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Report on the individual review of the annual submission of Norway submitted in 2020*

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 2020 annual submission of Norway, 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 31 August to 5 September 2020.

* In the symbol for this document, 2020 refers to the year in which the inventory was submitted, not to the year of publication.

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Contents

Abbreviations and acronyms

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"
C	carbon
CER	certified emission reduction
CH_4	methane
CM	cropland management
CO	carbon monoxide
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"
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
dm	dry matter
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU ETS	European Union Emissions Trading System
Eurostat	statistical office of the European Union
F-gas	fluorinated gas
FM	forest management
FMRL	forest management reference level
GE	gross energy intake
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
ICP	International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests, operating under the Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
N	nitrogen
NA	not applicable

NE	not estimated
NEA	Norwegian Environment Agency
NEU	non-energy use
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NIR	national inventory report
NMVOC	non-methane volatile organic compound
NO	not occurring
NO_X	nitrogen oxides
N_2O	nitrous oxide
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
Revised 1996 IPCC Guidelines	*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*
RMU	removal unit
RV	revegetation
SF_6	sulfur hexafluoride
SN	Statistics Norway
SOC	soil organic carbon
UNFCCC Annex I inventory reporting guidelines	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*
Y_m	methane conversion rate
2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
2019 Refinement to the 2006 IPCC Guidelines	*2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*

I. Introduction

1. This report covers the review of the 2020 annual submission of Norway, 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 31 August to 5 September 2020 and was coordinated by Sevdalina Todorova (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Norway.

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

Area of expertise	*Name*	*Party*
Generalist	Melissa Weitz	United States of America
Energy	Dario Ruben Gomez	Argentina
	Katrina Young	United Kingdom
IPPU	Koen E.L. Smekens	Belgium
	Alexander Valencia	Colombia
Agriculture	Braulio Pikman	Brazil
LULUCF and KP-LULUCF	Rosie Brook	United Kingdom
	Inge G.C. Jonckheere	Belgium
Waste	Detelina Petrova	Bulgaria
Lead reviewers	Alexander Valencia	
	Melissa Weitz	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2020 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that Norway resolve identified findings, including issues[1] designated as problems.[2] Other findings, and, if applicable, the encouragements of the ERT to Norway to resolve related issues, are also included.

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

5. Annex I presents the annual GHG emissions of Norway, 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.

[1] Issues are defined in decision 13/CP.20, annex, para. 81.

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

II. Summary and general assessment of the Party's 2020 annual submission

7. In accordance with paragraph 76 of the UNFCCC review guidelines and paragraphs 47 and 65 of the Article 8 review guidelines, the ERT has prioritized the review of issues and problems identified in previous review reports or in the initial assessment, recalculations that have changed the emission or removal estimate for a category by more than 2 per cent or national total emissions by more than 0.5 per cent for any of the recalculated years and supplementary information reported under the Kyoto Protocol. Table 2 provides the assessment by the ERT of the Party's 2020 annual submission with respect to the tasks undertaken during the desk review. Further information on the issues identified, as well as additional findings, may be found in tables 3, 5 and 6.

Table 2
Summary of review results and general assessment of the 2020 annual submission of Norway

Assessment			*Issue/problem ID#(s) in table 3, 5 or 6*[a]
Date of submission	Original submission: NIR, 3 April 2020; CRF tables (version 2), 3 April 2020; standard electronic format tables (SEF-CP1-2019 and SEF-CP2-2019), 3 April 2020		
Review format	Desk review		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	E.5, E.20, I.7, L.3, L.7, L.14, L.17, KL.3, KL.5, KL.6
	(c) Development and selection of EFs?	Yes	E.21, I.17, L.19, W.3, KL.7
	(d) Collection and selection of AD?	Yes	G.9, E.1, E.2, E.3, E.11, E.14, E.26
	(e) Reporting of recalculations?	Yes	E.24, I.8, I.9, I.10, W.7
	(f) Reporting of a consistent time series?	Yes	E.13, L.11, KL.1
	(g) Reporting of uncertainties, including methodologies?	Yes	G.12, I.6
	(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	L.1, L.22, W.2, W.6, KL.8
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	No	L.2, W.2, W.5
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	I.19, L.28
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?	Yes	G.2
	(b) Performance of the national system functions?	Yes	G.3, G.6, G.8, G.9
	Have any issues been identified related to the national registry:		

Assessment			*Issue/problem ID#(s) in table 3, 5 or 6*[a]
	(a) Overall functioning of the national registry?	No	
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No	
	Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the standard independent assessment report?	No	
	Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No	
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	No	
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	No	
	(c) Reporting requirements of decision 6/CMP.9?	No	
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	NA	
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	Norway 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?	Yes	Please refer to annex III for a list of the questions and issues to be considered during the in-country review
Questions of implementation	Did the ERT list any questions of implementation?	No	

[a] The ERT identified additional issues and/or problems related to all sectors that are not listed in this table but are included in tables 5–6.

[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 18 July 2019,[3] and had not been resolved by the time of publication of the review report of the Party's 2018 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. The ERT noted that the individual review of Norway's 2019 annual submission did not take place in 2019 owing to insufficient funding for the review process.

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

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	National system (G.8, 2018) KP reporting adherence	Implement the proposed updates to the resourcing plan and provide training to the new team to mitigate the risks to the functions of the national system that have been identified by SN, and report on progress in subsequent annual submissions.	Resolved. The Party reported in its NIR (section 10.4.2 and annex V) on its national system and the implementation of the plans for further improvement of the institutional arrangements and for training the new inventory team aimed at ensuring sufficient capacity and making suitable arrangements for the technical competence of the staff involved in the development of the national inventory (decision 19/CMP.1, annex, para. 10(b)). A plan for capacity-building and increased contact between the more experienced NEA staff and the new SN staff has been established and training has been provided in order to minimize the risk of loss of institutional memory (NIR table 10.12). The Party reported in the NIR on several training courses and coordination activities that have been completed (e.g. a two-day seminar for all staff involved in inventory preparation) or are planned (e.g. a workshop on QA/QC management). During the review, the Party clarified that while the former inventory team was in the process of handing over tasks and transferring knowledge to the new SN inventory team, a detailed resourcing plan was in place; however, details of the plan are no longer considered necessary and hence were not updated and presented in the NIR. The ERT concluded that this issue should be regarded as resolved because training has been provided to the new team and there is a system in place to ensure continued learning and capacity-building among inventory staff.
G.2	National system	NEA, as the single national entity with overall	Addressing. The Party reported in its NIR (section 1.2.1) on the signed

[3] FCCC/ARR/2018/NOR. The ERT notes that the report on the individual inventory review of Norway's 2019 annual submission has not been published yet. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2018 annual submission.

ID#	*Issue/problem classification[a, b]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(G.8, 2018) KP reporting adherence	responsibility for inventory delivery and quality, support the functions of the national system through the NEA–SN agreement, which specifies the roles and responsibilities of SN as inventory agency for several sectors, to scrutinize the SN inventory staff and resourcing plan and to ensure that sufficient resources are available across the organizations to deliver a high-quality inventory and maintain continuous improvement; report in the NIR on the actions taken by NEA in that regard, such as documenting the review and acceptance by NEA of the SN resourcing plan as a means of delivering an inventory in accordance with the guidelines for national systems.	agreements between NEA and SN and the Norwegian Institute of Bioeconomy Research and outlined the roles and responsibilities of the various organizations in relation to delivering a high-quality inventory, without detailing the specific actions taken by NEA. Norway further reported in the NIR (section 10.4.1, p.514) that resource allocation and work progress have been suggested as agenda items for steering group and national system meetings. During the review, the Party clarified that it has in place a process for evaluating the resources allocated to the inventory team and to the project aimed at resolving the issue regarding the reference and sectoral approaches (see ID# E.1 below). The Party reviews the allocation of resources within SN four times a year. Although NEA is able to express views and possible concerns about resource allocation within SN, it does not have a mandate to instruct SN on how to allocate its resources. The ERT is of the view that Norway is making good progress in terms of addressing this issue.
G.3	National system (G.9, 2018) KP reporting adherence	Conduct (via NEA and SN) regular reviews and evaluations of the level and quality of the resources committed to the work to improve the energy balance, including to assess whether the SN team has the skills and capabilities to deliver the work in accordance with the workplan schedule; report on these assessments in future submissions; and ensure that financial and human resources are deployed to deliver on time the workplan which was provided in response to a list of potential problems and further questions from the ERT.	Addressing. The Party reported a detailed workplan for improving the reference and sectoral approaches in its NIR (sections 10.4.1–10.4.2, pp.511–516) with the goal of reducing differences between the approaches to an acceptable level by 2021, but did not include information on assessments of the level and quality of the resources committed to this work. During the review, the Party informed the ERT that there are currently two teams working on the statistics related to the energy balance (equivalent to 5.5 person years) and the emissions inventory (equivalent to 6.5 person years), with one person working across both teams to ensure knowledge transfer and an in-depth understanding of the statistics for both approaches. The Party clarified that thanks to this working structure, it is able to deliver the work in accordance with the workplan schedule and is on track to achieve an acceptable level of difference between the two approaches by 2021. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet completed the improvements and finalized the workplan, but expects to do so in 2021.
G.4	National system (G.9, 2018) Transparency	Report on the evaluation of resource allocation, including specific consideration of the resource allocation at all biannual national system meetings and steering group meetings for the duration of the workplan, and any updates in future NIRs.	Addressing. The Party reported in its NIR (section 10.4.1, p.514) on resource allocation as a suggested agenda item for national system meetings and steering group meetings. Although the NIR mentions the resource allocation process, it does not discuss the outcomes of that process.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			During the review, the Party clarified that the steering group has met and considered resource allocation. The ERT notes that the previous recommendation applies for the duration of the workplan and considers that Norway is making good progress and that, as this issue is directly linked to the issue concerning the energy balance (see ID# G.3 above), it may be considered resolved when the workplan has been completed.
G.5	National system (G.9, 2018) Transparency	Report on the progress in the implementation of the workplan in each NIR submitted in 2019–2021 (or earlier if the workplan is fully implemented at an earlier date and the differences between the reference and sectoral approach are addressed), to include full details of the planned and ongoing activities to resolve all the problems identified, as set out in the response to the list of potential problems and further questions raised by the ERT, including: (a) Consolidation of the new energy balance routines and associated quality controls; (b) Research to evaluate the statistical differences in the data on refined petroleum products; (c) Analysis of petroleum product sales statistics and import data with respect to ships combining domestic and international routes; (d) Analysis and documentation to set out the progress as far as is practicable in relation to the statistical differences for 1990–2009; (e) Research and data improvement for solid and gaseous fuels to reduce statistical differences and discrepancies between the reference and sectoral approach; (f) Development of upstream data provision by data suppliers so that energy balance data handling and quality controls can be streamlined to reduce the need for complex data processing and bespoke analysis by the SN energy balance team.	Addressing. The Party reported detailed information on the progress to date regarding implementation of the workplan in its NIR (section 10.4.1, pp.514–516) and during the review (see ID# E.2 below), including on the items listed under the recommendation from the previous review report: (a) Norway provided a detailed diagram on energy balance routines and included information on associated quality checks carried out by SN (NIR, section 3.2.1.2, pp.78–83); (b) The Party indicated that there had been several meetings on the statistical differences in the data on refined petroleum products and noted that it plans to make further improvements (NIR, sections 3.6.2, p.183, and 10.4.1, p.515); (c) Norway conducted analyses of petroleum product sales statistics and import data with respect to ships combining domestic and international routes and reported its conclusions in the NIR (section 10.4.1, pp.515–516); (d) The Party discussed the statistical differences for 1990–2009, but these have not yet been resolved (NIR, pp.180–189); (e) Norway noted that natural gas data compare between the reference and sectoral approach but quality controls for other energy product data are fair (NIR, sections 3.6, pp.180–189, and 10.4, pp.511–516); (f) The Party has been in regular contact with data suppliers through several meetings (NIR, section 10.4, pp.515–517). The ERT notes that the previous recommendation applies for the duration of the workplan and considers that the recommendation has not yet been fully addressed because the Party has not yet completed the workplan and finalized all planned activities, but expects to do so in 2021.
G.6	National system (G.9, 2018) KP reporting adherence	Proceed with enhancements to the national system (such as conducting regular meetings among workplan stakeholders and establishing a steering group to consider the need for key data providers such as the Norwegian Petroleum	Addressing. The Party reported in its NIR (section 10.4.1, p.515) on enhancements to the national system aimed at keeping upstream data providers and other stakeholders informed of energy balance and inventory data requirements. The Party reported on meetings with several

