub> emissions.</p>	Yes. Transparency
	Agriculture	No findings for the agriculture sector additional to those included in table 3 were made by the ERT during the review.	
	LULUCF		
L.15	4.A Forest land – CO <sub>2</sub>	<p>The Party reported the amount of above- and below-ground biomass (t dry matter/ha) (NIR table 6.8, p.208) and the amount of carbon in deadwood per unit of area (Mg C/ha) (NIR table 6.9, p.212) as increasing in an almost linear trend for 1990–2019. The extrapolation of this trend to years before 1990 is inferred from a change in forest composition that is assumed to have started in the 1970s or 1980s and continued until now. The explanation provided in the methodology report (Arets et al., 2021), contained in NIR annex 7 (pp.117–120), namely that that forestry policy changed in the 1970s from wood production to multifunctional, implicitly justifies this change. Data on the age class structure of forest, provided by the Party during the review, show that the historical share of age classes in national forest was relatively stable up until 1970 but more dynamic thereafter. The ERT considers these data important background information for the estimation of a continuous increase in forest carbon stocks in living biomass and deadwood, from which continuous net removals in national forest are derived for 1990 onward.</p> <p>The ERT recommends that the Party include information in its NIR on forest age structure that justifies the trend in removals so as to improve the transparency of reporting.</p>	Yes. Transparency
L.16	4.C Grassland – CO <sub>2</sub>	<p>The Party reported in the NIR that the calculation of CSCs in orchards was updated (section 6.1.3, p.198) and provided the methodology used (section 6.6.2, pp.218–220), including time-series data for area and unit of carbon stock for above-ground biomass for orchards (table 6.10). The ERT noted that some descriptions relating to the orchard calculation in the NIR do not reflect the recent estimation and mention that the average age of trees is relatively constant over time at around 10.5 years (e.g. p.217 of the NIR and section 6.1.1 of the methodology report (Arets et al., 2021) (p.47)). The ERT also noted that a small increase in orchard area between 2014 and 2015 (about 1 kha) is reported in table 6.10 and that this was derived from a change in statistical survey classification, according to the source data referred to in footnotes 11 and 12 on page 219 of the NIR. During the review, the Party clarified that it did not pay much attention to this increase because its potential impact was so small (around 0.04 per cent of the national total) but will seek further information on the matter from the statistical office. The Party indicated that the explanation of the orchard calculation methodology will be updated in its next annual submission.</p> <p>The ERT recommends that the Party report information in the NIR on the exact methodology applied in the estimation of CSCs in orchards.</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
L.17	4.D Wetlands – CO <sub>2</sub>	<p>The Party explained in its NIR (p.223) that no changes in carbon stocks in living biomass and soil were estimated for wetlands remaining wetlands. However, in CRF table 4.D, a small number of CSCs in mineral soils were reported under the subcategories open water and reed marsh in wetlands remaining wetlands, with an almost linear increasing trend starting from 0 in 1990 (“NO”). During the review, the Party clarified that these CSCs concern land that has changed between open water and reed swamp less than 20 years since changing from another land use to wetlands, such that its carbon stock has not yet reached equilibrium. The Party remarked that this issue is similar to that identified for grassland and will be addressed in the new bookkeeping model (see ID# L.8 in table 3).</p> <p>The ERT recommends that the Party report in the NIR and CRF table 4.D the correct estimation results for mineral soils under wetlands remaining wetlands.</p>	Yes. Accuracy
L.18	4.D Wetlands – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The ERT noted that the Party did not fully implement the methodologies set out in the Wetlands Supplement. During the review, the Party explained that it is assessing the methods and data available for improving the reporting of emissions from wetlands, including CH<sub>4</sub> emissions, which are covered by the Wetlands Supplement, by the end of 2021, and that possible methodological improvements will be considered on the basis of this assessment.</p> <p>The ERT acknowledges the Party’s ongoing efforts and encourages it to use the Wetlands Supplement in preparing its annual inventory for future annual submissions.</p>	Not an issue/problem
L.19	4.G HWP – CO <sub>2</sub>	<p>The Party used methods set out in the Kyoto Protocol Supplement to calculate CSCs for HWP in its reporting under both the Convention and its Kyoto Protocol for reasons of consistency (see also ID# L.10 in table 3). Under this approach, the Party included carbon inflows to HWP pools for 1990 onward but did not include pre-1990 carbon inflows. The ERT noted that, for KP-LULUCF accounting, a Party using an FMRL based on a projection may choose not to account for emissions from HWP originating from forests prior to the start of the second commitment period if the treatment of HWP is consistent between the FMRL and the FM estimation in accordance with decision 2/CMP.7, annex, paragraph 16. Since in the case of the Netherlands the treatment of HWP is the same in the FMRL and the FM estimate, the ERT considers that, for KP-LULUCF reporting, excluding pre-1990 carbon inflows for HWP is permitted and the method used is in line with decision 2/CMP.7, annex, paragraph 16, and the Kyoto Protocol Supplement. However, the ERT notes that in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 12, pp.12.7–12.9) it is necessary to include data for years before 1990 to establish an adequate balance between inflows of carbon to HWP and carbon outflows arising from existing HWP stock. The ERT considers that, in reporting under the Convention, excluding pre-1990 carbon inflows to HWP leads to an underestimation of emissions from the HWP pool for the GHG inventory time series. During the review, the Party explained that, once Kyoto Protocol reporting is over, it intends to use historic data series, including years before 1990, for imports, exports and production for the various HWP categories.</p> <p>The ERT recommends that the Party include carbon inflows for the years before 1990 in its estimation of CSCs for HWP.</p>	Yes. Accuracy
Waste			
W.10	5.A Solid waste disposal on land – CH <sub>4</sub>	<p>The ERT noted that the DOC<sub>f</sub> value in CRF table 5.A does not correspond to the DOC<sub>f</sub> value reported in the NIR (p.235). During the review, the Party informed the ERT that the amount of DOC per t waste was accidentally reported for the DOC<sub>f</sub> content in the CRF table 5.A. The Party confirmed that the values for DOC<sub>f</sub> of 58 per cent for 1990–2004 and 50 per cent for 2005–2019 stated in the NIR are correct and are used in the Dutch model.</p>	Yes. Convention reporting adherence

