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

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2022 annual submission of Denmark, 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 26 September to 1 October 2022 in Bonn.

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



Contents

	<i>Page</i>
Abbreviations and acronyms	3
I. Introduction	5
II. Summary and general assessment of the Party's 2022 annual submission	6
III. Status of implementation of recommendations included in the previous review report.....	8
IV. Issues and problems identified in three or more successive reviews and not addressed by the Party	22
V. Additional findings made during the individual review of the Party's 2022 annual submission	24
VI. Application of adjustments.....	29
VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol	29
VIII. Questions of implementation	29
Annexes	
I. Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Denmark in its 2022 annual submission	30
II. Information to be included in the compilation and accounting database	35
III. Additional information to support findings in table 2	40
IV. Reference documents	41

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
ARR	annual review report
Article 8 review guidelines	“Guidelines for review under Article 8 of the Kyoto Protocol”
C	carbon
CER	certified emission reduction
CH ₄	methane
CM	cropland management
CNG	compressed natural gas
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
COD	chemical oxygen demand
Convention reporting adherence	adherence to the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
CPR	commitment period reserve
CRF	common reporting format
DKE	country identification code for Denmark’s submission under the Kyoto Protocol (mainland Denmark and Greenland)
dm	dry matter
DNK	country identification code for Denmark’s submission under the Convention (mainland Denmark, Greenland and the Faroe Islands)
DNM	country identification code for Denmark’s submission under the second commitment period of the Kyoto Protocol (mainland Denmark only)
DOC	degradable organic carbon
DOC _f	fraction of degradable organic carbon that decomposes
EEA	European Environment Agency
EF	emission factor
EF _{st}	emission factor for methane emissions from septic tanks
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
EMEP/EEA guidebook	EMEP/EEA air pollutant emission inventory guidebook
ERT	expert review team
ERU	emission reduction unit
FM	forest management
FMRL	forest management reference level
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol

LNG	liquefied natural gas
LULUCF	land use, land-use change and forestry
N ₂ O	nitrous oxide
NA	not applicable
NE	not estimated
Nex	nitrogen excretion
NF ₃	nitrogen trifluoride
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
NO _x	nitrogen oxides
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF ₆	sulfur hexafluoride
SIAR	standard independent assessment report
UNFCCC Annex I inventory reporting guidelines	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
UNFCCC review guidelines	“Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”
WDR	wetland drainage and rewetting
Wetlands Supplement	2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands
Y _m	methane conversion rate

I. Introduction

1. This report covers the review of the 2022 annual submission of Denmark,¹ 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 26 September to 1 October 2022 in Bonn and was coordinated by Tomoyuki Aizawa and Jongi Witi (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Denmark.

Table 1

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

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Sorin Deaconu	Romania
	Hlobisile Patricia Sikhosana	Eswatini
Energy	Ana Carolina Avzaradel Szklo	Brazil
	Lawrence Kotoe	Ghana
	John Watterson	United Kingdom
	Songli Zhu	China
IPPU	Jet Chong	Australia
	Kristina Gonchar	Belarus
	Ingrid Person Rocha e Pinho	Brazil
Agriculture	Kingsley Kwako Amoako	Ghana
	Hongmin Dong	China
LULUCF and KP-LULUCF	Thiago de Araujo Mendes	Brazil
	Helen Karu	Estonia
	Atsushi Sato	Japan
	Admore Mureva	Zimbabwe
Waste	Richard Claxton	United Kingdom
	Phindile Mangwana	South Africa
Lead reviewers	Thiago de Araujo Mendes	
	John Watterson	

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

3. The ERT has made recommendations that Denmark resolve identified findings, including issues² designated as problems.³ Other findings, and, if applicable, the

¹ Denmark submitted its instrument of ratification of the Doha Amendment on behalf of Denmark and Greenland. Greenland had a reduction commitment for the first commitment period of the Kyoto Protocol; however, for the second commitment period, a territorial exemption for Greenland was made in the ratification of the Doha Amendment. Therefore, the assessment of the annual submission in this report, including information on accounting, is based on the submission for mainland Denmark only, unless otherwise specified.

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

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

encouragements of the ERT to Denmark to resolve related issues, are also included in this report.

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

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

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

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

7. Table 2 provides the assessment by the ERT of the Party’s 2022 annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2

Summary of review results and general assessment of the 2022 annual submission of Denmark

Assessment		Issue/problem ID#(s) in table 3 or 5 ^d	
Date of submission	Original submission: NIR, 15 April 2022; CRF tables (DKE version 1, DNK version 1 and DNM version 1), 15 April 2022; SEF tables, 15 April 2022		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	I.4, I.5, KL.9
	(c) Development and selection of EFs?	Yes	I.1, L.10, KL.7
	(d) Collection and selection of AD?	Yes	L.9, KL.6
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	No	
	(g) Reporting of uncertainties, including methodologies?	No	
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness? ^b	No	
(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?	NA	The Party did not report any insignificant categories as “NE”
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 or 5^a</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?	No	KL.10
(c) Reporting requirements of decision 6/CMP.9?	No		
(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	NA		
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	Denmark does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Questions of implementation	Did the ERT list any questions of implementation?	No	

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

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

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

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 17 August 2022,⁴ and had not been resolved by the time of publication of the report on the review of the Party's 2021 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3

Status of implementation of recommendations included in the previous review report for Denmark

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
General	No issues identified.		
Energy			
E.1	1.A.2 Manufacturing industries and construction – other fossil fuels (industrial waste) – CO ₂ (E.6, 2021) Transparency	Further clarify the information on EFs in section 3.2.5 of the NIR on methodological issues by describing the industrial waste fuel type and the basis for the EFs, including by explaining how the biomass part of the industrial waste CO ₂ EF was derived and whether there is a corresponding fossil CO ₂ EF component.	Addressing. The ERT noted that a new paragraph was added to the NIR (pp.141–142) to explain the industrial waste fuel type and the basis for the CO ₂ EF for the fossil part. The paragraph clarifies that industrial waste is only applicable for one cement production company (Aalborg Portland Ltd) that has been included in the European Union Emissions Trading System since 2006 and, as the plant-specific data are confidential, the CO ₂ EF of the fossil part of the industrial waste is assumed to be equal to that for municipal waste (e.g. 42.5 kg/GJ total waste in 2020, as shown in NIR table 3.2.27, p.141). The ERT noted that the new paragraph concentrates on the fossil part of industrial waste rather than the biomass part and its related CO ₂ EF. The ERT also noted that the CO ₂ EF for industrial waste (biomass part) in the NIR (table 3A-4.2, p.832) is identical to the EF in the Party's 2021 NIR (79.6 kg/GJ), and there is no explanation about whether there is a corresponding fossil CO ₂ component in the EF. During the review, the Party clarified that there is no fossil component in the biomass EF and stated that further documentation describing the biomass part of industrial waste will be added to the NIR in its next submission. The Party also clarified that CO ₂ EF for industrial waste (biomass part) was included in the NIR in error and will not be included in the next submission.
E.2	1.A.3 Transport – all fuels – CO ₂ , CH ₄ and N ₂ O (E.7, 2021) Convention reporting adherence	Correct the fuel consumption values (in PJ) listed for 2019 in NIR table 3.3.3, as appropriate, to ensure consistency with the values reported for road transport in NIR figure 3.3.4 (p.175) and the reporting for mobile sources in CRF tables 1.A(a)s2, 1.A(a)s 3 and 1.A(a)s 4.	Resolved. The values for fuel consumption for 2020 (in PJ) in NIR table 3.3.3 (p.178) are consistent with the values reported for passenger cars, light-duty vehicles, heavy-duty vehicles and mopeds and motorcycles in NIR figure 3.3.4 (p.180) and also consistent with those reported in CRF table 1.A(a)s3. Fuel consumption values listed in the same table for other mobile sources (i.e. off-road vehicles and machinery accounted under categories 1.A.2 and 1.A.4) are consistent with the consumption values reported in CRF tables 1.A(a)s2 and 1.A(a)s4.

⁴ FCCC/ARR/2021/DNK.

<i>ID#</i>	<i>Issue/problem classification^d</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
E.3	1.A.3.a Domestic aviation – liquid fuels – CH ₄ (E.2, 2021) (E.7, 2020) Transparency	Revise the incorrect reference to the source of the EFs for CH ₄ emissions from piston engine aircraft using aviation gasoline.	Addressing. The ERT noted that the text in the NIR (p.245) about the source of the EFs for CH ₄ emissions from piston engine aircraft using aviation gasoline is identical to that provided in the 2021 NIR (p.240). During the review, the Party acknowledged that the recommendation has not yet been fully addressed and stated that the correct explanation will be included in the NIR of its next submission. In response to a question from the ERT, the Party explained that the correct information is that the EFs for CH ₄ emissions are derived from volatile organic compound factors from the EMEP/EEA guidebook and the non-methane volatile organic compounds/CH ₄ split is based on the shares of these emissions for conventional gasoline engines in the Danish road transport fleet.
E.4	1.A.3.d Domestic navigation – gaseous fuels – CO ₂ and CH ₄ (E.3, 2021) (E.4, 2020) (E.4, 2018) Comparability	Reallocate emissions from LNG used in ferries from natural gas liquid to gaseous fuels in CRF table 1.A(a).	Resolved. The Party reallocated energy consumption and the corresponding GHG emissions from LNG used in domestic navigation from 2015 onward from other fossil fuels to gaseous fuels in CRF table 1.A(a)3 and to other related categories of 1.A. Consumption of LNG did not occur in the country before 2015.
E.5	International bunkers and multilateral operations – liquid fuels – CO ₂ (E.1, 2021) (E.6, 2020) (E.7, 2018) Convention reporting adherence	Ensure consistent reporting between CRF tables 1.D and 1.A(b) for jet kerosene consumed in international aviation bunkers (1990–2000) and for residual fuel oil consumed in international navigation bunkers.	Not resolved. The Party continued to report, under the scope of the Convention, inconsistent values in CRF tables 1.D and 1.A(b). For example, the jet kerosene consumed in international aviation bunkers in 2020 is reported as 13,564.57 PJ in CRF table 1.D, but as 13,561.57 PJ in CRF table 1.A(b). The Party had explained during the previous review that the inconsistency arose because its reporting relating to the Faroe Islands used only the sectoral approach and not the reference approach. The ERT also noted there is no inconsistency in the reporting under the Kyoto Protocol because the Faroe Islands are not included in the reporting under the Kyoto Protocol. During the review, the Party reiterated that full implementation of the reference approach for the Faroe Islands will not be completed until the next submission.
IPPU			
I.1	2.F.1 Refrigeration and air conditioning – HFCs (I.3, 2021) (I.9, 2020) Consistency	Investigate the reasons for the outlier values of the HFC-143a product manufacturing factor for commercial refrigeration reported for 2017–2018 and revise them, as necessary, providing a transparent explanation in the NIR if there continues to be significant inter-annual variation in the values reported.	Addressing. The ERT noted that the inter-annual changes from 1.56 to 1.67 per cent between the 2017 and 2018 submissions under the Kyoto Protocol changed to 0.54 to 0.58 per cent for the same period, since the values were revised in the 2022 submission, with the highest inter-annual variation (1.50 to 0.53 per cent) occurring between 2009 and 2010. During the review, the Party clarified that the product manufacturing factor for commercial refrigeration for Greenland is 1.5 per cent for the entire time series, while the same factor for mainland Denmark is 1.5 per cent for 1994–2009 and 0.5 per cent for 2010–2020. However, the ERT noted that only the latter is reported in the NIR (section 4.7.4, p.361 and table 4.7.2, p.363), and that the steep decrease in the EF for mainland Denmark for 2010–2020 and the impact of the EF for Greenland on the trend is not explained in the NIR.

