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

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2021 annual submission of Iceland, 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 4 to 8 October 2021 remotely.

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

Contents

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
BOD	biochemical oxygen demand
C	carbon
CER	certified emission reduction
Cf_i	coefficient for calculating net energy for maintenance
CH_4	methane
CM	cropland management
CO	carbon monoxide
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
Convention reporting adherence	adherence to the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
COPERT	software tool for calculating road transport emissions
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
DC	degradable organic component
dm	dry matter
DOM	dead organic matter
EA	Environment Agency of Iceland
EEA	European Environment Agency
EF	emission factor
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
EU	European Union
F-gas	fluorinated gas
FM	forest management
FMRL	forest management reference level
$Frac_{GASF}$	fraction of synthetic nitrogen fertilizer applied to soils that volatilizes as ammonia and nitrogen oxides
$Frac_{GASM}$	fraction of applied organic nitrogen fertilizer materials and of urine and dung nitrogen deposited by grazing animals that volatilizes as ammonia and nitrogen oxides
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEA	International Energy Agency

IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*
LULUCF	land use, land-use change and forestry
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NCV	net calorific value
NE	not estimated
NEA	National Energy Authority of Iceland
NEU	non-energy use
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NFI	national forest inventory
NH_3	ammonia
NIR	national inventory report
NMVOC	non-methane volatile organic compound
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
SOC	soil organic carbon
SWDS	solid waste disposal site(s)
UNFCCC Annex I inventory reporting guidelines	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
UNFCCC review guidelines	“Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”
VS	volatile solid(s)
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction

1. This report covers the review of the 2021 annual submission of Iceland, 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 4 to 8 October 2021 remotely[1] and was coordinated by Claudia do Valle, Roman Payo, Sohel Pasha and Karin Simonson (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Iceland.

Table 1
Composition of the expert review team that conducted the review for Iceland

Area of expertise	*Name*	*Party*
Generalist	Justin Goodwin	United Kingdom
	Marcelo Theoto Rocha	Brazil
Energy	Pierre Boileau	Canada
	Veronica Eklund	Sweden
	Yuriko Hayabuchi	Japan
	Nicola McPherson	Australia
IPPU	Youngsook Lyu	Republic of Korea
	Juan Luis Martin Ortega	El Salvador
	Mauro Meirelles de Oliveira Santos	Brazil
Agriculture	Laura Cardenas	United Kingdom
	Etienne Mathias	France
	Batima Punsalmaa	Mongolia
LULUCF and KP-LULUCF	Pierre Brender	United Kingdom
	Craig Elvidge	New Zealand
	Yasna Rojas Ponce	Chile
Waste	Satoshi Kawanishi	Japan
	Tertius Vitus de Kluyver	Australia
	Tatiana Tugui	Republic of Moldova
Lead reviewers	Justin Goodwin	
	Marcelo Theoto Rocha	

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

3. The ERT has made recommendations that Iceland resolve identified findings, including issues[2] designated as problems.[3] Other findings, and, if applicable, the encouragements of the ERT to Iceland to resolve related issues, are also included in this report.

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

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

5. Annex I presents the annual GHG emissions of Iceland, including totals excluding and including LULUCF, indirect CO_2 emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.

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 2021 annual submission

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

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

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
Date of submission	Original submission: NIR, 15 April 2021; CRF tables (version 1), 15 April 2021; SEF-2020-CP1 and SEF-2020-CP2, 15 April 2021		
Review format	Centralized review conducted remotely		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	A.24, L.14, L.18, L.26, L.35, L.36, KL.9
	(c) Development and selection of EFs?	Yes	E.10, E.26, A.8, L.24
	(d) Collection and selection of AD?	Yes	E.5, A.3, L.16, W.2, KL.18
	(e) Reporting of recalculations?	Yes	G.9, KL.12, KL.13
	(f) Reporting of a consistent time series?	Yes	E.20, A.27
	(g) Reporting of uncertainties, including methodologies?	Yes	L.1, L.2, L.7, KL.3
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness?[b]	Yes	E.21, L.11, L.19, L.21, L.28, L.34, W.4, KL.10, KL.11, KL.14
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	Yes	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
	(b) Performance of the national system functions?	Yes	G.6
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	Yes	G.2
	(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?	Yes	G.1
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes	KL.2, KL.11, KL.19
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	Yes	KL.4, KL.16
	(c) Reporting requirements of decision 6/CMP.9?	No	
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	Yes	KL.1
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	Iceland 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 19 March 2020,[4] and had not been resolved by the time of publication of the report on the review of the Party's 2019 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

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

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Article 3, paragraph 14, of the Kyoto Protocol (G.10, 2019) KP reporting adherence	Report any changes in the information provided under Article 3, paragraph 14, of the Kyoto Protocol in accordance with decision 15/CMP.1 in conjunction with decision 3/CMP.11.	Addressing. Iceland included additional information on the activities undertaken under Article 3, paragraph 14, of the Kyoto Protocol. However, the Party did not report in the NIR whether any changes have been made to the information provided under Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission or specify which changes have been made. The Party reported in the NIR (p.315) the same activities as those reported in the 2019 NIR.
G.2	National registry (G.2, 2019) (G.3, 2017) (G.4, 2016) KP reporting adherence	Include in the national registry disaster recovery plan information on the roles and responsibilities of primary and alternate registry personnel in disaster recovery; a communication procedure for the contingency plan; documentation for registry operation in a crisis situation; a periodic testing strategy based on procedures agreed with the registry host; and the time frame in which the registry could resume operations following a disaster.	Not resolved. Iceland explained during the review that the national registry disaster recovery plan was not completed in time for inclusion in the 2021 submission owing to limited human resources and lack of understanding regarding the content of the plan.
G.3	National system (G.4, 2019) (G.5, 2017) KP reporting adherence	Report comprehensive information in the NIR on the status of implementation of regulation 520/2017, including how Iceland ensures that the institutional, legal and procedural arrangements between different government agencies, including the roles and responsibilities, are fully understood by all the institutions involved (e.g. the Agricultural University of Iceland, Icelandic Forest Research and the Ministry for	Resolved. Iceland included a table in the NIR (chap. 13, table 13.2, p.313) describing the status of implementation for each Article under regulation 520/2017, including changes to the national system and institutional arrangements made during the 2020 inventory cycle. The Party provided further clarification in the NIR, explaining that the regulation is currently being revised and that a draft of the revised version is currently (as at

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

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		the Environment and Natural Resources), and the changes in the national system resulting from such implementation, if any.	September 2021) under consideration by the Ministry for the Environment and Natural Resources.
G.4	National system (G.5, 2019) (G.6, 2017) KP reporting adherence	Include in the NIR complete information on efforts made to continue supporting the enhancement of the technical competence of the new inventory team and report on any change in its capacity to ensure that the national system performs its functions (these efforts could include, for example, ensuring a sufficient number of competent national experts for each inventory sector and facilitating the participation of relevant institutions in the inventory process, as well as promoting continuous improvement via training and practical experience).	Resolved. Iceland reported the required information in NIR sections 1.3.4 (training and capacity-building activities) and 1.3.5 (capacity and staffing).
G.5	National system (G.8, 2019) KP reporting adherence	Include in the NIR information on the improvement of the inventory team's technical competence, including the addition of personnel, the division of responsibilities of the current inventory team and any activities undertaken to increase the technical capacity of the inventory team.	Resolved. Iceland reported in the NIR the improvements made to the inventory team's technical competence. In NIR section 1.3.5 (p.9), the Party reported that the capacity of the inventory team is now 7.5 persons, and in NIR section 1.3.4 (p.8), it reported on the activities undertaken to increase the technical capacity of the inventory team. The division of responsibilities is reported in NIR figure 1.1 (p.4).
G.6	QA/QC and verification (G.6, 2019) (G.7, 2017) Convention reporting adherence	Report in the NIR complete information on the tools and spreadsheets used for QA/QC and present a summary of the revised QA/QC plan and manual once they are finalized.	Addressing. Iceland included additional information on QA/QC in the NIR (section 1.5). During the review, the Party explained that the QA/QC manual is being updated and that it is planning to include the QA/QC manual as an annex to the NIR in the next annual submission. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided updated information on its QA/QC procedures as it develops its programme.
G.7	QA/QC and verification (G.11, 2019) Convention reporting adherence	Use the 2006 IPCC Guidelines as the only guidelines for QA/QC procedures and for assessing completeness and remove all outdated references to earlier IPCC guidelines from the NIR in order to improve its transparency and comparability.	Addressing. Iceland removed outdated references to earlier IPCC guidelines from NIR sections 1.3.2, 1.6 and 1.7 and confirmed that it uses only the 2006 IPCC Guidelines for QA/QC procedures and assessing completeness. However, references to the *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* are still provided in NIR section 1.3.1 and in the KP-LULUCF sections of the NIR (chap. 11).
G.8	Recalculations (G.12, 2019) Convention reporting adherence	Improve the reporting on recalculations, particularly for the agriculture and LULUCF sectors, by clearly documenting and justifying the recalculations and clearly indicating the reason for the changes compared with previously submitted inventories (e.g. error correction, statistical reasons) in the NIR in line with	Resolved. Iceland improved the transparency of the reporting on recalculations for the agriculture sector. There are still a number of issues related to the LULUCF sector, where the Party has not yet provided fully transparent recalculations, but the issues are being considered under LULUCF sector in tables 3 and 5.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		the UNFCCC Annex I inventory reporting guidelines, paragraphs 44–45.	
G.9	Recalculations (G.12, 2019) Convention reporting adherence	Improve the QC for the NIR to ensure that all changes affecting the recalculations of a given category are included in the description of the recalculations in the NIR and ensure consistent reporting of the recalculations between the NIR and the CRF tables.	Addressing. Iceland explained during the review that its QC plan is being improved to ensure consistent reporting of recalculations between the NIR and the CRF tables and that explanations of the impact of the recalculations on emission trends will be included in future annual submissions.
Energy			
E.1	1. General (energy sector) (E.3, 2019) (E.4, 2017) (E.4, 2016) (E.4, 2015) (23, 2014) (21, 2013) Transparency	Provide more transparent information on the modification methodologies used when recategorizing the data received from NEA.	Resolved. The ERT noted that the previous issue was related to the recategorization of the data on the values for diesel oil and fuel oil sales reported by NEA to ensure consistency with the IPCC categories for public electricity and heat production (1.A.1.a), manufacturing industries and construction (1.A.2), commercial/institutional (1.A.4.a) and residential (1.A.4.b). Iceland explained in the NIR (section 3.1.1, p.43) the method developed by EA to attribute fuel consumption to the IPCC categories on the basis of sales statistics provided by NEA. In addition, the Party clarified in the NIR that for the 2020 submission a comprehensive review was performed of how the fuel sales data from NEA are attributed to IPCC categories. The review was for 2003–2018 only because the methodology used by NEA to collect the data changed between 2002 and 2003. In the 2021 submission, the same allocation of fuels to IPCC categories was performed for 1990–2002 and a review of the sales statistics was conducted. Consequently, the Party has reviewed the whole time series and harmonized the methodologies used for the data from 1990 onward. Recalculations were reported in the 2020 and 2021 NIRs.
E.2	1. General (energy sector) (E.4, 2019) (E.17, 2017) Convention reporting adherence	Reassess the uncertainty values for AD and EFs used to carry out the uncertainty analysis and archive the relevant supporting information in accordance with decision 19/CMP.1, and implement the provision from regulation 520/2017 on the joint work of EA and NEA regarding the uncertainty analysis.	Resolved. Iceland provided category-specific uncertainty values for the AD, EFs and emissions of CO_2, CH_4 and N_2O for each of the category-specific sections in the NIR (i.e. sections 3.3.1–3.3.8). Iceland also provided a source for each uncertainty assessment. The complete uncertainty analysis is provided in annex 2 to the NIR (tables A2. 1 and A2. 2). The uncertainty values for the AD (fuel sales) are mostly estimated by NEA, while the uncertainty values for the CO_2 and CH_4 EFs are default values from the 2006 IPCC Guidelines. The uncertainty value for the N_2O EF is based on expert judgment. During the review, Iceland further explained that it has specific files for the uncertainty analysis in which it documents the values used and the references for the data sources.
E.3	1. General (energy sector) (E.5, 2019) (E.18, 2017)	Correct the errors and omissions in the national inventory, such as: (f) Missing use of charcoal.	Addressing. Iceland did not correct the omission of information on the use of charcoal. During the review, the Party clarified that it is aware that charcoal is

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	Convention reporting adherence		used for grilling, but that data on this activity have not yet been obtained. Work is in progress to collect the data, in collaboration with Statistics Iceland.
E.4	Fuel combustion – reference approach – electrodes – CO_2 (E.22, 2019) Convention reporting adherence	Remove the separate entries for electrodes from the reference approach and report the correct apparent consumption for the reference approach, allowing for meaningful comparison between the estimated CO_2 emissions resulting from the two approaches across the time series and explain the planned recalculation for the reference approach in the next NIR.	Addressing. Iceland clarified during the review that electrodes are reported as "NO" for the reference approach and are used and reported under the IPPU sector. However, the ERT is of the view that if electrodes are used for non-energy purposes, the corresponding AD should be reported under the reference approach (CRF table 1.A(b)) and the amount of carbon used as NEU or stored in products (even if this equates to 100 per cent) should be excluded and reported in CRF table 1.A.d, with an explanation of the sector in which NEU of electrodes is reported (see also ID# E.7 below).
E.5	Fuel combustion – reference approach – CO_2 (E.26, 2019) Accuracy	Report the results of the data analysis by NEA in the NIR and ensure the use of consistent AD for the inventory estimates across the time series.	Not resolved. Iceland explained during the review that work is in progress, in collaboration with NEA, to ensure the use of consistent AD for the inventory estimates across the time series.
E.6	Fuel combustion – reference approach – jet kerosene – CO_2 (E.27, 2019) Convention reporting adherence	Correctly report consumption of and CO_2 emissions from jet kerosene in CRF table 1.A(b).	Resolved. Iceland corrected the reporting of jet kerosene in CRF table 1.A(b) and reported CO_2 emissions of 44.72 kt CO_2 for 2017, instead of reporting the emissions as "NA".
E.7	Fuel combustion – reference approach – peat – CO_2 (E.28, 2019) Convention reporting adherence	Report on peat consistently between the sectoral and reference approach.	Not resolved. Iceland continued to report peat consumption and emissions as "NO" for the entire time series in CRF table 1.A(b). During the review, the Party clarified that Statistics Iceland confirmed that all peat is used for non-energy purposes, and was therefore not included under the sectoral or reference approach. However, this is not in accordance with the UNFCCC Annex I inventory reporting guidelines. If peat is used for non-energy purposes, the related AD should be reported under the reference approach (CRF table 1.A(b)) and the amount of carbon used as NEU or stored in products (even if this equates to 100 per cent) should be excluded and reported in CRF table 1.A.d, with an explanation of the sector in which the NEU of peat is reported.
E.8	Comparison with international data – solid, liquid and other fuels – CO_2 (E.29, 2019) Convention reporting adherence	Enhance the collaboration among NEA, IEA and relevant national authorities to resolve the errors detected in the data, and (a) report correctly in CRF table 1.A(b) the production of waste (non-biomass fraction) for the entire time series; (b) the export of liquid fuels for the time series; (c) and stock changes for coke oven/gas coke between 2007 and 2012 and make corrections to the emission estimates.	(a) Resolved. Iceland reported data on the production of waste (non-biomass fraction) for 1993–2013 and for 2014 onward as "NO" in CRF table 1.A(b). Collaboration with IEA is ongoing to update the IEA data for 2011–2013; (b) Resolved. For liquid fuels, the Party reported data on exports of other oil in CRF table 1.A(b) for 2004 onward, but not for all years. Iceland explained that it used export data from Statistics Iceland in the inventory, which reports only some exports. The IEA data are provided by NEA, which does not report any exports. Collaboration with IEA is ongoing to update the IEA data;

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			(c) Not resolved. The stock change values for coke oven/gas coke reported in CRF table 1.A(b) are related to sub-bituminous coal only, while the IEA data include sub-bituminous coal and coke oven/gas coke. The Party clarified during the review that NEA is currently investigating this issue and will check whether the stock change values for coke oven/gas coke reported in the inventory are correct.
E.9	Feedstocks, reductants and other NEU of fuels – liquid fuels – CO_2 (E.30, 2019) Convention reporting adherence	Correctly fill in CRF table 1.A(d) for lubricants. Correctly estimate and consistently report the use of petroleum coke across the time series.	Not resolved. Iceland continues to report CO_2 emissions as "IE" under "CO_2 emissions from the NEU reported in the inventory" in CRF table 1.A(d). The ERT noted that emissions from lubricants and petroleum coke reported in CRF table 1.A(d) as NEU are not attributed to combustion in the energy sector but should be included for information purposes. In CRF table 1.A(b), Iceland correctly reported carbon stored or excluded for lubricants and petroleum coke and indicated in CRF table 1.A(d) the sector where those CO_2 emissions are allocated, namely under categories 2.D.1 (lubricant use) and 2.C.2 (ferroalloys production). During the review, the Party explained that it plans to report these emissions in CRF table 1.A(b) in the next annual submission. The Party also explained that consumption of petroleum coke has been double counted as it was included under both the energy and the IPPU sectors. As the petroleum coke is used in the production of mineral wool as a reducing agent, the related emissions will be reported under the IPPU sector only in the next annual submission. However, the Party indicated that there is consumption of petroleum coke in stationary combustion under category 1.A.2.f (non-metallic minerals) related to the cement industry from 2004 to 2007 and to the mineral wool industry from 2013 onward (see ID# E.12 below). The related CO_2 emissions are reported as "IE" under the IPPU sector and are related to process emissions (NIR p.70).
E.10	1.A. Fuel combustion – sectoral approach – all fuels – CO_2 (E.10, 2019) (E.21, 2017) Accuracy	Develop country-specific fuel properties (NCVs and carbon content of fuels) that would allow the tier 2 approach for key categories to be used in line with the 2006 IPCC Guidelines.	Addressing. Iceland did not apply country-specific fuel properties to all key categories under the energy sector (see NIR table 3.1, p.41). Regarding category 1.A.3.b (road transportation), the Party has applied a tier 2 approach and used COPERT to estimate the emissions since the 2020 submission. In the NIR, the Party reported that recalculations were performed owing to the use of measured carbon content values for gasoline and diesel (pp.57–58). However, it was not clear from the NIR exactly how the CO_2 EFs were derived. During the review, the Party provided a spreadsheet with the calculations and explained that the CO_2 EFs were based on values of measured carbon content for 2019 (19.15 t/TJ for gasoline and 20.06 t/TJ for diesel) and that these values were applied for the entire time series. The Party also obtained country-specific NCVs for 2017–2019 (44, 43.7 and 43.9 TJ/kt respectively), and used an IPCC default NCV (43 TJ/kt) for 1990–2016. The ERT checked the CO_2 EF values throughout the time series and noted an inter-annual variation for diesel and gasoline for 2017–2019 as the country-