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
		The ERT recommends that the Netherlands correct the DOC <sub>f</sub> values in CRF table 5.A.	
W.11	5.A Solid waste disposal on land – CH <sub>4</sub>	<p>In NIR table 7.3, the Netherlands reported the amount of waste landfilled in 2019 and the DOC value of each waste group. The average DOC value from this table is used to explain the time series of AD in NIR table 7.2. The ERT noted that the 2006 IPCC Guidelines classify municipal solid waste into one of 11 categories on the basis of its composition (vol. 5, chap. 2, p.2.11), from which the DOC value is derived. However, the Party did not provide information on the waste composition and the calculated DOC values (changing from 132 kg/t for 1945 to 50 kg/t for 2019) across the time series. During the review, the Netherlands informed the ERT that the composition of DOC in waste was determined by Tauw (2011) partly on the basis of literature research, expert judgment and determination of biogen content. In the case of household waste, use was made of research into the biogen content of various fractions of household residual waste. Composition data for household waste are collected annually. Appendix 3 to Tauw (2011) contains an explanation of how the biogenic carbon calculations and assumptions were carried out. NIR table B3.2 (p.134) provides the best insight into how the value of 182 kg/t biogen was determined per stream. Paper and organic waste form a large part of household residual waste (60 per cent) and therefore largely determine the amount of biogenic carbon in household residual waste (approximately 70 per cent). The composition of household waste is used as a basis for calculating the DOC value of household waste and the waste composition has changed over the time series.</p> <p>The ERT recommends that the Netherlands apply the time series of household waste composition to update the estimated DOC values in the next annual submission.</p>	Yes. Transparency
W.12	5.B.1 Composting – CH <sub>4</sub> and N <sub>2</sub> O	<p>The Netherlands uses the EF of 750 g/t CH<sub>4</sub> for the whole time series for the composting of organic waste from households. However, there is no explanation in either the NIR or the methodology report (Honig et al., 2021) as to whether this EF is derived on a wet or dry weight basis. During the review, the Netherlands clarified that the EF for composted and digested waste is based on wet weight.</p> <p>The ERT recommends that the Netherlands specify in the next annual submission that the EF is based on wet weight to improve transparency and consistency between the NIR and the methodology report.</p>	Yes. Transparency
W.13	5.C.1 Waste incineration – CH <sub>4</sub> and N <sub>2</sub> O	<p>The Netherlands reported in the NIR (p.243) that this category comprises mostly emissions from the activities of waste incineration facilities that process municipal solid waste and other waste streams. The ERT noted that the NIR does not contain any information on hazardous and medical waste in the “other” waste stream, even though the 2006 IPCC Guidelines (vol. 5, chap. 3) explicitly mention hazardous and medical waste as types of waste incinerated. During the review, the Netherlands informed the ERT that, according to appendix C-4 to Rijkswaterstaat (2021), which provides an overview of waste materials processed in waste incineration plants, these plants process a small portion of hazardous waste (135 kt in 2019). Examples of such waste include organic liquids from the chemical industry, cleaning cloths contaminated with oil and/or solvents and oil filters. Other hazardous waste is incinerated abroad (mainly in North-western Europe) in rotary kilns. Hospital waste is almost always incinerated at a special facility (Rijkswaterstaat, 2021, appendix C-5), which processed approximately 10 kt hospital waste in 2019.</p> <p>The ERT recommends that the Netherlands improve the transparency of its reporting in the NIR by including the information provided to the ERT during the review regarding hazardous and medical waste.</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