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		Directorate and the Norwegian Tax Administration to play a more active role in the Norwegian national system) in order to keep upstream data providers and other stakeholders informed of energy balance and inventory data requirements.	data suppliers, such as the Norwegian Petroleum Directorate, the two refineries in Norway, the trade association for the oil companies and the Norwegian Tax Administration, including the results of the information exchange. Although the Party reported on the establishment of a steering group and several planned meetings with stakeholders and upstream data providers, no further details were provided on any specific implemented activities of the steering group either in the NIR or during the review.
G.7	National system (G.9, 2018) Transparency	Include in the progress reports in each NIR submitted in 2019–2021 (or earlier if the workplan is fully implemented at an earlier date and the differences between the reference and sectoral approach are addressed): (a) An overview of the workplan schedule, setting out the timelines for the delivery of each task to meet interim and final project deadlines; (b) Statements on the status of each workplan task in relation to the workplan schedule and task outcomes; (c) Updates on the organization responsible for the delivery of each task; (d) Resources (human, financial and other) allocated to each task, including the strengthening of such resources based on consultations between NEA and SN on their evaluation of the level and quality of resources committed to the energy balance; (e) Details of the contribution and engagement of other stakeholders required to support the delivery of the tasks, in particular upstream data providers such as the Norwegian Petroleum Directorate, the tax office, refiners and oil and gas companies.	Addressing. The Party reported in its NIR (section 10.4.1) on its progress in reducing the differences between the reference and sectoral approaches (see also ID# E.3 below). The information included updates covering: (a) An overview of the workplan schedule (NIR, pp.512–514), including information in tabular format on the reporting of plans and progress (NIR, p.514) and the status of additional related activities (NIR, pp.514–515); (b) Statements on the status of each workplan task in relation to the workplan schedule and task outcomes (NIR, pp.514–516); (c) Updates on the organization responsible for the delivery of each task (NIR table 10.10, p.513); (d) Resources (human, financial and other) allocated to each task, including the strengthening of such resources based on consultations between NEA and SN on their evaluation of the level and quality of resources committed to the energy balance (NIR, pp.514 and 516–517) (see also ID#s G.1 and G.3 above); (e) Details of the contribution and engagement of other stakeholders required to support the delivery of the tasks, in particular upstream data providers such as the Norwegian Petroleum Directorate, the tax office, refiners and oil and gas companies (NIR, p.515). The ERT notes that the previous recommendation applies for the duration of the workplan and considers that this issue could be resolved when the issues in ID#s G.2–G.6 above have also been resolved following the completion of the workplan.
G.8	National system (G.10, 2018) KP reporting adherence	Comprehensively document and archive the findings of the recent analysis to enhance the primary petroleum fuel statistics and develop a clear documented process to integrate the primary petroleum fuel data into the new energy balance, to ensure that the improvements developed by the current team are embedded in a repeatable data compilation system to deliver a more complete and accurate energy balance, in order to maintain a fully functional national system, and report on the progress of	Addressing. The Party reported detailed information on the previous improvements related to primary petroleum fuel statistics (a 2012 project, see ID# E.25 in table 6) and on progress regarding the energy balance in its NIR (section 3.6.2, p.182, and section 10.4.1, pp.512–516, respectively). According to the NIR, most statistical differences for primary petroleum products were due to the new data and revised methods used and have been significantly reduced in the latest submission. During the review, the Party explained that the findings and results of

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		this research.	related work and analysis, as well as the workplan, are documented in the NIR (sections 3.6.1 and 10.4.1). However, the Party did not provide additional information on the integration and documentation of the data for the purposes of the inventory. The ERT considers that this recommendation has not yet been fully addressed because the Party has not yet completed the workplan for the energy balance, which is expected to be finalized in 2021 and is to include the integration of the primary petroleum fuel data, as specified in the NIR (section 10.4.1).
G.9	National system (G.10, 2018) Accuracy	Noting that discrepancies between the reference and sectoral approach are also evident for solid and gaseous fuels, advance research equivalent to that carried out for petroleum fuels to improve the quality of primary and secondary fuel statistics for solid and gaseous fuels.	Not resolved. The Party reported in its NIR (sections 3.6 and 10.4.1) detailed information on its progress and planned improvements in relation to the energy balance. However, the ERT noted that solid and gaseous fuels are not specifically discussed in the NIR and that discrepancies between the reference and sectoral approaches are still evident for solid and gaseous fuels (see ID#s E.1–E.3 below). During the review, the Party confirmed that the findings and results of related work and analysis, as well as the workplan, are documented in the NIR (sections 3.6.1 and 10.4.1, respectively). The Party also clarified that lower priority has been given to improving the quality of the statistics for solid fuels in the planned improvements.
G.10	QA/QC and verification (G.3, 2018) (G.15, 2016) Convention reporting adherence	Correct the identified errors in NIR table 1.1 and the inconsistency between NIR table 10.4 and CRF table 10s6.	Resolved. The NIR table 1.1 headings had already been corrected for the 2018 submission (FCCC/ARR/2018/NOR, ID# G.3). In the 2020 submission, the Party reported consistent information between NIR table 10.7 (p.484), equivalent to table 10.4 of the 2016 NIR, and CRF table 10s6, including on the trends by gas for 1990–2015, for which discrepancies were noted in the previous submission.
G.11	QA/QC and verification (G.12, 2018) Transparency	Report on the approach to managing QA/QC in the NIR, in particular clarifying how the change in personnel is being managed without affecting the essential QA/QC functions of the inventory agency.	Resolved. The Party reported in its NIR detailed information on QA/QC (section 1.2.3, pp.11–15) and on the training (both past and planned) of new and existing personnel (pp.515–517) in response to the recommendation from the previous ERT. During the review, the Party clarified that a QA/QC coordinator is appointed in each institution that is part of the national system, and that activities related to this issue are documented in the NIR (section 10.4.2). In addition, the Party provided the ERT with the annual QA/QC reports provided by the three key institutions (NEA, the Norwegian Institute of Bioeconomy Research and SN). The Party is planning to hold a workshop on QA/QC management arranged by NEA for the QA/QC coordinators of these three institutions in October 2020 to further improve the QA/QC procedures of the institutions. Lastly, as noted in ID# G.3 above, the Party

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			informed the ERT that there are currently two teams working on the statistics related to the energy balance and the emissions inventory, with one person working across both teams to ensure knowledge transfer, including with regard to QA/QC procedures.
G.12	Uncertainty analysis (G.11, 2018) Convention reporting adherence	Update and improve the uncertainty analysis through a comprehensive revision and update of the uncertainty parameters applied for the base year and ensure that the uncertainty estimates for the latest year reflect the methods now used for Norway's inventory.	Addressing. The Party reported information on uncertainty in its NIR (section 1.6 and annex II). However, the uncertainty analysis has not been updated with new parameters and data. In the NIR (table 10.9) the Party stated that a project to update and improve the uncertainty analysis is planned for 2020. During the review, the Party clarified that the project has begun and that it aims to report the results in the 2021 NIR.
Energy			
E.1	Fuel combustion – reference approach – all fuels – CO_2 (E.2, 2018) (E.2, 2016) (E.2, 2015) (26, 2014) Accuracy	Continue work to analyse the reasons for the differences between the reference and sectoral approach.	Addressing. The Party reported in its NIR that a project was launched with the aim of reducing the differences in the energy use and consequently in the CO_2 emission estimates between the reference and sectoral approaches to an acceptable level and that the results from the project are expected to be ready for inclusion in the 2021 submission (NIR sections 3.6.3, p.180, and 10.4.1, pp.512–516). The revised energy balance published in June 2017 by SN, which was not used for the 2018 submission, has been incorporated in the emissions inventory since the 2019 submission. During the review, the Party provided summary information on the differences in the CO_2 emission estimates between the reference and sectoral approaches for the entire time series for the 2018, 2019 and 2020 submissions. For the 2020 submission, the CO_2 emission estimates for the reference approach were between 0.7 and 17.1 per cent lower than those of the sectoral approach for 11 of the 29 years in the time series 1990–2018. For the 18 years for which the CO_2 emission estimates for the reference approach were higher than those for the sectoral approach, the differences were in the range of 3.0–43.7 per cent. The Party explained that the discrepancies are linked to the supply side of the energy balance and are primarily due to statistical differences and small detected errors, which, if adjusted, would result in a difference between the reference and sectoral approaches of within ±4 per cent.
E.2	Fuel combustion – reference approach – all fuels – CO_2 (E.4, 2018) (E.16, 2016) (E.16, 2015) Accuracy	Continue to implement improvements to reduce the differences between the reference and the sectoral approach and provide in the NIR a detailed account of the measures that have been undertaken.	Addressing. The Party reported that it is carrying out a project aimed at reducing the differences between the reference approach and the sectoral approach (see ID# E.1 above). The Party indicated in the NIR the progress of the activities undertaken (section 10.4.1, pp.514–516). The main activities include (1) revising the energy balance (published in November 2018, June 2019 and June 2020); (2) capacity-building for team members responsible for addressing the differences between the reference and