ID#	Issue/problem classification ^d	Recommendation from previous review report	ERT assessment and rationale
			<p>The ERT considers that the recommendation has not yet been addressed because the Party has not reported in the NIR the differentiated product manufacturing factor applied for commercial refrigeration production in Greenland. The ERT notes that reporting the Greenland product manufacturing factor and explaining how it contributes to fluctuations in the IEF of HFC-143a emissions from commercial refrigeration production will resolve this recommendation.</p>
I.2	2.F.1 Refrigeration and air conditioning – HFCs (I.4, 2021) (I.3, 2020) (I.12, 2018) Consistency	Ensure consistent reporting of the emissions from laboratory freezers in the CRF tables across the time series and include in the NIR an explanation on the methodology used and allocation of the emissions for this subcategory.	<p>Addressing. The Party continues to report PFC emissions from laboratory freezers under subcategory 2.F.1.b Domestic refrigeration as in its 2021 submission. During the review, the Party clarified that emissions of PFC-14 from laboratory freezers will be reported under subcategory 2.F.1.a Commercial refrigeration in its next submission, in line with the recommendation made by the previous ERT. The ERT considers that this issue will be resolved when the reporting allocation for PFC emissions from laboratory freezers has been updated and a corresponding explanation in the NIR explaining the methodology used and allocation of the emissions for the 2.F.1.a Commercial refrigeration subcategory has been provided.</p>
I.3	2.F.1 Refrigeration and air conditioning – HFCs (I.5, 2021) (I.10, 2020) Consistency	Recalculate the emissions for the subcategory for 2010 onward by correcting the product manufacturing factor values used for the calculation of HFC-125 emissions from commercial refrigeration.	<p>Resolved. The Party recalculated the emissions for subcategory 2.F.1.a Commercial refrigeration in line with the recommendation in the ARR 2020 by using a product manufacturing factor of 0.5 per cent for commercial refrigeration for 2010–2020.</p>
I.4	2.F.1 Refrigeration and air conditioning – HFCs (I.6, 2021) Accuracy	Estimate the amount of HFCs emitted during system disposal considering the destruction and removal efficiency of incinerators. (Given that incinerators' destruction and removal efficiency is over 99.99 per cent for concentrated sources of ozone-depleting substances, the Party could justify the exclusion of emissions at disposal on the basis that they are insignificant and report "NE" instead of "NO".)	<p>Addressing. The Party explained in its NIR (p.362) that it reported "NO" for quantities of HFCs remaining in products at decommissioning. The ERT noted that this was inconsistent with the information reported in CRF table 2(II)B-Hs2, in which volumes of HFC-125, HFC-134a and HFC-143a were estimated as remaining in products at decommissioning for subcategories 2.F.1.a Commercial refrigeration, 2.F.1.b Domestic refrigeration, 2.F.1.d Transport refrigeration and 2.F.1.f Stationary air-conditioning.</p> <p>During the review, the Party stated that it will report "NE" for disposal emissions in future submissions on the basis that disposal of HFCs emitted during refrigeration and air conditioning is highly efficient and captures all sources within the Party, in line with the recommendations of the previous ERT. Denmark also explained that potential estimated emissions at decommissioning amount to between 0.000001 and 0.000016 per cent of the national total, which is well below 0.05 per cent of the total national GHG emissions and therefore these emissions are considered negligible. The Party further clarified that the statement in its NIR (section 4.7.4, p.362) that the notation key "NO" was used in the CRF for the amounts of HFCs remaining in products at decommissioning was inaccurate. Rather, "NO" was intended to apply to the emissions from disposal, not the HFCs remaining in product at decommissioning as stated in the NIR.</p> <p>The ERT considers that this recommendation will be resolved when the Party reviews and updates its estimations of HFC volumes and emissions from disposal of refrigeration and</p>

ID#	Issue/problem classification ^d	Recommendation from previous review report	ERT assessment and rationale
I.5	2.F.2 Foam blowing agents – HFCs (I.7, 2021) Accuracy	Estimate the amount of HFCs emitted during the decommissioning process considering the destruction and removal efficiency of incinerators. (Given that incinerators’ destruction and removal efficiency is over 95 per cent for diluted sources of ozone-depleting substances, the Party could justify the exclusion of emissions from the decommissioning process on the basis that they are insignificant and report “NE” instead of “NO”.)	<p>air-conditioning systems, including applying and justifying the notation keys used. The ERT concluded that any underestimation would be below the significance threshold for the application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11 (0.05 kt CO₂ eq in 2020) and therefore this issue was not included in the list of potential problems and further questions raised.</p> <p>Addressing. The Party continues to report “NO” for disposal in CRF table 2(II)B-Hs2 for foam blowing agents without providing an explanation for this in the NIR. During the review, the Party clarified that it will report “NE” for disposal emissions in future submissions on the basis that fluorinated gases remaining in foam products at decommissioning are destroyed by incineration, resulting in negligible disposal emissions. The Party also explained that estimates of potential emissions at decommissioning, which were at their height in 2013 (3.7 kt CO₂ eq), are well below 0.05 per cent of total national GHG emissions, even when using an exceptionally high EF of 5 per cent escape.</p> <p>The ERT considers that this recommendation will be resolved when the Party’s submission completely reports emissions from foam decommissioning processes, including information on decommissioning practices, and use and justification of notation keys. The ERT concluded that any underestimation would be below the significance threshold for application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11 (3.0 kt CO₂ eq in 2020) and therefore this issue was not included in the list of potential problems and further questions raised.</p>
Agriculture			
A.1	3.A.1 Cattle – CH ₄ (A.1, 2021) (A.5, 2020) Transparency	Include information on the planned revisions for the Karoline model in the Party’s description of planned improvements in the NIR.	<p>Resolved. The Party updated the information in NIR table 5.40 (p.459), indicating that the Karoline model has been revised and is no longer known as the Karoline model. The Party indicated that the reference to a 2014 report by Hellwing et al. has been updated to Hellwing et al. (2016). Further, the Party stated that the estimation of Y_m is ongoing because feeding practices relevant to the changes in the model will be taken into account when revising the model, as necessary.</p> <p>The ERT considers that the recommendation has been fully addressed because the Party has included the required information in the NIR as recommended by the previous ARR.</p>
A.2	3.A.1 Cattle – CH ₄ (A.4, 2021) Transparency	Include in the NIR a justification of the Y _m value used.	<p>Resolved. The Party provided in its NIR (table 5.7, p.409) a justification for the Y_m values used.</p> <p>During the review, the Party clarified that all Y_m values shown in NIR table 5.7 are shown to two decimal places. As shown in the tables, in the calculation of Y_m values, only one decimal place was used until 2017 owing to uncertainty regarding the model estimate. From 2018 onward, the improved model with lower uncertainty makes it possible to use two decimal places in the calculation. The Y_m values reflected in CRF</p>

ID#	Issue/problem classification ^d	Recommendation from previous review report	ERT assessment and rationale
A.3	3.A.4 Other livestock – CH ₄ (A.3, 2021) Comparability	Report in CRF table 3.As1 the number of mink and report “NE” in the corresponding column, while including its reasoning in the NIR.	<p>table 3.As1 are those used in the estimation (i.e. rounded to one decimal place for 1990–2017 and with two decimal places from 2018 onward).</p> <p>The ERT considers that the recommendation has been fully addressed because the Party provided justification and further explained the Y_m values used for the different time periods in table 5.7 in the NIR.</p> <p>Resolved. The Party added a subcategory named “Fur-bearing animals” under subcategory 3.A.4 Other livestock, consistent with its reporting for category 3.B Manure management. The Party reported numerical values for the number of fur-bearing animals and average gross energy intake, and reported “NA” for Y_m in CRF table 3.As1.</p> <p>The ERT considers that the recommendation has been fully addressed because the Party has provided the number of fur-bearing animals in the CRF tables and included the reasoning for this in the NIR as recommended by the previous ARR.</p>
A.4	3.B Manure management – N ₂ O (A.2, 2021) (A.6, 2020) Transparency	Include in the list of planned improvements in the NIR updated information on the verification of total Nex used in the inventory calculations, including the Party’s plan to compare it with farmers’ nitrogen accounts.	<p>Addressing. The Party reported updated information in its NIR (section 5.16, pp.459–460), including that it plans to extend its “normative system” for verifying Nex and ammonia emissions to include carbon and CH₄ emissions. This will involve a range of scientific projects covering GHG emissions from livestock, housing and storage facilities. This work is planned for 2021–2024 and, when results are available, they will be incorporated in the Party’s inventory as far as possible. No comparison is provided with the farmers’ nitrogen accounts, which are part of a register controlled by the Danish Agricultural Agency, mentioned in the NIR.</p> <p>During the review, the Party confirmed that the work includes comparing and quality checking a range of variables used in the inventory calculations and in the normative system. The normative system is the basis for the farmers’ fertilizer accounts, so these will also be included in the checks, and the text of the NIR will be further clarified in the next submission.</p> <p>The ERT considers that the recommendation has not yet been fully addressed because the Party has stated that the text included in the NIR could be further clarified to improve transparency.</p>
A.5	3.B Manure management – N ₂ O (A.5, 2021) Convention reporting adherence	<p>(a) Ensure consistency between the NIR and CRF table 3.B(b).</p> <p>(b) Provide documentation showing how the typical animal mass values for sheep, goats and horses reported in NIR table 5.36 were derived.</p>	<p>(a) Resolved. The Party provided consistent information between CRF table 3.B(b) and the NIR (table 5.36, p.440) for typical animal mass.</p> <p>(b) Addressing. The animal mass values (i.e. sheep 70 kg, goats 60 kg and horses 600 kg) are shown with references to the typical animal mass values for sheep and goats in notes 3 and 4 to NIR table 5.36. However, no reference was provided for the animal mass values for horses.</p> <p>During the review, the Party provided the reference for the animal mass values for horses.</p> <p>The ERT considers that the recommendation has not been fully addressed because the Party has not provided the necessary information that responds to the recommendation of the previous ARR.</p>