KP-LULUCF			
KL.10	FM – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The Party reported in its NIR (section 11.5.2.3, pp.296–297) and in section 13.4.2 of the methodology report (Arets et al., 2021) contained in NIR annex 7 (pp.76–78) that various improvements have been made to forest land estimates since the submission led to technical corrections of the FMRL and its total impact was 360 kt CO<sub>2</sub> at the time of the 2021 submission. During the review, the Party clarified that the technical correction included the addition of a carbon pool (emissions from organic soils) and gases (CH<sub>4</sub> and N<sub>2</sub>O emissions from forest fires) that were not included in the proposed FMRL for 2011. The ERT noted that it is difficult to recognize this information from the NIR and to understand the extent to which these issues are relevant to the technical correction and the contribution of each issue in the current report. According to the Kyoto Protocol Supplement (section 2.7.6.3, p.2.103), checking the criteria set out in table 2.7.1 (p.2.101) and reporting transparent information on this in the annual NIR can provide a comprehensive overview and would show the contribution of each issue transparently.</p> <p>The ERT recommends that the Party provide in its NIR the summary information and the disaggregated number of technical corrections to the FMRL based on the elements listed in table 2.7.1 of the Kyoto Protocol Supplement (p.2.101).</p>	Yes. Transparency
KL.11	General (KP-LULUCF) – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>Where the Party uses a projected FMRL, it is good practice to provide information in the NIR on the main factors generating the accounted quantity (i.e. the difference in net emissions between reporting of FM during the second commitment period and the FMRL) and whether this accounting quantity is consistent with those factors, to show that the accounting quantity can be explained as deviations in actual policies compared with those historical policies included in the FMRL, rather than as differences in the methodological elements as factors/parameters, including increments, used in the FMRL and in the actual GHG emissions and removals in accordance with the Kyoto Protocol Supplement (p.2.97). The ERT noted that the NIR does not contain any such information. During the review, the Party explained that in the current iteration of the FMRL technical correction, the Party did not assess the main factors generating the accounted quantity and that it might be premature to provide this information at present, since the current FM estimate is based on the age class structure projected by EFISCEN, and the latest data from the seventh NFI will be reflected in its next annual submission. The Party clarified that demand for biomass (particularly for use in energy) is expected to increase significantly and that this was an outcome of the Global Biosphere Management Model used to translate policies into wood demand in the FMRL. However, in practice, harvests from the Party's forests have been relatively low over the past decade, with harvests as low as 55 per cent of annual increment, and this will be an important factor in explaining the generated accounting quantity. The Party indicated that an assessment of this matter will be included in the next NIR.</p> <p>The ERT recommends that the Party include information in the NIR on the main factors generating the accounted quantity that can be explained as deviations in actual policies compared with those historical policies included in the FMRL, rather than the methodological difference between the FMRL and the actual FM estimate.</p>	Yes. Transparency