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			sectoral approaches; (3) developing a new system/procedure for reporting data on the reference and sectoral approaches in the CRF tables and NIR; (4) removing or explaining all statistical differences; (5) documenting the data on and workflows of the energy balance; (6) maintaining regular contact with data providers; (7) assessing production and export data on refined petroleum products; (8) assessing the coverage of sales statistics and import data in foreign trade statistics; and (9) assessing the need for QC of other energy products, such as gas and coal.
E.3	Fuel combustion – reference approach – solid fuels – CO_2 (E.3, 2018) (E.4, 2016) (E.4, 2015) (26, 2014) Accuracy	Improve the data collection procedures for solid fuels (coal and coke oven coke).	Not resolved. In the section of the NIR on the status of implementation of the recommendations included in the 2018 review report (NIR table 10.9, p.487), the Party reported that this issue was addressed in sections 3.6.1 and 10.4.1 of the NIR. However, no activities to improve data collection procedures for solid fuels were mentioned in the referenced sections. In addition, even after the adjustment of the apparent energy consumption for NEU of solid fuels in the reference approach, the difference with the solid fuel consumption under the energy sector in the sectoral approach reported in CRF table 1.A(c) is 143.2 per cent for 2018, indicating that there are issues with the Party's data collection procedures. During the review, Norway indicated that data on solid fuels were not prioritized in the ongoing SN project aimed at reducing the differences between the reference and sectoral approaches. The Party clarified that the work on improving the data on liquid fuels, which is still in progress, is both time-consuming and complex, and it has not yet been possible to analyse the AD for solid fuels for the reference approach (see ID# E.4 below).
E.4	Fuel combustion – reference approach – solid fuels – CO_2 (E.5, 2018) (E.17, 2016) (E.17, 2015) Transparency	Report on the time frame and progress of the revised energy balance system, highlighting the resulting reduction in statistical differences for solid fuels.	Not resolved. The energy balance has been regularly revised within the framework of the ongoing SN project aimed at reducing the differences between the reference and sectoral approaches (see ID#s E.1–E.3 above). However, data on solid fuels were not prioritized in the ongoing project and, thus far, the Party has not managed to consider the corresponding AD (see ID# E.3 above). Moreover, the Party did not report on the planned time frame for the revision of the energy balance for solid fuels. During the review, the Party informed the ERT that work is still underway to improve the data on liquid fuels, and that as soon as that task is completed, it intends to begin work on improving the data on solid fuels. The Party estimates that its work on solid fuels will be completed in 2021 or 2022.
E.5	Comparison with international data – all fuels – CO_2	Continue the work to analyse the reasons for the differences between the inventory and IEA statistics.	Addressing. In the section of the NIR on the status of implementation of the recommendations included in the 2018 review report (NIR table 10.9, p.488), the Party reported that this issue would be addressed in future

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	(E.6, 2018) (E.5, 2016) (E.5, 2015) (26, 2014) Accuracy		submissions. During the review, Norway provided sufficient information addressing the comparison between the data in the national energy balance and those reported to IEA in response to questions raised by the ERT. The Party also clarified that as part of the revision of the energy balance (see ID# E.2 above), the reporting to IEA and Eurostat has been more coordinated with the energy balance published by SN and, as a result of the improvements, the data from 2010 onward were resubmitted to IEA and Eurostat.
E.6	Comparison with international data – all fuels – CO_2, CH_4 and N_2O (E.7, 2018) (E.18, 2016) (E.18, 2015) Transparency	Transparently describe the technical solution that aims to improve the consistency between the energy balance and the IEA reporting, including by providing any preliminary results in the submission, and then improve the alignment of the energy balance and the IEA reporting.	Addressing. In the section of the NIR on the status of implementation of the recommendations included in the 2018 review report (NIR table 10.9, p.488), the Party reported that this issue would be addressed in future submissions. Although the Party has taken steps to assess the differences between the energy balance and the IEA reporting, no information was provided in the NIR (see ID# E.5 above). The ERT notes that the results of the improvements in the alignment of the data and a comparison between the data in the energy balance and the IEA statistics could be provided in, for example, an annex to the NIR or a publicly available file.
E.7	Feedstocks, reductants and other NEU of fuels – liquid fuels – CO_2 (E.9, 2018) (E.6, 2016) (E.6, 2015) (29, 2014) Transparency	Document in the NIR the approach used to estimate CO_2, CH_4 and N_2O emissions from feedstocks and NEU of lubricants, gasoline, residual fuel oil and gas/diesel oil for the entire time series and report in CRF table 1.A(d) where the emissions are included.	Resolved. The Party provided in its NIR (section 3.6.3, pp.184–185) detailed information on the methods used to estimate emissions from petroleum products (gasoline, gas/diesel oil, residual fuel oil and lubricants) that may be used as feedstock or for NEU and their allocation to CRF categories. The Party revised the notation keys reported in CRF table 1.A(d) and no longer reported emissions as "NE", but indicated where the emissions are included.
E.8	Feedstocks, reductants and other NEU of fuels – liquid fuels – CO_2 (E.10, 2018) (E.7, 2016) (E.7, 2015) (29, 2014) Comparability	Improve QC procedures to ensure the consistency of the information reported on feedstocks, reductants and NEU in different CRF tables.	Resolved. In addition to the information on petroleum products (see ID# E.7 above), the Party expanded section 3.6.3 of the NIR (pp.185–189) to include detailed information on the use of fuels as feedstock and reductant in manufacturing industries. This information includes the use of (1) LPG and ethylene for the production of ammonia, vinyl chloride and plastics; (2) natural gas for methanol production; (3) petroleum coke for carbide and aluminium production; and (4) coal and coke for titanium dioxide and metal production. This information was consistently reported in the column entitled "Reported under: Select category(ies) from the category tree" in CRF table 1.A(d) and the CRF tables for the IPPU sector, suggesting that improvements had been made to the relevant QC procedures.
E.9	Feedstocks, reductants and other NEU of fuels – gaseous, liquid and solid	Review and revise the reporting in CRF table 1.A(d) and improve QC procedures to ensure the consistency of the reporting.	Resolved. The information and notation keys reported in CRF table 1.A(d) for LPG, petroleum coke and other bituminous coal were revised in a consistent manner, thereby suggesting improved QC procedures. In

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	fuels – CO_2 (E.11, 2018) (E.8, 2016) (E.8, 2015) (30, 2014) (27, 2013) (60, 2012) Comparability		general, notation keys were not used to report these fuels. The Party specified in the column entitled "Reported under: Select category(ies) from the category tree" in CRF table 1.A(d) where the emissions from NEU of these fuels are included in the inventory.
E.10	Feedstocks, reductants and other NEU of fuels – gaseous, liquid and solid fuels – CO_2 (E.12, 2018) (E.9, 2016) (E.9, 2015) (30, 2014) (27, 2013) (60, 2012) Transparency	Provide in the NIR, for fuels for which the fraction of carbon stored is smaller than 1.00, balances showing that all NEU of fuels is accounted for under the IPPU sector.	Resolved. Section 3.6.3 of the NIR was revised and expanded to include balances for the energy balance data and emissions for the IPPU sector. Estimates of CO_2 emissions from NEU were reported in CRF table 1.A(d) for the first time in the 2020 submission and the corresponding section of the NIR was significantly rewritten to provide the relevant cross-sectoral information (see ID#s E.8–E.9 above).
E.11	1.A. Fuel combustion – sectoral approach – liquid fuels – CO_2 (E.34, 2018) Accuracy	Initiate a review and evaluation of the downstream oil market and develop and implement a plan to improve the quality of downstream oil supply data for national consumption and sales to the international market, which should include implementing new or improved data supply mechanisms to secure access to required AD, where necessary; conducting research to improve data quality through the comparison of oil product supply data from customs with information received directly from refiners and other suppliers; conducting research to reduce the uncertainty of the allocation of fuels between national navigation and international shipping; and reporting on progress in the NIR.	Addressing. In the section of the NIR on the status of implementation of the recommendations included in the 2018 review report (NIR table 10.9, p.492), the Party noted that the findings and results from ongoing work to address this issue, as well as the workplan, are documented in the NIR (sections 3.6.1 and 10.4.1, respectively). The Party reported in its NIR (section 10.4.1, p.515) its progress with regard to (1) maintaining regular contact with relevant data providers to ensure good-quality data; (2) identifying and correcting inconsistencies between production and export data for gasoline, naphtha and LPG; and (3) assessing the coverage of sales statistics and import data in the foreign trade statistics. All items suggested in the previous review report to improve the quality of the downstream oil supply data for national consumption and sales to the international market have been taken into account in the workplan. The ERT considers that this issue is not fully resolved because although progress has been made, the work to reconcile the differences between the reference and sectoral approaches has not yet been completed.
E.12	1.A.2.a Iron and steel – solid fuels – CO_2 (E.35, 2018) Transparency	Describe in the NIR the methods, AD and emissions voluntarily reported by the iron and steel industry, and how the Party ensures that a complete and consistent time series of information is reported at the national level for this industry.	Not resolved. The Party reported in its NIR (table 3.3, p.75) that plant-specific data are used to estimate CO_2 emissions from iron and steel and that the reported emissions from plant operators accounted for 87 per cent of total CO_2 emissions from the iron and steel industry in 2018. CO_2 emissions and fuel use reported by the industry under the EU ETS are used in the calculations; plant-specific fuel use is subtracted from the energy consumption for iron and steel in the energy balance. The emissions not covered by plant-specific data are estimated using the difference in energy use between the energy balance data and plant-specific data and default EFs (NIR, section 3.2.1.1, pp.72 and 77). In the NIR (p.77), the Party indicated that for CO-rich excess gas in iron and