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			specific NCV varies between those years (from 73.22 to 73.39 t CO_2/TJ for diesel and from 70.59 to 71.07 t CO_2/TJ for gasoline). Considering that the same measured carbon content value for 2019 is applied for the previous years of the time series and that an IPCC default constant NCV is applied for 1990–2016, the ERT noted that the CO_2 EF for diesel is constant for 1990–2016 (73.56 t CO_2/TJ) but not for gasoline (ranging from 69.96 to 70.15 t CO_2/TJ). The ERT found this strange as both the carbon content values and the NCVs are constant (see ID# E.26 in table 5). The ERT considers that this issue has not yet been fully addressed because the Party did not explain in the NIR how the CO_2 EFs for road transportation were derived and because the CO_2 EFs for gasoline for 1990–2016 are not consistent with the constant values used for the carbon content and NCVs. In addition, the Party did not apply country-specific fuel properties to all key categories under the energy sector.
E.11	1.A Fuel combustion – sectoral approach – liquid fuels – CO_2 (E.31, 2019) Convention reporting adherence	Report information on AD and emissions for the information item waste incineration with energy recovery in CRF table 1.A(a)s4.	Addressing. Iceland included in CRF table 1.A(a)s4 information on AD and emissions for the information item waste incineration with energy recovery (biomass) for 1993–2013. For 2014 onward, the Party reported the emissions as "NO" because the district heating stations stopped burning waste for energy recovery. However, the Party continues to report blank cells for fossil fuels under this information item. Emissions from fossil fuels are reported for 1993–2013.
E.12	1.A.2 Manufacturing industries and construction (E.1, 2019) (E.2, 2017) (E.2, 2016) (E.2, 2015) (21, 2014) Transparency	Report information on (a) electrode consumption, (b) steam coal consumption and (c) petroleum coke consumption that provides justification for the significant inter-annual changes and gaps in the time series of fuel consumption and associated emissions under category 1.A.2.f (non-metallic minerals).	(a) Resolved. With regard to electrodes from cement factories reported under category 1.A.2.f (non-metallic minerals) in the previous annual submission, the Party explained that this was related to waste electrodes, which are exported. The amount of electrode waste was therefore removed from the energy sector in the 2021 submission (see NIR section 3.3.2, p.53); (b) and (c) Addressing. Iceland did not include in the NIR information to explain the reasons for the significant inter-annual changes in the time series for other bituminous coal (which was reported as steam coal in the 2014 NIR (p.54) owing to a translation error) and petroleum coke under category 1.A.2.f (non-metallic minerals). For other bituminous coal (reported under solid fuels), there is a significant inter-annual variation in the AD for 2005–2007 (increasing from 255 to 630 TJ, followed by a decrease to 94 TJ for 2010). For petroleum coke (reported under liquid fuels), there are significant inter-annual changes between 1992 and 2007, especially for 2003–2005, where the AD increased from 22 to 345 TJ, followed by a decrease to 16 TJ for 2007. With respect to the gaps in the time series, the Party reported in the NIR that other bituminous coal was used as a fuel for cement production under category 1.A.2.f and clarified under the IPPU sector (section 4.2.1.1, p.71) that cement production ceased in 2011. The ERT considers that this

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			explanation clarifies why "NO" is reported for this category in CRF table 1.A(a)s2s for 2012–2019. However, for petroleum coke there is no explanation in the NIR. The Party explained during the review that petroleum coke was also used for combustion and is reported under cement production industry under category 1.A.2.f for 2004–2007; since 2013, petroleum coke has been used for stationary emissions in mineral wool production (also reported under category 1.A.2.f). The ERT noted that petroleum coke is reported as "NO" for 1990–2000 in NIR table 3.8 (p.51).
E.13	1.A.2 Manufacturing industries and construction – CO_2 (E.12, 2019) (E.23, 2017) Accuracy	Provide justification for the country-specific values or, if that is not possible, use the tier 1 IPCC default values of NCV and carbon content defined in the 2006 IPCC Guidelines for steam coal and wastes of electrodes, and archive all relevant information regarding the selection of AD, EFs and associated parameters (e.g. NCV) used to estimate the emissions.	Resolved. For other bituminous coal (which was reported as steam coal in the 2017 NIR (p.49) owing to a translation error), the Party applied a NCV (25.8 TJ/kt) and carbon content value (25.8 kg C/GJ) from the 2006 IPCC Guidelines, as reported in NIR table 3.11 (p.52). For wastes of electrodes, the Party explained that the amount of electrodes reported under category 1.A.2.f (non-metallic minerals) is related to electrode wastes and that these wastes are exported and are therefore not reported under the energy sector (NIR section 3.3.2, p.53) (see also ID# E.12 above).
E.14	1.A.3.b Road transportation – liquid fuels – CO_2, CH_4 and N_2O (E.14, 2019) (E.15, 2017) (E.14, 2016) (E.14, 2015) (36, 2014) Consistency	Use a consistent methodology for the division of vehicle groups and conduct recalculations for the earlier years of the time series (1990–2005).	Resolved. Iceland changed the methodology used for reporting road transportation and now uses the COPERT model (since the 2020 submission), applying a consistent methodology for the whole time series.
E.15	1.A.3.b Road transportation – diesel oil – CH_4 and N_2O (E.15, 2019) (E.25, 2017) Transparency	Update the NIR with the CH_4 and N_2O EFs used for estimating emissions from diesel oil in road transportation.	Addressing. In the original 2017 recommendation, the Party was requested to recalculate CH_4 and N_2O emissions using default EFs from the 2006 IPCC Guidelines (3.9 kg CH_4/TJ and 3.9 kg N_2O/TJ respectively) and to resubmit the emission estimates (in response to a request made in a 'Saturday paper'), which was then implemented by the Party in subsequent annual submissions. However, in the 2020 submission, the Party changed the reporting method used for road transportation by using the COPERT model, which applies a tier 3 methodology to estimate N_2O and CH_4 emissions (NIR p.57). And the same issue observed by the previous ERT was observed by the current ERT, namely that the CH_4 and N_2O EFs are still below the IPCC default values and no justification is provided in the NIR to explain the trends and reasons for these lower EFs. The ERT checked the values applied for diesel oil and noted that the CH_4 EF values decrease from 5.98 kg/TJ for 1990 to 0.12 kg/TJ for 2019, while the N_2O EF values are constant (0.01 kg/TJ) for 1990–1995 and increase steadily from 0.14 kg/TJ for 1996 to 2.60 kg/TJ for 2019.

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E.16	1.A.3.b.i Cars – liquid fuels – CO_2 (E.23, 2019) Convention reporting adherence	Revise the AD for fuel consumption for road transportation using a consistent approach across the entire time series. When applying the recalculation, indicate in the NIR the reason for the changes compared with previously submitted inventories in line with paragraph 45 of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The AD were revised for the entire time series using a consistent approach (applying annual sales statistics).
E.17	1.A.3.b.i Cars – gasoline – CH_4 and N_2O (E.32, 2019) Transparency	Explain in the NIR any significant inter-annual and trend changes in the AD, emissions and IEFs for CH_4 and N_2O emissions related to the use of gasoline for passenger cars.	Addressing. Iceland used the COPERT model for road transportation for the whole time series and the inter-annual variation in the CH_4 and N_2O IEFs observed in the previous review no longer occurs. However, the recalculations led to an inter-annual variation in the N_2O EF between 2005 and 2006 (5.16 and 2.37 kg/TJ respectively) and in the related emissions (0.034 and 0.016 kt N_2O for 2005 and 2006 respectively) which is not explained in the NIR.
E.18	1.A.3.b.i Cars – biomass – CO_2, CH_4 and N_2O (E.33, 2019) Transparency	Explain any significant inter-annual changes in the AD used for biomass and provide information on the EFs used for biofuels to justify any significant inter-annual changes in the biomass IEFs.	Not resolved. Iceland has recalculated the emissions under this category using the COPERT model since the 2020 submission. The CH_4 and N_2O EFs for biomass reported in the 2021 submission still show some inter-annual variation; however, the ERT could not identify in the NIR an explanation for the reasons for the inter-annual changes or trends in the AD and EFs, or how the EFs were derived. The ERT noted that sales data from NEA are used as AD (NIR table 3.16, p.56).
E.19	1.A.3.b.i Cars – biomass – N_2O (E.34, 2019) Transparency	Update the N_2O EF for biogasoline and ensure that the EF choice is well documented and justified in the NIR.	Resolved. Iceland recalculated the emissions under this category using the COPERT model. As a result of the recalculations, the maximum value of the N_2O EF for biomass under this category is 1.99 kg/TJ for 2018. Further information on the recalculations is provided in the NIR (p.57).
E.20	1.A.3.e Other transportation – liquid fuels – CO_2, CH_4 and N_2O (E.35, 2019) Comparability	Investigate the possibility of separately estimating and reporting fuel consumption by splitting it between ground activities at airports and harbours (category 1.A.3.e.ii), agriculture and forestry (category 1.A.4.c.ii) and manufacturing industries and construction (category 1.A.2) by developing institutional cooperation or by extending the reporting obligations included in Icelandic regulation 520/2017, which is expected to be updated soon.	Addressing. Iceland informed the ERT during the review that owing to improved data gathering by NEA in 2019, it was possible for the Party to distinguish and report (for 2019 only) fuel consumed by off-road vehicles under categories 1.A.2.g.v (other, construction) and 1.A.4.c.ii (off-road vehicles and other machinery under agriculture/forestry/fishing). The remaining fuel that is still reported under category 1.A.2.g.vii (other, off-road vehicles and other machinery) consists of fuel used in transport activities that are not reported under road transportation, such as ground activities at airports and harbours (see NIR section 3.3.2, p.51). For 1990–2018, all sales statistics for off-road transportation are reported under category 1.A.2.g.viii (other). In addition, the ERT noted that, according to the 2006 IPCC Guidelines (vol. 2, chap. 3, table 3.1.1) fuels used in ground activities at airports and harbours should be reported under category 1.A.3.e.ii (other transportation, off-road), and that the CRF tables indicate that fuels used by off-road vehicles under

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			category 1.A.2 (manufacturing industries and construction) should be reported under category 1.A.2.g.vii (other, off-road vehicles and other machinery). Therefore, the correct allocation of fuels consumed by off-road transportation under category 1.A.2 should be under category 1.A.2.g.vii for the entire time series (and not under category 1.A.2.g.v).
E.21	1.A.4 Other sectors – other fuels – CO_2, CH_4 and N_2O (E.18, 2019) (E.27, 2017) Completeness	Collect AD on the consumption of charcoal, estimate emissions from charcoal consumption, report the corresponding CO_2 emissions as a memo item and include the non-CO_2 emissions in the corresponding CRF table and national totals.	Addressing. Iceland explained during the review that charcoal is used for grilling and that work is in progress, in collaboration with Statistics Iceland, to obtain these AD.
E.22	1.B.2.d Other (oil, natural gas and other emissions from energy production) – other fuels – CO_2 and CH_4 (E.19, 2019) (E.28, 2017) Transparency	Improve the description provided in the NIR of the methodology used to estimate the emissions from geothermal power plants, as this is a key category accounting for 11.1 per cent of the GHG emissions of the energy sector, by providing the necessary details in order to facilitate the replication and assessment of the inventory.	Addressing. Iceland included additional information in its NIR (section 3.3.8, pp.65–66) and informed the ERT during the review that further information related to the "Icelandic report on the emissions of geothermal power plants in Iceland in 1970–2009" and on the methodology used for estimating the related emissions will be provided in future annual submissions in order to facilitate the replication and assessment of the inventory.
E.23	1.B.2.d Other (oil, natural gas and other emissions from energy production) – other fuels – CO_2 and CH_4 (E.20, 2019) (E.29, 2017) Transparency	Include in the NIR additional information regarding the use of geothermal fluids and associated emissions, making it explicit that all geothermal power plants are covered and that other uses of geothermal power are not considered.	Resolved. Iceland reported the required information in the NIR (section 3.3.8, p.65), stating that "all reported emissions are from geothermal systems classified as high-temperature. Emissions from direct hot water use, from low-temperature geothermal resources, are not thought to result in significant GHG emissions and are not included in the inventory". The ERT noted that geothermal power plants invariably use fluids from 'high-temperature' areas and that 'low-temperature' fluids are used in district heating plants.
E.24	1.B.2.d Other (oil, natural gas and other emissions from energy production) – other fuels – CO_2 and CH_4 (E.21, 2019) (E.31, 2017) Transparency	Identify the main drivers for the trend in CO_2 and CH_4 emissions (e.g. power plants, geothermal fields) and investigate why geothermal electricity is being produced with decreasing levels of CO_2 emissions per GWh since 1993 and report the findings in the NIR.	Resolved. Iceland included new information regarding "Time series consistency issues" in the NIR (section 3.3.8, p.66), which includes an explanation for the fluctuations in CO_2 emissions from geothermal energy production and the decreasing level of CO_2 emissions per GWh.
IPPU			
I.1	2. General (IPPU) – CO_2, HFCs, PFCs, SF_6 and NF_3 (I.1, 2019) (I.1, 2017) (I.3, 2016) Transparency	Report in the CRF tables emission estimates or the relevant notation keys, as appropriate, for the categories glass production (2.A.3), ammonia production (2.B.1), adipic acid production (2.B.3), soda ash production (2.B.7) and electronics industry (2.E), and for foam	Addressing. Iceland reported in the CRF tables the correct notation keys for some categories. CO_2 emissions are reported as "NO" under categories 2.A.3 (glass production), 2.B.1 (ammonia production), 2.B.3 (adipic acid production) and 2.B.7 (soda ash production). Regarding HFC, PFC, SF_6 and NF_3 emissions under categories 2.E (electronics industry), 2.F.1 (refrigeration and air conditioning), 2.F.2 (foam blowing agents), 2.F.3 (fire protection),

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		blowing agents (2.F.2), fire protection (2.F.3), solvents (2.F.5) and other applications (2.F.6).	2.F.5 (solvents) and 2.F.6 (other applications), the Party stated that CRF Reporter does not allow it to upload notation keys.
I.2	2. General (IPPU) – NF_3 (I.7, 2019) Transparency	Include in the NIR an explanation, based on the information provided during the review, for the non-occurrence of NF_3 emissions in the country.	Resolved. Iceland included the required information in the NIR (p.68) justifying the reporting of "NO" or "NA" owing to the non-occurrence of NF_3 emissions in the country.
I.3	2.D.2 Paraffin wax use – CO_2 (I.9, 2019) Completeness	Carry out the planned improvement and revise the AD, if appropriate, and report on any improvements in the quality of the data on paraffin wax use in the NIR.	Resolved. Iceland revised the AD for paraffin wax. In the 2020 NIR, the Party explained that the AD for imports and exports of candles have been updated from previous annual submissions. Previously, AD were only available for 2004 from Statistics Iceland. The values for 1990–2003 have been updated as a result of the improved data collection. The Party reported in the NIR (p.84) on plans to continue improving data collection, although the amount of emissions for this category is very small and considered insignificant.
I.4	2.D.2 Paraffin wax use – CO_2 (I.10, 2019) Completeness	Carry out the planned improvement and include AD for candle production to improve the completeness of the estimates for the category.	Resolved. Iceland reported in its NIR (p.84) that AD for the production of candles are missing. However, considering that most candles used in Iceland are imported (and therefore accounted for), only candles produced by very small local craft workshops might be missing from the emission estimates. Since the quantity of emissions from use of paraffin (both for candles and not for candles) is already small, amounting to 0.002 per cent of the total emissions for 2019, the ERT considers this issue resolved.
I.5	2.F Product uses as substitutes for ozone-depleting substances – HFCs, PFCs and SF_6 (I.3, 2019) (I.13, 2017) Completeness	Regularly conduct F-gas and product use surveys in order to estimate F-gas emissions for all relevant subcategories on the basis of the latest possible information, with a frequency of at most three years, and include in the NIR information on the level of enforcement of the prohibition of F-gas fire extinguishers and other aerosol products, including personal care products (e.g. haircare products, deodorants, shaving cream), household products (e.g. air fresheners, oven and fabric cleaners), industrial products (e.g. special cleaning sprays such as those for operating electrical equipment, lubricants, pipe freezers).	Resolved. Iceland explained during the review that information on F-gases was thoroughly revised in 2019 in collaboration with consultants from Aether Ltd. Included in the revision was a product use survey to obtain updated estimates on the allocation of the various F-gases to the relevant subcategories (NIR p.265). NIR chapter 4.7 was rewritten and relevant information was included. Information on legislation on the enforcement of the prohibition of F-gases in fire extinguishers and other aerosol products was also provided in the NIR (p.90).
I.6	2.F.1 Refrigeration and air conditioning – HFC-23 (I.11, 2019) Completeness	Include consistent data on HFC-23 emissions from the disposal of commercial refrigeration equipment over the entire time series, or include information justifying the reporting of "NO" for some of the years, explaining the trend in emissions, in the NIR.	Resolved. Iceland explained in its NIR (p.266) that HFC-23 disposal emissions from commercial refrigeration (subcategory 2.F.1.a) are reported as "NO" owing to the non-import or non-allocation of this species to the commercial refrigeration subcategory. Gaps in the time series are due to the calculation method used, which takes into account the lifetime of the equipment and the fact that the disposal can only occur following an import of this species (and a subsequent allocation to this subcategory).