<i>ID#</i>	<i>Issue/problem classification^d</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
A.6	3.B Manure management – N ₂ O (A.6, 2021) Transparency	Provide in the NIR additional details justifying the increases in the EF for NO _x from manure management by referring to the update provided in the EMEP/EEA guidebook and information on the impact on the N ₂ O emission estimates.	Resolved. The Party reported in its NIR (section 5.14.2, p.455) that the recommendation made in the previous review report is redundant because, in the 2022 submission, the EF for NO _x was recalculated and was therefore not mentioned in the NIR. Rather, a dedicated section for recalculations for NO _x was included in the NIR (section 5.14.2) which cited the distribution of male and female turkeys as the main cause of the changes in NO _x emissions between 2005 and 2019.
A.7	3.B Manure management – N ₂ O (A.7, 2021) Convention reporting adherence	Include the correct values and category names for the Nex rate for sheep in NIR table 5.36 and ensure that consistent information is reported in the NIR and CRF table 3.	Resolved. The Party included the updated values and category names for the Nex rate for sheep in NIR table 5.36 (p.440). The ERT reviewed the Nex values in CRF table 3.B(b) and found them to be consistent with the values in NIR table 5.36 (p.440).
LULUCF			
L.1	4. General (LULUCF) – General (L.2, 2021) (L.2, 2020) (L.2, 2018) (L.15, 2016) (L.15, 2015) Convention reporting adherence	Ensure consistent reporting of the area of organic soils between the NIR and CRF tables 4.A–4.F and improve QC procedures for consistent reporting of the areas of organic soils.	Addressing. The ERT noted that, for category 4.B, there were small differences (ranging from 3 to 14 ha) in the area of organic soils for cropland reported in the NIR (table 6.19, p.503) and CRF table 4.B for 1990, 2000 and 2010. During the review, the Party explained that the areas reported in the NIR for organic soils are correct and that there is an error in CRF table 4.B which occurred during the process of allocating the areas of organic soils for cropland into cropland remaining cropland and forest land converted to cropland. The Party also clarified that the reported emissions (all emissions were reported under cropland remaining cropland and “IE” was used for forest land converted to cropland) were properly estimated by using the correct AD.
L.2	4.A Forest land – CO ₂ (L.4, 2021) (L.7, 2020) (L.16, 2018) Transparency	Include in the NIR synthesized information on the main parameters defining the characteristics used in the calculation of biomass and growing stocks.	Addressing. The Party provided the information on assumptions, parameters and some references relating to estimating emissions and removals from forest carbon pools in its NIR (section 6.2.4, pp.478–479), which includes the calculation methods with some parameter values (i.e. wood density, reduction factor) and data for growing stocks by species or by a group of species. However, the information does not include all the parameter values used in the calculation of carbon stock in biomass and some important values are missing (e.g. biomass expansion factors). During the review, the Party stated that the explanations will be included in the next NIR and will also be published as a separate report. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included synthesized information on the main parameters. This issue can be fully addressed if the Party includes data (e.g. in tabular format) in future NIRs on the values for the biomass expansion factor, root–shoot ratio, wood density by tree species, and areas and volumes by species. References to the sources of the parameters should also be provided.

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L.3	4.A Forest land – CO ₂ (L.5, 2021) (L.17, 2020) Consistency	Ensure time-series consistency by revising the living biomass estimates to address the inconsistency caused by the use of different data sources for the periods before and after 2006.	Resolved. The Party had recalculated living biomass estimates in its 2021 submission, resolving the sharp changes of the IEF for the volume of living biomass per ha in forests that existed in its 2020 submission, but had not included the necessary background information. In the 2022 NIR, the Party provided an additional explanation on forest area mapping and explained that a consistent data source is used starting from 2002 (pp.476–477). The ERT notes that the recommendation to include additional information, referred to in ID# L.4 below, is expected to contribute to a better understanding of the trend in the time series of forest land carbon stock change estimates when using the NFIs from 2002 for the recent part of the time series and the forest census in 1990 and 2000 for the earlier part of the time series.
L.4	4.A Forest land – CO ₂ (L.17, 2021) Transparency	Include in the NIR information on the approaches for using the NFI surveys or the forest census to estimate the carbon stock changes in pools of living biomass, litter and deadwood under forest land for 1990–2006 and for 2007 onward to enable consistency to be assessed for all reporting years.	Not resolved. The Party did not include the relevant information in the NIR. During the review, the Party explained that the information will be included in the next submission and also indicated that a separate report will be published covering the issues of forest land estimations, including the information referred in ID# L.5 below.
L.5	4.A.1 Forest land remaining forest land – CO ₂ (L.6, 2021) (L.8, 2020) (L.7, 2018) (L.5, 2016) (L.5, 2015) (51, 2014) (51, 2013) Transparency	Provide additional information on the area and volume of clear-cutting and the area subject to destructive disturbance, subject to the availability of data.	Not resolved. The Party did not provide a description or the requested additional information in its NIR. During the review, the Party explained that the information will be included in the next submission as a part of the separate report mentioned in ID# L.4 above.
L.6	4.A.1 Forest land remaining forest land – CO ₂ (L.8, 2021) (L.18, 2020) Transparency	Explain the reasons for any significant inter-annual changes in deadwood/ha in the NIR and provide a justification as to why the changes do not result in underestimation of emissions or overestimation of removals.	Addressing. The Party recalculated the estimation for deadwood in its 2021 submission, resolving the significant inter-annual changes of the IEF for deadwood/ha that had existed in the 2020 submission (e.g. sharp increases or outliers for 2006–2007 and 2015–2016). However, the Party has not included the information requested by the previous ERT in the 2021 or 2022 NIRs. During the review, the Party explained that the information will be included in the next submission in the separate report mentioned in ID# L.4 above.
L.7	4.A.2 Land converted to forest land – CO ₂ (L.9, 2021) (L.10, 2020) (L.18, 2018) Transparency	Improve the transparency of the NIR by explaining how land converted to forest land changed over the entire time series.	Resolved. The Party reported areas of all land-use changes, including land converted to forest land from 1960 to 2020 in annex 3.E to the NIR (table 3.E.18, pp.892–893).

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L.8	4.A.2 Land converted to forest land – CO ₂ (L.11, 2021) (L.19, 2020) Transparency	Provide transparent information in the NIR on the transition period applied to construct the land-use change matrix, ensuring that the information reported in the NIR reflects the actual methodological approaches applied for estimating emissions and removals as reported in the CRF tables.	Resolved. The Party provided information in its NIR (annex 3.E, pp.889–893) on the approach it uses for constructing its land-use change matrix, which is based on a 30-year transition period using annual land-use changes starting from 1960.
L.9	4.B Cropland – CO ₂ (L.12, 2021) (L.20, 2020) Accuracy	Revise the areas of drained organic soils for 2011–2018 by collecting additional data on drainage status and recalculate the associated emissions.	Addressing. The Party estimated the area of organic soils based on the soil classification maps for 1975 and 2010. As the areas of organic soils had decreased in 2010 when compared with 1975, the Party used linear interpolation to estimate areas of drained organic soils for 1990–2010 and assumed a constant area of drained organic soils as the sum of cropland and grassland since 2010. Due to the improvement made in land classification between cropland and grassland, the areas of drained organic soils for cropland were reported with a decreasing trend after 2011, as mentioned in the previous review report, but this was counterbalanced by an increase in the area of drained organic soils under grassland. Thus, the inconsistency in the trends of drained organic soil areas between 1990–2010 and after 2011 still remains. The Party reported in its NIR (p.530) and during the review that it has initiated new research to address this issue, but it will take time to collect new information because it is costly and time-consuming work.
L.10	4.B Cropland – CO ₂ (L.13, 2021) (L.21, 2020) Accuracy	(a) Recalculate emissions from drained organic soils under cropland by collecting additional data on soils with 6–12 per cent organic content. (b) Include in the NIR data and information from the study by Elsgaard et al. (2012) on calculating the EFs for drained organic soils with organic content greater than 12 per cent, including soil type, percentage of organic content and assumptions made, demonstrating their applicability for all the reporting years.	(a) Not resolved. The Party did not recalculate emissions by using new data on soils with 6–12 per cent organic content. However, the Party explained in its NIR (p.530) and during the review that it had initiated a research programme on the loss of organic matter from organic soils in relation to the groundwater table and total carbon stock above the groundwater level, which could result in more accurate CO ₂ emission estimates in the future. (b) Not resolved. The Party did not provide additional information in its NIR compared with its 2020 submission.
L.11	4.B Cropland – CO ₂ (L.14, 2021) (L.22, 2020) Convention reporting adherence	Correct the total area of organic soils in cropland reported for 2018 in DNK CRF table 4.B, ensuring consistency between the areas reported in the NIR and in CRF table 4.B.	Resolved. The Party reported the area of organic soils for 2018 (94,228 ha) for DNK in its NIR (table 6.19, p.503) consistent with that reported in CRF table 4.B (94.23 kha). For 2011–2020, CRF table 4.B reported an area of organic soils for DNK that was 2.625 ha larger than the area reported in CRF table 4.B for DNK, which corresponds to the area of land converted to cropland in Greenland.

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L.12	4.C Grassland – CO ₂ (L.15, 2021) (L.23, 2020) Transparency	Include information in the NIR on how the EFs used for drained organic soils in grassland are representative of the drained soils in terms of management practices.	<p>Not resolved. In NIR table 6.22 (p.508), the Party provided the areas of grassland organic soils with an organic content of 12 per cent or greater and with an organic content of 6–12 per cent. However, the Party did not include in the NIR information on the extent to which the EFs used are representative of the different management practices in grassland.</p> <p>During the review, the Party indicated that it will include more information in its next submission and explained that the area of organic soils in grassland was estimated using a geographic information system overlaid with the organic soil map and the land parcel information polygons, which contain information on crop type. The Party also clarified that each year the Danish Agricultural Agency issues a table with the maximum nitrogen application rates for each crop.</p> <p>The ERT considers that the combination of information mentioned above can capture the status of management practice in grassland, but that information on the applicability or the representativeness of the country-specific EFs for grassland is still missing.</p>
L.13	4.D.1.2 Flooded land remaining flooded land – CO ₂ (L.18, 2021) Convention reporting adherence	Change the reporting from “NO” to “NE” for all carbon pools under subcategory 4.D.1.2 Flooded land remaining flooded land and justify the use of the notation key by explaining that a methodology is not provided by the 2006 IPCC Guidelines in NIR sections 6.5.9 and 16.6.6.	<p>Addressing. The Party introduced some changes in the notation key used for the subcategory and reported “NA” or “0” instead of “NE” in NIR table 6.25 (p.512) and “NA” in CRF table 4.D, but has not provided an explanation on the notation keys used. During the review, the Party stated that this will be corrected in its next submission.</p> <p>The ERT considers that the recommendation has not yet been fully addressed.</p>
L.14	4.E.2 Land converted to settlements – CO ₂ (L.19, 2021) Transparency	Include in the NIR information on the EF used in the calculation for mineral soils under the category land converted to settlements.	<p>Resolved. The Party has gradually updated the estimation of carbon stock change in mineral soils under the category land converted to settlements in terms of the transition period and the initial year of estimation during 2019–2021. The ERT confirms that the reported information about the EF (referencing the soil organic carbon amount as well as the transition period) used in the calculation for mineral soils under the category land converted to settlements in its NIR (p.516) correctly explained the methodology used for calculating carbon stock changes in mineral soils under the category land converted to settlements and that the recommendation was properly addressed.</p>
L.15	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – N ₂ O (L.16, 2021) (L.24, 2020) Transparency	Include in the NIR information on the methodological approach and the EFs used for calculating off-site emissions from leaching of dissolved organic carbon in cropland, grassland and wetlands.	<p>Not resolved. The Party did not update the information in the NIR. During the previous review, the Party explained that it used default EFs from the Wetlands Supplement in the absence of country-specific EFs. However, this explanation was not included in the NIR. During the review, the Party explained that the information will be included in the next submission.</p>
L.16	4(II) Emissions/removals from drainage and rewetting and other	Report “NO” for N ₂ O emissions from rewetted organic soils for Greenland and update the text in NIR section 16.6.11.	<p>Not resolved. The Party did not update the information in the NIR and “NE” is still reported in NIR section 16.6.11. During the review, the Party explained that the information will be corrected in the next submission.</p>