<sup>a</sup> 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**

12. The ERT did not identify the need to apply any adjustments for the 2021 annual submission of the Netherlands.

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

13. The Netherlands elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF is not applicable to the 2021 review.

## **VIII. Questions of implementation**

14. No questions of implementation were identified by the ERT during the individual review of the Party's 2021 annual submission.

## Annex I

## Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by the Netherlands in its 2021 annual submission

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

Table I.1

### Total greenhouse gas emissions and removals for the Netherlands, base year–2019

(kt CO<sub>2</sub> eq)

	Total GHG emissions excluding indirect CO <sub>2</sub> emissions		Total GHG emissions and removals including indirect CO <sub>2</sub> emissions <sup>d</sup>		Land-use change (Article 3.7 bis as contained in the Doha Amendment) <sup>b</sup>	KP-LULUCF (Article 3.3 of the Kyoto Protocol) <sup>c</sup>	KP-LULUCF (Article 3.4 of the Kyoto Protocol)	
	Total including LULUCF	Total excluding LULUCF	Total including LULUCF	Total excluding LULUCF			CM, GM, RV, WDR	FM
FMRL								-1 425.00
Base year <sup>d</sup>	227 287.01	221 214.72	228 204.20	222 131.91	752.27		NA	
1990	225 676.39	219 604.10	226 593.58	220 521.29				
1995	235 570.48	229 639.34	236 222.42	230 291.29				
2000	223 107.99	217 577.76	223 639.55	218 109.32				
2010	216 693.71	211 675.15	217 151.92	212 133.36				
2011	202 348.11	197 327.07	202 804.78	197 783.74				
2012	198 036.27	193 081.48	198 489.30	193 534.51				
2013	198 501.82	193 387.53	198 951.17	193 836.88		484.47	NA	-1 233.46
2014	190 573.19	185 617.27	191 002.55	186 046.63		523.59	NA	-1 202.21
2015	197 626.64	192 712.73	198 078.36	193 164.45		564.54	NA	-1 140.50
2016	197 970.67	193 101.02	198 421.40	193 551.75		607.03	NA	-1 140.35
2017	195 302.83	190 567.47	195 755.88	191 020.52		645.34	NA	-1 093.67
2018	191 029.65	186 394.47	191 470.05	186 834.87		678.66	NA	-1 048.19
2019	184 963.37	180 441.30	185 394.50	180 872.42		712.42	NA	-1 024.25

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

<sup>a</sup> The Party reported indirect CO<sub>2</sub> emissions in CRF table 6.

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

<sup>c</sup> Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

<sup>d</sup> "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O and 1995 for HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub>. The Netherlands has not elected any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.



Table I.2

**Greenhouse gas emissions and removals by gas for the Netherlands, excluding land use, land-use change and forestry, 1990–2019**(kt CO<sub>2</sub> eq)

	<i>CO<sub>2</sub><sup>a</sup></i>	<i>CH<sub>4</sub></i>	<i>N<sub>2</sub>O</i>	<i>HFCs</i>	<i>PFCs</i>	<i>Unspecified mix of HFCs and PFCs</i>	<i>SF<sub>6</sub></i>	<i>NF<sub>3</sub></i>
1990	162 724.11	31 833.15	17 488.15	5 606.33	2 662.85	NO	206.70	NO, IE
1995	172 952.31	29 628.38	17 624.09	7 545.61	2 279.92	NO	260.97	NO, IE
2000	171 616.58	24 194.07	15 528.61	4 608.46	1 902.81	NO	258.78	NO, IE
2010	181 995.79	19 357.85	8 183.39	2 128.77	313.77	NO	153.79	NO, IE
2011	168 727.98	18 808.14	7 955.78	1 891.47	275.20	NO	125.17	NO, IE
2012	165 153.47	18 388.53	7 799.93	1 831.63	188.45	NO	172.50	NO, IE
2013	165 133.92	18 373.58	8 025.12	2 040.65	143.76	NO	119.86	NO, IE
2014	158 092.57	17 954.64	8 149.35	1 622.99	93.21	NO	133.86	NO, IE
2015	164 651.61	18 145.24	8 322.72	1 801.17	104.22	NO	139.49	NO, IE
2016	165 375.98	18 273.17	7 998.87	1 617.76	151.81	NO	134.16	NO, IE
2017	163 063.11	17 953.68	8 241.87	1 558.45	77.03	NO	126.38	NO, IE
2018	159 536.36	17 343.99	8 007.59	1 660.23	163.01	NO	123.69	NO, IE
2019	153 717.11	17 217.02	7 892.45	1 817.31	117.32	NO	111.22	NO, IE
<b>Percentage change 1990–2019</b>	<b>–5.5</b>	<b>–45.9</b>	<b>–54.9</b>	<b>–67.6</b>	<b>–95.6</b>	<b>NA</b>	<b>–46.2</b>	<b>NA</b>

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

<sup>a</sup> Including indirect CO<sub>2</sub> emissions as reported in CRF table 6.