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I.7	2.G.1 Electrical equipment – SF_6 (I.5, 2019) (I.15, 2017) Accuracy	Obtain clear information about the recovery of SF_6 emissions from electrical equipment and revise the emission estimates as necessary.	Resolved. Iceland reported in its NIR (p.101) that it acquired its first SF_6 equipment in 1981, for use at one power station. At the same time, some 66 kV equipment was imported. These installations are still in use, which explains why there are no disposal emissions.
I.8	2.G.3 N_2O from product uses – N_2O (I.12, 2019) Completeness	Include estimates for N_2O emissions from whipped cream containers.	Resolved. Iceland reported in its NIR (p.102) that following a request made by the previous ERT during the review of the 2019 submission, N_2O emissions from the use whipped cream aerosol cans have been included in the 2021 submission. The Party also reported that there is no register in the country on the number of aerosol cans or whipped cream cartridges imported to Iceland. In order to estimate the amount of N_2O that could be emitted from whipped cream containers, Iceland follows the method used by Finland of applying an average of the EFs used in Central Europe, that is 3.3 g N_2O/inhabitant/year.
Agriculture			
A.1	3. General (agriculture) – CO_2, CH_4 and N_2O (A.1, 2019) (A.1, 2017) (A.1, 2016) (A.1, 2015) (56, 2014) Transparency	Include detailed explanations of the AD, EFs and emission trends for all categories, including for young cattle population and for N_2O emissions from synthetic N fertilizer applied to agricultural soils.	Resolved. Iceland reported in its NIR detailed information compared with previously reviewed NIRs. The time series is reported for major activities (NIR table 5.6), including for the young cattle population (NIR table 5.17), Nex rates (table 5.25) and N fertilizer applied to agricultural soils (NIR tables 5.31 and 5.32), as well as for CH_4 emissions from enteric fermentation (NIR table 5.16), manure management (NIR table 5.23) and N_2O emissions from N fertilizer. The Party also provided ranges for the EFs when they fluctuate over time.
A.2	3. General (agriculture) (A.2, 2019) (A.8, 2017) Transparency	Include in the NIR additional tables with the animal numbers from Statistics Iceland (or other data sources) combined with the background estimations of animal numbers reported in the CRF tables for the agriculture sector for the whole time series and, in cases where the 2006 IPCC Guidelines prescribe the use of average animal populations, include additional information on how the animal numbers from Statistics Iceland have been converted to average animal populations.	Resolved. Iceland reported in its NIR the method used to estimate average animal populations and presented a comparison between the animal numbers used for calculating GHG emissions and those provided by Statistics Iceland (NIR table 5.6, p.112). It also provided related explanations (in NIR section 5.2.1), including on the use of additional data from other organizations, in particular the Farmers Association of Iceland. For horses, the numbers were calculated taking into account two different data sets (NIR table 5.7, p.113). In cases where data on the annual average animal population are not available (animals living less than one year), the Party reported in the NIR that estimates are calculated using the IPCC methodology for production and estimated age of slaughter (NIR table 5.5, p.112).
A.3	3. General (agriculture) – CH_4 and N_2O (A.3, 2019) (A.9, 2017) Accuracy	Update productivity data, in particular the weight categories for cattle, poultry productivity (live weight and living age) and swine productivity (piglets per sow) and include in the improvement plan activities to update the productivity data at regular intervals.	Addressing. Iceland reported in its NIR (p.268) that animal characterization data have been updated for mature dairy cattle for 2018, for lambs for 2003–2018 and for mature ewes for 2018. The weights for mature dairy cattle and lambs have been updated since the previous review and show an increasing trend over the time series. The weights for other animal categories are stable for the whole time series (CRF table 3.As2). For poultry, the living age is

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			used to estimate the annual average population for production but is constant across the time series (NIR table 5.5). The live weights for poultry are also constant throughout the time series. For sows, information on productivity (piglets per sow) is not reported in the NIR, although the age of slaughter for pigs is reported as changing over time (from 5.9 months for 1990 to 4.5 months for 2010). NIR tables 5.9 and 5.10 show the characterization data for cattle and sheep. In its NIR (p.119), Iceland indicated that it is working on improving the quality of the animal characterization data by working with the Icelandic Agricultural Advisory Centre and the Ministry of Industries and Innovation with the aim of regularly updating productivity data, such as the digestible energy content of feed and gross energy intake. In addition, the Party is planning to regularly update animal characterization parameters for all livestock categories. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet analysed and improved the characterization data for swine and poultry.
A.4	3. General (agriculture) – CH_4 and N_2O (A.4, 2019) (A.10, 2017) Transparency	Report weighted average AD for feed intake, typical animal mass, VS excretion rates and Nex rates in the CRF tables and in the NIR, as used in the calculations.	Resolved. Iceland reported in its CRF tables aggregated values for growing cattle, which includes heifers, steers and calves, in accordance with option B for reporting on cattle. The values for these subcategories are reported in both the NIR and annex 7 to the NIR. In particular, Iceland reported in NIR tables 5.17 and 5.25 weighted average body weight, digestible energy, gross energy and Nex rates for growing cattle.
A.5	3. General (agriculture) – CH_4 and N_2O (A.5, 2019) (A.16, 2017) Accuracy	Correct the CH_4 and N_2O emission estimates for other livestock on the basis of the correct number of horses for 2013–2015 and avoid any underestimation of emissions for this subcategory.	Resolved. Iceland corrected the CH_4 and N_2O emission estimates and the EFs are now based on the animal population of horses as reported in the CRF tables. The previous slight discrepancy was corrected in the 2021 submission.
A.6	3. General (agriculture) – CH_4 and N_2O (A.25, 2019) Transparency	Document and justify the recalculations in the NIR in line with paragraph 44 of the UNFCCC Annex I inventory reporting guidelines and include in the NIR up-to-date and complete information on recalculations applied in the sector (e.g. in specific recalculation sections for each category) and ensure consistent reporting on recalculations between the CRF tables and the NIR.	Resolved. Iceland reported in its NIR information on recalculations for each subcategory in accordance with the UNFCCC Annex I inventory reporting guidelines. The ERT did not identify any missing explanations.
A.7	3. General (agriculture) – CH_4 and N_2O (A.28, 2019) Comparability	Correct the reporting of the AD for growing cattle across the time series.	Resolved. Iceland reported in CRF tables 3.As1 and 3.B(a)s1 the AD for growing cattle in accordance with option B. No unusual trend was observed in the AD for growing cattle; the animal population that remained constant in the 2019 NIR now fluctuates slightly in the same range of magnitude.

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			Detailed information on the subcategories included under growing cattle (heifers, steers and calves) is provided in NIR tables 5.9, 5.11 and 5.17 and in annex 7 to the NIR.
A.8	3.A.1 Cattle – CH_4 (A.30, 2019) Accuracy	Justify the appropriateness of the current parameters and/or update the input parameters and consequently the CH_4 EF for future annual submissions, as planned.	Not resolved. During the review, the Party indicated that there were no updates available for the livestock parameters for other mature cattle. These parameters will be updated when such data become available. The ERT considers that the recommendation has not yet been addressed because the Party has not yet investigated the relevance of the parameters used for other mature cattle.
A.9	3.A.1 Cattle – CH_4 (A.31, 2019) Consistency	Ensure time-series consistency for subcategory 3.A.1 (cattle) by obtaining data on animal population for 1990–1991 and, if this is not possible, use one of the techniques included in the 2006 IPCC Guidelines (vol. 1, chap. 5), as appropriate, to extrapolate the time series and include a section in the NIR that explains how time-series consistency has been ensured for the estimates in the category.	Resolved. Iceland reported in the CRF tables (e.g. CRF table 3.As1) animal population data extrapolated for 1990 and 1991 and provided further information in the NIR (p.112).
A.10	3.A.1 Cattle – CH_4 (A.32, 2019) Transparency	Justify the low CH_4 IEF reported for growing cattle and explain any significant changes in the animals covered by this subcategory that would affect the CH_4 IEF trend.	Resolved. Iceland reported in its NIR (p.121) a table showing the population composition for growing cattle and the related emissions and EFs. The NIR indicates that "for the years in which the calf population is much higher than heifers and steers for producing meat, the EF will be lower and outside the default IPCC range (35–48 kg CH_4/head/year) as the EF for calves calculated according to Equation 10.21 of the 2006 IPCC guidelines is 19 kg CH_4/head/year". Considering the parameters reported for weight digestibility and growth, the EFs used by the Party (NIR table 5.17, p.123) are in a good order of magnitude and consistent with an IPCC tier 2 method.
A.11	3.A.1 Cattle – CH_4 (A.33, 2019) Transparency	Revise the explanation of CH_4 estimates for mature dairy cattle in the NIR by indicating the use of the Cf_i value from the 2006 IPCC Guidelines and ensure that the approach is used consistently across the time series.	Not resolved. Iceland did not indicate in the NIR the values used for Cf_i, although the Cf_i values used in the inventory appear to be correct. During the review, the Party provided information on the Cf_i values and related assumptions (share of lactating cows). This information was considered in line with the 2006 IPCC Guidelines. The ERT considers that the recommendation has not yet been addressed because the Party has not yet included in the NIR the values for the Cf_i parameter used in the calculations and related assumptions.
A.12	3.B Manure management – N_2O (A.11, 2019) (A.2, 2017) (A.3, 2016) (A.3, 2015)	Include in the NIR information on the circumstances under which the country-specific Nex rates have been estimated.	Resolved. Iceland reported in its NIR (p.129) the new methodology used to estimate Nex rates, which follows the IPCC tier 2 method for cattle and IPCC tier 1 method for other animals. The methodology is correctly described in the NIR.

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	(61, 2014) (57, 2013) Transparency		
A.13	3.B Manure management – N_2O (A.12, 2019) (A.18, 2017) Transparency	Provide additional information in the NIR to allow for a better understanding of the N mass flow approach, in particular the correlation between the volatilization of N-containing compounds reported under the United Nations Economic Commission for Europe and under the Convention.	Resolved. Iceland reported in its NIR (p.135) a new figure containing information on N fluxes (NIR figure 5.3) and a correct N balance showing N inputs (excretion + bedding) and N outputs (manure spreading – pasture).
A.14	3.B Manure management – N_2O (A.13, 2019) (A.19, 2017) Accuracy	Correct the N_2O emission estimates by using the total amount of N excreted in the different manure management systems.	Resolved. Iceland reported in its NIR (p.132) that N_2O emissions from manure management are not estimated directly on the basis of the 2006 IPCC Guidelines but are estimated only indirectly through the use of the EMEP/EEA guidebook 2019. This option is supported by the method provided in annex 1 (table A1.8) to the EMEP/EEA guidebook 2019 and facilitates the production of a correct N balance.
A.15	3.B Manure management – N_2O (A.14, 2019) (A.20, 2017) Accuracy	Correct the N_2O emission estimates for manure management systems by using the default N_2O EFs from the 2006 IPCC Guidelines or provide additional information that supports the use of other N_2O EFs that may be more representative of manure management systems in Iceland.	Resolved. Iceland reported in its NIR (p.132) that N_2O emissions from manure management are not directly estimated on the basis of the 2006 IPCC Guidelines but only indirectly estimated using the EMEP/EEA guidebook 2019. This option is supported by the method provided in annex 1 (table A1.8) to the EMEP/EEA guidebook 2019 and facilitates the production of a correct N balance.
A.16	3.B.1 Cattle – N_2O (A.34, 2019) Transparency	Update the NIR with the revised information on the estimation method and the input parameters used for the N_2O estimates for mature dairy cattle across the time series.	Resolved. Iceland reported in its NIR (p.121) that the Nex rates for dairy cattle were updated and are now estimated using the IPCC tier 2 method. Detailed information is provided in sections 5.5.2 (p.128) and 5.5.6 (p.133) of the 2020 NIR.
A.17	3.B.2 Sheep – CH_4 (A.35, 2019) Accuracy	Correct the VS values and recalculate emissions from sheep for the entire times series, transparently documenting the change in the NIR.	Resolved. Since the 2020 submission, Iceland has reported in the CRF tables VS values calculated using the tier 2 method from the 2006 IPCC Guidelines and has included the contribution of urine in the estimate of the VS parameter (NIR equation 10.24, p.123).
A.18	3.D.a.1 Inorganic N fertilizers – N_2O (A.37, 2019) Transparency	Include in the next NIR the explanation provided during the 2019 review for the cause of sudden peaks in the use of N fertilizers, along with any other relevant explanations for significant changes in the emission trend.	Resolved. Iceland reported in its NIR (p.139) an explanation for N fertilizer use, including the peaks and trends in N fertilizer data.
A.19	3.D.a.2 Organic N fertilizers – N_2O (A.18, 2019) (A.4, 2017) (A.10, 2016) (A.10, 2015 Completeness	Collect information on sewage sludge and other organic fertilizers applied to soils and estimate the related emissions, or, if these emissions are considered to be insignificant, provide in the NIR sufficient information showing that the likely level of emissions meets the	Resolved. Iceland reported information in its NIR (p.140) on the investigations conducted on sewage sludge and other organic fertilizers applied to soils. According to the NIR, data on sewage sludge application are available only for 2012 using information obtained from a pilot project (for 2012–2014) and no indication was found of any sewage sludge application

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		criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	prior to 2012. The ERT considers that the reporting of sewage sludge application as "NO" for the period prior to 2012 is reasonable. Other organic fertilizers applied to soils was found to occur from 2009 onward and was therefore reported as "NO" for the period prior to 2009. The trend in other organic fertilizers applied to soils after 2009 indicates that the reporting of "NO" for the period prior to 2009 is reasonable.
A.20	3.D.a.5 Mineralization/ immobilization associated with loss/gain of soil organic matter – N_2O (A.20, 2019) (A.5, 2017) (A.11, 2016) (A.11, 2015) Transparency	Estimate N_2O emissions from mineral soils, or, if the Party considers these emissions as insignificant, provide in the NIR sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. Iceland reported in its NIR (p.142) that "there is a carbon stock gain (+) reported in land remaining cropland, and therefore there are no associated N_2O emissions". This explanation is correct and the ERT therefore considers the issue as resolved. The Party reported the emissions as "NO" in CRF table 3.D.
A.21	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.21, 2019) A.6, 2017) (A.4, 2016) (A.4, 2015) (63, 2014) (59, 2013) Completeness	Include in the NIR a comparison of the country-specific N_2O EF for the cultivation of histosols with peer-reviewed studies.	Resolved. Iceland reported in its NIR (p.357) a new annex 8 entitled "Justification of use of country-specific N_2O emission factor for cultivation of organic soils (histosols)", which was prepared in response to a request made in a 'Saturday paper' during the 2019 review and accepted by the previous ERT as justifying the use of a country-specific N_2O EF. Annex 8 is comprehensive and well referenced (see also ID# A.23 below).
A.22	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.22, 2019) (A.23, 2017) Accuracy	Correct the misallocation of N_2O emissions by moving the N_2O emissions under the subcategory other (4.II.H) in CRF table 4(II) to the subcategory cultivation of organic soils (3.D.a.6) in CRF table 3.D.	Resolved. Iceland moved (since its 2020 submission) the N_2O emissions under the subcategory other (4.II.H) in CRF table 4(II) to the subcategory cultivation of organic soils (3.D.a.6) in CRF table 3.D.
A.23	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.38, 2019) Transparency	Include in the NIR the explanation for the low country-specific N_2O EF for cultivated organic soils provided during the 2019 review.	Resolved. Iceland included in the NIR the explanation justifying the low country-specific N_2O EF for cultivated organic soils provided during the 2019 review in response to a request made in a 'Saturday paper'. (see also ID# A.21 above).
A.24	3.D.b.1 Atmospheric deposition – N_2O (A.23 2019) (A.24, 2017) Accuracy	Make a thorough examination of N flow to estimate emissions from N volatilized from atmospheric deposition reported in CRF table 3.D and consider including in the NIR a table with the overall mass balance of N, including information on N volatilized as NO_X, nitric oxide and N_2O.	Addressing. Iceland reported in its NIR (p.135) a new figure containing information on N fluxes (figure 5.3). The figure presents information on N from livestock which contributes to indirect emissions of N_2O, but the contribution of inorganic fertilizers and other organic compounds is not fully clear in the NIR.

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			The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided detailed information on the contribution of inorganic and other organic fertilizers.
A.25	3.F Field burning of agricultural residues – CH_4 and N_2O (A.24, 2019) (A.7, 2017) (A.5, 2016) (A.5, 2015) (54, 2014) Transparency	Include in the NIR additional information on the non-occurrence of the field burning of agricultural crop residues.	Not resolved. Iceland reported in its NIR (p.149) that insufficient AD are currently available to estimate emissions from field burning. The ERT considers that the recommendation has not yet been addressed because the Party has not yet included in the NIR additional information to justify the non-occurrence of the field burning of agricultural crop residues.
A.26	3.G Liming – CO_2 (A.39, 2019) Consistency	Implement the planned checks of the AD for the category and update them as planned and report CO_2 emissions from liming following the UNFCCC Annex I inventory reporting guidelines in future annual submissions, ensuring consistent reporting of the emissions across the entire time series under category 3.G. If the change is not made in the next annual submission, justify this in the NIR and include an explanation of the allocation in CRF table 9.	Addressing. Iceland reported in CRF table 3.G-I a complete time series of emissions from limestone for 1990 onward owing to an update in the data collected by Statistics Iceland. Data for dolomite are, however, not available for the period prior to 2002 and the related emissions are reported in the CRF tables as "NE". During the review, Iceland indicated that it contacted experts from the Agricultural University of Iceland who clarified that dolomite was not used in agriculture between 1990 and 2002. When one company started to import dolomite, its use became more widespread. Therefore, the appropriate notation key for reporting dolomite for 1990–2002 is "NO" instead of "NE". The trend in recent years, the low value of dolomite used for the years for which data are available and the expert judgment used by Iceland justify the reporting of "NO" for this category for 1990–2002.
A.27	3.I Other carbon-containing fertilizers – CO_2 (A.40, 2019) Consistency	Report CO_2 emissions from other carbon-containing fertilizers consistently across the time series under category 3.I. If the change is not made in the next annual submission, justify this in the NIR and include an explanation of the allocation in CRF table 9.	Not resolved. Iceland reported in CRF table 3.G-I AD for other carbon-containing fertilizers for 2003 onward but no data on shell sand are reported for 1990–2002. The Party reported in its NIR (p.152) that it is planning to continue improving the collection of AD.
LULUCF			
L.1	4. General (LULUCF) (L.1, 2019) (L.1, 2017) (L.2, 2016) (L.2, 2015) (67, 2014) Transparency	Enhance the transparency of the information in the NIR on the uncertainty analysis.	Addressing. Iceland included in its NIR (pp.180, 182, 188, 192, 195, 197 and 200) information on the uncertainty of the EFs for cropland, grassland, wetlands and land converted to settlements and similar to the information included in NIR annex 2 entitled "Assessment of uncertainty". The Party did not include additional information on the uncertainty of forest land and the expert judgment used was not reported, for example for land converted to cropland. During the review, the Party clarified that uncertainties analyses were conducted for most of the land categories and additional text would be provided in the NIR.