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	management of organic/mineral soils – N ₂ O (L.20, 2021) Comparability		
Waste			
W.1	5.A Solid waste disposal on land – CH ₄ (W.2, 2021) (W.4, 2020) (W.16, 2018) Convention reporting adherence	Correct the erroneous entry of DOC _f in CRF table 5.A.	Resolved. The Party reported the correct DOC _f value (50, as a percentage) in CRF table 5.A correcting the previous reporting error.
W.2	5.A Solid waste disposal on land – CH ₄ (W.3, 2021) (W.6, 2020) Accuracy	Recalculate CH ₄ emissions from solid waste disposal in Greenland using the correct values of DOC for dry and wet paper/cardboard in line with the 2006 IPCC Guidelines (vol. 5, chap. 2, table 2.4).	Resolved. The Party reported in its NIR (table 16.7.4, p.753) recalculated emissions from solid waste disposal in Greenland using the correct values of DOC for dry and wet paper/cardboard in line with the 2006 IPCC Guidelines (vol. 5, chap. 2, table 2.4).
W.3	5.A.1 Managed waste disposal sites – CH ₄ (W.6, 2021) (W.9, 2020) Convention reporting adherence	Ensure that the references to NIR tables relating to CH ₄ recovered from solid waste disposal are correct in the NIR.	Resolved. The Party reported in its NIR (p.545) the correct table reference relating to CH ₄ recovered from solid waste disposal. The erroneous reference to “table 7.2.9” in the 2021 NIR has been corrected and replaced by “table 7.2.6”.
W.4	5.A.1 Managed waste disposal sites – CH ₄ (W.7, 2021) (W.10, 2020) Convention reporting adherence	Correct the equation used for estimating the CH ₄ generation potential by using the correct value for the coefficient (0.33).	Resolved. The Party reported in its NIR (section 7.2.3, equation 7.2.9, p.548) the correct equation for estimating the CH ₄ generation potential by using the correct value for the coefficient (0.33).
W.5	5.B Biological treatment of solid waste – CH ₄ and N ₂ O (W.14, 2021) (W.16, 2020) Transparency	Explain why CH ₄ and N ₂ O emissions from the biological treatment of waste (category 5.B) are not estimated and reported for Greenland in the NIR.	Not resolved. No explanation on the treatment of category 5.B in is provided in the NIR. During the review, the Party explained that it did not include the requested explanation in its NIR, but did provide the following text to the ERT and stated its intention to include this in its next submission: “There is no biological treatment of waste in Greenland. Greenland has an arctic climate and mostly consists of rocks with very little soil. Therefore, it is not a suitable place for composting waste because, in addition to the difficulties that sub-zero temperatures present for composting, there is no use for compost in such a climate”. The ERT supports the inclusion of this text in the Party’s next NIR.

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W.6	5.B.1 Composting – CH ₄ and N ₂ O (W.9, 2021) (W.11, 2020) Convention reporting adherence	Accurately report the methodological tiers used to estimate CH ₄ and N ₂ O emissions from composting in CRF summary table 3s2, ensuring consistency with the NIR.	Resolved. The Party reported in CRF table 3s2 the methodological tiers for CH ₄ and N ₂ O emissions for category 5.B.1 Biological treatment of solid waste – composting as “T1, T2”. This is consistent with NIR table 7.1.2 (p.539).
W.7	5.B.1 Composting – CH ₄ and N ₂ O (W.10, 2021) (W.12, 2020) Convention reporting adherence	Correct the reference in the NIR to the GHGs emitted from composting by clarifying that only CH ₄ and N ₂ O emissions are estimated for composting.	Resolved. The Party reported in its NIR (section 7.3.1, p.551) that emissions of CH ₄ and N ₂ O are estimated for composting. Previous NIRs indicated the inclusion of CO ₂ as an emission from composting in Denmark, which was incorrect. This incorrect description has been removed from the NIR.
W.8	5.B.1 Composting – CH ₄ and N ₂ O (W.15, 2021) (W.17, 2020) Transparency	Estimate CH ₄ and N ₂ O emissions from waste composting for the Faroe Islands.	<p>Not resolved. There are no estimates for the Faroe Islands added to the inventory. The Party reported in its NIR (p.955) that composting in the Faroe Islands is primarily a small-scale activity in private households only. However, some Faroese municipalities (e.g. the municipality of Vágur in Suðuroy) intend to establish composting sites for organic household waste.</p> <p>During the review, the ERT calculated a worst-case estimate of composting emissions for CH₄ and N₂O in the Faroe Islands. Using the 2020 population of 45,855 (World Bank), the ERT estimated AD on the basis of worst-case assumptions (i.e. assumptions that lead to the highest 2020 emission estimates) for (1) municipal waste generation (650 kg/person/year); and (2) maximum fraction of municipal organic waste that could be available for composting (10 per cent, representing waste that is not recorded as “inert” or “sludge” in the NIR, p.955). These AD were then combined with the default EFs on a dry weight basis (i.e. N₂O = 0.6 g/kg and CH₄ = 10 g/kg) from the 2006 IPCC Guidelines (vol. 5, chap. 4, table 4.1) to derive potential emissions amounting to 1.28 kt CO₂ eq (or 0.0029 per cent of the Danish total national emissions). This is well below the significance thresholds outlined in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines that would require Denmark to report a calculated estimate instead of its current “NE”.</p> <p>As such, the ERT concludes that the information provided by Denmark in its NIR (p.955) is sufficient to indicate that the emissions are insignificant and considers that the inclusion of an explanation on the likely level of the emissions would improve the transparency of the NIR.</p>
W.9	5.B.1 Composting – CH ₄ and N ₂ O (W.27, 2021) Convention reporting adherence	Report in CRF table 5.B the correct AD for composting of food and garden waste. If AD are not available, the ERT recommends that the Party report AD as “NE”.	Resolved. The Party reported the AD for food and garden waste in CRF table 5.B as “NE” and also provided specific information on the AD in NIR table 7.3.3 (p.554) in line with the previous recommendation.

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W.10	5.B.2 Anaerobic digestion at biogas facilities – CH ₄ (W.8, 2021) (W.20, 2020) Transparency	Estimate and report the amount of CH ₄ for energy recovery in CRF table 5.B rather than reporting it as “NO”.	Resolved. The Party reported data on energy recovered for energy purposes in CRF table 5.B. During the review, the Party clarified that additional information on the recovered amount will be included in its next NIR. It will also include the relevant information in the table showing AD and emissions (NIR table 7.3.6, p.558).
W.11	5.B.2 Anaerobic digestion at biogas facilities – CH ₄ (W.16, 2021) (W.18, 2020) Convention reporting adherence	Ensure that the correct EF value is given in the equation used to estimate emissions from anaerobic digestion of organic waste at biogas facilities.	Resolved. Since its 2021 submission, Denmark has integrated the results of a plant measurement programme into its inventory regarding the percentage of CH ₄ released as emissions from anaerobic digestion of organic waste at biogas facilities (NIR section 7.3.2, pp.558–559, including table 7.3.6). As such, plant-specific EFs are now used where available, with the previous (default) value of 4.2 per cent retained for facilities (and associated AD) not included in the measurement programme. This approach results in a weighted average EF of 2.9 per cent for 2020. For the years up to and including 2016, the previous EF of 4.2 per cent is retained (with the typographical error noted in the previous reviews corrected in the NIR (p.558)). For interim years, this value has been interpolated. The ERT concludes that both the approach used and the presentation of the derived EFs in relation to the percentage of CH ₄ emitted from anaerobic digestion of organic waste at biogas facilities are appropriate.
W.12	5.C.1 Waste incineration – CH ₄ and N ₂ O (W.18, 2021) (W.21, 2020) Transparency	Include in the NIR information on how the CH ₄ and N ₂ O EFs for human and animal cremation were derived, including whether the contribution of any emissions from the fuels used was considered when deriving the EFs.	Resolved. The Party reported in its NIR (sections 7.4.1, p.562 and 7.4.2, p.564) information on how the EFs for human and animal cremation were derived.
W.13	5.C.1 Waste incineration – C ₂ O, CH ₄ and N ₂ O (W.19, 2021) (W.22, 2020) Transparency	Report the AD on the amount of waste incinerated for human cremation as “NE” instead of “NO” in CRF table 5.C and provide a corresponding explanation in a documentation box.	Resolved. The Party reported the AD on the amount of waste incinerated for human cremation as “NE” in CRF table 5.C instead of “NO”. AD (in alternative units) are provided in the NIR (section 7.4.1, p.561).
W.14	5.D.1 Domestic wastewater – CH ₄ (W.22, 2021) (W.23, 2020) Transparency	Enhance the transparency of the reporting by correcting the units of measurement for the EF (EF _{st}) presented in NIR equation 7.5.6 (kg CH ₄ /kg COD instead of kg CH ₄ /kg DOC).	Resolved. The Party reported in its NIR (section 7.5.2, equation 7.5.6, p.569) the correct units of measurement for the EF (EF _{st}) as kg CH ₄ /kg COD, instead of kg CH ₄ /kg DOC as was reported in the 2021 NIR submission.
W.15	5.E Other (waste) – CH ₄ (W.26, 2021) (W.28, 2020) Comparability	Report N ₂ O emissions from accidental fires as “NE” instead of “NA” in CRF tables 5 and summary 2, and correct the reporting in the NIR accordingly.	Resolved. The Party reported N ₂ O emissions from accidental fires as “NE” instead of “NA” in CRF tables 5 and summary 2. This is correctly reflected in the NIR (section 7.6, p.574) and this issue is considered resolved.