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			steel, the AD reported under the EU ETS differ from the data reported to SN and that this difference leads to inconsistencies. During the review, the Party explained that the NIR describes the method used to calculate emissions for the category for the 2018 and earlier submissions and the information was not updated with the method used for the 2019 submission onward. The Party explained that CO_2 emissions from solid fuels in iron and steel in Norway are solely from CO-rich excess gas (blast furnace gas) purchased from adjacent plants (as the plant-level emissions from coal and coke consumption are reported under category 2.C.1 (iron and steel production)). The Party further explained that plant-level AD correspond to the energy balance data in the revised 2019 energy balance and there is no remaining energy use for which emissions are estimated using default EFs. The Party noted that updated information will be included in the next submission. For information on time-series consistency, see ID# E.13 below.
E.13	1.A.2.a Iron and steel – solid fuels – CO_2 (E.35, 2018) Accuracy	Investigate the underlying reason where large inter-annual fluctuations are identified to ensure accurate reporting of emissions, and describe the reason in the NIR.	Addressing. The CO_2 IEF was recalculated in the 2019 submission for 1990–2016, reducing the 2015–2016 inter-annual increase of 24.8 per cent for the CO_2 IEF to 1.6 per cent in the 2019 and 2020 submissions. However, the reasons for the variability in the IEFs across the time series (ranging between 141.57 and 228.84 t/TJ with inter-annual changes between –24.8 per cent (2003–2004) and 22.3 per cent (1997–1998)) were not investigated or explained in the NIR. During the review, the Party explained that the range of CO_2 IEFs for 2008–2018 (156–189 t/TJ), which are based on the AD from the energy balance, is considered accurate, despite some minor inconsistencies with the CO_2 data reported under the EU ETS. The Party further explained that the range of IEFs for 1990–2007 (142–229 t/TJ) was due to a lack of continuous plant-specific data on the energy content of the CO-rich gas for those years. Recalculations of the CO_2 IEFs for the earlier part of the time series (1990–2007) have not been prioritized in the Party's improvement plans.
E.14	1.A.3.b Road transportation – liquid fuels – CH_4 and N_2O (E.20, 2018) (E.26, 2016) (E.24, 2015) Accuracy	Derive updated AD representative of annual consumption of LPG in road transportation in order to confirm that emissions have not been underestimated; alternatively, demonstrate that the current approach of keeping AD flat does not lead to an underestimation of emissions for 2014.	Resolved. The Party reported in its 2020 NIR (section 3.2.5.1, p.106) and 2019 NIR (p.108) that consumption of LPG was estimated on the basis of figures from sales statistics on petroleum products and figures from Drivkraft Norge, a Norwegian association for the country's fuel and energy sector. The AD for LPG were revised for the 2019 submission and resulted in higher estimates for use of LPG in road transport and therefore higher CO_2 emission estimates. In the 2018 submission, Norway reported a constant value of 161.35 TJ for LPG consumption for 2007–2016 and reported "NA" or "NO" for the earlier years of the time series. In the 2020

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			submission, AD were reported for 2002–2018, with values between 138.30 TJ (2002) and 358.62 TJ (2016). The revised AD resulted in higher emissions for all years in 2002–2016. For example, for 2014, the value used in the 2020 submission was 304.89 TJ, up from 161.35 TJ in the 2018 submission. As a result of this change in AD, the estimated CO_2 emissions for 2014 in the 2020 submission were 89.0 per cent higher than those in the 2018 submission (19.84 kt compared with 10.50 kt).
E.15	1.B.2 Oil, natural gas and other emissions from energy production – gaseous and liquid fuels – CO_2 and CH_4 (E.26, 2018) (E.31, 2016) (E.29, 2015) Comparability	Investigate and ensure the appropriate use of notation keys for the subcategories under category 1.B.2; specifically ensure that there is a logical relationship between the AD reported and the emissions. As part of this investigation, check that the notation keys used in the NIR (table 3.28) also match the data and notation keys used in the corresponding categories in the CRF tables.	Addressing. In its previous recommendation (see document FCCC/ARR/2018/NOR, ID# E.26 in table 3), the ERT highlighted discrepancies in the reporting of two subcategories, namely distribution of oil products (subcategory 1.B.2.a.5) and natural gas – other (subcategory 1.B.2.b.6). The Party corrected the reporting of CH_4 emissions for subcategory 1.B.2.a.5, which are now reported as "NA" in NIR table 3.26 (table 3.28 in the 2015 NIR) and CRF table 1.B.2. However, Norway has not changed the reporting of subcategory 1.B.2.b.6; the associated CO_2 and CH_4 emissions were reported in CRF table 1.B.2, while the AD were reported as "NE". With regard to subcategory 1.B.2.b.6, the Party clarified during the review that the CH_4 emissions correspond to those reported by the industry, while the CO_2 emission estimates are indirect CO_2 emissions calculated on the basis of the reported CH_4 and NMVOC emissions (for further information on the reporting of indirect CO_2 emissions, see ID# E.28 in table 6). Norway considered that the AD used in the estimation of indirect CO_2 emissions were the CH_4 and NMVOC emissions. However, the ERT is of the view that the AD in the CRF sectoral background tables could refer to a quantity representative of the activity where the emissions (in this case, the amount of gas processed) originate, regardless of the emission estimation method used. Making the information on AD available would enable the IEF to be calculated, allowing for comparability of reporting among Parties included in Annex I to the Convention.
E.16	1.B.2 Oil, natural gas and other emissions from energy production – gaseous and liquid fuels – CO_2 and CH_4 (E.27, 2018) (E.32, 2016) (E.30, 2015) Transparency	Implement the planned improvement to include AD for the subcategories where no emissions are reported because they are reported elsewhere (e.g. number of wells drilled in subcategories 1.B.2.a.1 and 1.B.2.b.1).	Resolved. The Party reported the time series 1990–2018 for the total number of exploration wells for oil and/or gas in its NIR (section 3.4.2, pp.143–144). This information was disaggregated according to wildcat and appraisal/exploration wells. The total number of exploration wells was reported under subcategory 1.B.2.a.1 (oil – exploration) in CRF table 1.B.2 and consequently reported as "IE" under subcategory 1.B.2.b.1 (natural gas – exploration). During the review, the Party indicated its intention to include more information on the AD for subcategories 1.B.2.a.1 and 1.B.2.b.1 in future NIRs and/or in the documentation box of CRF table 1.B.2.

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E.17	1.B.2 Oil, natural gas and other emissions from energy production – gaseous and liquid fuels – CO_2 and CH_4 (E.28, 2018) (E.33, 2016) (E.31, 2015) Comparability	Report emissions at the level of data entry in CRF table 1.B.2, providing AD and CO_2 and CH_4 emission estimates (or notation keys) for all subcategories, as appropriate.	Not resolved. Although the Party implemented a new methodology to estimate fugitive emissions from oil and natural gas (NIR, section 3.4.4, pp.148–157) (see ID# E.18 below), it continued to report "IE" for the same categories as in the 2016 and 2018 submissions.
E.18	1.B.2 Oil, natural gas and other emissions from energy production – gaseous and liquid fuels – CH_4 and CO_2 (E.36, 2018) Comparability	Advance research on fugitive and cold-venting sources from oil and natural gas exploration and production and make further improvements to the data supply and reporting system, where necessary, to enable the Party to significantly improve the level of resolution in the reporting of fugitive, flaring and venting emissions from oil and natural gas systems.	Addressing. The Party reported in its NIR (section 3.4.4, pp.148–157) that it implemented a new methodology to estimate fugitive emissions from oil and natural gas. In developing the new methodology, the Party reported that (1) the production facilities on the Norwegian continental shelf were assessed individually to identify and map their respective sources of CH_4 and NMVOC emissions (NIR, p.150); (2) fugitive emissions of hydrocarbon gases were divided into two emission categories (diffuse emissions and venting/cold venting/cold flaring) (NIR, p.150); (3) fugitive emissions of CH_4 were calculated using a bottom-up approach (NIR, p.151); and (4) a total of 48 types of potential sources were identified (NIR, p.151 and table 3.29). In spite of these efforts, Norway continued to report emissions from oil and natural gas in the same aggregated manner used in previous reporting. During the review, the Party clarified that establishing the methodology had been prioritized over improving the level of resolution in the reporting.
E.19	1.B.2 Oil, natural gas and other emissions from energy production – gaseous and liquid fuels – CH_4 and CO_2 (E.36, 2018) Comparability	Report disaggregated emissions per subcategory and avoid using "IE", or, where this is not possible, provide transparent justification in the NIR for use of this notation key.	Resolved. Although the Party continued to report these emissions as it had done previously (see ID#s E.17–E.18 above), the NIR (section 3.4.1.4, pp.140–142) now includes an overview of the methodology used to estimate emissions and the corresponding reporting across subcategories summarizing the use of notation keys. In addition, explanations for the use of "IE" to report this category were provided in the documentation box of CRF table 1.B.2. The pending issue on the reporting of disaggregated emissions is covered under ID#s E.17–E.18 above.
E.20	1.B.2 Oil, natural gas and other emissions from energy production – gaseous and liquid fuels– CH_4 and CO_2 (E.37, 2018) Accuracy	Advance the research and make improvements to the data reporting systems used to estimate emissions by subcategory, including fugitive emissions and emissions from venting and flaring, and include clear justification for the country-specific EFs and methods applied in order to provide evidence of the accuracy and completeness of the time series of emission estimates for all subcategories, including fugitive emissions and venting and flaring. (In	Addressing. The Party reported in its NIR (p.151) that (1) a new tier 3 method for calculating and reporting venting and diffuse emissions from offshore oil and gas production fields was used by the field operators and reported for 2017–2018 (see ID# E.18 above) and (2) emissions for the time series 1990–2016 were recalculated to obtain a consistent time series for 1990–2018. The methods used to estimate the emissions from 15 potential main emissions sources that were subdivided into a total of 31 subsources were reported in the NIR (table 3.29, p.154), together with the