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L.2	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.2, 2019) (L.14, 2017) Convention reporting adherence	Conduct an uncertainty assessment of all carbon pools and gases in the LULUCF sector in accordance with decision 24/CP.19, annex I, paragraph 15.	Addressing. Iceland reported in its NIR (pp.180, 182, 188, 192, 195, 197 and 200) an uncertainty assessment for land categories (see ID# L.1 above). However, the Party did not provide an uncertainty assessment for some carbon pools such as DOM and soil for certain land uses. The ERT noted that the Party included in its NIR (p.174) that error estimates for all data sources and calculation processes for forest land are not currently conducted but are planned for the near future. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included an uncertainty assessment for all carbon pools and gases.
L.3	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.3, 2019) (L.15, 2017) Comparability	Review and, as appropriate, revise the use of notation keys under the LULUCF sector for categories estimated using a tier 1 method, in line with decision 24/CP.19, annex I, paragraph 37, and provide additional information to justify why the notation keys used are appropriate.	Resolved. Iceland correctly reported CSC as "NA" when using a tier 1 method where it could be assumed that there was no CSC.
L.4	4. General (LULUCF) – (L.30, 2019) Convention reporting adherence	Improve the QA/QC plan to avoid discrepancies in cross-references between NIR sections and ensure that section numbering is correct.	Addressing. Iceland improved the cross-references between NIR sections. The ERT noted some discrepancies, however. For example, page 174 contains a reference to chapter 5.7.2.6; however, the methodology is described in chapter 5.7.3 and the complementary information is included in table 5.37 (p.143) with a reference to annex 9, but the information is actually included in annex 8. During the review, the Party clarified that an update of the QA/QC plan is in progress and the issue of the consistency of NIR section numbering will be added to the plan.
L.5	4. General (LULUCF) – (L.31, 2019) Transparency	Provide transparent information in the NIR section discussing the land-transition matrix on the use of the notation key "IE" where areas have been accounted for elsewhere.	Not resolved. Iceland reported some land uses and land-use changes as "IE" in CRF table 4.1 (cropland and wetlands (managed) converted to settlements, other land converted to cropland, and other land converted to settlements). The Party did not include information in the NIR section discussing the land-transition matrix on the use of the notation key "IE". During the review, the Party clarified that the recommendation will be taken into consideration for future annual submissions.
L.6	Land representation (L.4, 2019) (L.2, 2017) (L.3, 2016) (L.3, 2015) (68, 2014) Transparency	Select the required information and organize it in a manner that enables the reader to clearly understand the data sources and their quality and the methodology used to derive the land representation.	Not resolved. Iceland did not reorganize the information on land representation in its NIR (section 6.1). The ERT considers that Iceland could improve the transparency of its reporting by providing the following information on land representation in an appropriate format (such as tabular) for each category: (1) the data sources; (2) the time series of raw data; (3) the methodology applied for filling in gaps in the raw data, if any; (4) the methodology applied, including assumptions and inferences, to derive the land category areas from the raw data; (5) the methodology applied for filling

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			in gaps in the time series of areas, if any; (6) the transition time of the land category (for land in conversion categories); and (7) any other relevant information. During the review, the Party clarified that this issue has not been resolved and that it will be taken into consideration in future annual submissions.
L.7	Land representation (L.5, 2019) (L.16, 2017) Transparency	Improve the land representation data used to report LULUCF emissions and removals under the Convention by reconciling all data on areas contained in databases and land-use maps, as well as data collected from observations, including an estimation of uncertainties related to AD once land matrices are improved and updated.	Addressing. Iceland improved some of the inconsistencies in the data on land areas detected between the land transition matrix (CRF table 4.1) and the corresponding CRF tables on carbon stocks (CRF tables 4.A, 4.B, 4.C and 4.E). The ERT observed that for CRF tables 4.D and 4.F, the inconsistencies have not been resolved. The ERT considers that the information provided by Iceland in NIR sections 6.3 (p.166) and 11.2.2 (p.294) has not been improved in line with the previous recommendations. During the review, the Party clarified that there are still some small inconsistencies between the final areas reported in CRF table 4.1 and the corresponding total areas reported in CRF tables 4.D and 4.F on carbon stocks. Work is ongoing to improve the transparency of the land representation data.
L.8	Land representation – CO_2 (L.25, 2019) Transparency	Improve the transparency of the AD reporting by providing information on the uncertainties related to habitat type classification, especially in relation to separating wetlands from grassland and other land.	Not resolved. Iceland reported new recalculations for land areas in CRF table 4.1 and in the NIR (pp.163, 182 and 183), especially for grassland and other land. The Party indicated in its NIR (p.183) increasing areas of grassland corresponding to areas of other land previously considered unmanaged, where grazing activities occur instead. According to the NIR, these recalculations were made possible by using the map from the Icelandic Geographic Land Use Database and a habitat type map to obtain better information on land use. The ERT noted that the habitat type map is updated regularly and the most recent update used for the 2021 submission was conducted in 2020. Considering that the Party has updated the AD for some land uses (e.g. grassland and other land) on the basis of regular updates of the habitat type map, it is important to provide information on the uncertainties related to habitat type classification in accordance with the recommendation made by the previous ERT. During the review, the Party clarified that the recommendation will be taken into consideration for future annual submissions.
L.9	Land representation – CO_2, CH_4 and N_2O (L.32, 2019) Accuracy	Report a consistent national land area across the inventory time series in line with the 2006 IPCC Guidelines. This can be derived, for example, from the official land area of the Party and applied across the entire time series, possibly leading to recalculations of areas.	Resolved. Iceland reported a consistent national land area across the inventory time series in CRF table 4.1 in line with the 2006 IPCC Guidelines.
L.10	4.A Forest land – CO_2 (L.7, 2019) (L.3, 2017)	Provide an additional description of the processes by which CSC and associated emissions and removals are	Addressing. Iceland did not include in its NIR an additional description of the processes by which CSC and associated emissions and removals were

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	(L.4, 2016) (L.4, 2015) (69, 2014) Transparency	estimated, including tables with raw data and intermediate outputs stratified by year and forest type.	estimated. During the review, the Party clarified that it will take this recommendation into consideration for future annual submissions.
L.11	4.A Forest land – CO_2 (L.8, 2019) (L.17, 2017) Completeness	Improve the estimates of CSC under forest land, particularly by including estimates for the deadwood and litter carbon pools or provide an explanation in the NIR and in CRF table 9 of why these pools could not be estimated.	Addressing. Iceland reported net CSC for the litter carbon pool as "NA" in CRF table 4.A and included an explanation in its NIR (p.173) for the use of the tier 1 method. The ERT considers that the issue relating to the estimates of CSC for the litter carbon pool has been resolved. The ERT observed that the Party reported in the NIR (p.173) that the estimates for the deadwood carbon pool will be included as part of future inventory improvements, including biomass losses in deadwood in stumps, root stock of cut trees and standing dead trees, as well as continuous decomposition of all deadwood. During the review, the Party clarified that it will consider including estimates of CSC in deadwood in future annual submissions.
L.12	4.A Forest land – CO_2 (L.33, 2019) Comparability	Provide transparent information in CRF table 9 for reporting "IE" where GHG emissions have been accounted for elsewhere and correct the notation key from "NE" to "NA" for litter carbon stock in the forest land remaining forest land categories.	Addressing. Iceland corrected the notation key from "NE" to "NA" for litter carbon stock in the forest land remaining forest land category. However, the Party did not provide transparent information in CRF table 9 and in the documentation box of CRF table 4.A for reporting as "IE" the CSC in deadwood for forest land remaining forest land (category 4.A.1) and other land converted to forest land (category 4.A.2.5). During the review, the Party clarified that the main sources of deadwood are cutting and harvest activities that cannot be separated between the categories forest land remaining forest land and land converted to forest land. The Party informed the ERT that all CSC in deadwood is therefore included in grassland converted to forest land. The Party will include this information in the documentation box of CRF table 4.1 and in CRF table 9 in the next annual submission.
L.13	4.A.2 Land converted to forest land – CO_2 (L.10, 2019) (L.18, 2017) Transparency	Include transparent information in the NIR on carbon stock for the land-use categories occurring in Iceland.	Not resolved. Iceland reported losses in living biomass for other land converted to forest land and grassland converted to forest land (afforestation: natural birch forest) as "IE" in CRF table 4.A, but did not include additional information in the NIR to clarify where these losses are reported (p.176). The Party reported in its NIR (p.181) an EF of 1.27 kg C m^{-2}, equivalent to 12.7 t C ha^{-1}, for grassland converted to cropland. The ERT noted that this value is higher than the default values for grassland in table 6.4 of the 2006 IPCC Guidelines, and the Party did not include additional information to explain the main differences between the county-specific EF and the default values provided in the 2006 IPCC Guidelines. In addition, the Party reported in CRF table 4.A an EF for losses of living biomass in grassland converted to forest land (cultivated forest) which is lower than the EF reported for grassland converted to cropland. The Party did not include in the NIR information to transparently explain the differences in biomass losses in grassland when it is converted to forest land and when it is converted to cropland. Furthermore,

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			The ERT noted that for land converted to cropland, the Party used an EF of 2.1 t C ha^{-1} for gains in living biomass (NIR p.181) but did not include information in the NIR on the origin of this EF. During the review, the Party clarified that for other land and grassland converted to forest land (afforestation: natural birch forest) it uses the stock-difference method as described in section 2.3.1.1 and equation 2.8 of the 2006 IPCC Guidelines (vol. 4, chap. 2.3). Biomass losses are therefore included in the net annual removals and reported as "IE" in CRF table 4.A as they are included in the gain value as net gain. The ERT noted that it is important to include complementary information in the NIR to ensure the transparency of the reporting.
L.14	4.A.2 Land converted to forest land – CO_2 (L.11, 2019) (L.18, 2017) Accuracy	Implement the calculation methods in line with equations 2.15 and 2.16 of volume 4 of the 2006 IPCC Guidelines with instant oxidation of all amounts of living biomass and litter when making land-use conversions, unless Iceland can document that the carbon stock before land-use conversion is maintained in the land converted.	Not resolved. Iceland reported in its NIR (p.176) that in the estimation of CSC in living biomass for land converted to forest land (natural birch woodland) there is a linear regression between biomass per area unit in trees on measurement plots in natural birch woodland, and a measured age of sample trees is used to measure the net annual CSC. No additional information is provided on the implementation of calculation methods in line with equations 2.15 and 2.16 of volume 4 of the 2006 IPCC Guidelines in the section of the NIR on land converted to forest land or documentation to prove that the carbon stock before land-use conversion is maintained in the land converted. During the review, the Party clarified that both the chrono-sequence study referred to in the NIR (Sigurðsson et al., 2005) and the tree measurements from the NFI clearly show an increase in the biomass stock when grassland is converted to forest land. According to the Party, loss of carbon stock in biomass has never been measured and the Party therefore does not intend to assume carbon stock loss if only carbon stock gain has been measured. The ERT reviewed the Sigurðsson et al. study and noted that, in the study, areas of grassland were fenced, thereby protecting areas from grazing, and the evolution of biomass in the natural birch forest was studied over a period of years. This could be interpreted as the carbon stock before land-use conversion being maintained in the land converted. However, the ERT noted that it is not clear whether the results of this specific study of grassland converted to forest land, with grassland fenced to allow establishment of the forest, is sufficient to extrapolate to all conversions of grassland to forest land in the country. The ERT is of the view that the Party should include more detailed information on the study by Sigurðsson et al. and the assumptions for using this study as a basis for all conversions of grassland to forest land with the objective of documenting that the carbon stock before land-use conversion is maintained in the land converted. Otherwise the Party will have to implement

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			the calculation methods in line with equations 2.15 and 2.16 of volume 4 of the 2006 IPCC Guidelines for grassland converted to forest land that is not subject to the same conditions as those used for the study by Sigurðsson et al.
L.15	4.B.1 Cropland remaining cropland – CO_2 (L.34, 2019) Transparency	Provide information to justify the high EF for mineral soils in the next annual submission.	Addressing. Iceland included additional information on the EF for mineral soils in the NIR (p.179) for Andosol soil. The ERT noted that it is important to include additional information on the method used to determine the EF for cropland remaining cropland, such as the depth considered for the carbon content, the assumptions used for the different N fertilizers and the carbon content used. During the review, the Party clarified that an experiment was conducted at four different locations to estimate the changes in base status and soil organic matter content resulting from long-term use of three different N fertilizers and provided additional information on one of the sites. Changes were largely restricted to the top of the soil (0–5 cm) and seemed to disappear in soil depth of 10–15 cm. Compared with the plot where no N was added during the experiment, the study detected a 15 per cent increase in soil organic carbon in soil depth of 0–5 cm in comparison with the soil organic carbon measured in 1945. However, after reviewing the original study, the Party decided that the value of the EF as initially calculated should be corrected from 0.1708 t C/ha/year to 0.1525 t C/ha/year for the next annual submission (see ID# L.35 in table 5). The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included all the necessary information to justify the high EF for carbon stock in mineral soils. This issue would be resolved by including the information provided during the review and on the calculation of the EF.
L.16	4.B.2 Land converted to cropland (L.13, 2019) (L.7, 2017) (L.11, 2016) (L.11, 2015) Accuracy	Estimate the area of forest land and other land that was converted to cropland before 1990 and report these values under the appropriate categories.	Addressing. Iceland did not report new information in its NIR on the estimation of the area of forest land and other land that was converted to cropland before 1990. With regard to the reporting of other land converted to cropland as "IE", the Party included an explanation in the documentation box of CRF table 4.B but not in CRF table 9. During the review, the Party clarified that it has not yet made any improvements in relation to this recommendation but it will be considered for future annual submissions.
L.17	4.B.2 Land converted to cropland – CO_2 (L.35, 2019) Transparency	Provide an explanation for reporting "IE" in CRF table 9 with regard to net CSC in DOM for grassland and wetlands converted to cropland and consider adding explanatory information to the documentation box to CRF table 4.B.	Resolved. Iceland provided an explanation in CRF table 9 for reporting "IE" with regard to net CSC in DOM from grassland and wetlands converted to cropland and added explanatory information to the documentation box to CRF table 4.B.
L.18	4.B.2.2 Grassland converted to cropland – CO_2	Ensure the equivalence of climatic, historical and edaphic conditions when analysing pairs of samples (i.e. in cropland and grassland) to determine the	Not resolved. Iceland reported in NIR table 10.9 (p.280) that it has not made any improvements to ensure the equivalence of climatic, historical and edaphic conditions when analysing pairs of samples (i.e. in cropland and

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	(L.14, 2019) (L.8, 2017) (L.6, 2016) (L.6, 2015) (71, 2014) Accuracy	dynamic of the soil carbon stocks associated with conversion among the two land uses.	grassland) to determine the dynamic of the soil carbon stocks associated with conversion among the two land uses. During the review, the Party explained that it is planning to improve the transparency of future NIR submissions by including more specific information.
L.19	4.C Grassland – CO_2 (L.15, 2019) (L.9, 2017) (L.7, 2016) (L.7, 2015) (72, 2014) (67, 2013) Completeness	Prepare estimates for the emissions from degraded areas of grassland.	Addressing. Iceland reported in NIR table 10.9 (p.280) that improvements have not been made to locate degraded areas of grassland. During the review, the Party clarified that measurements and data collection of degraded areas of grassland began in mid-2021 and estimates of the emissions from these areas will be prepared for future annual submissions.
L.20	4.C Grassland – CO_2 (L.36, 2019) Transparency	Explain the reporting of "IE" for each subcategory and pool in CRF table 9 in the reporting of grassland CSC in DOM and soils and consider adding explanatory information to the documentation box to CRF table 4.C.	Resolved. Iceland included an explanation for the reporting of "IE" for each subcategory and pool in CRF table 9 in the reporting of grassland CSC in DOM and soils and added explanatory information to the documentation box to CRF table 4.C.
L.21	4.C.1 Grassland remaining grassland – CO_2 (L.16, 2019) (L.10, 2017) (L.12, 2016) (L.12, 2015) Completeness	Estimate and report CSC in mineral soils under grassland remaining grassland for "natural birch shrubland – old" and "revegetated land older than 60 years".	Addressing. Iceland correctly reported CSC in mineral soils as "NA" instead of "NE" in CRF table 4.C for "revegetated land older than 60 years" in accordance with the UNFCCC Annex I inventory reporting guidelines. However, the Party continued to report "natural birch shrubland – old" as "NA". During the review, the Party clarified that the preparation of soil, litter and vegetation samples from the NFI systematic plot sampling is ongoing and the samples will be analysed in 2021. In addition, the Party informed the ERT that CSC in mineral soils of natural birch shrubland is more similar to CSC in natural birch forest than grassland, and numerous research results show that cold temperate forests generally add carbon to soil. Therefore, the Party explained that assuming equilibrium and reporting the CSC as "NA" is a reasonable tier 1 approach for the category "natural birch shrubland – old". The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet estimated and reported CSC in mineral soils for "natural birch shrubland – old". The information that the Party will obtain from the NFI systematic plot sampling should help to address this recommendation.
L.22	4.C.1 Grassland remaining grassland – CO_2 (L.26, 2019) Transparency	Update the information on the EF used for organic soils under natural birch shrubland in the NIR and ensure that the information in the NIR is up-to-date and consistent with the information reported in the CRF tables.	Resolved. Iceland reported consistent information on the EF used for organic soils under natural birch shrubland in the NIR (p.184) and in CRF table 4.C. The value of the EF for organic soils is based on the tier 1 method from the Wetlands Supplement, that is 0.37 t C ha^{-1} $year^{-1}$.
L.23	4.C.1 Grassland remaining grassland – CO_2	Improve the transparency of the reporting of CSC under grassland mineral soils for revegetated land older than 60 years by providing an explanation in the NIR and in	Addressing. Iceland reported CSC under grassland mineral soils for revegetated land older than 60 years as "NA" for the complete time series in CRF table 4.C. However, the Party reported in its NIR (p.185) that CSC in