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KP-LULUCF			
KL.1	General (KP-LULUCF) – General (KL.1, 2021) (KL.9, 2020) Transparency	Correct the error in the table showing the relationship between the LULUCF categories and the KP-LULUCF by removing the references comparing CM and GM against forest land remaining forest land.	Not resolved. The Party did not correct the information in NIR table 10.5 (p.641). During the review, the Party clarified that this issue will be corrected in the next submission if reporting on KP-LULUCF is required in the next NIR.
KL.2	General (KP-LULUCF) – CO ₂ (KL.2, 2021) (KL.10, 2020) Transparency	Include the method and country-specific carbon stock values used to estimate carbon stock changes in litter in areas subject to AR and FM and separately provide the values used for broadleaves and conifers in the NIR and report them as separate subcategories in the corresponding CRF tables.	<p>Not resolved. The Party did not report the required information in its NIR and did not provide the carbon stock changes under separate forest subcategories, such as broadleaved forest and coniferous forest, in the CRF tables for AR and FM.</p> <p>During the review, the Party clarified that the key data for estimating the carbon stock changes in litter are based on measurements of depth of litter along with information on forest types. Each of these have national reference values. The Party also explained that the forest area often consists of mixed forest stands (broadleaves and conifers, mixed stands and changes between these over time), so splitting the reporting by forest type would result in little extra improvement of the overall assessment.</p> <p>The ERT considers that providing the recommended information is still applicable in the context of the LULUCF sector reporting (see also ID# L.5 above). The ERT also notes the view from the Party that splitting the reporting by forest type will not result in any significant recalculation in the category and therefore does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.</p>
KL.3	AR – CO ₂ (KL.3, 2021) (KL.2, 2020) (KL.6, 2018) Transparency	Include information to support the geographical location of boundaries of AR activities in the NIR, for both plantations and natural expansion of forests.	<p>Resolved. The Party provided additional information on forest area mapping in its NIR (section 6.2.3, p.477) and also explained during the review that a new technical document about the assessment of annual land use/land cover and changes since 2011 was published recently (Levin and Gyldenkærne, 2022). According to the information contained in the above-mentioned documents, since 2011 the AR areas in particular have been detected on an annual basis using detailed field-level data with information on the locations and afforestation types.</p> <p>The ERT considers that the area of AR activities can be identified using the Party's land use/land cover assessment system even though a single national boundary was applied for reporting in response to the requirement set out in paragraph 2(b) of annex II to decision 2/CMP.8.</p>
KL.4	Deforestation – CO ₂ (KL.5, 2021) (KL.4, 2020) (KL.7, 2018) Transparency	Amend the information to support the geographical location of boundaries of deforestation activities in the NIR, including information on how deforestation (i.e. land-use change) is distinguished from regeneration clear-cuts in forest land (i.e. temporary change in	Resolved. The Party described in its NIR (p.629) a procedure that showed how Denmark was able to distinguish temporarily unstocked areas and deforestation areas. A new technical document (Levin and Gyldenkærne, 2022) (see ID# KL.3 above) explains how deforestation areas are detected using satellite images and field-level vector data (land parcel information system), and also explains the procedure for eliminating the changes of land use/cover from forest land to other land uses that may not clear tree vegetation.

<i>ID#</i>	<i>Issue/problem classification^d</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
		land cover), and how different end uses of deforested land (e.g. settlements versus ‘nature restoration’) are distinguished from one another.	The ERT considers that deforestation activities have been detected to a basic level by geo-referenced data and the recent land use/land cover assessment system allows the Party to detect deforestation types. Issue ID# KL.3 above is also relevant in conjunction with the use of a single national boundary under reporting method 1.
KL.5	FM – CO ₂ (KL.8, 2021) Transparency	Include in the next NIR information on the approaches for using the NFI surveys or the forest census to estimate the carbon stock changes in pools of living biomass, litter and deadwood under forest land for FMRL and for the second commitment period and explain how the estimates are consistent.	Not resolved. The Party did not include relevant information in its NIR on carbon stock changes, but did provide information on the approach for using NFI surveys in the LULUCF sector of the NIR (see ID# L.4 above). The ERT notes the explanation from the Party that the new approach is consistent with the FMRL calculations as it does not cause any changes to the NFI samplings, such as sampling intervals or density, which referred to in ID# KL.8 of ARR 2021. During the review, the Party confirmed that the above-mentioned explanation was applicable for the 2022 submission and so the ERT considers that it is not necessary to cover this issue under a technical correction of FMRL. Therefore, this issue was not included in the list of potential problems and further questions raised.
KL.6	CM – CO ₂ (KL.6, 2021) (KL.11, 2020) Accuracy	Recalculate emissions from drained organic soils reported under CM by collecting AD on the area of drained organic soils for all reporting years in the second commitment period of the Kyoto Protocol.	Addressing. The Party had recalculated the area of drained organic soils under CM and GM in its 2021 submission and maintained the same reporting in its 2022 submission. This area estimation was made on the basis of data on the organic soils area for agriculture land use in 2010 and the Party explained during the review that the new research addresses this issue by collecting new data has not yet been completed; see further details on this issue in ID# L.9 above. The ERT notes that, as mentioned in the previous review report (ID# KL.11 of ARR 2020), this issue could lead to an overestimation of emissions during the second commitment period but has no impact on the base-year emissions calculation.
KL.7	CM – CO ₂ (KL.7, 2021) (KL.12, 2020) Accuracy	(a) Recalculate emissions from drained organic soils under CM by collecting additional data on soils with 6–12 per cent organic content. (b) Include in the NIR data and information on calculating the fixed EFs for drained organic soils with organic content greater than 12 per cent, referring to the study by Elsgaard et al. (2012), including soil type, percentage of organic content and assumptions made. (c) Demonstrate the applicability of those EFs for all reporting years in the second commitment period of the Kyoto Protocol.	Not resolved. The Party did not prepare an updated EF for this calculation and so the methodological assumption was used by the Party that the EF for drained organic soils with 6–12 per cent of organic content, is 50 per cent of the value of the EF developed for drained organic soils with greater than 12 per cent organic content. See further details about progress on this issue in ID# L.10 above, including the discussion which took place on the issue during the review. The ERT notes that the previous review made some suggestions for potential improvement to this calculation by gaining clarity on the applicability of country-specific EFs for drained organic soils. However, the current available information gives no indication that the country-specific EF for drained organic soils with 6–12 per cent of organic content clearly leads to an overestimation of emissions in the base year and an underestimation of emissions during the commitment period. For example, some Parties’ organic soil areas have decreased over time when they became mineral soils as a result of decreasing organic contents because of land management. Based on the methodology of soils in the 2006 IPCC Guidelines (vol. 4, chap. 2), drained mineral soil areas are no longer included in estimations of GHG emissions due to drainage; however,

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
			the many transitions from organic soils to mineral soils occur gradually and expected emissions associated with the decomposition of organic contents may gradually decrease as well. Therefore, this issue was not included in the list of potential problems and further questions raised.
KL.8	GM – CO ₂ (KL.9, 2021) Transparency	Include in the next NIR information on the EF used in the calculation for mineral soils for GM.	Not resolved. The Party did not report information on the methodologies it used for estimating carbon stock changes in mineral soils for GM lands converted to settlements during the second commitment period. During the review, the Party clarified that the methodology used was explained in its NIR under “change in carbon stock in soils” under land converted to settlements (section 6.6.10, p.638). See ID# L.19 above. The ERT considers that Denmark can resolve this issue by including the above explanation in NIR section 10.7.1 or 10.7.2.

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

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

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 2022 annual submission of Denmark, and had not been addressed by the Party by the time of publication of this review report.

Table 4

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

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed^a</i>
General	No issues identified.	
Energy		
E.3	Revise the incorrect reference to the source of the EFs for CH ₄ emissions from piston engine aircraft using aviation gasoline.	3 (2020–2022)
E.5	Ensure consistent reporting between CRF tables 1.D and 1.A(b) for jet kerosene consumed in international aviation bunkers (1990–2000) and for residual fuel oil consumed in international navigation bunkers.	4 (2018–2022)
IPPU		
I.2	Ensure consistent reporting of the emissions from laboratory freezers in the CRF tables across the time series and include in the NIR an explanation on the methodology used and allocation of the emissions for this subcategory.	4 (2018–2022)

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed^a</i>
Agriculture		
A.4	Include in the list of planned improvements in the NIR updated information on the verification of total Nex used in the inventory calculations, including the Party's plan to compare it with farmers' nitrogen accounts.	3 (2020–2022)
LULUCF		
L.1	Ensure consistent reporting of the area of organic soils between the NIR and CRF tables 4.A–4.F and improve QC procedures for consistent reporting of the areas of organic soils.	6 (2015–2022)
L.2	Include in the NIR synthesized information on the main parameters defining the characteristics used in the calculation of biomass and growing stocks.	4 (2018–2022)
L.5	Provide additional information on the area and volume of clear-cutting and the area subject to destructive disturbance, subject to the availability of data.	8 (2013–2022)
L.6	Explain the reasons for any significant inter-annual changes in deadwood/ha in the NIR and provide a justification as to why the changes do not result in underestimation of emissions or overestimation of removals.	3 (2020–2022)
L.9	Revise the areas of drained organic soils for 2011–2018 by collecting additional data on drainage status and recalculate the associated emissions.	3 (2020–2022)
L.10	(a) Recalculate emissions from drained organic soils under cropland by collecting additional data on soils with 6–12 per cent organic content. (b) Include in the NIR data and information from the study by Elsgaard et al. (2012) on calculating the EFs for drained organic soils with organic content greater than 12 per cent, including soil type, percentage of organic content and assumptions made, demonstrating their applicability for all the reporting years.	3 (2020–2022)
L.12	Include information in the NIR on how the EFs used for drained organic soils in grassland are representative of the drained soils in terms of management practices.	3 (2020–2022)
L.15	Include in the NIR information on the methodological approach and the EFs used for calculating off-site emissions from leaching of dissolved organic carbon in cropland, grassland and wetlands.	3 (2020–2022)
Waste		
W.5	Explain why CH ₄ and N ₂ O emissions from the biological treatment of waste (category 5.B) are not estimated and reported for Greenland in the NIR.	3 (2020–2022)
W.8	Estimate CH ₄ and N ₂ O emissions from waste composting for the Faroe Islands.	3 (2020–2022)
KP-LULUCF		
KL.1	Correct the error in the table showing the relationship between the LULUCF categories and the KP-LULUCF by removing the references comparing CM and GM against forest land remaining forest land.	3 (2020–2022)

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed^a</i>
KL.2	Include the method and country-specific carbon stock values used to estimate carbon stock changes in litter in areas subject to AR and FM and separately provide the values used for broadleaves and conifers in the NIR and report them as separate subcategories in the corresponding CRF tables.	3 (2020–2022)
KL.6	Recalculate emissions from drained organic soils reported under CM by collecting AD on the area of drained organic soils for all reporting years in the second commitment period of the Kyoto Protocol.	3 (2020–2022)

^a Reports on the reviews of the 2017 and 2019 annual submissions of Denmark have not yet been published. Therefore, 2017 and 2019 were not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

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

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

Table 5

Additional findings made during the individual review of the 2022 annual submission of Denmark