Table I.3

**Greenhouse gas emissions and removals by sector for the Netherlands, 1990–2019**(kt CO<sub>2</sub> eq)

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
1990	158 622.52	23 190.11	24 528.03	6 072.29	14 180.64	NO
1995	169 241.72	24 889.95	23 638.10	5 931.14	12 521.52	NO
2000	167 031.64	21 241.24	20 078.00	5 530.23	9 758.44	NO
2010	178 800.02	11 180.10	17 554.06	5 018.56	4 599.18	NO
2011	165 397.81	10 833.69	17 225.39	5 021.04	4 326.85	NO
2012	162 018.78	10 380.06	17 037.88	4 954.79	4 097.80	NO
2013	161 681.93	10 734.75	17 526.34	5 114.29	3 893.87	NO
2014	154 519.50	10 185.53	17 685.15	4 955.92	3 656.45	NO
2015	161 267.36	10 220.75	18 231.24	4 913.91	3 445.09	NO

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
2016	162 124.71	9 695.08	18 445.10	4 869.65	3 286.86	NO
2017	159 250.78	10 189.65	18 497.05	4 735.36	3 083.04	NO
2018	155 491.37	10 421.19	17 934.85	4 635.17	2 987.47	NO
2019	149 992.00	10 342.60	17 650.73	4 522.08	2 886.72	NO
<b>Percentage change 1990–2019</b>	<b>–5.4</b>	<b>–55.4</b>	<b>–28.0</b>	<b>–25.5</b>	<b>–79.6</b>	<b>NA</b>

*Notes:* (1) The Netherlands did not report emissions or removals in the sector other (sector 6); the corresponding cells in the CRF tables were left blank; (2) totals include indirect CO<sub>2</sub> emissions reported in CRF table 6.

Table I.4

**Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year–2019, for the Netherlands**  
(kt CO<sub>2</sub> eq)

	<i>Article 3.7 bis as contained in the Doha Amendment<sup>a</sup></i>	<i>Activities under Article 3.3 of the Kyoto Protocol</i>		<i>FM and elected activities under Article 3.4 of the Kyoto Protocol</i>				
	<i>Land-use change</i>	<i>AR</i>	<i>Deforestation</i>	<i>FM</i>	<i>CM</i>	<i>GM</i>	<i>RV</i>	<i>WDR</i>
FMRL				–1 425.00				
Technical correction				362.00				
Base year <sup>b</sup>	752.27				NA	NA	NA	NA
2013		–602.28	1 086.74	–1 233.46	NA	NA	NA	NA
2014		–602.92	1 126.51	–1 202.21	NA	NA	NA	NA
2015		–603.02	1 167.57	–1 140.50	NA	NA	NA	NA
2016		–602.68	1 209.71	–1 140.35	NA	NA	NA	NA
2017		–605.33	1 250.67	–1 093.67	NA	NA	NA	NA
2018		–613.22	1 291.88	–1 048.19	NA	NA	NA	NA
2019		–620.87	1 333.29	–1 024.25	NA	NA	NA	NA
<b>Percentage change base year–2019</b>					<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

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

<sup>a</sup> The value reported in this column relates to 1990.

<sup>b</sup> The Netherlands has not elected to report on any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol, and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

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

Table I.5

**Key relevant data for the Netherlands under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2021 annual submission**

<i>Parameter</i>	<i>Data values</i>
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: not elected (e) GM: not elected (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None
Election of application of provisions for natural disturbances	Yes, for AR and FM
3.5% of total base-year GHG emissions, excluding LULUCF and including indirect CO <sub>2</sub> emissions	7 811.943 kt CO <sub>2</sub> eq (62 495.551 kt CO <sub>2</sub> 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

### Information to be included in the compilation and accounting database

Tables II.1–II.7 include the information to be included in the compilation and accounting database for the Netherlands. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1

#### Information to be included in the compilation and accounting database for 2019, including on the commitment period reserve, for the Netherlands (t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>CPR</b>	–	–	–	–
<b>Annex A emissions</b>				
CO <sub>2</sub>	153 584 900	153 717 106	–	153 717 106
CH <sub>4</sub>	17 217 021	–	–	17 217 021
N <sub>2</sub> O	7 892 447	–	–	7 892 447
HFCs	1 817 313	–	–	1 817 313
PFCs	117 317	–	–	117 317
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	111 218	–	–	111 218
NF <sub>3</sub>	NO, IE	–	–	NO, IE
<b>Total Annex A sources</b>	<b>180 740 216</b>	<b>180 872 423</b>	–	<b>180 872 423</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–620 875	–	–	–620 875
Deforestation	1 333 294	–	–	1 333 294
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	–1 024 246	–	–	–1 024 246