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	(L.37, 2019) Transparency	CRF table 9 as to why estimates could not be produced for this pool for 1990–2015 and by reporting "NA" where CSC is assumed to be in equilibrium (i.e. zero).	revegetated land older than 60 years is currently estimated as not occurring. The NIR does not include an additional explanation for reporting "NA" where CSC is assumed to be in equilibrium.
L.24	4.C.2 Land converted to grassland – CO_2 (L.17, 2019) (L.19, 2017) Accuracy	Revise the CO_2 estimates for land converted to grassland using updated data on carbon sequestration in soils, especially for other land converted to grassland, and include in the NIR, in tabular format, the total estimates of CSC in living biomass, litter and soil, and the average CSC per area for the whole time series, in land converted to grassland and land converted to forest land.	Addressing. Iceland did not include new information on the revision of the CO_2 estimates for land converted to grassland using updated data on carbon sequestration in soils, especially for other land converted to grassland. The Party explained in its NIR (p.280) that is working to improve this issue. During the review, the Party clarified that the preparation of soil, litter and vegetation samples from the systematic plot sampling conducted by the Soil Conservation Service of Iceland is ongoing and the samples will be analysed at the end of 2021. The Party expects further scientific analyses of the data to be conducted in the coming years. The ERT considers that the recommendation has not yet been fully addressed because the Party has not included information on the revision of the CO_2 estimates for land converted to grassland using updated data on carbon sequestration in soils.
L.25	4.D.2.3 Land converted to wetlands – CO_2 (L.18, 2019) (L.11, 2017) (L.13, 2016) (L.13, 2015) Transparency	Estimate and report CSC in mineral soils under land converted to wetlands.	Addressing. Iceland included estimates for CSC in mineral soils for "rewetted wetland soils" in CRF table 4.D for the years for which AD are available (2016–2019). In accordance with the recommendation made in the previous review, the Party reported the CSC as "NO" instead of "IE" for 1996–2015. Iceland did not include additional information in its NIR to improve the transparency of the reporting of CSC as "NO". The Party reported "land converted to refilled lakes and ponds" as "NE" in CRF table 4.D without providing an additional explanation in the NIR. During the review, the Party clarified that regarding the transparency of the reporting of "rewetted wetland soils", it will include further clarifications in future annual submissions. For "land converted to refilled lakes and ponds", the Party will continue reporting the CSC as "NE" because the 2006 IPCC Guidelines (vol. 4, chap. 7, p.7.20) do not provide a methodology for estimating CSC in soils in land converted to flooded land. The ERT considers that this issue would be resolved by including the explanations for the estimation of CSC in mineral soils in "rewetted wetland soils" and "land converted to refilled lakes and ponds".
L.26	4.D.1 Wetlands remaining wetlands – CO_2 (L.38, 2019) Accuracy	Develop a country-specific methodology for managed wetlands that would allow the use of the tier 2 approach for key categories in line with the 2006 IPCC Guidelines.	Not resolved. Iceland reported other wetlands remaining other wetlands (intact mires) in CRF table 4.D using an EF based on a tier 1 approach in the Wetlands Supplement (NIR p.195). The Party recognized that wetlands remaining wetlands is a key category (NIR p.193), in particular CSC in other wetlands remaining other wetlands. During the review, the Party indicated

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			that this recommendation will be taken into consideration for future annual submissions.
L.27	4.D.2.3 Land converted to wetlands – CO_2 (L.19, 2019) (L.20, 2017) Transparency	Correct the statement in section 6.7.3.2 of the NIR referring to the reporting of aggregate CSC for mineral and organic soils so as to clarify that the value reported in CRF table 4.D as loss from mineral soils on land converted to wetlands consists of two subcategories (grassland converted to flooded land and other land converted to flooded land) and that CSC in mineral and organic soils is reported separately in the CRF tables.	Resolved. Iceland corrected the statement in section 6.8.1.2 of the NIR (p.194) referring to the separate reporting of CSC for mineral and organic soils. For mineral soils, CSC is estimated for "Grassland converted to flooded land – Medium SOC to reservoirs" and "Other land converted to flooded land – Low SOC reservoirs", while for organic soils, CSC is estimated for "Flooded Land Remaining Flooded Land – Mires converted to reservoirs". The ERT noted that adequate information is reported in CRF table 4.D.
L.28	4.E.2 Land converted to settlements – CO_2 (L.20, 2019) (L.12, 2017) (L.14, 2016) (L.14, 2015) Completeness	Estimate and report CSC in mineral soils under land converted to settlements.	Not resolved. Iceland did not estimate and report CSC in mineral soils for land converted to settlements, with the exception of forest land converted to settlements, which was reported in the same way as in previous annual submissions. During the review, The Party explained that it will start estimating CSC in land converted to settlements in future submissions.
L.29	4(I) Direct N_2O emissions from N inputs to managed soils – N_2O (L.28, 2019) Accuracy	Check the EF used for inorganic fertilizer and revise it, if appropriate, and report any recalculations made for N_2O emissions from inorganic fertilizers on forest land.	Resolved. Iceland explained during the review that inorganic fertilizers have been reported under the agriculture sector since the 2020 submission. The Party reviewed the EF applied for inorganic fertilizers in CRF table 3.D and used an EF of 0.01 kg N_2O-N/kg N in accordance with the default method described in the 2006 IPCC Guidelines (vol. 4, chap. 11.2).
L.30	4(II) Emissions and removals from drainage and rewetting and other management of organic/mineral soils – CO_2, CH_4 and N_2O (L.29, 2019) Accuracy	Check and revise, if appropriate, the EFs for CO_2 and CH_4 emissions from drained organic soils under the forest land category in CRF table 4(II) to avoid the possibility of emissions from forest land soils being underestimated and report any recalculations in the next annual submission.	Resolved. Iceland reported in CRF table 4(II) the EFs for CO_2 and CH_4 emissions from drained organic soils under the forest land category in accordance with the default method described in the Wetlands Supplement.
L.31	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O (L.40, 2019) Transparency	Report in the NIR the reasons for carbon accumulation on cropland soils, especially on mineral soils converted to cropland.	Addressing. Iceland included additional information in the NIR (p.179) on the EF for mineral soils related to Andosol soil. However, the ERT noted that it is important to include additional information on the method used to determine the EF, such as the depth considered for the carbon content, the assumptions used for different N fertilizers and the content of carbon used, to understand the reasons for carbon accumulation. During the review, the Party provided additional information (see ID# L.35 in table 5) on the EF for CSC in mineral soils, explaining that the value of the EF as initially calculated was 0.1708 t C/ha/year but will be corrected to 0.1525 t C/ha/year for the next annual submission.

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			The ERT considers that the recommendation has not yet been fully addressed because the Party has not reported sufficient information on the reasons for carbon accumulation on cropland soils (see also ID# L.15 above).
L.32	4(IV) Indirect N_2O emissions from managed soils – N_2O (L.23, 2019) (L.22, 2017) Completeness	Estimate and report indirect N_2O emissions from managed soils, excluding those from agricultural lands that are reported in CRF table 3.D and, where the notation key "IE" is used, indicate in the NIR and in the documentation box of the corresponding CRF table where in the inventory the emissions have been included and report information on the use of this notation key in CRF table 9.	Resolved. Iceland explained during the review that indirect N_2O emissions from managed soils are reported under the agriculture sector under category 3.D.b in CRF table 3.D. This information is also reported in the NIR (p.207). The Party correctly reported the emissions as "IE" in CRF table 4(IV) and provided relevant information in the documentation box of CRF table 4(IV) and in CRF table 9.
L.33	4(V) Biomass burning – CO_2, CH_4 and N_2O (L.24, 2019) (L.23, 2017) Transparency	Correct the use of notation keys to report on emissions from biomass burning in CRF table 4(V).	Addressing. Iceland changed the reporting of emissions from controlled burning from "NE" to "NO" in CRF table 4(V) for all land-use categories except for forest land. However, in its NIR (p.208), the Party explained that controlled burning on grazing land near farms was previously common practice among sheep farmers, but that this management regime for grassland and wetlands is becoming less common and is now subject to official licensing requirements. Recording of the activity is minimal, although formal approval from the local police authority is needed for safety and bird protection purposes. During the review, the Party clarified that controlled burning is no longer part of the management regime for grassland and wetlands. However, although this activity is allowed subject to official licensing requirements, this rule is not followed and, as a result, reliable data on controlled burning are not available. The ERT considers that controlled burning on grassland and wetlands should therefore be reported as "NE" because it is an activity that could occur in the country, and the Party should include relevant justification for using this notation key. The ERT considers that the recommendation has not yet been fully addressed because the Party reported controlled burning in grassland and wetlands as "NO" instead of "NE", and additional explanations for reporting emissions as "NE" should be included in the NIR and in CRF table 9 in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
L.34	4(V) Biomass burning – CO_2, CH_4 and N_2O (L.41, 2019) Completeness	Include estimates of the emissions from biomass burning on cropland and grassland for the entire time series, or, if not, include information on the reporting of "NE" (both in the NIR and the CRF tables) and provide an explanation as to why these pools could not be estimated	Addressing. Iceland changed the reporting of emissions from controlled burning from "NE" to "NO" in CRF table 4(V) for all land-use categories except for forest land. However, in line with the previous recommendation (see ID# L.33 above), the ERT considers that controlled burning on grassland and wetlands should be reported as "NE" because it is an activity that could occur in the country, and the Party should include relevant justification for using this notation key.

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			The ERT considers that the recommendation has not yet been fully addressed because the Party reported controlled burning in grassland and wetlands as "NO" instead of "NE", and additional explanations for reporting emissions as "NE" should be included in the NIR and in CRF table 9 in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
Waste			
W.1	5.A Solid waste disposal on land – CH_4 (W.12, 2019) Transparency	Document and provide in the NIR all the parameters used in the estimation of CH_4 emissions from solid waste disposal and include the population data and waste generation rates used as input data in the IPCC solid waste disposal model.	Addressing. Iceland included a new annex in the NIR (annex 9, p.366) containing input data for managed and unmanaged SWDS, namely a table specifying the parameters used (e.g. degradable organic carbon, methane correction factor, etc.) and two tables containing population data and the types of waste assigned to managed and unmanaged SWDS for the entire time series (the same tables are also included in the NIR as tables 7.4 and 7.5, pp.218–221). However, the Party did not provide information to support the historical and current distribution of solid waste disposal between SWDS and incineration/open burning, and the distribution between incineration and open burning.
W.2	5.A Solid waste disposal on land – CH_4 (W.13, 2019) Accuracy	Investigate the composition of both municipal solid waste and industrial waste and reconsider estimating separately emissions from industrial waste.	Not resolved. Iceland still assumes a similar composition of waste between municipal solid waste and industrial waste (NIR p.213). The Party explained that the reason for this is that the existing data on waste amounts do not support this distinction. Waste amounts are reported to EA as either mixed or separated waste. In addition, the Party explained that data received according to the categories of the Icelandic waste statistics regulation do not match exactly the IPCC categories. The Party also explained in the NIR (p.217) that efforts are under way to harmonize the waste statistics regulation categories with the IPCC categories and that composition amounts may be revised in future annual submissions.
W.3	5.A Solid waste disposal on land – CH_4 (W.13, 2019) Transparency	Report information on waste composition for municipal solid waste and industrial waste separately in order to enhance the transparency of the NIR.	Not resolved. See ID# W.2 above.
W.4	5.A.1 Managed waste disposal sites – CO_2, CH_4 and N_2O (W.11, 2019) Completeness	(a) Estimate emissions from the combustion of landfill gas for energy and transparently allocate them under the relevant categories in the energy sector (e.g. for electricity production for 2002–2009); (b) Improve the explanation of the allocation of emissions from landfill gas in the inventory (NIR section 7.2.4.1).	(a) Addressing. Iceland stated in the NIR that between 2002 and 2006 landfill gas recovery was used for electricity production and that since 2007 it is sold for use as fuel in vehicles (reported under category 1.A.3.b (road transportation)). The Party recalculated emissions under category 1.A.1.a.i (electricity generation) and included in the inventory emissions from landfill gas used for electricity generation (under biomass). However, these emissions were reported for 2003–2007 and 2017–2018 (and not 2002–2006). The Party also did not explain the recalculations clearly in the NIR. Under the energy sector (NIR table 3.4, p.47), the Party indicated the use of biomethane and

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			biodiesel as fuel but did not provide a clear explanation either in the NIR, indicating that biomethane was also included in the calculations and for which years, or in the documentation box of CRF table 1.A(a).s4, indicating for which years the types of fuel are reported under biomass; (b) Not resolved. The ERT considers that there is a lack of transparency because the NIR indicates that landfill gas was used for electricity for 2002–2006 (p.225) but the Party calculated biomass emissions in the energy sector for 2003–2007 and 2017–2018. In addition, NIR figure 7.5 (p.226) indicates that landfill gas was used for electricity production from 2002 to 2009.
W.5	5.A.1 Managed waste disposal sites – CH_4 (W.14, 2019) Convention reporting adherence	Correct the value for the half-life of industrial waste in the NIR and enhance the QA/QC procedures in order to ensure that the information reported in the NIR is consistent with the information used in the estimation files.	Resolved. Iceland updated NIR table 7.8 (p.224) to reflect the correct half-life value (8) for industrial waste, demonstrating that the QA/QC procedures have been enhanced.
W.6	5.D Wastewater treatment and discharge – CH_4 and N_2O (W.6, 2019) (W.8, 2017) (W.5, 2016) (W.5, 2015) (81, 2014) (74, 2013) Transparency	Include in the NIR more background data on sludge removal (e.g. amount and N content), clearly indicating in which category the resulting emissions are accounted for.	Addressing. Iceland reported in the NIR the amount of sewage sludge removed and the N effluent for relevant years of the time series. For 2019, sewage sludge removed accounted for 2.4 kt DC and N effluent for 2.5 kt N (see NIR section 7.5.4.2 and table 7.21, p.244). The Party also indicated that emissions from sewage sludge removed are accounted for under categories 5.A.1.a (managed waste disposal sites, anaerobic) and 5.C.1.1.b.iv (biogenic waste incineration, sewage sludge). However, the Party reported sewage sludge applied to soils (as fertilizer) under the agriculture sector. NIR table 5.33 (p.140) indicates that in 2019 the N content of sewage sludge applied to soils as fertilizer was 4.75 t N. During the review, the Party clarified that the amount of sewage sludge reported under the agriculture sector as organic fertilizer was not deducted from the calculations of N_2O emissions under category 5.D.1 (domestic wastewater). The Party provided a spreadsheet in which it estimated N_2O emissions by removing from category 5.D.1 the amount of sewage sludge used as fertilizer, resulting in a decrease in emissions by 37 kg N_2O. The Party stated that will it correct the reporting in the next annual submission.
W.7	5.D Wastewater treatment and discharge – CH_4 (W.15, 2019) Transparency	Correct the statement in the NIR on the correction factor used to account for additional BOD from industrial wastewater co-discharge in order to ensure that the information reported in the NIR is consistent with the estimates reported in CRF table 5.D.	Resolved. Iceland revised the methodology in the 2020 submission and has reported industrial wastewater separately from domestic wastewater since then. As a result, the correction factor used to account for additional BOD from industrial wastewater co-discharge into sewers is not considered (the Party applied a correction factor value of 1 instead of 1.25).
KP-LULUCF			
KL.1	General (KP-LULUCF) – CO_2, CH_4 and N_2O	Include in the NIR country-specific information on the associated FM and AR and background levels of	Addressing. Iceland reported in its NIR (pp.298 and 301) that no historical data exist on natural disturbance events in forests under AR and FM;

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	(KL.2, 2019) (KL.2, 2017) (KL.4, 2016) (KL.4, 2015) Transparency	emissions associated with annual disturbances, as well as information on a margin and how to avoid the expectation of net credits or net debits during the commitment period, including through the use of a margin.	therefore, a calculation of the background levels of emissions and margin, as described in the Kyoto Protocol Supplement (pp.2.45–2.54), is not possible and should be reported as zero or "NO". The Party reported the background level as "NO" for AR in CRF table 4(KP-I)A.1.1 and as "NE" for FM in CRF table 4(KP-I)B.1.3. The Party did not provide country-specific information (data and methods) in its NIR on the associated FM and AR and background levels of emissions associated with annual disturbances. In addition, the ERT noted that the Party provided estimates of the background levels and margin for FM in the 2016 annual review report. During the review, the Party clarified that it chose to apply the provisions for natural disturbances. The reasons for doing so were described in the initial review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol. In the section of the report in which wildfires are described, it was stated that "only two of these events are of a size (bigger than 0.5 ha) to be reported in the UNFCCC-CRF, in 2010 and 2013". In accordance with the previous recommendation, Iceland was requested to calculate the background levels and margin associated with natural disturbances for FM and AR, which the Party attempted to do in response to the review of the 2016 submission. Only one of the two events mentioned above was in fact a forest fire as the fire reported for 2010 was a fire on grassland covered partly with natural birch shrubland (7.9 ha of 13.3 ha was natural birch shrubland). The fire in 2013 was reported as affecting an area of 0.4 ha and the background level and margin for natural disturbances were calculated as the standard deviation of the emissions from this fire and a value of zero (0) for 2006–2012 and 2014 (background level for FM (0.00004586875 kt CO_2 eq) and margin (0.000275213 kt CO_2 eq)). As no fires were reported on AR areas for 2006–2014, the background level and margin for AR were assigned a value of zero (0). In the 2018 submission, the Party decided not to report the 2013 forest fire affecting an area of 0.4 ha as it does not reach the minimum reporting unit required for forest changes (0.5 ha). In accordance with that decision, the new value for the background level and margin for FM should have been zero (0) or "NO", as for AR. Unfortunately, this was not applied and instead "NE" was reported for the background level and margin for FM. The Party stated that it will correct the use of the notation key for the next annual submission. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included in the NIR country-specific information on the associated FM and AR and background levels of emissions associated with annual disturbances, as well as information on a margin and how to avoid the expectation of net credits or net debits during the commitment period, including through the use of a margin. The explanation

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			provided by the Party during the review should be included in the NIR to improve the transparency of the reporting.
KL.2	General (KP-LULUCF activities) – CO_2, CH_4 and N_2O (KL.3, 2019) (KL.3, 2017) (KL.5, 2016) (KL.5, 2015) Transparency	Report information clearly demonstrating that emissions by sources and removals by sinks resulting from FM under Article 3, paragraph 4, and any elected activities under Article 3, paragraph 4, are not accounted for under activities under Article 3, paragraph 3.	Addressing. Iceland included in its NIR (p.301) a section 11.5.5 entitled "Information that demonstrates that emissions and removals resulting from elected Article 3.4 are not accounted for under activities under Article 3.3". However, this section does not include the required information. On the other hand, NIR sections 11.1.3 and 11.1.4 (p.293) provide information on definitions of AR and FM and a description of conditions creating a precedence or hierarchy among activities under Article 3, paragraph 4. The ERT noted that the information included in these sections together with additional information would improve the reporting in section 11.5.5. During the review, the Party clarified that the recommendation will be taken into consideration for future annual submissions.
KL.3	General (KP-LULUCF activities) – CO_2, CH_4 and N_2O (KL.4, 2019) (KL.7, 2017) Transparency	Provide in the NIR a description of the methodologies used for conducting an uncertainty analysis for KP-LULUCF (AR, deforestation, FM and HWP), including the methodology used in the uncertainty analysis of AD, EFs and emissions for each carbon pool.	Not resolved. Iceland reported in its NIR (p.298) an uncertainty estimate for the AD for afforestation, FM of cultivated forest and RV. However, the Party did not provide a description of the methodologies used for conducting an uncertainty analysis for KP-LULUCF. The ERT noted that, in accordance with the 2006 IPCC Guidelines, including information on uncertainty, such as the methodologies used for conducting the uncertainty assessment, underlying assumptions, data sources and documentation of expert judgment used to calculate uncertainties, would improve the transparency of the uncertainty analysis of AD, EFs and emissions for each carbon pool. During the review, the Party clarified that this recommendation will be taken into consideration for future annual submissions.
KL.4	General (KP-LULUCF activities) – CO_2, CH_4 and N_2O (KL.5, 2019) (KL.8, 2017) Transparency	Provide information in the NIR on the approach used to develop the background level and margin values for FM and AR and demonstrate how the approach taken avoids the expectation of net credits or net debits, in accordance with decision 2/CMP.7, annex, paragraph 33.	Addressing. Iceland reported in its NIR (pp.298 and 301) that it intends to apply zero (0) values to the background level and margin for AR and FM respectively. The Party also reported that no historical natural disturbances were detected in afforestation or FM forests. In accordance with decision 2/CMP.7, annex, paragraph 33, if the background level is defined using a country-specific approach or the Party's reference level is zero (0), the Party must describe how a margin is established, where a margin is needed (see also ID# KL.1 above). During the review, the Party clarified that this recommendation will be taken into consideration for future annual submissions.
KL.5	AR – CO_2, CH_4 and N_2O (KL.6, 2019) (KL.4, 2017) (KL.1, 2016) (KL.1, 2015) (86, 2014) Transparency	Provide an additional description of the process by which CSC and associated emissions and removals are estimated, including tables with raw data and intermediate outputs stratified by year and forest type.	Not resolved. Iceland did not include in its NIR an additional description of the process by which CSC and associated emissions and removals were estimated (see ID# L.10 above). The ERT considers that including summary tables of average carbon stocks with relevant data on forest areas and intermediate outputs stratified by year and forest type would resolve this