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?^a</i>
General		No general findings additional to those included in table 3 were made by the ERT during the review.	
Energy			
E.6	1.A.3.e.i Pipeline transport – all fuels – CO ₂ , CH ₄ and N ₂ O	The Party reported “NO” in CRF table 1.A(a)s3 for fuel consumption and GHG emissions from pipeline transport (1.A.3.e.ii). However, the ERT noted there is a pipeline system in Denmark to transport, transmit and distribute oil and natural gas, and there is no explanation in the NIR on why the emissions from pipeline transport are reported as “NO”. During the review, the Party clarified that all pipeline compressors on the natural gas grid are electric compressors for which no emissions occur. The Party further clarified that fuel transported to and used in the Danish gas treatment plant for gas heating and drying is included under subcategory 1.A.1.c.ii Oil and gas extraction, which is mentioned in section 3.2 of the NIR (p.106). The ERT recommends that the Party explain in the NIR why combustion emissions for pipeline transport are reported as “NO”.	Yes. Transparency
E.7	1.A.3.b Road transportation – liquid and gaseous fuels – CO ₂	The Party reported in its NIR (p.216) that the CO ₂ EF for CNG is country specific. However, the ERT noted that it is not listed in table 3.3.7 on the same page of the NIR, although all other fuels are listed, and the Party does not report a reference for the country-specific CO ₂ EF. The ERT also noted that CRF table 1.A(a)s3 reports the CO ₂ EF for gaseous fuel for road transportation as 56.8 t/TJ (NCV based), different from but in line with the default data in the 2006 IPCC Guidelines (vol. 2, chap. 3, table 3.2.1, p.3.16) (56.1 t/TJ). Meanwhile, the Party reported in its NIR (p.216) that the CO ₂	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
E.8	1.B.2.b Natural gas – natural gas – CO ₂ and CH ₄	<p>EF for diesel (74.1 kg/GJ) is from the 2006 IPCC Guidelines, although CO₂ emissions from diesel combustion in road transportation is a key category for the whole time period so the country-specific EF should be used.</p> <p>During the review, the Party provided additional information. The CO₂ EF for CNG (56.8 t/TJ) is estimated by the Danish gas transmission company, Energinet.dk, on the basis of gas analysis data for 2013 (Energinet, 2022), and the Party stated that the reference will be included in the next NIR. Also, the country-specific EF for diesel used in road transportation is not available from Danish refineries; instead, the Party used the diesel EF for stationary combustion, which is from the European Union Emissions Trading System. The average CO₂ EF of diesel burned in stationary sources for 2008–2016 is 74.1 kg/GJ, which is identical to the IPCC default value as per the 2006 IPCC Guidelines (vol. 2, chap. 3, table 3.2.1, p.3.16).</p> <p>The ERT recommends that the Party include in its NIR the CO₂ EF data for CNG as well as the corresponding reference used for generating the country-specific EF and revise the corresponding text describing the source of the CO₂ EF for diesel used in road transportation. The ERT also encourages the Party to provide justification as to why the CO₂ EF for diesel used in stationary combustion is suitable for mobile sources.</p> <p>The Party reported “NA” in CRF table 1.B.2 for emissions for category 1.B.2.b Natural gas processing, although gas production occurs in the country and is reported for the whole time series. The ERT also noted that there is no corresponding explanation in the NIR.</p> <p>During the review, the Party explained that the gas produced in the North Sea and transported by pipeline to the Nybro treatment plant is dry and has a low hydrogen sulfide content. That means it does not need specific processing, which is usually the source of fugitive emissions, before going into the transmission network. The Party also provided a reference (in Danish) from 2009 to support this explanation (https://mst.dk/media/mst/Attachments/Rev), and further clarified that the situation is applicable to 1990–2020.</p> <p>The ERT recommends that the Party include in its next submission information explaining why fugitive emissions from gas processing are reported as “NA”.</p>	Yes. Transparency
IPPU			
I.6	2.A.2 Lime production – CO ₂	<p>The Party reported in its NIR (section 4.2.4, pp.325–327) the methodology used for estimating emissions from lime production. The Party used an EF based on carbonate input calculated from historical measurements at Faxø Kalk, a large Danish lime production plant, and national lime production AD. The Party further reported that the IEF for lime production exhibits year-on-year variation between 0.788 and 0.793 t/t. However, the ERT noted that the IEF for 2020 is 0.780 t/t which is the lowest value reported in the time series. There is no explanation for this fluctuation. The ERT further noted that the explanation of the emission estimation methodology provided in the NIR was not transparent because it was unclear how a plant-specific carbonate input EF was being applied to national production data, and why the IEF changed even though an EF based on historical data was used.</p> <p>During the review, the Party clarified that it used two separate approaches for reporting these emissions. Emissions from Faxø Kalk for 2008–2020 were estimated using a tier 3 methodology based on an EF (kg CO₂/kg lime produced) updated annually on the basis of an analysis of carbonate inputs at Faxø Kalk. Emissions from all other lime producers in Denmark for 2008–2020, as well as emissions for 1990–2007, were estimated using an EF based on the historical average Faxø Kalk EF for 2008–2012, on the assumption that the historical EFs are an appropriate representation of carbonate inputs into Denmark’s lime production industry. This explained the variation in IEFs, because the Faxø Kalk</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>EF is measured annually and varies from year to year. The ERT also noted the decreasing share of the lime from Faxe Kalk across the time series.</p> <p>The ERT recommends that the Party improve the transparency of its emission estimation methodology for lime production by clearly outlining the methodology employed, including specifying which EFs are applied to particular lime producers over the time series, specifying how the EFs were derived and how a carbonate input EF is adapted to apply to lime production AD, and clearly document in its NIR the assumptions made when estimating emissions for this category.</p>	
	Agriculture	No findings for the agriculture sector additional to those included in table 3 were made by the ERT during the review.	
	LULUCF		
L.17	4.D.2 Land converted to wetlands – CO ₂	<p>The Party reported a small area of land converted from forest land to wetlands (mostly less than 5 ha annually except for 2005–2011, when it reported 108 ha annually). The Party explained in its NIR (p.513) that carbon stock changes in dead organic matter for forest land converted to wetlands were assumed as clearing all dead organic matter with instant oxidation. However, “NA” was reported in the dead organic matter cell in CRF table 4.D for forest land converted to flooded land and forest land converted to other wetlands, although losses in living biomass were estimated.</p> <p>During the review, the Party clarified that the explanation in the NIR was wrong, and the carbon losses were not estimated for forest land converted to wetlands, because it assumed dead organic matter remained on land.</p> <p>The ERT notes that the 2006 IPCC Guidelines does not provide methodological guidance about treatment of dead organic matter for land converted to flooded land (vol. 4, chap. 7, section 7.3.2.1), and it is appropriate to use “NE” when an activity occurs but the 2006 IPCC Guidelines do not provide methodologies to estimate the emissions/removals, based on footnote 6 of annex I to decision 24/CP.19.</p> <p>The ERT notes that the Wetlands Supplement does not provide methodological guidance on the above-mentioned land-use change; rather, it suggests that carbon losses of dead organic matter resulting from rewetting activities for inland wetlands mineral soils should be estimated using a tier 1 method (Wetlands Supplement, sections 5.2.1.1 and 5.3.1.1), which may be considered applicable to land converted to partly water-covered wetlands in Denmark on a voluntary basis.</p> <p>The ERT recommends that the Party provide in its NIR a correct explanation of the methodology applied for estimating carbon stock changes in dead organic matter for forest land converted to wetlands and ensure consistency between the NIR and CRF table 4.D.</p>	Yes. Transparency
L.18	4.E.2 Land converted to settlements – CO ₂	<p>The Party reported in its NIR (p.516) that for estimating carbon stock change in living biomass for land converted to settlements it used “a standard default gain value” of 2,200 kg dm/ha for above-ground biomass and 2,200 kg dm/ha for below-ground biomass. However, the NIR does not explain how these values were developed taking into account the multiple options and combinations of land cover status in settlements.</p> <p>During the review, the Party clarified that the above-mentioned parameters were developed considering the proportion of greenspace in settlements under three classes (low greenspace proportion, medium greenspace proportion and high greenspace proportion) and the average amount of biomass carbon content in each class. The biomass carbon contents were developed based on some country-specific assumptions taking into account some default parameters in the 2006 IPCC Guidelines (vol. 4): (1) the above-ground biomass amount of roadside and garden is assumed to be about half of</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
L.19	4.G HWP – CO ₂	<p>the default peak biomass value for annual crop (table 5.9), and (2) the root-to-shoot ratios are assumed to be about 1 when considering the range of default values for trees (about 0.2–0.4, table 4.4) and grasses (2.8 to 4.0, table 6.1).</p> <p>The ERT recommends that the Party include in its NIR information on how it established the parameters used for estimating above- and below-ground biomass stock for land converted to settlements.</p> <p>In its estimation of emissions from HWP for reporting under the Convention, the Party excluded HWP originating from deforestation on the basis that they are accounted as instantaneous oxidation (NIR, p.520), in order to be consistent with its KP-LULUCF accounting, which is calculated on the basis of the HWP rules and modality in line with decision 2/CMP.7 and the <i>2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol</i>.</p> <p>The ERT noted that at the 19th Lead Reviewer Meeting held in March 2022, the lead reviewers discussed how to treat this type of reporting and concluded that ERTs should check whether the reporting of HWP-related emissions under the Convention is in line with the methodologies in the 2006 IPCC Guidelines and the UNFCCC Annex I inventory reporting guidelines with respect to accuracy and comparability. Based on paragraph 18(d)(ii) of the conclusions and recommendations from the 19th meeting of lead reviewers (https://unfccc.int/sites/default/files/resource/Nineteenth%20meeting%20of%20Inventory%20Lead%20Reviewers.pdf), when the HWP contribution is reported as zero, Parties should clearly demonstrate that the annual HWP carbon stock changes in the HWP pool are “insignificant” (the term “insignificant” in this context means that the annual HWP carbon stock change, expressed in units of CO₂, is less than the size of any key category).</p> <p>During the review, the Party clarified that annual emissions from HWP originating from deforestation range from 1.6 to 61.4 kt CO₂ for the whole time series. The ERT notes that the quantities did exceed the minimum key category of the Party (133 kt CO₂eq) based on tier 1 level assessment including LULUCF in 2020 (NIR, annex 1, table A1-7, p.815).</p> <p>The ERT recommends that the Party provide the information on the impact of annual HWP-related emissions originating from deforestation if these emissions remain to be reported based on instantaneous oxidation in its NIR. The ERT notes that the priority of maintaining consistency between the KP-LULUCF reporting and the LULUCF reporting will not be necessary in future submissions.</p>	Yes. Transparency
Waste		No findings for the waste sector additional to those included in table 3 were made by the ERT during the review.	
KP-LULUCF			
KL.9	AR – CO ₂	<p>The Party applied the 30-year land transition period for dividing remaining land and converted land in the LULUCF sector. Thus, the areas of AR land and land converted to forest land for 2019 both contained afforestation implemented in the past 30 years (i.e. from 1990 to 2019). This means that the carbon stock changes around 2019 for AR and land converted to forest land could be similar. However, the Party reported litter carbon stock changes for 2020 as 0.98 kt C for AR (CRF table 4(KP-I)A.1) and 33.68 kt C for land converted to forest land (CRF table 4.A).</p> <p>During the review, the Party clarified that the value of AR reported for 2020 is wrong and the correct value is 27.58 kt C. The ERT notes that this has resulted in an underestimation of removals by about 97.53 kt CO₂ from the activity AR, but this has not caused an overestimation of accounted removals from activities under Article 3, paragraph 3, of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.</p>	Yes. Accuracy