Table II.2

#### Information to be included in the compilation and accounting database for 2018 for the Netherlands (t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	159 460 440	159 536 358	–	159 536 358
CH <sub>4</sub>	17 343 991	–	–	17 343 991
N <sub>2</sub> O	8 007 594	–	–	8 007 594
HFCs	1 660 232	–	–	1 660 232
PFCs	163 009	–	–	163 009
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	123 690	–	–	123 690
NF <sub>3</sub>	NO, IE	–	–	NO, IE
<b>Total Annex A sources</b>	<b>186 758 956</b>	<b>186 834 874</b>	–	<b>186 834 874</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–613 221	–	–	–613 221
Deforestation	1 291 880	–	–	1 291 880
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
FM	-1 048 192	-	-	-1 048 192

Table II.3

**Information to be included in the compilation and accounting database for 2017 for the Netherlands**  
(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	163 063 110	-	-	163 063 110
CH <sub>4</sub>	17 953 680	-	-	17 953 680
N <sub>2</sub> O	8 241 868	-	-	8 241 868
HFCs	1 558 449	-	-	1 558 449
PFCs	77 029	-	-	77 029
Unspecified mix of HFCs and PFCs	NO	-	-	NO
SF <sub>6</sub>	126 380	-	-	126 380
NF <sub>3</sub>	NO, IE	-	-	NO, IE
<b>Total Annex A sources</b>	<b>191 020 516</b>	-	-	<b>191 020 516</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	-605 332	-	-	-605 332
Deforestation	1 250 668	-	-	1 250 668
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	-1 093 670	-	-	-1 093 670

Table II.4

**Information to be included in the compilation and accounting database for 2016 for the Netherlands**  
(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	165 375 975	-	-	165 375 975
CH <sub>4</sub>	18 273 174	-	-	18 273 174
N <sub>2</sub> O	7 998 873	-	-	7 998 873
HFCs	1 617 758	-	-	1 617 758
PFCs	151 812	-	-	151 812
Unspecified mix of HFCs and PFCs	NO	-	-	NO
SF <sub>6</sub>	134 155	-	-	134 155
NF <sub>3</sub>	NO, IE	-	-	NO, IE
<b>Total Annex A sources</b>	<b>193 551 746</b>	-	-	<b>193 551 746</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	-602 682	-	-	-602 682
Deforestation	1 209 714	-	-	1 209 714
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	-1 140 346	-	-	-1 140 346

Table II.5

**Information to be included in the compilation and accounting database for 2015 for the Netherlands**  
(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	164 651 609	-	-	164 651 609
CH <sub>4</sub>	18 145 235	-	-	18 145 235
N <sub>2</sub> O	8 322 724	-	-	8 322 724

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
HFCs	1 801 172	–	–	1 801 172
PFCs	104 220	–	–	104 220
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	139 490	–	–	139 490
NF <sub>3</sub>	NO, IE	–	–	NO, IE
<b>Total Annex A sources</b>	<b>193 164 450</b>	–	–	<b>193 164 450</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–603 023	–	–	–603 023
Deforestation	1 167 566	–	–	1 167 566
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	–1 140 505	–	–	–1 140 505

Table II.6

**Information to be included in the compilation and accounting database for 2014 for the Netherlands**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	158 092 571	–	–	158 092 571
CH <sub>4</sub>	17 954 638	–	–	17 954 638
N <sub>2</sub> O	8 149 353	–	–	8 149 353
HFCs	1 622 994	–	–	1 622 994
PFCs	93 210	–	–	93 210
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	133 859	–	–	133 859
NF <sub>3</sub>	NO, IE	–	–	NO, IE
<b>Total Annex A sources</b>	<b>186 046 625</b>	–	–	<b>186 046 625</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–602 924	–	–	–602 924
Deforestation	1 126 514	–	–	1 126 514
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	–1 202 206	–	–	–1 202 206