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			recommendation. During the review, the Party clarified that it will consider this recommendation for future annual submissions.
KL.6	AR – CO_2 (KL.7, 2019) (KL.9, 2017) Transparency	Correct the use of notation keys by reporting CSC in the HWP pool under AR using the notation key "NO" for the whole time series and provide an explanation in the NIR that harvesting from afforestation lands has not yet occurred.	Addressing. Iceland reported CSC in the HWP pool under AR as "NA" in CRF tables 4(KP-I)A.1 and 4(KP-I)C. The ERT noted that, according to the explanation in the NIR (p.295), wood removal after commercial thinning or clear-cutting has not been detected in the NFI in afforestation areas since 1990. Carbon stock losses in living woody biomass are therefore reported as "NO". During the review, the Party clarified that CSC in the HWP pool under AR will be reported as "NO" instead of "NA" in the next annual submission.
KL.7	AR – CO_2 (KL.16, 2019) Convention reporting adherence	Carry out additional QA/QC procedures to update the cross-references in the latest NIR to other chapters within the document and update the text of the NIR as needed (e.g. extrapolated years should be updated from 2013–2016 to 2013–last reported year).	Resolved. Iceland carried out additional QA/QC procedures and reported in its NIR (p.294) correct cross-references to other chapters within the document and updated the text of the NIR as needed (e.g. extrapolated years were updated to 2013–2019 on NIR p.175).
KL.8	AR – CO_2 (KL.17, 2019) Transparency	Indicate in the NIR that the average EF obtained from the data from two research projects for litter on AR includes both natural birch forests and cultivated forests.	Not resolved. Iceland reported in CRF table 4(KP-I)A.1 the same EF for litter in natural birch forests and cultivated forests under AR (0.14 t C/ha), and the EF under FM (0.09 tC/ha) reported in CRF table 4(KP-I)B.1 was lower than the EF for litter in cultivated forests under AR. In addition, the Party reported litter in natural birch forests under FM as "NE" in CRF table 4(KP-I)B.1 (see ID# KL.14 below). The Party explained in its NIR (p.296) that CSC for litter on AR and FM is estimated using the EFs described in section 6.5 (pp.173 and 176). According to the NIR (p.176), the EF for litter under AR is an arithmetic average of the results from two research projects; however, there is no additional information on how natural birch forests and cultivated forests were considered in the projects. During the review, the Party clarified that the lower EF for litter in cultivated forests under FM compared with the EF for litter in cultivated forests under AR can be explained by the age of afforestation under FM. Part of the forest under FM was afforested more than 50 years ago and reported with no removal to litter. The part of the forest under FM that is younger than 51 years was estimated using the same EF as the one used for AR. The average of these two groups results in a lower EF than the country wise EF of 0.14 t C/ha. The Party informed the ERT that it will improve the transparency of the reporting by including an explanation of the EF for litter on AR in the next annual submission.
KL.9	Deforestation – CO_2, CH_4 and N_2O (KL.8, 2019) (KL.5, 2017) (KL.2, 2016) (KL.2, 2015) (87, 2014) Accuracy	Recalculate CSC in soil organic matter by ensuring symmetry among the pairs of land-use conversions (e.g. grassland converted to forest land, and forest land converted to grassland).	Not resolved. Iceland did not recalculate CSC in soil organic matter in CRF table 4(KP-I)A.1 and CRF table 4(KP-I)A.2 by ensuring symmetry among pairs of land-use conversion, for instance grassland converted to forest land, and forest land converted to grassland. During the review, the Party clarified that the recommendation will be taken into consideration for future annual submissions.

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KL.10	Deforestation – CO_2 and N_2O (KL.18, 2019) Completeness	Report the AD, CSC and related N_2O emissions for this category to avoid underestimating the emissions. If this is not possible, provide information that justifies the reporting of "NE" for AD and CSC related to N_2O emissions from mineralization and immobilization due to carbon loss or gain associated with land-use conversion and management change in mineral soils on land subject to deforestation in the NIR in the next annual submission and consider providing information in the documentation box to CRF table 4(KP-II)3.	Not resolved. Iceland reported "NE" in CRF table 4(KP-II)3 for the AD and CSC for deforestation for 2013–2019 related to N_2O emissions from N mineralization and immobilization and "NA" for N_2O emissions. No additional information was provided on the use of the notation keys in the documentation box to CRF table 4(KP-II)3. During the review, the Party indicated that it will include estimates related to N_2O emissions in the next annual submission.
KL.11	FM – CO_2 (KL.10, 2019) (KL.10, 2017) Completeness	Report information on CSC in below-ground biomass for FM or provide justification that the carbon pool is not a net source in accordance with decision 2/CMP.8, annex II, paragraph 2(e).	Not resolved. Iceland reported in CRF table 4(KP-I)B.1 gains for below-ground biomass under FM in cultivated forests for 2013–2019 but reported the corresponding losses as "NE" for 2013–2019. The ERT noted that the Party did not provide a justification for reporting "NE" or explain why this carbon pool is not a net source in accordance with decision 2/CMP.8, annex II, paragraph 2(e). During the review, the Party clarified that this recommendation will be taken into consideration for future annual submissions.
KL.12	FM – CO_2 (KL.13, 2019) Transparency	Report transparently in the NIR any recalculations for FM (including changes in CSC factors for the pools, e.g. mineral and organic soils).	Not resolved. Iceland reported recalculated EFs for cultivated forests on mineral soils between the 2019 and 2020 submissions in CRF table 4(KP-I)B.1. No information was provided on recalculations for FM in the 2020 NIR. The ERT noted that in the 2019 submission, the EF for cultivated forests on mineral soils was reported as 0.21 t C/ha for 2015, 2016 and 2017, while in the 2020 and 2021 submissions the EF was reported as 0.25 t C/ha for the same years (2015, 2016 and 2017). During the review, the Party clarified that cultivated forests under FM do not have any EFs. For cultivated forests older than 50 years, no CSC in mineral soils is reported. For cultivated forests converted from other land that are 50 years old or younger, an EF of 0.513 t C/ha is used and for cultivated forests converted from grassland that are 50 years old or younger, an EF of 0.365 t C/ha is used. These EFs do not change between reporting years. On the other hand, the average EF for cultivated forests on mineral soils varies from one reporting year to another according to the fractional changes in the subgroups of the cultivated forest. Another factor causing variation in the EF is new data input from the annual NFI data as the data input of the sample data. The ERT considers that the recommendation has not yet been addressed because the Party did not clarify in the NIR the changes in data and methods or how the EF is considered across the time series. The ERT noted that including the explanation provided by the Party during the review would improve the transparency of the reporting.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
KL.13	FM – CO_2 (KL.14, 2019) Transparency	Provide information on any changes in data and methods from previous annual submissions, including those resulting from a detected error, in future annual submissions.	Not resolved. Iceland reported in CRF table 4(KP-I)B.1 lower losses of above-ground biomass for cultivated forests compared with the previous submission, although this is not mentioned in the NIR. For example, according to the 2021 submission, losses amounted to 0.67 kt C for 2018, while in the 2020 submission they were reported as 1.09 kt C for the same year. The ERT observed that the EF used for losses of above-ground biomass was 0.18 kt C/ha for the 2020 submission but 0.11 kt C/ha for the 2021 submission, and the AD were also different in both submissions. During the review, the Party clarified that losses in above-ground biomass are mostly estimated on the basis of AD on annual harvest. In the 2020 submission, AD on harvest for 2018 were not available in time to be used in the estimates. Instead, a trend line using data from 2010 to 2017 was used as a preliminary estimate for losses in above-ground biomass due to harvest activity, resulting in the above-mentioned amount of 1.09 kt C. A new estimate based on actual AD replaced the trend line estimate in the 2021 submission, resulting in lower losses of above-ground biomass. The ERT noted that including the explanation provided by the Party would improve the transparency of the reporting. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided information on any changes in data and methods from previous annual submissions.
KL.14	FM – CO_2 (KL.19, 2019) Completeness	Report estimates for CSC in the litter of natural birch forests under FM or justify why the carbon pool is not a net source, in accordance with decision 2/CMP.8, annex II, paragraph 2(e).	Not resolved. Iceland reported CSC in litter for natural birch forests under FM for 2013–2019 as "NE" in CRF table 4(KP-I)B.1 without justifying in the NIR why the pool is not a net source of emissions. In contrast, the Party reported CSC in litter for cultivated forests under FM and included the description in its NIR (p.176). During the review, the Party clarified that it will include estimates for CSC in litter for natural birch forests under FM in the next annual submission. The ERT considers that if "NE" is reported, the Party could include an accompanying explanation in the documentation box to CRF table 4(KP-I)B.1.
KL.15	FM – CO_2 (KL.20, 2019) Transparency	Report transparently the technical corrections made to the FMRL, including those made in previous submissions, as stated in sections 2.7.5 and 2.7.6 of the Kyoto Protocol Supplement and in CRF table 4(KP-I)B.1.1.	Resolved. Iceland reported in its NIR (pp.299–301) information on the technical corrections made to the FMRL.
KL.16	FM – CO_2 (KL.21, 2019) Accuracy	Provide the revised technical correction to the FMRL, as planned, before the end of the commitment period.	Not resolved. Iceland reported in its NIR (p.301) that a further technical correction to the FMRL will be performed for the 2022 submission when the stock changes in natural birch forests between the first period (2005–2011) and second period (2015–2020) of the systematic sample plot inventory have been estimated and published. During the review, the Party clarified that a

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			new field inventory of natural birch forests started in 2015, consisting of remeasurements of the plots from the 2005–2011 inventory. Fieldwork was completed in mid-2021 and an analysis and estimate of the new mean annual CSC estimate for natural birch forests under FM for 2008–2020 will be used for the next annual submission. Other changes resulting in improvements to the FMRL will also be introduced in the 2022 submission. The ERT noted that the Party will include in the technical correction the CSC in litter for natural birch forests under FM as a new carbon pool (see ID# KL.14 above).
KL.17	FM – CO_2 (KL.22, 2019) KP reporting adherence	Report in the CRF accounting table the FM cap as established in the initial report and in accordance with decision 6/CMP.9, paragraph 12.	Resolved. Iceland reported in its CRF accounting table the FM cap as established in the initial report and in accordance with decision 6/CMP.9, paragraph 12.
KL.18	RV – CO_2 (KL.11, 2019) (KL.11, 2017) Accuracy	Revise estimates of carbon stock in living and dead biomass as well as carbon stock in soils in revegetated areas and revise estimates of carbon sequestration in revegetated land for the whole time series.	Addressing. Iceland reported in its NIR (p.296) that for CSC in soils, ongoing field sampling began in 2007, with a second sampling beginning in 2018, which is expected to result in better estimates in the future. In addition, in the NIR (p.297), the Party explained that the CSC in RV sites was estimated using a country-specific EF covering all carbon pools. Current results from the National Inventory on Revegetation Areas database for 2007–2011, which have not yet been published, indicate considerable variation between land reclamation methods and land types, and the data have not been fully analysed. During the review, the Party clarified that it is working to improve the estimation of CSC in living and dead biomass and carbon stock in soils; the preparation of soil, litter and vegetation samples by the Soil Conservation Service of Iceland through systematic plot sampling is ongoing and the samples will be analysed for their carbon content in late 2021. Further scientific analyses of the data are expected in the coming years.
KL.19	HWP – CO_2 (KL.12, 2019) (KL.12, 2017) Transparency	Provide in the NIR information on the calculation of emissions from HWP, including the AD and methodology used, including information on HWP from FM and deforestation, as well as information on how Iceland distinguishes between domestic and imported HWP, in accordance with the requirements in decision 2/CMP.8, annex II, paragraph 2(g)(i).	Addressing. Iceland reported in its NIR (p.302) information on wood and sawn wood production until 2019. The Party informed the ERT that AD are collected from different information sources, including the annual unofficial report of the Icelandic Forestry Association. However, the Party did not include additional information on how it distinguishes between domestic and imported HWP, nor did it provide information on the methodology used to estimate HWP from deforestation and FM. During the review, the Party clarified that the information on the origin of HWP is unclear and provided across several parts of the NIR and that it will be improved in the next annual submission. Regarding the methodology used to estimate HWP from deforestation and FM, the Party informed the ERT that all deforestation activities are closely followed by the Icelandic Forest Service in accordance with the Icelandic Forest Act (NIR p.170). Until now, only one deforestation event has yielded harvested wood but, in that case, the wood was not usable for producing sawn wood and was used for producing firewood instead.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included in the NIR information on the origin of HWP and information on the methodology used to estimate HWP from deforestation and FM.
KL.20	HWP – CO_2 (KL.23, 2019) Comparability	Include harvest data (e.g. in m^3 or kt C) for FM in column D of CRF table 4(KP-I)C on CSC in the HWP pool and report data that are consistent with those in NIR table 11.2.	Resolved. Iceland included in CRF table 4(KP-I)C harvest data in m^3 for FM that are consistent with the data reported in NIR table 11.3 (p.302).

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

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

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

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

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

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
General		
G.2	Include in the national registry disaster recovery plan information on the roles and responsibilities of primary and alternate registry personnel in disaster recovery; a communication procedure for the contingency plan; documentation for registry operation in a crisis situation; a periodic testing strategy based on procedures agreed with the registry host; and the time frame in which the registry could resume operations following a disaster.	4 (2016–2021)
G.6	Report in the NIR complete information on the tools and spreadsheets used for QA/QC and present a summary of the revised QA/QC plan and manual once they are finalized.	3 (2017–2021)
Energy		
E.3	Correct the errors and omissions in the national inventory, such as: (f) Missing use of charcoal.	3 (2017–2021)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
E.10	Develop country-specific fuel properties (NCVs and carbon content of fuels) that would allow the tier 2 approach for key categories to be used in line with the 2006 IPCC Guidelines.	3 (2017–2021)
E.12	Report information on steam coal consumption and petroleum coke consumption that provides justification for significant inter-annual changes and gaps in the time series of fuel consumption and associated emissions under category 1.A.2.f (non-metallic minerals).	5 (2014–2021)
E.15	Update the NIR with the CH_4 and N_2O EFs used for estimating emissions from diesel oil in road transportation.	3 (2017–2021)
E.21	Collect AD on the consumption of charcoal, estimate emissions from charcoal consumption, report the corresponding CO_2 emissions as a memo item and include the non-CO_2 emissions in the corresponding CRF table and national totals.	3 (2017–2021)
E.22	Improve the description provided in the NIR of the methodology used to estimate the emissions from geothermal power plants, as this is a key category accounting for 11.1 per cent of the GHG emissions of the energy sector, by providing the necessary details in order to facilitate the replication and assessment of the inventory.	3 (2017–2021)
IPPU		
I.1	Report in the CRF tables emission estimates or the relevant notation keys, as appropriate, for the categories glass production (2.A.3), ammonia production (2.B.1), adipic acid production (2.B.3), soda ash production (2.B.7) and electronics industry (2.E), and for foam blowing agents (2.F.2), fire protection (2.F.3), solvents (2.F.5) and other applications (2.F.6).	4 (2016–2021)
Agriculture		
A.3	Update productivity data, in particular the weight categories for cattle, poultry productivity (live weight and living age) and swine productivity (piglets per sow) and include in the improvement plan activities to update the productivity data at regular intervals.	3 (2017–2021)
A.24	Make a thorough examination of N flow to estimate emissions from N volatilized from atmospheric deposition reported in CRF table 3.D and consider including in the NIR a table with the overall mass balance of N, including information on N volatilized as NO_X, nitric oxide and N_2O.	3 (2017–2021)
A.25	Include in the NIR additional information on the non-occurrence of the field burning of agricultural crop residues.	5 (2014–2021)
LULUCF		
L.1	Enhance the transparency of the information in the NIR on the uncertainty analysis.	5 (2014–2021)
L.2	Conduct an uncertainty assessment of all carbon pools and gases in the LULUCF sector in accordance with decision 24/CP.19, annex I, paragraph 15.	3 (2017–2021)
L.6	Select the required information and organize it in a manner that enables the reader to clearly understand the data sources and their quality and the methodology used to derive the land representation.	5 (2014–2021)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
L.7	Improve the land representation data used to report LULUCF emissions and removals under the Convention by reconciling all data on areas contained in databases and land-use maps, as well as data collected from observations, including an estimation of uncertainties related to AD once land matrices are improved and updated.	3 (2017–2021)
L.10	Provide an additional description of the processes by which CSC and associated emissions and removals are estimated, including tables with raw data and intermediate outputs stratified by year and forest type.	5 (2014–2021)
L.11	Improve the estimates of CSC under forest land, particularly by including estimates for the deadwood and litter carbon pools, or provide an explanation in the NIR and in CRF table 9 of why these pools could not be estimated.	3 (2017–2021)
L.13	Include transparent information in the NIR on carbon stock for the land-use categories occurring in Iceland.	3 (2017–2021)
L.14	Implement the calculation methods in line with equations 2.15 and 2.16 of volume 4 of the 2006 IPCC Guidelines with instant oxidation of all amounts of living biomass and litter when making land-use conversions, unless Iceland can document that the carbon stock before land-use conversion is maintained in the land converted.	3 (2017–2021)
L.16	Estimate the area of forest land and other land that was converted to cropland before 1990 and report these values under the appropriate categories.	4 (2015/2016–2021)
L.18	Ensure the equivalence of climatic, historical and edaphic conditions when analysing pairs of samples (i.e. in cropland and grassland) to determine the dynamic of the soil carbon stocks associated with conversion among the two land uses.	5 (2014–2021)
L.19	Prepare estimates for the emissions from degraded areas of grassland.	6 (2013–2021)
L.21	Estimate and report CSC in mineral soils under grassland remaining grassland for “natural birch shrubland – old” and “revegetated land older than 60 years”.	4 (2015/2016–2021)
L.24	Revise the CO_2 estimates for land converted to grassland using updated data on carbon sequestration in soils, especially for other land converted to grassland, and include in the NIR, in tabular format, the total estimates of CSC in living biomass, litter and soil, and the average CSC per area for the whole time series, in land converted to grassland and land converted to forest land.	3 (2017–2021)
L.25	Estimate and report CSC in mineral soils under land converted to wetlands.	4 (2015/2016–2021)
L.28	Estimate and report CSC in mineral soils under land converted to settlements.	4 (2015/2016–2021)
L.33	Correct the use of notation keys to report on emissions from biomass burning in CRF table 4(V).	3 (2017–2021)
Waste		
W.6	Include in the NIR more background data on sludge removal (e.g. amount and N content), clearly indicating in which category the resulting emissions are accounted for.	6 (2013–2021)
KP-LULUCF		