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		particular, the NIR should include a description of the methods used by operators for the facility-level reporting of emissions.)	estimated emissions reported by the field operators for 2017 (table 3.30, p.155). The estimation methods were categorized as "generic", using AD and EFs, and "facility specific" for emissions sources exhibiting significant complexity and variability. The type of method (generic or facility specific) used to estimate the emissions from each of the identified subsources is indicated in the NIR (table 3.29). The basis for the estimation method for each subsource was also reported in the NIR; however, for most of the emissions estimated using a facility-specific method, the only information provided is that the method was established by each operator. During the review the Party indicated that the emissions estimated using facility-specific methods accounted for about 1 per cent of total fugitive emissions. For further details of the methods, AD and EFs used, the NIR refers to the guidelines for discharge and emission reporting in the *Handbook for quantifying direct methane and NMVOC emissions*, published by the Norwegian Oil and Gas Association in 2019, as well as summary and background reports published by NEA (Add Novatech AS, 2016a–d). Owing to the complex nature of the tier 3 method applied by the Party, the ERT was not in a position to fully assess it during the desk review and was therefore unable to determine whether the method and country-specific EFs applied by the Party are appropriate.
E.21	1.B.2 Oil, natural gas and other emissions from energy production – gaseous and liquid fuels – CH_4 and CO_2 (E.37, 2018) Accuracy	Present information supporting the EFs, in particular a comparison of country-specific EFs and methods with IPCC default EFs and methods, together with relevant information on, for example, mitigation technologies used in the oil and gas exploration and production sector in Norway, and any monitoring of fugitive and venting emissions at oil and gas installations, for CH_4 in particular, in order to provide assurance of the completeness and accuracy of the national inventory.	Not resolved. Although the Party has made efforts to develop and implement a new methodology to estimate fugitive emissions from oil and natural gas (see ID#s E.18 and E.20 above), the NIR does not report information on the comparison of country-specific EFs and methods with IPCC default EFs and methods (vol. 2, chap. 4.2.2), nor does it include any information on mitigation technologies used in the oil and gas exploration and production sector in Norway or on monitoring of fugitive and venting emissions at oil and gas installations. During the review, the Party clarified that the EFs and methods used for the emission estimates were not compared with IPCC default EFs and methods. The Party compared the emissions estimated using the new tier 3 method with those obtained using the IPCC tier 1 method and provided the ERT with this information and a brief analysis of the results (see ID# E.27 in table 6).
E.22	1.B.2 Oil, natural gas and other emissions from energy production – gaseous and liquid fuels –	Provide in the NIR a full description of the data reporting and QA/QC systems in place and all the measures that are implemented to check reported national fugitive, venting and flaring emission data for accuracy and completeness	Resolved. The NIR (section 3.4.4.6, p.157) includes a discussion on the QA/QC procedures related to the use of the new emission estimation methodology applied for the 2020 submission. Quality checks include those conducted by the operators and by the Norwegian Oil and Gas

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	CH_4 and CO_2 (E.38, 2018) Transparency	and ensure that the data meet IPCC data quality objectives.	Association in line with the requirements of the regulations related to the reporting of the industry to NEA and the QC procedures performed by NEA. QC activities performed by NEA include cross-checking CO_2 emissions against EU ETS reports; cross-checking CH_4 and NMVOC emissions against data reported under the Environment Hub database of the Exploration and Production Information Management Association; and assessing time-series consistency against the Environment Hub data. The NIR also indicates that special attention was given to assessing field-specific methods and large emissions sources.
E.23	1.C.1.a Pipelines – CO_2 (E.39, 2018) Completeness	Estimate emissions for this category in accordance with the 2006 IPCC Guidelines.	Resolved. The Party reported CO_2 emissions from pipelines as "NE" instead of the previously reported "NO" and provided sufficient information in its NIR (table 1.9 and section 3.5.3.2, p.174) showing that the likely level of emissions meets the insignificance criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. Norway estimated CO_2 emissions from the 152-km pipeline in the Snøhvit area (the only such pipeline in Norway) using the tier 1 method from the 2006 IPCC Guidelines (vol. 2, chap. 5.4.1). The estimated emissions were equal to 0.2 kt CO_2, which is below the threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. During the review, Norway indicated that the monitoring methods did not reveal any sign of CO_2 leakage from the pipeline.
IPPU			
I.1	2. General (IPPU) – (I.21, 2018) Transparency	Review and improve consistency in the presentation of information in the NIR on specific methods and actual AD and EFs where emissions are estimated using aggregated data from plant-specific reporting, considering the good practice guidance in the 2006 IPCC Guidelines. (Examples of information that will enhance transparency include (1) for lime production, EFs for limestone, links to EU ETS methods, and lime kiln dust quantity; (2) for ammonia production, AD on gas consumption and composite EFs; (3) for nitric acid, references to methods for continuous measurement; (4) for petrochemical production subcategories methanol, ethylene, and ethylene dichloride and vinyl chloride monomer, AD on fuel quantity combusted, and production quantities; (5) for silicon carbide, AD on crude production; and (6) for other categories, other process uses of carbonates (e.g. AD on fly ash and references to EU ETS methods).)	Addressing. The Party included in its NIR descriptions, references and sources of information for specific methodologies, AD and EFs where tier 3 methods were used, in line with paragraph 41 of the UNFCCC Annex I inventory reporting guidelines, for most of the relevant categories: (1) Resolved. Information on lime production, EFs for limestone, links to EU ETS methods, and lime kiln dust quantity were included in the NIR (sections 4.2.2.3 and 4.2.2.4); (2) Resolved. For ammonia production, AD on gas consumption and composite EFs were reported in the NIR (section 4.3.1.2); (3) Resolved. For nitric acid, references to methods for continuous measurement were provided in the NIR (section 4.3.3.3); (4) Addressing. For petrochemical production subcategories, only AD on fuel quantity combusted for methanol were included in the NIR (section 4.3.6.3). The Party has not yet provided in its NIR AD for ethylene, ethylene dichloride and vinyl chloride monomer or their respective production quantities, and no production quantities have yet been

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			provided for methanol (values for methanol and ethylene production quantities were provided in CRF table 2(I).A-Hs1); (5) Resolved. For silicon carbide, AD on crude production and their sources were provided in the NIR (table 4.19); (6) Resolved. For other categories, other process uses of carbonates, information on AD for fly ash and references to EU ETS methods were included in the NIR (table 4.13 and section 4.2.7.4, respectively).
I.2	2.A.4 Other process uses of carbonates – CO_2 (I.3, 2018) (I.14, 2016) (I.14, 2015) Transparency	Provide in the NIR the AD and the corrected EFs used for estimating emissions from lightweight expanded clay aggregate production and sulfuric acid neutralization.	Resolved. The Party included in its NIR (p.206, table 4.13) AD for dolomite and clay used in lightweight expanded clay aggregate production and for limestone and fly ash for sulfuric acid neutralization. It also reported on the EFs applied separately for limestone, dolomite, fly ash and clay (NIR section 4.2.7.4).
I.3	2.B.1 Ammonia production – CO_2 (I.23, 2018) Transparency	Report in the NIR the specific methods used to estimate CO_2 recovered and deducted from ammonia production reported under category 2.H.2, including information on how the Party avoids double counting of emissions with other process and energy emissions.	Resolved. The Party reported in its NIR (section 4.3.1.2) on the methods used to estimate CO_2 recovery from ammonia production and explained how it avoids double counting emissions with other process and energy emissions. The amount of CO_2 recovered (subtracted) by the plant is determined by using the amount of CO_2 from the compressor unit minus the amount of CO_2 emitted measured using an orifice plate with a differential pressure cell (NIR, pp.209–210).
I.4	2.B.5 Carbide production – CO_2 (I.24, 2018) Accuracy	Correct the AD for silicon carbide in the CRF tables for the complete time series and include AD for select years in the NIR under the AD section (see document FCCC/ARR/2018/NOR, ID# I.21 in table 5).	Resolved. The Party corrected the AD for silicon carbide production in CRF table 2(I).A-H, replacing the pure production values previously reported for some years of the time series with the values for crude production (in line with the tier 2 method from the 2006 IPCC Guidelines, vol. 3, p.3.42), which resulted in a more stable IEF time series (2.68–2.72 t CO_2/t production). Norway consistently reported in its NIR (table 4.19) on the time series of AD for crude silicon carbide production.
I.5	2.B.8 Petrochemical and carbon black production – CO_2, CH_4 and N_2O (I.25, 2018) Comparability	Use methodologies and reporting approaches that are consistent with the 2006 IPCC Guidelines for subcategories 2.B.8.b and 2.B.8.c, allocating combustion emissions from all relevant fuels and emissions obtained from feedstock within the IPPU sector and allocating emissions from other combustion to the energy sector, in addition to documenting how the approach avoids gaps and double counting with the energy sector, or provide information on the country-specific approach used to estimate CO_2 emissions from petrochemical production, justifying the reason for the allocation choice and explaining the circumstances as to why the Party is unable	Resolved. According to the NIR (table 10.9), the Party followed the recommendation from the previous review report by reallocating emissions previously reported as combustion under category 1.A.2.c (chemicals) to subcategories 2.B.8.a (methanol), 2.B.8.b (ethylene) and 2.B.8.c (ethylene dichloride and vinyl chloride monomer) (included under subcategory 2.B.8.b according to the NIR (section 4.3.7.1, p.222)) and the relevant changes are reflected in the CRF tables and the NIR (sections 4.3.6–4.3.8). The recalculations are also noted in NIR section 10.2.2 (p.471). The NIR further explains that the emissions are available in the reporting under the EU ETS and that all emissions from fuel use in petrochemical production are allocated to the IPPU sector only and are not reported under the energy sector (NIR, p.221).