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
KL.10	FM – CH ₄ and N ₂ O	<p>The Party reported the total technical correction of FMRL as –82.62 kt CO₂ eq in CRF table 4(KP-I)B.1.1.1, which was based on the revision made in 2015. In the 2021 and 2022 submissions, CH₄ and N₂O emissions from forest organic soils were reported in CRF table 4(KP-II)2 with different numbers compared with those reported in previous submissions (for 2016–2020). For example, in the 2022 submission emissions for 2013–2018 were reported as 0.1 kt CH₄ and 0.114–0.115 kt N₂O, but were reported as 1.12–1.13 kt CH₄ and 0.057–0.058 kt N₂O in the 2020 submission. However, those recalculations were not reflected in the technical correction to the FMRL.</p> <p>During the review, the Party clarified that CH₄ and N₂O emissions from forest organic soils were wrongly reported under FM in the 2021 and 2022 submissions (in CRF table 4(KP-II)2). For CH₄, the technical correction to the FMRL included CH₄ emissions from both drainage and rewetting of forest organic soils, while in the 2021 and 2022 submissions there was an error in that the GHG inventory only included emissions from drained organic soils and did not include emissions from rewetted organic soils. The Party clarified that the missing CH₄ emission estimates for rewetted organic soils in forest would be 1.45 kt CH₄ (36.25 kt CO₂ eq) for 2020, so total CH₄ emissions from forest organic soils would be 1.55 kt CH₄ (38.75 kt CO₂ eq) for 2020, which is comparable with the 28 kt CO₂ eq per year indicated in the technical correction to the FMRL. For N₂O, the technical correction to the FMRL included N₂O emissions from drained forest organic soils only and did not include N₂O emissions from rewetted organic soils. However, in the 2021 and 2022 submissions, N₂O emissions from drained organic soils were reported under both drained and rewetted organic soils. The impact of double counting the N₂O emissions for 2020 was 0.057 kt N₂O (16.86 kt CO₂ eq), therefore the GHG emissions from forest organic soils under FM for 2020, reported as 19.39 kt CO₂ eq (i.e. 36.25 – 16.86 kt CO₂ eq), was an underestimation.</p> <p>The ERT considers that the change of emissions reported in the 2021 and 2022 submissions was caused by an error of estimation and does not need to be covered in a technical correction to the FMRL. However, this error caused overestimation of net removals from FM in the reported numbers in the CRF accounting table. On the basis of the Party’s preliminary revised estimate for 2020, the impact of this overestimation of net removals amounts to 155 kt CO₂ eq for the years of the second commitment period (calculated as eight times the overestimated value mentioned above, considering that the forest organic soils area was reported as almost stable for 2013–2020). The net removals from FM for the entire second commitment period were reported as –23,771.31 kt CO₂ eq, so the expected corrected net removals from FM should be about –23,616 kt CO₂ eq. As both the originally reported net FM removals and the expected corrected net FM removals clearly exceed the FM cap of Denmark (i.e. –19,822.77 kt CO₂ eq), the ERT confirms that this overestimation of net removals does not have an impact on the accounting quantity of FM that is limited by the FM cap and therefore this issue was not included in the list of potential problems and further questions raised.</p>	Yes. Accuracy
KL.11	CM and GM – CO ₂	<p>The Party did not report in its NIR information on the year of onset of an activity for CM and GM; instead it reported “NA” (sections 10.6.8, p.638 and 10.7.7, p.639). The ERT noted that, according to decision 2/CMP.7, annex, paragraph 23, emissions and removals from KP-LULUCF can be accounted only for the years from the onset of the activity or from the beginning of the commitment period, whichever comes later. Thus, Parties are requested to report on this situation, in line with decision 2/CMP.8, annex II, paragraph 2(d).</p> <p>The ERT noted that small amounts of land conversion occurred: from wetlands to cropland from 2013 to 2017 (in the range of 1–202 ha), and from wetlands to grassland in 2013, 2015 and 2016 (in the range of 1–7 ha). The ERT considers that, because these converted areas were treated as CM or GM areas according to the definition, the reporting of the information on the year of the onset of an activity for CM and GM in the NIR as “NA” is not appropriate.</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>During the review, the Party confirmed that emissions/removals from lands not subject to any activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (e.g. wetlands) that were converted to lands subject to any such activities (i.e. cropland or grassland) during the second commitment period were only included in the Party's reporting under the Kyoto Protocol and accounted from the year of the conversion. The ERT confirmed that this inclusion is correctly implemented, on the basis of the information on CM and GM areas according to the land-use matrices in table 3E.18 of the NIR (p.893) and CRF table NIR-2.</p> <p>The ERT considers that the lack of transparency in the NIR does not impact the Party's ability to fulfil its commitments for the second commitment period and therefore this issue was not included in the list of potential problems and further questions raised.</p>	

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

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments for the 2022 annual submission of Denmark.

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

12. Table I.5 presents the accounting quantities for KP-LULUCF reported by Denmark and the final values agreed by the ERT. The final quantities of units to be issued are presented in table I.6.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2022 annual submission.

Annex I

Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Denmark in its 2022 annual submission

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

Table I.1
Total greenhouse gas emissions and removals for Denmark, base year–2020
 (kt CO₂ eq)

	<i>Total GHG emissions excluding indirect CO₂ emissions</i>		<i>Total GHG emissions and removals including indirect CO₂ emissions^a</i>		<i>Land-use change (Article 3.7 bis as contained in the Doha Amendment)^b</i>	<i>KP-LULUCF (Article 3.3 of the Kyoto Protocol)^c</i>	<i>KP-LULUCF (Article 3.4 of the Kyoto Protocol)</i>	
	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>			<i>CM, GM, RV, WDR^d</i>	<i>FM</i>
FMRL								409.00
Base year ^e	77 195.14	70 321.53	78 314.98	71 441.37	8.807		7 915.84	
1990	76 875.29	70 001.69	77 995.13	71 121.52				
1995	83 367.71	77 966.72	84 425.26	79 024.28				
2000	75 760.06	70 625.05	76 598.44	71 463.43				
2010	65 785.50	63 327.96	66 274.70	63 817.15				
2011	60 176.20	58 174.00	60 597.01	58 594.82				
2012	55 104.96	53 637.15	55 485.82	54 018.01				
2013	56 506.13	55 401.58	56 863.29	55 758.73		–39.76	4 233.01	–3 377.03
2014	53 041.48	51 225.10	53 368.00	51 551.62		–50.53	5 514.69	–3 863.94
2015	49 420.19	48 627.96	49 733.03	48 940.80		390.56	4 442.90	–3 868.09
2016	52 536.53	50 650.42	52 837.43	50 951.31		285.07	4 727.92	–3 018.92
2017	50 163.13	48 342.74	50 458.23	48 637.85		–298.40	4 267.13	–2 390.93
2018	51 878.71	48 140.97	52 159.76	48 422.03		–69.19	5 488.45	–1 707.32
2019	47 129.77	44 236.73	47 396.71	44 503.68		–396.47	5 146.36	–1 988.59
2020	44 616.13	41 509.00	44 852.87	41 745.75		239.69	5 011.36	–945.42

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

^a The Party reported indirect CO₂ emissions in CRF table 6.

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

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

^d In accordance with decision 3/CMP.11, para. 8, the Party previously reported that it would report emissions from CM and GM. The base year for those activities is 1990.

^e “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O and 1995 for HFCs, PFCs, SF₆ and NF₃. The base year for CM and GM under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

Table I.2

Greenhouse gas emissions and removals by gas for Denmark, excluding land use, land-use change and forestry, 1990–2020

(kt CO₂ eq)

	CO ₂ ^a	CH ₄	N ₂ O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF ₆	NF ₃
1990	54 704.69	7 906.27	8 468.15	NA, NO	NA, NO	NA, NO	42.41	NA, NO
1995	62 671.93	8 314.41	7 675.69	257.86	0.63	NA, NO	103.76	NA, NO
2000	55 144.50	8 182.15	7 291.19	766.19	22.57	NA, NO	56.84	NA, NO
2010	49 692.87	7 641.65	5 598.02	837.43	10.22	NA, NO	36.97	NA, NO
2011	44 668.93	7 476.32	5 607.09	757.31	7.71	NA, NO	77.46	NA, NO
2012	40 251.79	7 368.19	5 508.60	756.48	3.47	NA, NO	129.47	NA, NO
2013	42 130.14	7 277.80	5 508.26	688.93	3.70	NA, NO	149.90	NA, NO
2014	37 904.26	7 236.86	5 628.62	625.21	2.65	NA, NO	154.00	NA, NO
2015	35 540.82	7 163.61	5 647.89	467.05	0.02	NA, NO	121.40	NA, NO
2016	37 334.16	7 226.41	5 763.25	523.32	0.01	NA, NO	104.17	NA, NO
2017	35 075.37	7 224.41	5 837.25	424.26	1.09	NA, NO	75.45	NA, NO
2018	35 006.03	7 267.54	5 580.33	494.93	0.01	NA, NO	73.18	NA, NO
2019	31 222.39	7 101.28	5 771.86	335.79	1.11	NA, NO	71.24	NA, NO
2020	28 518.78	7 117.49	5 729.38	334.56	0.01	NA, NO	45.54	NA, NO
Percentage change 1990–2020	-47.9	-10.0	-32.3	NA	NA	NA	7.4	NA

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

^a Including indirect CO₂ emissions as reported in CRF table 6.

Table I.3

Greenhouse gas emissions and removals by sector for Denmark, 1990–2020

(kt CO₂ eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
1990	53 526.21	2 361.94	13 337.67	6 873.61	1 895.70	NO
1995	61 662.88	2 914.06	12 718.66	5 400.98	1 728.67	NO
2000	54 408.68	3 717.04	11 870.80	5 135.01	1 466.90	NO
2010	49 642.98	1 914.15	11 069.18	2 457.54	1 190.84	NO

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
2011	44 287.52	2 056.34	11 059.75	2 002.19	1 191.20	NO
2012	39 721.00	2 092.37	11 065.45	1 467.81	1 139.18	NO
2013	41 513.06	2 055.65	11 062.31	1 104.56	1 127.71	NO
2014	37 205.61	2 010.96	11 204.62	1 816.38	1 130.43	NO
2015	34 883.41	1 835.92	11 091.89	792.23	1 129.58	NO
2016	36 489.68	2 044.92	11 265.19	1 886.12	1 151.53	NO
2017	34 104.40	2 029.01	11 338.58	1 820.38	1 165.86	NO
2018	34 046.40	2 048.76	11 154.31	3 737.74	1 172.56	NO
2019	30 318.70	1 842.28	11 182.53	2 893.04	1 160.17	NO
2020	27 342.27	1 926.13	11 267.64	3 107.12	1 209.71	NO
Percentage change 1990–2020	-48.9	-18.5	-15.5	-54.8	-36.2	NA

Notes: (1) Denmark did not report emissions or removals for the sector other (sector 6); the corresponding cells in the CRF tables were left blank; (2) totals include indirect CO₂ 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–2020, for Denmark
(kt CO₂ eq)

	<i>Article 3.7 bis as contained in the Doha Amendment^a</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				409.00				
Technical correction				-82.62				
Base year	8.807				5 544.77	2 371.07	NA	NA
2013		-110.00	70.23	-3 377.03	2 422.07	1 810.94	NA	NA
2014		-221.21	170.68	-3 863.94	3 560.94	1 953.75	NA	NA
2015		-287.32	677.88	-3 868.09	2 450.75	1 992.16	NA	NA
2016		-278.23	563.31	-3 018.92	2 610.04	2 117.88	NA	NA
2017		-343.14	44.74	-2 390.93	2 208.34	2 058.79	NA	NA
2018		-484.76	415.57	-1 707.32	3 302.01	2 186.44	NA	NA
2019		-610.36	213.89	-1 988.59	2 994.15	2 152.20	NA	NA
2020		-274.99	514.67	-945.42	2 756.71	2 254.65	NA	NA
Percentage change base year–2020					-50.3	-4.9	NA	NA

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

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

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

Table I.5
Accounting quantities for activities under Article 3, paragraph 3, and forest management and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol for Denmark

(kt CO₂ eq)

GHG source/sink activity	Base year ^b	Net emissions/removals									Accounting parameters	Accounting quantities ^a
		2013	2014	2015	2016	2017	2018	2019	2020	Total ^f		
A.1. AR		-109.997	-221.211	-287.324	-278.234	-343.141	-484.758	-610.359	-274.987	-2 610.011		-2 610.010
Excluded emissions from natural disturbances ^d		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		-	-	-	-	-	-	-	-	-		-
A.2. Deforestation		70.234	170.682	677.880	563.306	44.741	415.572	213.888	514.673	2 670.975		2 670.975
B.1. FM										-21 160.245		-23 771.307
Net emissions/removals		-3 377.031	-3 863.941	-3 868.091	-3 018.924	-2 390.927	-1 707.319	-1 988.590	-945.422	-21 160.245		
Excluded emissions from natural disturbances ^d		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		-	-	-	-	-	-	-	-	-		-
Any debits from newly established forest		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
FMRL ^e											409.000	
Technical corrections to FMRL											-82.617	
FM cap											19 822.068	-19 822.068
B.2. CM (if elected)	5 544.768	2 422.066	3 560.941	2 450.746	2 610.041	2 208.345	3 302.006	2 994.153	2 756.710	22 305.010		-22 053.136
B.3. GM (if elected)	2 371.071	1 810.941	1 953.747	1 992.157	2 117.880	2 058.787	2 186.444	2 152.203	2 254.654	16 526.813		-2 441.753
B.4. RV (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

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

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

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

^d The Party indicated that it does not intend to exclude emissions from natural disturbances.