Table II.7

**Information to be included in the compilation and accounting database for 2013 for the Netherlands**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	165 133 923	–	–	165 133 923
CH <sub>4</sub>	18 373 576	–	–	18 373 576
N <sub>2</sub> O	8 025 115	–	–	8 025 115
HFCs	2 040 653	–	–	2 040 653
PFCs	143 757	–	–	143 757
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	119 860	–	–	119 860
NF <sub>3</sub>	NO, IE	–	–	NO, IE
<b>Total Annex A sources</b>	<b>193 836 884</b>	–	–	<b>193 836 884</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–602 279	–	–	–602 279
Deforestation	1 086 745	–	–	1 086 745
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	–1 233 462	–	–	–1 233 462

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## Annex III

### Additional information to support findings in table 2

#### Missing categories that may affect completeness

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

- (a) 1.A.1.c Manufacture of solid fuels and other energy industries – liquid fuels (CH<sub>4</sub> and N<sub>2</sub>O) for 1991–2013 (see ID# E.3 in table 3);
- (b) 2.C.1.f. Sinter production (CH<sub>4</sub>) (see ID# I.24 in table 6);
- (c) 2.G.2 SF<sub>6</sub> and PFCs from other product use – SF<sub>6</sub> use in particle accelerators in universities, industry and medical facilities and in magnesium production (SF<sub>6</sub>) (see ID# I.32 in table 6);
- (d) Agriculture – emissions from mules and asses (CH<sub>4</sub> and N<sub>2</sub>O) for 1990–2009 (see ID# A.1 in table 3);
- (e) Deforestation (CO<sub>2</sub>) (see ID# KL.4 in table 3).

## Annex IV

### Reference documents

#### A. Reports of the Intergovernmental Panel on Climate Change

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

IPCC. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <https://www.ipcc.ch/publication/2013-revised-supplementary-methods-and-good-practice-guidance-arising-from-the-kyoto-protocol/>.

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

#### B. UNFCCC documents

##### Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015, 2016, 2017 and 2019 annual submissions of the Netherlands, contained in documents FCCC/ARR/2013/NLD, FCCC/ARR/2014/NLD, FCCC/ARR/2015/NLD, FCCC/ARR/2016/NLD, FCCC/ARR/2017/NLD and FCCC/ARR/2019/NLD, respectively.

##### Other

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

Annual status report for the Netherlands for 2021. Available at [https://unfccc.int/sites/default/files/resource/asr2020\\_NLD.pdf](https://unfccc.int/sites/default/files/resource/asr2020_NLD.pdf).

Conclusions and recommendations from the 16<sup>th</sup> meeting of greenhouse gas inventory lead reviewers. Available at [https://unfccc.int/sites/default/files/resource/04\\_GHG-LRs-2019-conclusions.pdf](https://unfccc.int/sites/default/files/resource/04_GHG-LRs-2019-conclusions.pdf).

#### C. Other documents used during the review

Responses to questions during the review were received from Peter Zijlema (Netherlands Enterprise Agency), including additional material on the methodology and assumptions used. The following references are reproduced as received:

Arets, E.J.M.M., J.W.H. van der Kolk, G.M. Hengeveld, J.P. Lesschen, H. Kramer, P.J. Kuikman and M.J. Schelhaas, (2021): Greenhouse gas reporting of the LULUCF sector in the Netherlands. Methodological background, update 2021. WOt Technical report 201. DOI 10.18174/539898. Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu), Wageningen UR, Wageningen, The Netherlands.

Bannink et al. 2011. *A model of enteric fermentation in dairy cows to estimate methane emission for the Dutch National Inventory Report using the IPCC Tier 3 approach*. Animal Feed Science and Technology ISSN 0377-8401 pp.603-618. Available at <https://library.wur.nl/WebQuery/wurpubs/410155>.



Bannink, A., W.J. Spek, J. Dijkstra, and L.B.J. Šebek, (2018): A Tier 3 Method for Enteric Methane in Dairy Cows Applied for Fecal N Digestibility in the Ammonia Inventory, *Frontiers in Sustainable Food Systems*, 2.

CBS. 2012. *Standardised calculation methods for animal manure and nutrients*. Statistics Netherlands. Available at <https://www.cbs.nl/nl-nl/publicatie/2012/29/standardised-calculation-methods-for-animal-manure-and-nutrients>.

CBS, 2011-2019: Dierlijke mest en mineralen 2009 t/m 2018 (C. van Bruggen; in Dutch). Statistics Netherlands, Den Haag/Heerlen, the Netherlands. Available at [www.cbs.nl/nl-nl/longread/aanvullende-statistische-diensten/2021/dierlijke-mest-en-mineralen-2020/3-graasdieren](http://www.cbs.nl/nl-nl/longread/aanvullende-statistische-diensten/2021/dierlijke-mest-en-mineralen-2020/3-graasdieren).