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		to calculate the estimates following the 2006 IPCC Guidelines.	During the review, the Party explained that the approach was chosen on the basis of its understanding of the 2006 IPCC Guidelines and the recommendation from the previous ERT, in particular regarding the allocation of emissions from feedstocks to the IPPU sector and emissions from other combustion to the energy sector. The Party further confirmed that emissions from petrochemical production reported under the energy sector are not from feedstock.
I.6	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.26, 2018) Transparency	Include in the NIR the specific methods applied, providing the equations, rationale for the selection of methods and EFs, and underlying assumptions informing the uncertainty of the data used, as well as, if applicable, a link to additional information on the methods used.	Addressing. The Party amended the methodological information in its NIR (section 4.7.1), providing the equations used to estimate HFC emissions from refrigeration and air conditioning. In addition, Norway included in the NIR (p.265) a general reference to the tier 2 methodology used and to Bjønness (2013) for some of the assumptions used for values within the IPCC default range provided in the 2006 IPCC Guidelines (vol. 3, chap. 7.5). The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet reported transparently on the rationale for the selection of methods and EFs or the underlying assumptions used.
I.7	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.27, 2018) Accuracy	Implement the identified areas for improvement (e.g. gathering information on recycling rates, including expanding ongoing research and outreach to relevant industry associations on EFs and use practices, and use of blends), especially for more significant applications, and report on progress in the NIR.	Addressing. The Party reported in its NIR (section 4.7.1.8, p.269) on an ongoing project related to the calculation of HFC emissions from refrigeration and air conditioning. The project will investigate the time series of the distribution of AD, destructed amounts and EFs. During the review, the Party clarified that the goal of the project is to implement recalculations of HFC and PFC emissions from refrigeration and air conditioning for the 2021 submission. Norway reported that minor changes and adjustments may not be completed before the 2022 submission.
Agriculture			
A.1	3. General (agriculture) – CH_4 and N_2O (A.5, 2018) Transparency	Explain (a) how animal numbers from SN production subsidies are corrected, (b) how full-grown sheep are counted and (c) how the number of dairy cows and heifers for breeding is derived in the NIR.	Resolved. (a) The animal numbers from SN production subsidies data were corrected in terms of the estimated coverage of animal populations; the data were supplemented with data from statistics of approved carcasses, the cow recording system operated by Norwegian dairy product cooperative TINE, and the Norwegian Agriculture Agency, and the figures used in the calculations represent the total animal population (NIR, section 5.2.1, p.284; table 5.3; and annex IX); (b) The information on how sheep are counted is presented in the NIR (section 5.2.3, pp.287–288, and annex IX, section 1.2). The sheep population is divided into sheep aged over one year and sheep aged

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			under one year. Data from the register of production subsidies and slaughter statistics are used in estimating the number of sheep. In 2017, two changes were made to the register data: the counting date was changed from 1 January to 1 March, and the two categories (sheep aged over one year and sheep aged under one year) were merged into one category for adult sheep. To solve this, the data were split into the two previous categories on the basis of data from the Animalia Meat and Poultry Research Centre. Sheep aged over one year are estimated as the number of sheep registered by 1 March, less the number of sheep slaughtered before May the same year. The sheep slaughtered later in the year are counted as living for the whole year. The number of sheep under one year old is estimated as number of sheep under one year registered by 1 March + number of lambs slaughtered June–December × 143/365. Lambs slaughtered before June are assumed to be registered as sheep aged under one year on 1 March of the same year. Practically all lambs slaughtered after June are born in the spring. An expert judgment suggests an average lifetime of 143 days for slaughtered lambs born in the spring; (c) The number of dairy cows and heifers for breeding is derived annually from the TINE cow recording system (NIR, sections 5.2.1–5.2.2, pp.285–286). Between 98 and 99 per cent of all dairy cows are registered in this system and the figure reported in the inventory is adjusted to account for those that are not. The adjustment is based on the percentage of herds monitored by the cow recording system. The correction and figures are verified by the SN contact person at TINE.
A.2	3. General (agriculture) – CH_4 and N_2O (A.6, 2018) Convention reporting adherence	Further develop the uncertainty analysis for emission estimation methods at the level of the derived EFs for agriculture subcategories, and update the uncertainty analysis for the sector accordingly to reflect the Norwegian models and data.	Resolved. The Party reported in its NIR (e.g. section 5.4.2) more detailed information on uncertainties, updating the uncertainty analysis. Furthermore, new models were introduced to estimate emissions from enteric fermentation; an error analysis of the models and a comparison between different models were described in the NIR (section 5.4.3 and annex IX, section 2.2). Annex II to the NIR contains a summary of all uncertainty values used in the NIR. For example, regarding the uncertainties for subcategories related to enteric fermentation (using the new models described in annex IX), the Party demonstrated in the NIR (section 5.4.2, p.300) that while the AD uncertainties were kept within ±5 per cent, the uncertainty estimates for the EFs were updated to ±28 per cent for dairy cows (from "Prestløkken and Schwarm, 2019", as per the NIR, annex IX, section 2.2), ±20 per cent for beef cows (2006 IPCC Guidelines) and ±25 per cent for other cattle and sheep using the tier 2 methodology (Storlien and Harstad, 2015).
A.3	3. General (agriculture) –	Explain the methods used to estimate the four populations	Resolved. The methods used to estimate the sheep population for

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	CH_4 and N_2O (A.7, 2018) Transparency	of sheep for estimating CH_4 emissions from enteric fermentation and the two populations used for estimating CH_4 and N_2O emissions and Nex rates from manure management in the NIR or its annexes (annex IX).	estimating emissions from enteric fermentation and manure management were provided in the NIR (section 5.2.3, pp.287–288, and annex IX, section 1.2) and were consistently used for estimating CH_4 emissions from enteric fermentation and CH_4 and N_2O emissions and Nex rates from manure management. The sheep population is currently divided into sheep aged over one year and sheep aged under one year. Data from the register of production subsidies and slaughter statistics were used in estimating the number of sheep (see ID# A.1, point (b), above).
A.4	3.A.1 Cattle – CH_4 (A.8, 2018) Transparency	Update the NIR with explanations on the inputs and outputs of the NorFor model, as well as on how the model simulations were used to develop regression equations to determine the most appropriate parameters to calculate GE and Y_m.	Resolved. The Party reported in its NIR (annex IX, section 2.2) that a new model was developed to estimate emissions from enteric fermentation. Annex IX provides a new and more comprehensive and transparent description, including a comparison of the new and old models and their underlying uncertainties. The ERT commends Norway for the new approach and the transparency of its description. The model covers the following topics: (1) an update of the methodology used for calculating CH_4 emissions from enteric fermentation for different types of cows; (2) an update of the methodology used for calculating national emissions from enteric fermentation; and (3) an approach to calculating the influence of various mitigation efforts on reducing the level of enteric CH_4 emissions. The model inputs include number of treatment means; dry matter intake (kg/day); ether extract content (% dm); fatty acid content (g/kg dm); and neutral detergent fibre content (g/kg dm), and the model outputs are the estimates for the GE and Y_m. The regression equations used are provided in the NIR (annex IX, section 2.2).
A.5	3.A.1 Cattle – CH_4 (A.8, 2018) Transparency	Revise figure AIX-1 to provide complete information for all parameters presented.	Resolved. The Party revised the relevant section of annex IX to the NIR and figure AIX-1 is no longer part of the NIR. The revised annex provides sufficient information on the parameters used.
A.6	3.A.1 Cattle – CH_4 (A.9, 2018) Transparency	Include a more detailed and transparent description in the annual submission of all calculations, including data references and assumptions applied, to determine the country-specific parameters (e.g. GE intake, digestibility) and to estimate CH_4 emissions from enteric fermentation in beef cows.	Resolved. The Party reported in its NIR (section 5.4, pp.294–299) a detailed description of the method used for calculating CH_4 emissions from enteric fermentation in beef cattle, including references for data, assumptions and a transparent description of the calculations. The equations were reorganized in order to allow the reader to replicate the calculations; intermediary parameters (Y_m, GE, etc.) were provided for beef cattle, replacement heifers and young cattle, in addition to data sources. The Party also provided a description of the method used to determine the variables GE and Y_m for young cattle in the 2019 NIR (annex IX, section 2.2.1).
A.7	3.A.1 Cattle – CH_4 (A.9, 2018)	Where the data, assumptions and methods deviate from IPCC defaults, present information to justify the use of the country-specific parameters and to describe the calculation	Resolved. The Party reported in its NIR (section 5.4, pp.294–299) a detailed description of the calculation procedure and justification for the use of tier 2 based on quality local data resulting in lower uncertainty. The

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	Transparency	method such that a future ERT may replicate the calculations of parameters and emissions.	values for GE and Y_m used in the estimates and a description of the model used were provided in the NIR (annex IX, sections 2.1 and 2.2, respectively).
A.8	3.A.1 Cattle – CH_4 (A.10, 2018) Transparency	Incorporate the explanations regarding the method applied to account for CH_4 emissions from enteric fermentation in heifers and bulls provided during the review into the next NIR.	Resolved. The Party reported in its NIR (section 5.2.2, p.286) more detailed information regarding the method used for estimating CH_4 emissions from enteric fermentation in heifers and bulls, in particular regarding the methodology used for accounting for the number of cattle provided during the previous review. The NIR explains that for heifers and bulls for slaughter, the animal numbers are based on data from statistics of approved carcasses, which provide data on numbers of animals slaughtered and slaughter weights. Combined with data on slaughter age from the cow recording system operated by dairy cooperative TINE (collected annually), this enables an accurate estimation of animal lifetime for each animal slaughtered.
A.9	3.B.1 Cattle – CH_4 (A.12, 2018) Comparability	Revise the notation key used for typical animal mass in CRF table 3.B(a)s1 from "NE" to "NA".	Resolved. Typical animal mass (other cattle) was reported as "NA" in CRF table 3.B(a)s1 in line with the recommendation by the previous ERT to reflect the fact that the parameter is not applied in the country-specific models used by Norway.
A.10	3.B.2 Sheep – CH_4 (A.11, 2018) Convention reporting adherence	Verify and correct the tables in the NIR to record the correct values for GE and Y_m for the entire time series and improve the QC of the tables presented in the NIR annexes.	Resolved. The Party corrected the data for sheep in its NIR (annex IX, section 2.1). The values for GE and Y_m reported in NIR table AIX-5 are consistent with those reported in CRF table 3.As1 across the time series, suggesting that QC has improved.
A.11	3.D Direct and indirect N_2O emissions from agricultural soils – N_2O (A.13, 2018) Transparency	Update the reporting on improvements for the agriculture sector in NIR chapter 10 such that it is consistent with the category chapters, including actions and priorities.	Resolved. The reporting on improvements and recalculations for the agriculture sector in NIR chapter 10 is now consistent with the category chapters and is consistently cross-referenced (e.g. NIR section 5.6.4 refers to details in chap. 10 of the same document).
LULUCF			
L.1	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.11, 2018) Completeness	Quantify the emissions for each excluded category to test its significance against the threshold values.	Not resolved. The Party continued to report CO_2 emissions from drainage on land converted to peat extraction (category 4.D.2) and CH_4 and N_2O emissions from biomass burning on forest land (controlled burning) and managed grassland (wildfires) as negligible (NIR, table 1.10) without providing quantitative information on the amount of emissions excluded from each category. In the NIR (table 10.9) and during the review, the Party clarified that it plans to investigate the possibility of quantifying CO_2 emissions from drainage on land converted to peatland, CH_4 and N_2O emissions from controlled burning of forest land remaining forest land and land converted to forest land, and CH_4 and N_2O emissions from wildfires in managed grassland in order to demonstrate that those emissions are