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
KL.1	Include in the NIR country-specific information on the associated FM and AR and background levels of emissions associated with annual disturbances, as well as information on a margin and how to avoid the expectation of net credits or net debits during the commitment period, including through the use of a margin.	4 (2015/2016–2021)
KL.2	Report information clearly demonstrating that emissions by sources and removals by sinks resulting from FM under Article 3, paragraph 4, and any elected activities under Article 3, paragraph 4, are not accounted for under activities under Article 3, paragraph 3.	4 (2015/2016–2021)
KL.3	Provide in the NIR a description of the methodologies used for conducting an uncertainty analysis for KP-LULUCF (AR, deforestation, FM and HWP), including the methodology used in the uncertainty analysis of AD, EFs and emissions for each carbon pool.	3 (2017–2021)
KL.4	Provide information in the NIR on the approach used to develop background level and margin values for FM and AR and demonstrate how the approach taken avoids the expectation of net credits or net debits, in accordance with decision 2/CMP.7, annex, paragraph 33.	3 (2017–2021)
KL.5	Provide an additional description of the process by which CSC and associated emissions and removals are estimated, including tables with raw data and intermediate outputs stratified by year and forest type.	5 (2014–2021)
KL.6	Correct the use of notation keys by reporting CSC in the HWP pool under AR using the notation key “NO” for the whole time series and provide an explanation in the NIR that harvesting from afforestation lands has not yet occurred.	3 (2017–2021)
KL.9	Recalculate CSC in soil organic matter by ensuring symmetry among the pairs of land-use conversions (e.g. grassland converted to forest land, and forest land converted to grassland).	5 (2014–2021)
KL.11	Report information on CSC in below-ground biomass for FM or provide justification that the carbon pool is not a net source in accordance with decision 2/CMP.8, annex II, paragraph 2(e).	3 (2017–2021)
KL.18	Revise estimates of carbon stock in living and dead biomass as well as carbon stock in soils in revegetated areas and revise estimates of carbon sequestration in revegetated land for the whole time series.	3 (2017–2021)
KL.19	Provide in the NIR information on the calculation of emissions from HWP, including the AD and methodology used, including information on HWP from FM and deforestation, as well as information on how Iceland distinguishes between domestic and imported HWP, in accordance with the requirements in decision 2/CMP.8, annex II, paragraph 2(g)(i).	3 (2017–2021)

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

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

10. Table 5 presents findings made by the ERT during the individual review of the 2021 annual submission of Iceland that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2021 annual submission of Iceland

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
		No general findings additional to those included in table 3 were made by the ERT during the review.	
Energy			
E.25	1.A.3.a Domestic aviation – jet kerosene – CO_2, CH_4 and N_2O	Consumption of jet kerosene under category 1.A.3.a (domestic aviation) more than doubled between 2013 and 2014 but decreased to the original level in 2015. During the review, the Party clarified that 6.7 kt jet kerosene for 2014 was mistakenly allocated under category 1.A.3.a (domestic aviation) which should have been included under category 1.D.1.a (international aviation) instead. The ERT recommends that Iceland correct the allocation of the AD reported for jet kerosene for 2014 between category 1.A.3.a (domestic aviation) and 1.D.1.a (international aviation).	Yes. Comparability
E.26	1.A.3.b Road transportation – gasoline – CO_2	Iceland applied a tier 2 approach for road transportation in the 2021 submission. The ERT noted that in calculating the CO_2 EFs for gasoline, the Party obtained and applied country-specific NCVs for gasoline for 2017–2019 (varying from 70.59 to 71.07 t CO_2/TJ) and used an IPCC default constant NCV for 1990–2016 (43 TJ/kt). The Party also obtained a measured carbon content value for 2019 (19.15 t/TJ for gasoline) and applied it for the entire time series. Although the Party applied constant NCVs and a constant measured carbon content value for 1990–2016, the CO_2 EF for gasoline varied in this period (from 69.96 to 70.15 t CO_2/TJ) (see ID# E.10 in table 3). The ERT asked the Party whether the measured carbon content value for 2019 was for pure fossil fuel or fossil fuel blended with bioethanol. Iceland clarified that the fossil fuel was blended with bioethanol. The ERT considers that as the value of the CO_2 EF is wholly related to the carbon content, and it is important to measure and apply the correct carbon content in the inventory. The ERT recommends that Iceland verify the measured carbon content value for gasoline and apply the correct value, based on the pure fossil fuel, for estimating CO_2 emissions. The ERT also recommends that the Party explain in the NIR how the CO_2 EF was derived, including the values and assumptions for the NCVs and carbon content, and how the bioethanol is considered in the calculation of the CO_2 EF.	Yes. Accuracy
E.27	1.A.4 Other sectors – liquid fuels – CO_2, CH_4 and N_2O	Iceland did not report any information in its NIR on AD for working machinery (e.g. garden equipment and road construction machinery) or where the related emissions are reported. In CRF table 1.A(a)s4, the AD and emissions are reported as "NO" for category 1.A.4.a.ii (off-road vehicles and other machinery under commercial/institutional). During the review, the Party clarified that the AD and emissions related to working machinery are probably included under category 1.A.3.b (road transportation), as fuel sold at pump stations is defined as fuel consumption in road transportation according to NEA.	Yes. Comparability

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT recommends that Iceland change the notation key from "NO" to "IE" in CRF table 1.A(a)s4 for other machinery used in the category 1.A.4.a.ii (off-road vehicles and other machinery under commercial/institutional) and include in the NIR where AD and emissions related to other machinery are reported.	
E.28	1.A.4.c.ii Off-road vehicles and other machinery – CO_2, CH_4 and N_2O	Iceland does not have a separate section in its NIR for off-road vehicles under category 1.A.4.c.ii (off-road vehicles and other machinery under agriculture/forestry/fishing). Information on off-road vehicles is included in NIR section 3.3.2, entitled "Manufacturing Industries and Construction & Other (1A5)". The ERT recommends that Iceland create a separate section in its NIR containing information on off-road vehicles under category 1.A.4.c.ii (off-road vehicles and other machinery under agriculture/forestry/fishing).	Yes. Transparency
IPPU			
I.9	2.C.2 Ferroalloys production – CO_2	Iceland reported in NIR table 4.4 (p.78) emissions from ferroalloys production. The ERT noted that the emissions reported in NIR table 4.4 for 2019 were 431.4 kt CO_2 eq, while in CRF table 2(I).A-Hs2 the Party reported emissions of 429.81 kt CO_2 and 0.11 kt CH_4, which amounts to 432.6 kt CO_2 eq. During the review, the Party clarified that the total emissions for 2019 reported in the NIR are not correct and that it will update the next NIR accordingly. The ERT recommends that Iceland correct NIR table 4.4 (p.78) to reflect the correct emissions as reported in CRF table 2(I).A-Hs2.	Yes. Convention reporting adherence
I.10	2.D.2 Paraffin wax use – CO_2	Iceland reported in its NIR (p.84) the equation used to estimate CO_2 emissions from paraffin wax use. However, the methodology used for the estimates was not clear from the explanation provided in the NIR, especially the statement that "The proportion of paraffin candles used is assumed to be 66%, taken from the Norwegian Inventory Report for 2015". During the review, the Party explained that in section 4.5.2.4 of the NIR of Norway, both the 2015 submission (p.257) and 2021 submission (p.261) state: "The assumption of 0.66 as the fraction of all candles being made of paraffin waxes is based on estimates obtained from one major candle and wax importer". The Party further explained that paraffin wax consumption is calculated from the AD multiplied by the NCV value of 40.2 TJ/kt. Since the AD cover candles and other paraffin, the Party estimated emissions both from candles and from other paraffin, specifically: (a) emissions from paraffin from candles based on net consumption of candles; and (b) emissions from paraffin (without candles) based on net consumption of paraffin (without candles). To combine the two, the net consumption of candles is multiplied by the factor 0.66 since not all of the AD on candles relate to candles made of paraffin. The Party clarified that it will include a more detailed explanation of the methodology and assumptions used to estimate emissions from paraffin wax use in the next NIR. The ERT recommends that Iceland include in the NIR more detailed information on the methodology and assumptions used to estimate emissions from paraffin wax use, as explained during the review.	Yes. Transparency
Agriculture			
A.28	3. General (agriculture)	Iceland provided in its NIR (p.113) explanations for the calculation of the horse population and presented in NIR table 5.7 (p.113) a comparison of different data sets related to horses. The ERT noted that the values provided for the horse population in NIR table 5.7 (e.g. 70,612 for 2019) were not the same as those in CRF tables 3.As1 and 3.B(a)s1 (e.g. 72,449 for 2019). During the review, the Party clarified that NIR table 5.7 shows the difference between the two data sets and the final total horse number used to calculate the population of foals. The difference was therefore due to the inclusion of foals in CRF tables 3.As1 and 3.B(a)s1 but not in NIR table 5.7. The Party	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
		provided the ERT with a calculation file showing that the population of foals was estimated partially on the basis of recorded living foals and partially on the number of slaughtered foals. The ERT recommends that Iceland clarify in the NIR how the population of horses is estimated by adding an explanation of the methodology applied for the inclusion of foals.	
A.29	3. General (agriculture)	Iceland reported in its NIR (pp.111–112 that the population for some young animals is based on the population of mature animals and assumptions on the productivity and lifetime of animals. Ages at slaughter are presented in NIR table 5.5 (p.112). However, several parameters used in the calculations are not provided in NIR, in particular productivity of sows (number of piglets per year) and female goats (single and double birth) and the fact that early mortality is considered for lambs only and not for piglets and goat kids. During the review, the Party provided the ERT with a file containing the calculations applied for estimating the population of young animals (lambs, piglets, goat kids and foals) and indicated that the number of piglets per sow changed from 15 in 1990 to 25 in 2019. The calculations were performed in accordance with guidance provided in the 2006 IPCC Guidelines. NIR equation 10.1 presents the calculation used for the annual average population for animals living less than one year. The ERT recommends that Iceland provide in the NIR additional explanations of the calculations applied for estimating the population of young animals by indicating for each species the productivity (number of births per year), rate of pregnancy and early mortality considered.	Yes. Transparency
A.30	3.D Direct and indirect N_2O emissions from agricultural soils – N_2O	Iceland reported in CRF table 3.D additional information on the $Frac_{GASF}$ and $Frac_{GASM}$ parameters as required by the CRF tables (e.g. 0.022 and 0.158 for 2019 respectively). It was not clear to the ERT whether these values had been updated in line with the reporting of indirect N_2O emissions because for category 3.D.b.1 (atmospheric deposition) the reported $Frac_{GASF}$ and $Frac_{GASM}$ for 2019 result in higher AD values than those reported for volatilized N from agricultural inputs of N. During the review, the Party revised the fraction reported in the additional information box in CRF table 3.D; although the value of $Frac_{GASF}$ was correct, the $Frac_{GASM}$ value was calculated incorrectly as the most recent additions to organic fertilizer input (sewage, compost, other organic fertilizers) had been omitted. Adding NH_3 and NO_X from other organic fertilizers, animal manure applied to soils, and urine and dung deposited from grazing animals results in a $Frac_{GASM}$ value of 0.132 for 2019 compared with the reported value of 0.158. The Party indicated that this does not affect the emission estimate and that the value for $Frac_{GASM}$ will be corrected for the next annual submission. The ERT recommends that Iceland correct the reported value for $Frac_{GASM}$ for the entire time series (e.g. from 0.158 to 0.132 for 2019) by adding NH_3 and NO_X from other organic fertilizers, animal manure applied to soils, and urine and dung deposited from grazing animals.	Yes. Convention reporting adherence
LULUCF			
L.35	4.B.1 Cropland remaining cropland – CO_2	Iceland reported in its NIR (pp.178–179) and in CRF table 4.B two subdivisions for cropland remaining cropland, entitled “cropland active” and “cropland inactive (fallow)”, where “cropland inactive (fallow)” includes all cropland not currently considered under cultivation. However, the Party used the same EF for CSC in mineral soils for “cropland active” and “cropland inactive (fallow)” in CRF table 4.B (0.1708 t C/ha/year) and, according to the explanation provided in the NIR (section 6.6.12, p.179), CSC in mineral soils is estimated on the basis of a study by Helgason (1975) on the effects of different N fertilizers on soil properties. The ERT observed that “cropland inactive (fallow) is not considered under cultivation and it is therefore not appropriate to use the same EF as for “cropland active”. During the review, the Party clarified that the EF for CSC in mineral soils was estimated for the first time in the 2018 submission.	Yes. Accuracy

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The estimate was based on one study only (Helgason, 1975). Consequently, the data currently used for cropland are severely limited. The Party therefore decided to use the same EF for CSC in mineral soils both for "cropland active" and for "cropland inactive (fallow)". The Party is working to correct the situation, hopefully for the 2023 submission. The Party further clarified that after an initial revision of the study by Helgason, the EF for CSC in mineral soils for "cropland active" should be corrected from 0.1708 to 0.1525 t C/ha/year for the next annual submission. The ERT recommends that Iceland apply the correct EF for CSC in mineral soils for "cropland active" (0.1525 t C/ha/year) and revise the EF for CSC in mineral soils for "cropland inactive (fallow)", because "cropland inactive (fallow)" is not under cultivation and the carbon content in mineral soils should be different from the carbon content in mineral soils for "cropland active".	
L.36	4.D.1.2 Flooded land remaining flooded land – CO_2 and CH_4	Iceland reported in its NIR (p.193) that "mires converted to reservoirs" are reported as a subcategory under category 4.D.1.2 (flooded land remaining flooded land), although the land was not flooded before it was inundated by the reservoirs. "Mires converted to reservoirs" corresponds to land with high soil organic content and includes land with organic soils or complexes of peat land and upland soils that were inundated. The Party reported CSC in organic soils in CRF table 4.D and emissions of CO_2 and CH_4 in CRF table 4(II) (cells G61 and I61) and explained in the NIR that for rewetted organic soils, emissions were estimated applying equation 3.5 of the Wetlands Supplement (p.205). The ERT noted that mires have a substantial change in water surface area and are converted to flooded lands (reservoirs), and that the 2006 IPCC Guidelines provide a methodology for flooded land, although no guidance is provided on estimating CSC in soils. During the review, the Party explained that mires and flooded land are included under the wetlands subcategory. As the CRF tables do not allow land-use changes to be reported within a category (i.e. from other wetlands to flooded land), inundated mires are categorized as land remaining flooded land, although they should strictly be reported as "other wetlands" converted to "flooded land". However, that is not a valid option in the CRF tables. Inundated mires therefore remain as wetlands, although they are converted from one wetlands subcategory to another. The Party did not include an explanation for the use of the methodology provided in the Wetlands Supplement. If Iceland defines reservoirs as flooded land, the ERT recommends that the Party use the methodology for flooded land provided in the 2006 IPCC Guidelines (vol. 4, chap. 7.3, p.7.19). The ERT encourages the Party to explore peer-reviewed guidance, such as the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*, which could inform the Party's country-specific approaches. If, on the other hand, the Party considers reservoirs as rewetted organic soils, the ERT recommends that the Party use the methodology provided in the Wetlands Supplement (chap. 3). To improve the transparency of the reporting, the ERT recommends that the Party include more information on the characteristics of the reservoirs in the NIR.	Yes. Accuracy
L.37	4(I) Direct N_2O emissions from N input to managed soils – N_2O	In response to a question raised by the ERT regarding inorganic fertilizers applied to forest land (see ID# L.29 in table 3), Iceland explained that since the 2020 submission, all inorganic fertilizers are reported under the agriculture sector. In the NIR (p.202), the Party further clarified that fertilizers used in forestry are included under total synthetic fertilizers in category 3.D.a.1 (inorganic N fertilizers) and "NO, NA" is reported in CRF table 4(I) for category 4.A.2 (land converted to forest land). The ERT checked the AD reported for inorganic fertilizers in CRF table 3.D in the 2019 and 2021 submissions and noted that the same AD were reported in both submissions for category 3.D.a.1, whereas in the 2019 submission a value for N input under category 4.A.2.1 (cropland converted to forest land) (6,266.67 kg N/year for 2017) was also reported in CRF table 4(I). During the review, the	Yes. Convention reporting adherence