Coop et al, (1995): Emissies van stortplaatsen (Emissions from landfill sites). VROM Hoofinspectie Milieuhygiëne, Publicatie Emissieregistratie 28, Den Haag, (In Dutch).

DHV, 2000. Identificatie van onbekende bronnen van overige broeikasgassen (Identification of unknown sources of other greenhouse gases).

DHV, 2010 *Update of emission factors for N<sub>2</sub>O and CH<sub>4</sub> for composting, anaerobic digestion and waste incineration*. Report MD-AF20100263/mk, July. DHV, Amersfoort.

Honig, E, J.A. Montfoort, R. Dröge, B. Guis, K. Baas, B. van Huet, O.R. van Hunnik, A.C.W.M. van den Berghe, (2021): Methodology report on the calculation of emissions to air from the sectors Energy, Industry and Waste as used by the Dutch Pollutant Release and Transfer Register. RIVM report 2021-0003. Bilthoven

Moraal et al. 2004. *Verschuivingen van insectenplagen bij bomen sinds 1946 in relatie met klimaatverandering. Met aandacht voor de effecten van stikstofdepositie, vochtstress, bossamenstelling en bosbeheer*. Wageningen, Alterra, Alterra-rapport 856. 66 p. Available at <https://library.wur.nl/WebQuery/wurpubs/fulltext/28848>.

Netbeheer Nederland (2020): SF6-Emissie Netbeheerders Elektriciteit 2019. Rapport nr 20-0868, DNV-GL.

Oonk et al. 1994: *Validation of landfill gas formation models*. TNO Institute of Environmental and Energy Technology, December, reference number 94-315.

Oonk, H. (2016): Correction factor F for adsorption CO<sub>2</sub> in leachate. Oonkay, Apeldoorn.

Oonk, H. (2020): Peer review 2020 Dutch National Inventory Report (NIR) on waste, Apeldoorn.

Rijkswaterstaat, (2021): Afvalverwerking in Nederland, gegevens 2019, Werkgroep Afvalregistratie, Utrecht (in Dutch).

Spakman et al. 2003: *Method for calculating GHG emissions*. Emission Registration Report VROM-HIMH, The Hague Available at: <http://english.rvo.nl/nie>.

Tauw. 2011. *Validatie van het nationale stortgas emissiemodel (Validation of the national landfill gas emission model)*. Deventer, the Netherlands (In Dutch).

Van Bruggen, C., A. Bannink, C.M. Groenestein, J.M. Huijsmans, L.A. Lagerwerf, H.H. Luesink, S.M. van der Sluis, G.L. Velthof, and J. Vonk, (2021): Emissies naar lucht uit de landbouw berekend met NEMA voor 1990-2019: Berekeningen met het model NEMA (in Dutch). WOT-technical report 203. Wettelijke Onderzoekstaken Natuur & Milieu, Wageningen UR, Wageningen, the Netherlands.

Van Bruggen, C., A. Bannink, C.M. Groenestein, J.M. Huijsmans, L.A. Lagerwerf, H.H. Luesink, S.M. van der Sluis, G.L. Velthof, and J. Vonk, (2020): Emissies naar lucht uit de landbouw berekend met NEMA voor 1990-2019: Berekeningen met het model NEMA (in Dutch). WOT-technical report. Wettelijke Onderzoekstaken Natuur & Milieu, Wageningen UR, Wageningen, the Netherlands.

Van der Zee, T. C.; Bannink, A., van Bruggen, C., Groenestein, C.M.; Huijsmans, J.F.M.; van der Kolk, J.W.H., Lagerwerf, L.A., Luesink, H.H., Velthof, G.L., Vonk, J. Methodology for estimating emissions from agriculture in the Netherlands. RIVM Report 2021-0008.

Velthof et al. 1996, *Seasonal variations in nitrous oxide losses from managed grasslands in The Netherlands*. Plant and Soil, Volume 181, pp.263-274. Available at <https://link.springer.com/article/10.1007/BF00012061>.

Velthof and Mosquera. 2011, *Calculation of nitrous oxide emission from agriculture in the Netherlands. Update of emission factors and leaching fraction*. Alterra report 2151. Alterra, Wageningen.

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