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			negligible in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
L.2	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.11, 2018) Convention reporting adherence	Sum up all insignificant categories and apply the cumulative test referred to in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, and report the results in the NIR.	Not resolved. The Party did not quantify emissions for the categories considered insignificant for the LULUCF sector (see ID# L.1 above) to sum up all insignificant categories in its NIR (section 1.7) or apply the cumulative test referred to in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
L.3	4. General (LULUCF) – CO_2 and N_2O (L.12, 2018) Accuracy	Replace the current method for estimating SOC changes in mineral soils associated with land-use conversion with a methodology consistent with the 2006 IPCC Guidelines.	Addressing. Norway continued to apply a country-specific method to estimate SOC changes in mineral soils associated with land-use conversion that is based on a set of SOC values. One SOC value is provided for each land-use category, which is calculated as the average of the national conditions. This is not consistent with the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3) since the method does not stratify SOC values by climate zone, soil type and management practice so that the uncertainty is reduced as far as practicable. The Party reported in its NIR (table 10.9) and confirmed during the review that it is currently identifying which data on soil type, climate zone and management practice are available for the development of a tier 1 method consistent with the 2006 IPCC Guidelines.
L.4	4. General (LULUCF) – CO_2 (L.13, 2018) Transparency	Provide in the NIR a definition of litter pool that includes the minimum size of organic matter included in the pool.	Not resolved. No changes were made to the definition included in the 2020 submission (NIR, p.357). The Party clarified that the definition of the litter pool will be evaluated to ensure consistency with the definition of the SOC pool for future submissions (NIR table 10.9). This issue is related to the methodology, specifically the definition of pools, used when estimating changes in mineral soils after land-use conversion in the litter and soil pools. During the review, the Party clarified that owing to the planned revision of the methodology (see ID# L.3 above), the definition of the litter pool will be evaluated. The current definitions of the litter and SOC pools are given in the NIR (pp.357 and 382, respectively). Using the current method and definition, the Party confirmed that there is no overlap (double counting) between the SOC and litter pools.
L.5	4. General (LULUCF) – CO_2 (L.14, 2018) Accuracy	Ensure a consistent use of IPCC default factors for drained organic soils across categories, subcategories and subdivisions for all land-use categories and land-use changes.	Resolved. The Party reported that the previously detected inconsistencies in the IEF for CO_2 from drained organic soils due to rounding to two decimal places were resolved by reporting figures to five decimal places, thereby improving precision (NIR table 10.9). The CO_2 IEFs reported in CRF tables 4.A–4.F for drained organic soils are now consistent across land-use categories and with the IPCC default factors (Wetlands Supplement, table 2.1).

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L.6	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.15, 2018) Convention reporting adherence	Implement specific QC logical tests to avoid errors (in particular with regard to CRF table 4.1 (see ID# L.9 of document FCCC/ARR/2018/NOR), land representation (see ID#s L.7–L.8 of document FCCC/ARR/2018/NOR), use of EFs (see ID# 14 of document FCCC/ARR/2018/NOR) and use of CSC factors (see ID#s L.18–L.21 in table 5 of document FCCC/ARR/2018/NOR)), such as the checks detailed in ID# L.9 of table 5 in document FCCC/ARR/2018/NOR, checks of values assigned to the same factor in different subdivisions, subcategories and categories where applied and checks of symmetrical processes, such as the gain or loss of annual biomass in cropland and grassland, for which the same absolute value is expected to be used though its sign is opposite.	Addressing. In the section of the NIR on the status of implementation of the recommendations included in the 2018 review report (NIR table 10.9, p.503), the Party reported that a number of QC logical tests were implemented, such as a check that the total area of Norway remains constant, and checks on the variance of IEFs (some IEFs should be constant, given that they apply a constant EF). During the review, the Party further described some implemented tests, including one to check the initial, final and total land areas reported in the land-use change matrix in CRF table 4.1. Norway also plans to continuously develop new QC tests in order to detect logical errors (e.g. those mentioned in ID# L.11 below on land representation).
L.7	Land representation – CO_2, CH_4 and N_2O (L.7, 2018) Accuracy	Report cumulative 20-year conversion areas in CRF tables 4.A–F, which involves calculating annual land use and land-use change matrices for 1971–1989.	Addressing. The Party did not report cumulative 20-year conversion areas in CRF tables 4.A–4.F as recommended by the previous ERT. The Party reported in its NIR (table 10.9) and confirmed during the review that it is in the process of developing a methodology for backcasting land uses and land-use changes, and the related emissions. During the review, the Party indicated that it expects the results of the new methodology to be available for use in the 2021 submission.
L.8	Land representation – CO_2, CH_4 and N_2O (L.8, 2018) Accuracy	Ensure that for any year X of the GHG inventory time series, the area (A_X) of any land remaining category A is the area of A in the previous year (A_{X-1}) minus the area of A converted in the year X to all other land-use categories (A to OLU_X) plus the area converted to A from all other land-use categories 20 years before that has not been subsequently converted to any other land-use category before the transition period has expired (OLU to A_{X-20}) (i.e. $A_X=A_{X-1}$–A to OLU_X+OLU to A_{X-20}).	Resolved. In the section of the NIR on the status of implementation of the recommendations included in the 2018 review report (NIR table 10.9, p.501), the Party stated that the error in the 20-year transition period has been corrected. The Party ensured consistency by updating CRF tables 4.1 and 4.A, which contain the new values that take into account the fact that after 20 years, converted areas of land are transferred to the corresponding land remaining category.
L.9	Land representation – CO_2, CH_4 and N_2O (L.8, 2018) Accuracy	Ensure that for any year X of the GHG inventory time series, the area of any land converted from category B to A (B to A_X) is the cumulative area converted to category A from B (B to A) over the 20-year time period from year X to year X-19 (i.e. B to $A_X=\sum_{x-19}^{x}$ B to A).	Resolved. The Party reported in its NIR that the error in the 20-year transition period has been corrected and the land conversions account for the cumulative area converted over the 20-year time period (see ID# L.8 above). During the review, the Party further clarified that QC procedures were implemented to check that the land areas converted from category A to B in year X are converted to the remaining category of B in year X+20. The change has been consistently implemented in the CRF tables.
L.10	Land representation – CO_2, CH_4 and N_2O	Report information on the areas of land converted in previous years that have been subject to multiple land-use	Not resolved. The Party did not include additional information in its submission on the areas of land converted in previous years that were

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	(L.8, 2018) Transparency	changes before the transition period (20 years) has expired.	subject to multiple land-use changes before the expiry of the 20-year transition period. During the review, the Party clarified that it is investigating this topic and will attempt to report information on such multiple land-use change transitions in the NIR, should they occur.
L.11	Land representation – CO_2, CH_4 and N_2O (L.9, 2018) Consistency	Ensure the equivalence of reported areas so that the area of each land-use category at the beginning of year X is the same (without any rounding) as the final area in year X–1 for the same land-use category.	Addressing. The Party reported in CRF table 4.1 the total forest land area (managed) at the beginning of 2018 as 12,143.57 kha, while the same forest land area at the end of 2017 was reported as 12,143.40 kha. Small discrepancies were observed for other land-use categories, such as wetlands (unmanaged) (3,721.22 versus 3,721.31 kha) and settlements (698.23 versus 698.40 kha). In the section of the NIR on the status of implementation of the recommendations included in the 2018 review report (table 10.9, p.501), Norway explained that it is still working to resolve the issue. During the review, the Party clarified that it is addressing the issue, which is highly technical and related to the processing of split plots from the national forestry inventory database. Owing to technical issues, the initial area X and final area X–1 are still mismatched in the 2020 submission. The issue is not related to the rounding of numbers. The Party informed the ERT that the issue appears to have been resolved in its database and a QC method has been implemented to detect any discrepancies between the initial area X and final area X–1. Norway indicated that it expects accurate and consistent values to be reported in the 2021 submission.
L.12	Land representation – CO_2, CH_4 and N_2O (L.10, 2018) Transparency	Revise the description of the methodology applied for classifying areal plots under land use and land-use change classes, as well as for estimating associated uncertainties.	Addressing. The Party revised the description of the methodology applied for classifying areal plots under land use and land-use change classes in its NIR (section 6.3.5), describing in detail the estimation of associated uncertainties for areas and CSCs in living biomass. In order to clarify the hierarchy of uses in the event of multiple uses of the same land, during the review the Party explained that a scientific peer-reviewed paper describing the methodology for classifying areal plots is under preparation.
L.13	4.A.1 Forest land remaining forest land – CO_2 (L.16, 2018) Transparency	Report information allowing an assessment of the driver(s) of the gross increment increase in biomass in the period 1998–2002, as well as their individual contribution to the estimated increase.	Resolved. The Party explained that the 11.4 per cent increase in the gross annual increment in biomass in 1998–2002 is due to small gains in biomass which add up when expanded to the national level (NIR table 10.9, p.503). The Party reported the gross biomass increment in a separate new paragraph in its NIR (section 6.1.1, p.343) to allow an assessment of the drivers and their individual contribution to the estimated increase in biomass for 1998–2002.
L.14	4.A.1 Forest land remaining forest land –	Revise the use of the model and apply climate data reflecting the trends in temperature and precipitation	Addressing. Norway continued to use the Yasso07 model for its latest submission, using averages of temperature and precipitation data over a