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
		Party clarified that there was a mistake in the AD uploaded in CRF table 3.D for category 3.D.a.1 but that the emissions are reported correctly. The Party provided a spreadsheet with the correct values for the AD and emissions. The ERT checked the calculations and agreed that the emissions reported under category 3.D.a.1 are correct. The ERT also checked the estimate of indirect N_2O emissions from inorganic fertilizers under category 3.D.b (using the same N input as for category 3.D.a.1) and noted that the emission estimates are correct. The ERT recommends that Iceland report the correct AD for inorganic fertilizers in CRF table 3.D for the entire time series and correctly report the AD as "IE" in CRF table 4(I), explaining in the documentation box and in CRF table 9 where the emissions are reported.	
L.38	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CH_4	Iceland reported in its NIR (p.173) that for the estimation of CH_4 emissions from drained organic soils in forest land, it uses a proportion of 5 per cent of ditches. The ERT noted that using a proportion of 5 per cent of ditches should result in a CH_4 IEF of 12.75 kg CH_4/ha instead of the CH_4 IEF of 7.37 kg CH_4/ha as reported in the NIR (p.174) and in CRF table 4(II) (cells F12–F15). During the review, the Party clarified that there is a typographical error in the text of the NIR. The assumed area of ditches is 2.5 per cent for CH_4 from ditches in drained forest land instead of 5 per cent. The Party stated that this error will be corrected in the next annual submission. The ERT recommends that Iceland correct in the NIR the proportion of ditches for drained organic soils (using the correct value of 2.5 per cent).	Yes. Convention reporting adherence
Waste			
W.8	5.B.1 Composting – CH_4 and N_2O	Iceland reported in NIR table 7.13 (p.229) that 24 kt of waste was composted in 2019. However, 9.6 kt dm was reported in CRF table 5.B. In addition, the Party stated in the NIR (p.229) that it applied the default EF of 4 g CH_4/kg waste and 0.24 g N_2O/kg waste, whereas CRF table 5.B shows IEF values of 10 g CH_4/kg waste and 0.6 g N_2O/kg waste. During the review, the Party clarified that during the last review of the annual submission of the EU, it was realized that in CRF table 5.B the AD for category 5.B.1 should be expressed on a dry weight basis (kt dm), and that the IEFs should correspond to the default values expressed on a dry weight basis (10 g CH_4/kg and 0.6 g N_2O/kg waste on a dry basis). However, Iceland has always reported the AD on a wet weight basis, as it obtains data on the amounts of waste sent to composting on a wet weight basis; the 24 kt of waste reported in the NIR for 2019 therefore corresponds to the amount of waste composted in wet weight. The Party further explained that it calculated the AD on a dry weight basis, which is added to CRF table 5.B, but that it failed to update NIR table 7.13 accordingly. The Party explained that the emission estimates are correct and that it will update the next NIR accordingly. The ERT recommends that Iceland report the amount of waste composted consistently between NIR table 7.13 and CRF table 5.B, and correctly report in the NIR text whether dry weight or wet weight is used as the basis for the estimation.	Yes. Convention reporting adherence
W.9	5.D Wastewater treatment and discharge – CH_4 and N_2O	Iceland reported in its NIR (p.237) that a correction factor of 1 is used for discharge of industrial wastewater into sewers (category 5.D.1 – domestic wastewater) because emissions from industrial wastewater are calculated separately. However, the Party reported under category 5.D.2 (industrial wastewater) emissions related to a single industrial wastewater activity (fish processing), the discharge from which is assumed not to enter the domestic sewage system. The ERT noted that industrial wastewater includes discharge from a variety of commercial activities, including accommodation services (hotels, motels, etc.), restaurants, butchers and grocery stores, which	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		is commonly co-discharged with domestic wastewater (2006 IPCC Guidelines, vol. 5, chap. 6.2.2.3, p.6.14). In addition, Statistics Iceland reports that tourism is a major industry and that, in 2019, tourist accommodation provided 7,316,651 overnight stays for foreign nationals visiting Iceland. However, emission estimates for this and other commercial sources are not reported in the NIR. During the review, the Party clarified that the text in the NIR is partially incorrect. The text states that "The correction factor was set to 1 because emissions from industrial wastewater are calculated separately", but that applies only to the following discharge pathways: "not known", "septic tanks urban" and "septic tanks rural". The correction factor of 1.25 is applied to the following discharge pathways: "not known into sea, river, lake", "primary treatment", "secondary treatment" and "tertiary treatment". The Party estimated the additional emissions from overnight stays associated with foreign visitors to Iceland and demonstrated that, during 2015–2019, this source represented annual emissions of between 1 and 1.4 kt CO_2 eq, which is below the threshold of significance (approximately 2.5 kt CO_2 eq for 2015–2019). The ERT recommends that Iceland update the NIR to explain that a correction factor of 1 is applied to the discharge pathways "not known", "septic tanks urban" and "septic tanks rural" and that a correction factor of 1.25 is applied to the discharge pathways in which commercial activities are likely to occur, namely, "not known into sea, river, lake", "primary treatment", "secondary treatment" and "tertiary treatment". The ERT also recommends that the Party verify whether emissions from overnight stays associated with foreign visitors to Iceland are included in the inventory (in the discharge pathways using a correction factor of 1.25) and, if not, include the emission estimates in the inventory, because justification for exclusion based on the likely level of emissions should be applied at the category level and not to parts of a category or subcategory, in accordance with the UNFCCC Annex I inventory reporting guidelines, paragraph 37(b), footnote 7.	
W.10	5.D Wastewater treatment and discharge – NO_X, CO and NMVOCs	Iceland reported NO_X, CO and NMVOCs under domestic and industrial wastewater (categories 5.D.1 and 5.D.2) as "NE" in CRF table 5. During the review, the Party proposed the following changes to the notation keys after reviewing the notation keys in CRF table 5 and the EMEP/EEA guidebook 2019: (1) reporting NO_X and CO as "NA", as stated in the EMEP/EEA guidebook 2019 (section 5.D); and (2) reporting "NE" for NMVOCs, as there is an EF available in the EMEP/EEA guidebook 2019; however, to use it, the Party indicated that it will need to change the AD and obtain data on the volume of wastewater handled for calculating the GHG emissions, applying a tier 1 method and using BOD for the population. The ERT recommends that Iceland update the notation key to "NA" for NO_X and CO in CRF table 5. The ERT also recommends that the Party continue to report NMVOCs as "NE" until it is able to change the AD and obtain data on the volume of wastewater handled for calculating the GHG emissions, applying a tier 1 method and using BOD for the population. In addition, the ERT recommends that the Party provide in CRF table 9 the reasons for reporting "NE" for NMVOCs under domestic and industrial wastewater. The Party could consider providing justification for the exclusion of emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Yes. Convention reporting adherence
KP-LULUCF			
		No findings for KP-LULUCF additional to those included in table 3 were made by the ERT during the review.	

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

VI. Application of adjustments

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

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

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

VIII. Questions of implementation

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

Annex I

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

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

Table I.1

Total greenhouse gas emissions and removals for Iceland, base year–2019

(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions and removals including indirect CO_2 emissions*[a]		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)*[b]	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)*[c]	*KP-LULUCF (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*	*FM*
FMRL								–154.00
Base year[d]	12 875.10	3 682.90	NA	NA	NA		–386.76	
1990	12 875.10	3 682.90	NA	NA				
1995	12 674.22	3 513.11	NA	NA				
2000	13 310.67	4 126.80	NA	NA				
2010	14 159.65	4 866.27	NA	NA				
2011	13 914.94	4 647.06	NA	NA				
2012	13 919.84	4 657.36	NA	NA				
2013	13 903.21	4 654.39	NA	NA		–183.85	–608.60	–81.26
2014	13 910.72	4 685.66	NA	NA		–204.30	–615.04	–84.58
2015	13 966.17	4 763.99	NA	NA		–224.21	–622.37	–88.30
2016	13 891.38	4 716.62	NA	NA		–244.21	–595.87	–92.02
2017	13 930.64	4 795.42	NA	NA		–280.83	–598.64	–93.73
2018	13 927.76	4 822.19	NA	NA		–309.27	–615.50	–94.03
2019	13 794.41	4 722.35	NA	NA		–355.64	–603.13	–90.63

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

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

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

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

[d] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases except NF_3, for which the base year is 1995. The base year for RV 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 Iceland, excluding land use, land-use change and forestry, 1990–2019
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	2 228.42	601.55	356.84	0.34	494.64	NO, NA	1.10	NO, NA
1995	2 467.10	628.75	343.22	3.43	69.36	NO, NA	1.24	NO, NA
2000	2 932.13	656.91	342.59	43.96	149.89	NO, NA	1.31	NO, NA
2010	3 624.65	654.55	305.64	105.11	171.66	NO	4.66	NO
2011	3 501.31	635.43	302.30	130.46	74.52	NO	3.05	NO
2012	3 496.83	611.53	308.94	140.74	94.00	NO	5.32	NO
2013	3 482.73	614.12	302.80	163.38	88.17	NO	3.20	NO
2014	3 459.26	624.93	330.53	169.60	99.03	NO	2.32	NO
2015	3 536.22	629.81	313.05	179.65	103.70	NO	1.56	NO
2016	3 487.42	620.84	311.29	203.86	91.86	NO	1.34	NO
2017	3 604.89	609.35	321.98	188.88	68.01	NO	2.31	NO
2018	3 663.38	608.57	307.09	163.45	76.44	NO	3.26	NO
2019	3 550.75	569.25	296.02	207.27	97.06	NO	1.99	NO
Percentage change 1990–2019	**59.3**	**–5.4**	**–17.0**	**NA**	**–80.4**	**NA**	**81.9**	**NA**

Note: Emissions and removals reported in the sector other (sector 6) are not included in this table.
[a] Iceland did not report indirect CO_2 emissions in CRF table 6.

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

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	1 849.10	957.67	656.76	9 192.19	219.36	NO
1995	2 061.08	564.55	617.10	9 161.11	270.37	NO
2000	2 191.30	1 009.56	624.39	9 183.87	301.55	NO
2010	2 029.28	1 910.71	629.82	9 293.38	296.45	NO
2011	1 906.73	1 831.98	630.03	9 267.88	278.32	NO
2012	1 856.88	1 907.14	633.17	9 262.48	260.18	NO
2013	1 818.24	1 947.41	618.71	9 248.82	270.03	NO
2014	1 830.03	1 931.54	664.13	9 225.06	259.97	NO

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2015	1 852.17	1 998.36	652.57	9 202.18	260.89	NO
2016	1 827.50	1 986.58	654.30	9 174.76	248.25	NO
2017	1 870.52	2 024.05	655.94	9 135.23	244.90	NO
2018	1 912.88	2 022.53	631.91	9 105.57	254.86	NO
2019	1 854.91	2 024.37	618.85	9 072.06	224.22	NO
Percentage change 1990–2019	**0.3**	**111.4**	**– 5.8**	**– 1.3**	**2.2**	**NA**

Notes: (1) Iceland did not report emissions or removals in the sector other (sector 6); (2) Iceland did not report indirect CO_2 emissions in CRF table 6.

Table I.4

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

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[a]	*Activities under Article 3.3 of the Kyoto Protocol*		*FM and elected activities under Article 3.4 of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				–154.00				
Technical correction				76.95				
Base year[b]	NA				NA	NO, NA	–386.76	NA
2013		–184.01	0.16	–81.26	NA	NO, NA	–608.60	NA
2014		–204.41	0.11	–84.58	NA	NO, NA	–615.04	NA
2015		–224.86	0.65	–88.30	NA	NO, NA	–622.37	NA
2016		–244.46	0.25	–92.02	NA	NO, NA	–595.87	NO, NA
2017		–281.30	0.47	–93.73	NA	NO, NA	–598.64	NA
2018		–309.73	0.46	–94.03	NA	NO, NA	–615.50	NA
2019		–356.10	0.46	–90.63	NA	NO, NA	–603.13	NA
Percentage change base year–2019					**NA**	**NA**	**55.9**	**NA**

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

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

[b] The base year for RV 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.

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

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

Parameter	*Data values*
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: not elected (e) GM: not elected (f) RV: commitment period accounting (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	RV
Election of application of provisions for natural disturbances	Yes, for AR and FM
3.5% of total base-year GHG emissions, excluding LULUCF	127.175 kt CO_2 eq (1 071.396 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA
4. RV	NA

Annex II

Information to be included in the compilation and accounting database

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

Table II.1
Information to be included in the compilation and accounting database for 2019, including on the commitment period reserve, for Iceland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
CPR	13 794 496	–	–	13 794 496
Annex A emissions				
CO_2	3 550 747	–	–	3 550 747
CH_4	569 248	–	–	569 248
N_2O	296 024	–	–	296 024
HFCs	207 274	–	–	207 274
PFCs	97 061	–	–	97 061
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	1 994	–	–	1 994
NF_3	NO	–	–	NO
Total Annex A sources	**4 722 349**	–	–	**4 722 349**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–356 099	–	–	–356 099
Deforestation	462	–	–	462
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–90 628	–	–	–90 628
RV	–603 127	–	–	–603 127
RV for the base year	–386 762	–	–	–386 762

Table II.2
Information to be included in the compilation and accounting database for 2018 for Iceland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	3 663 377	–	–	3 663 377
CH_4	608 567	–	–	608 567
N_2O	307 092	–	–	307 092
HFCs	163 447	–	–	163 447
PFCs	76 444	–	–	76 444
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	3 260	–	–	3 260
NF_3	NO	–	–	NO
Total Annex A sources	**4 822 188**	–	–	**4 822 188**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–309 735	–	–	–309 735
Deforestation	462	–	–	462
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				

	Original submission	*Revised submission*	*Adjustment*	*Final value*
FM	–94 026	–	–	–94 026
RV	–615 501	–	–	–615 501
RV for the base year	–386 762	–	–	–386 762

Table II.3
Information to be included in the compilation and accounting database for 2017 for Iceland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	3 604 886	–	–	3 604 886
CH_4	609 354	–	–	609 354
N_2O	321 984	–	–	321 984
HFCs	188 878	–	–	188 878
PFCs	68 006	–	–	68 006
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	2 307	–	–	2 307
NF_3	NO	–	–	NO
Total Annex A sources	**4 795 416**	–	–	**4 795 416**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–281 298	–	–	–281 298
Deforestation	467	–	–	467
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–93 725	–	–	–93 725
RV	–598 640	–	–	–598 640
RV for the base year	–386 762	–	–	–386 762

Table II.4
Information to be included in the compilation and accounting database for 2016 for Iceland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	3 487 423	–	–	3 487 423
CH_4	620 844	–	–	620 844
N_2O	311 291	–	–	311 291
HFCs	203 863	–	–	203 863
PFCs	91 857	–	–	91 857
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	1 345	–	–	1 345
NF_3	NO	–	–	NO
Total Annex A sources	**4 716 622**	–	–	**4 716 622**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–244 456	–	–	–244 456
Deforestation	248	–	–	248
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–92 021	–	–	–92 021
RV	–595 870	–	–	–595 870
RV for the base year	–386 762	–	–	–386 762

Table II.5
Information to be included in the compilation and accounting database for 2015 for Iceland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	3 536 220	–	–	3 536 220
CH_4	629 812	–	–	629 812
N_2O	313 053	–	–	313 053
HFCs	179 653	–	–	179 653
PFCs	103 695	–	–	103 695
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	1 558	–	–	1 558
NF_3	NO	–	–	NO
Total Annex A sources	**4 763 991**	–	–	**4 763 991**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–224 860	–	–	–224 860
Deforestation	647	–	–	647
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–88 301	–	–	–88 301
RV	–622 368	–	–	–622 368
RV for the base year	–386 762	–	–	–386 762

Table II.6
Information to be included in the compilation and accounting database for 2014 for Iceland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	3 459 260	–	–	3 459 260
CH_4	624 933	–	–	624 933
N_2O	330 528	–	–	330 528
HFCs	169 595	–	–	169 595
PFCs	99 030	–	–	99 030
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	2 315	–	–	2 315
NF_3	NO	–	–	NO
Total Annex A sources	**4 685 661**	–	–	**4 685 661**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–204 409	–	–	–204 409
Deforestation	111	–	–	111
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–84 583	–	–	–84 583
RV	–615 039	–	–	–615 039
RV for the base year	–386 762	–	–	–386 762

Table II.7
Information to be included in the compilation and accounting database for 2013 for Iceland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	3 482 726	–	–	3 482 726
CH_4	614 120	–	–	614 120

	Original submission	*Revised submission*	*Adjustment*	*Final value*
N_2O	302 798	–	–	302 798
HFCs	163 377	–	–	163 377
PFCs	88 165	–	–	88 165
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	3 202	–	–	3 202
NF_3	NO	–	–	NO
Total Annex A sources	**4 654 388**	**–**	**–**	**4 654 388**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–184 007	–	–	–184 007
Deforestation	155	–	–	155
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–81 263	–	–	–81 263
RV	–608 599	–	–	–608 599
RV for the base year	–386 762	–	–	–386 762

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

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

(a) 1.A.4 other sectors – charcoal use (CH_4 and N_2O) (see ID# E.21 in table 3);

(b) 4.A forest land – CSC in the deadwood carbon pool (CO_2) (see ID# L.11 in table 3);

(c) 4.C grassland – degraded areas (CO_2) (see ID# L.19 in table 3);

(d) 4.C.1 grassland remaining grassland – CSC in mineral soils for "natural birch shrubland – old" and "revegetated land older than 60 years" (CO_2) (see ID# L.21 in table 3);

(e) 4.E.2 land converted to settlements – CSC in mineral soils (CO_2) (see ID# L.28 in table 3);

(f) 4(V) biomass burning – cropland and grassland (CO_2, CH_4 and N_2O) (see ID# L.34 in table 3);

(g) 5.A.1 managed waste disposal sites – emissions from combustion of landfill gas for energy for 2002–2009 (CH_4 and N_2O) (see ID# W.4 in table 3);

(h) Deforestation – N from mineralization/immobilization (N_2O) (see ID# KL.10 in table 3);

(i) FM – CSC in below-ground biomass (CO_2) (see ID# KL.11 in table 3);

(j) FM – CSC in litter in natural birch forests (CO_2) (see ID# KL.14 in table 3).

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2000. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. J Penman, D Kruger, I Galbally, et al. (eds.). Hayama: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency/Institute for Global Environmental Strategies. Available at https://www.ipcc.ch/publication/good-practice-guidance-and-uncertainty-management-in-national-greenhouse-gas-inventories/.

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

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

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

IPCC. 2019. *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. E Calvo Buendia, K Tanabe, A Kranjc, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html.

B. UNFCCC documents

Annual review reports

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

Other

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

Annual status report for Iceland for 2021. Available at https://unfccc.int/sites/default/files/resource/asr2021_ISL.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Nicole Keller (EA), 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:

European Environment Agency. (2019). EMEP/EEA air pollutant emission inventory guidebook. Retrieved from EMEP/EEA air pollutant emission inventory guidebook - 2019: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019.

Helgason, B. (1975). Breytingar á jarðvegi af völdum ólíkra tegunda köfnunarefnisáburðar. Samanburður þriggja tegunda köfnunarefnisáburðar. Íslenskar landbúnaðarrannsóknir, 7(1-2), 11.

Sigurðsson, B., Magnússon, B., Elmarsdóttir, A., & Bjarnadóttir, B. (2005). Biomass and composition of understory vegetation and the forest floor carbon stock across Siberian larch and mountain birch chronosequences in Iceland. Annals of Forest Sciences, 62(8), 881-888.