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

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

Table I.6

Key data for Denmark under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 annual submission

<i>Parameter</i>	<i>Data</i>
Periodicity of accounting	(a) AR: annual accounting (b) Deforestation: annual accounting (c) FM: annual accounting (d) CM: annual accounting (e) GM: annual accounting (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	CM and GM
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF and including indirect CO ₂ emissions	2 477.758 kt CO ₂ eq (19 822.068 kt CO ₂ eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	Issue 99 555 RMUs
2. Deforestation	Issue 399 385 RMUs
3. FM	Neither cancel nor issue any units
4. CM	Issue 3 511 487 RMUs
5. GM	Issue 116 422 RMUs

Note: Values in this table reflect the difference in the accounting quantities for activities under Article 3, para. 3, and FM and any elected activities under Article 3, para. 4, of the Kyoto Protocol as reported in table I.5 between this report and the previously published review report for the Party (FCCC/ARR/2021/DNK).

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.8 include the information to be included in the compilation and accounting database for Denmark. 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 2020, including on the commitment period reserve, for Denmark (t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
CPR	242 440 102	–	–	242 440 102
Annex A emissions				
CO ₂	28 518 776	–	–	28 518 776
CH ₄	7 117 485	–	–	7 117 485
N ₂ O	5 729 378	–	–	5 729 378
HFCs	334 564	–	–	334 564
PFCs	7	–	–	7
Unspecified mix of HFCs and PFCs	NA, NO	–	–	NA, NO
SF ₆	45 538	–	–	45 538
NF ₃	NA, NO	–	–	NA, NO
Total Annex A sources^a	41 745 749	–	–	41 745 749
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–274 987	–	–	–274 987
Deforestation	514 673	–	–	514 673
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–945 422	–	–	–945 422
CM	2 756 710	–	–	2 756 710
CM for the base year	5 544 768	–	–	5 544 768
GM	2 254 654	–	–	2 254 654
GM for the base year	2 371 071	–	–	2 371 071

^a The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.2

Information to be included in the compilation and accounting database for 2019 for Denmark (t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	31 222 389	–	–	31 222 389
CH ₄	7 101 283	–	–	7 101 283
N ₂ O	5 771 860	–	–	5 771 860
HFCs	335 795	–	–	335 795
PFCs	1 108	–	–	1 108
Unspecified mix of HFCs and PFCs	NA, NO	–	–	NA, NO
SF ₆	71 241	–	–	71 241
NF ₃	NA, NO	–	–	NA, NO
Total Annex A sources^a	44 503 676	–	–	44 503 676
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
AR	-610 359	-	-	-610 359
Deforestation	213 888	-	-	213 888
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-1 988 590	-	-	-1 988 590
CM	2 994 153	-	-	2 994 153
CM for the base year	5 544 768	-	-	5 544 768
GM	2 152 203	-	-	2 152 203
GM for the base year	2 371 071	-	-	2 371 071

^a The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.3

Information to be included in the compilation and accounting database for 2018 for Denmark(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	35 006 028	-	-	35 006 028
CH ₄	7 267 545	-	-	7 267 545
N ₂ O	5 580 330	-	-	5 580 330
HFCs	494 933	-	-	494 933
PFCs	7	-	-	7
Unspecified mix of HFCs and PFCs	NA, NO	-	-	NA, NO
SF ₆	73 184	-	-	73 184
NF ₃	NA, NO	-	-	NA, NO
Total Annex A sources^a	48 422 027	-	-	48 422 027
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-484 758	-	-	-484 758
Deforestation	415 572	-	-	415 572
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-1 707 319	-	-	-1 707 319
CM	3 302 006	-	-	3 302 006
CM for the base year	5 544 768	-	-	5 544 768
GM	2 186 444	-	-	2 186 444
GM for the base year	2 371 071	-	-	2 371 071

^a The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.4

Information to be included in the compilation and accounting database for 2017 for Denmark(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	35 075 373	-	-	35 075 373
CH ₄	7 224 410	-	-	7 224 410
N ₂ O	5 837 254	-	-	5 837 254
HFCs	424 262	-	-	424 262
PFCs	1 094	-	-	1 094
Unspecified mix of HFCs and PFCs	NA, NO	-	-	NA, NO
SF ₆	75 454	-	-	75 454
NF ₃	NA, NO	-	-	NA, NO
Total Annex A sources^a	48 637 847	-	-	48 637 847
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
AR	-343 141	-	-	-343 141
Deforestation	44 741	-	-	44 741
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-2 390 927	-	-	-2 390 927
CM	2 208 345	-	-	2 208 345
CM for the base year	5 544 768	-	-	5 544 768
GM	2 058 787	-	-	2 058 787
GM for the base year	2 371 071	-	-	2 371 071

^a The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.5

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

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	37 334 155	-	-	37 334 155
CH ₄	7 226 413	-	-	7 226 413
N ₂ O	5 763 246	-	-	5 763 246
HFCs	523 319	-	-	523 319
PFCs	8	-	-	8
Unspecified mix of HFCs and PFCs	NA, NO	-	-	NA, NO
SF ₆	104 172	-	-	104 172
NF ₃	NA, NO	-	-	NA, NO
Total Annex A sources^a	50 951 313	-	-	50 951 313
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-278 234	-	-	-278 234
Deforestation	563 306	-	-	563 306
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-3 018 924	-	-	-3 018 924
CM	2 610 041	-	-	2 610 041
CM for the base year	5 544 768	-	-	5 544 768
GM	2 117 880	-	-	2 117 880
GM for the base year	2 371 071	-	-	2 371 071

^a The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.6

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

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	35 540 824	-	-	35 540 824
CH ₄	7 163 615	-	-	7 163 615
N ₂ O	5 647 893	-	-	5 647 893
HFCs	467 053	-	-	467 053
PFCs	18	-	-	18
Unspecified mix of HFCs and PFCs	NA, NO	-	-	NA, NO
SF ₆	121 398	-	-	121 398
NF ₃	NA, NO	-	-	NA, NO
Total Annex A sources^a	48 940 801	-	-	48 940 801
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
AR	-287 324	-	-	-287 324
Deforestation	677 880	-	-	677 880
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-3 868 091	-	-	-3 868 091
CM	2 450 746	-	-	2 450 746
CM for the base year	5 544 768	-	-	5 544 768
GM	1 992 157	-	-	1 992 157
GM for the base year	2 371 071	-	-	2 371 071

^a The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.7

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

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	37 904 261	-	-	37 904 261
CH ₄	7 236 865	-	-	7 236 865
N ₂ O	5 628 621	-	-	5 628 621
HFCs	625 212	-	-	625 212
PFCs	2 653	-	-	2 653
Unspecified mix of HFCs and PFCs	NA, NO	-	-	NA, NO
SF ₆	154 005	-	-	154 005
NF ₃	NA, NO	-	-	NA, NO
Total Annex A sources^a	51 551 616	-	-	51 551 616
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-221 211	-	-	-221 211
Deforestation	170 682	-	-	170 682
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-3 863 941	-	-	-3 863 941
CM	3 560 941	-	-	3 560 941
CM for the base year	5 544 768	-	-	5 544 768
GM	1 953 747	-	-	1 953 747
GM for the base year	2 371 071	-	-	2 371 071

^a The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.8

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

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	42 130 138	-	-	42 130 138
CH ₄	7 277 803	-	-	7 277 803
N ₂ O	5 508 260	-	-	5 508 260
HFCs	688 933	-	-	688 933
PFCs	3 695	-	-	3 695
Unspecified mix of HFCs and PFCs	NA, NO	-	-	NA, NO
SF ₆	149 900	-	-	149 900
NF ₃	NA, NO	-	-	NA, NO
Total Annex A sources^a	55 758 730	-	-	55 758 730
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
AR	-109 997	-	-	-109 997
Deforestation	70 234	-	-	70 234
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-3 377 031	-	-	-3 377 031
CM	2 422 066	-	-	2 422 066
CM for the base year	5 544 768	-	-	5 544 768
GM	1 810 941	-	-	1 810 941
GM for the base year	2 371 071	-	-	2 371 071

^a The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

No mandatory categories from the 2006 IPCC Guidelines were identified as missing.

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>.

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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, 2018, 2020 and 2021 annual submissions of Denmark, contained in documents FCCC/ARR/2013/DNK, FCCC/ARR/2014/DNK, FCCC/ARR/2015/DNK, FCCC/ARR/2016/DNK, FCCC/ARR/2018/DNK, FCCC/ARR/2020/DNK and FCCC/ARR/2021/DNK respectively.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at <https://unfccc.int/documents/510888>.

Annual status report for Denmark for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_DNK.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Ole-Kenneth Nielsen (Aarhus University), including additional material on the methodology and assumptions used. The following references may not conform to UNFCCC editorial style as some have been reproduced as received:

EEA. 2019. *EMEP/EEA air pollutant emission inventory guidebook 2019: Technical guidance to prepare national emission inventories*. Luxembourg: Publications Office of the European Union. Available at <https://www.eea.europa.eu/publications/emep-eea-guidebook-2019>.

Elsgaard L, Görres, C.M., Hoffman, C.C., Blicher-Mathiesen, G., Schelde K. & Petersen S.O. 2012: Net ecosystem exchange of CO₂ and carbon balance for eight temperate organic soils under agricultural management. *Agriculture Ecosystems and Environment* 162:52-67.

Hellwing A.L.F, et al. (2016). *Prediction of the methane conversion factor (Y_m) for dairy cows on the basis of national farm data*. *Animal Production Science*, 2016, 56, 535–540.

Levin & Gyldenkerne 2022, *Estimating land use/land cover and changes in Denmark - Technical documentation for the assessment of annual land use/land cover and changes since 2011*. Technical Report from DCE – Danish Centre for Environment and Energy No. 227, 2022. Available at <https://dce2.au.dk/pub/TR227.pdf>.