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	CO_2 and N_2O (L.17, 2018) Accuracy	observed during the reporting period instead of using averages of temperature and precipitation data over a long period of time in order to make the Yasso07 outputs verifiable.	long period of time to estimate changes in soil organic matter and dead organic matter in the forest land category. In its NIR (table 10.9), the Party explained that it is currently investigating options involving the use of dynamic climate data collected during the reporting period as an input to the model. During the review, the Party clarified that it plans to implement a dynamic climate model, using five-year moving averages for temperature and precipitation, for the 2021 NIR.
L.15	4.A.1 Forest land remaining forest land – CO_2 and N_2O (L.17, 2018) Convention reporting adherence	Verify the Yasso07 outputs using independent estimates. (Verification could entail collecting a time series of data on SOC content in a subset of national forestry inventory plots representative of countrywide variability of the SOC dynamic in forest land.)	Not resolved. Section 6.4.1.3 of the NIR does not provide any additional information on the verification of the outputs of the Yasso07 model. In its NIR (table 10.9, p.504), the Party explained that it is currently investigating options involving the collection of data to verify the model. During the review, the Party clarified that no SOC monitoring is conducted for the national forestry inventory plots in Norway. Alternative sources are being considered to determine whether they can provide acceptable data to validate the Yasso07 outputs.
L.16	4.A.1 Forest land remaining forest land – CO_2 and N_2O (L.17, 2018) Convention reporting adherence	Pending the start of additional data collection, apply alternative means of verification, such as chrono-sequences stratified by climate, topography, soil and forest type and derived from available data (e.g. ICP Forest Level I) and data from other countries considered representative of conditions in Norway (e.g. Sweden).	Not resolved. Section 6.4.1.3 of the NIR does not provide any additional information on applying alternative means of verification, such as chrono-sequences and comparisons with data from other countries. During the review, the Party clarified that it will investigate the possibility of using alternative methods of verification.
L.17	4.B Cropland – CO_2 (L.18, 2018) Accuracy	Develop an age-class distribution of land with perennial crops and apply the net carbon stock gain factors to all land younger than 31 years, and estimate a complete loss of biomass carbon stock for any land that in the inventory year exceeds the age of 30 years.	Not resolved. The Party reported in its NIR (sections 6.5.1.5 and 6.5.2.5) that the planned improvements for the category are in line with the recommendations made in the 2018 review report. During the review, Norway clarified that it is looking into the possibility of developing a methodology in accordance with the recommendations made by the previous ERT. The Party's goal is to develop a methodology for estimating the national age-class distribution of perennial crops and for accounting for the net changes in living biomass of perennial crops over time.
L.18	4.B Cropland – CO_2 (L.20, 2018) Accuracy	Use a single biomass carbon stock value, or differentiate it according to the different types of annual crop, and apply it, or the set of values, consistently to each conversion of annual cropland to other land uses as biomass carbon stock loss for the year in which the land conversion occurs (see also document FCCC/ARR/2018/NOR, table 5, ID# L.19).	Resolved. The Party reported a single biomass carbon stock loss value for the conversion of annual cropland to different land-use categories in its NIR (section 6.8.2.1, p.406), which is consistent with the IPCC default method (vol. 4, chap. 5.3).
L.19	4.B.2 Land converted to cropland – CO_2	Use the IPCC default value (5 t C ha^{-1}) reported in table 5.9, volume 4, of the 2006 IPCC Guidelines, or differentiate it according to the different types of annual	Addressing. The Party reported in the NIR (section 6.5.2.1, p.389, and table 10.9) that it used the default factor of 4.7 t C ha^{-1} or 10 t dm ha^{-1} in accordance with the 2006 IPCC Guidelines, referring to page 8.18 of

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(L.19, 2018) Accuracy	crop, and apply it, or the set of values, consistently to each land-use conversion to annual cropland as biomass carbon stock gain for the year in which the land conversion occurs; for the following years, the biomass carbon stock of the annual crop type is assumed constant.	volume 4. The change affected the reported values for cropland in CRF table 4.B. However, the recommendation from the previous ERT refers to a value contained in table 5.9 of the 2006 IPCC Guidelines on cropland (vol. 4, chap. 5, p.5.28), while the response of the Party refers to table 8.4 (on settlements) and a value in the text above table 6.4 of the 2006 IPCC Guidelines (vol. 4, chap. 6, p.6.27) on grassland. During the review, the Party provided further explanations on its choice of default EF which are not present in the NIR and noted that the 2019 Refinement to the 2006 IPCC Guidelines (vol. 4, chap. 5.3.1.2) also suggests a value of 4.7 t C ha^{-1}.
L.20	4.B.2 Land converted to cropland – CO_2 (L.19, 2018) Transparency	Transparently describe the approach used for biomass carbon stock gain in the conversion of different land-use categories to annual cropland in the NIR.	Addressing. The Party described the approach used for biomass carbon stock gain in the conversion of different land-use categories to annual cropland in its NIR (section 6.5.2.1). The transparency has been improved by adding information on the tier methods used for the different pools and a description of the IPCC default EFs used. During the review, the Party informed the ERT that additional changes will be made for grassland converted to cropland once grass biomass gains and losses are included for land converted to grassland and grassland converted to other land-use categories.
L.21	4.C Grassland – CO_2 and N_2O (L.22, 2018) Comparability	Report grazed forest areas under a subdivision of grassland to ensure a transparent assignment of the factors and methods used to estimate GHG emissions and removals from that forest area, or alternatively report such areas under forest land.	Not resolved. Norway continued to report a fraction of forest area that meets the threshold of the forest land-use category under grassland since that forest area is subject to grazing. The Party reported in the NIR (table 10.9) and confirmed during the review that it will investigate how to report grazed forest areas under a separate subdivision. It has launched a project to address several issues regarding the reporting of land use (i.e. related to this recommendation and ID#s L.22–L.24 below). During the review, the Party indicated that it is evaluating the classification of grassland areas which meet the forest definition based on tree crown cover, but which contain land that is largely dominated by plant species native to grazed grassland. The Party's plan is to improve the reporting for the category in the 2021 NIR.
L.22	4.C.2 Land converted to grassland – CO_2 (L.21, 2018) Completeness	Estimate carbon stock gain from annual biomass for all relevant conversions of different land uses to grassland by using a single carbon stock value for annual biomass, or differentiate it according to the different types of grassland, and apply it, or the set of values, consistently to each conversion of land use to grassland as biomass carbon stock gain in the year in which the land conversion occurs.	Addressing. Norway included information on biomass gains for settlements converted to grassland in CRF table 4.C. However, the information on the carbon stock change from the conversion of other land, wetlands and settlements to grassland is still incomplete. The Party explained in the NIR (section 6.6.2 and table 10.9) that for remaining grassland with trees, a country-specific EF was estimated from national forest inventory measurements and consistently applied over the whole time series. None of the sample plots with land-use change to grassland were observed to have woody vegetation. Therefore, the default EF (2006

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			IPCC Guidelines, vol. 4, table 6.4) for annual crops of 8.5 t dm/ha was applied for changes to grassland. The Party is currently looking into the possibility of adjusting the method to include the changes in biomass for grassland during the land-use transition to grassland. The Party is also investigating the possibility of updating the definition of grassland to include subcategories where different EFs may then be applied. During the review, the Party indicated that the plan is to report the gains and losses from biomass for all land-use conversions to grassland in its 2021 NIR. However, there are still technical issues that must be resolved before the method can be implemented. The Party's efforts to address these issues are ongoing.
L.23	4.E Settlements – CO_2 and N_2O (L.23, 2018) Transparency	Noting that settlements comprise not only houses, roads or other built-up areas, but also power lines, tractor roads, open places and gardens, which can regrow if abandoned, report the land-cover types included under settlements under one or more subdivisions to ensure a transparent and accurate assignment of the factors and methods used to estimate CSCs.	Addressing. The Party reported in the NIR (section 6.8) the diverse land uses included under settlements but did not use any subdivisions when applying the methods and EFs to estimate CSCs. The Party clarified in the NIR (table 10.9) and confirmed during the review that it will look into how best to report different land-cover types under one or more subdivisions. It has launched a project to address several issues regarding the reporting of land use (i.e. related to this recommendation, ID# L.22 above and ID#s L.24–L.25 below). During the review, the Party mentioned that work is ongoing to acquire data on subdivisions under settlements in order to accurately assign EFs. There are also a number of technical challenges which make it difficult to acquire data for all subdivisions under settlements for all years of the time series. Any updates to the internal database will not be ready until January 2021 at the earliest, which means that this issue cannot be resolved before the 2022 submission.
L.24	4.F Other land – CO_2 and N_2O (L.24, 2018) Transparency	Provide a clear definition of managed land in addition to information on how managed land is distinguished from unmanaged land, and report areas of unmanaged land accordingly.	Addressing. The Party reported in its NIR (section 6.9) on other land still including land-cover categories that are likely to contain significant carbon stocks, such as other wooded land with crown cover of 5–10 per cent, coastal calluna heath and open areas with vegetation considered as unmanaged, without providing clear definitions of managed and unmanaged land. The Party clarified in the NIR (table 10.9) and confirmed during the review that it has launched a project to address several issues regarding the reporting of land use (i.e. related to this recommendation, ID#s L.22–L.23 above and ID# L.25 below) and initiated a process to address the issues raised by the previous ERT concerning managed versus unmanaged land. During the review, Norway explained that a reclassification of plots in the internal database has been conducted to resolve this issue. Scripts are currently being developed to process the data. The Party indicated that

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			the issue is expected to be resolved for its 2021 NIR.
L.25	4.F Other land – CO_2 and N_2O (L.24, 2018) Comparability	Noting that according to good practice set out in the 2006 IPCC Guidelines, any land that has been reported under a managed land category cannot be subsequently transferred to an unmanaged category, report data in CRF table 4.1 for unmanaged grassland, if any, and report it as a subdivision of grassland remaining grassland in CRF table 4.C.	Not resolved. No changes were made to the reporting in CRF tables 4.1 and 4.C in the 2020 submission. The Party clarified that it has initiated a process to address the issues raised by the previous ERT concerning managed versus unmanaged land (see ID# L.24 above).
L.26	4.F Other land – CO_2 and N_2O (L.24, 2018) Transparency	Should Norway keep reporting the land-cover types other wooded land with crown cover of 5–10 per cent, coastal calluna heath and open areas with vegetation considered as unmanaged under "other land", report in the NIR information on the area covered by those land-cover types and ensure that factors and methods applied for areas of other land converted to any land-use category distinguish between the two different kinds of other land, that is, land without significant carbon stock and unmanaged land with significant carbon stock.	Not resolved. The NIR does not distinguish between land without significant carbon stock and unmanaged land with significant carbon stock, as suggested by the previous ERT, and refers to ongoing projects in this area (see ID# L.24 above).
Waste			
W.1	5. General (waste) – CH_4 and N_2O (W.13, 2018) Convention reporting adherence	Include in the QA/QC activities the verification of cross-sectoral issues to ensure that information included in the NIR on the waste and energy sectors and on the waste and LULUCF sectors is consistent, avoiding any possible misunderstanding regarding potential omission or double counting of emissions.	Addressing. The Party did not report in the QA/QC activities the verification of cross-sectoral issues concerning the waste and energy sectors and the waste and LULUCF sectors in its NIR. During the review, Norway confirmed that there is no double counting of emissions between the waste and LULUCF sectors. The Party clarified that the text in section 7.7 of the 2018 NIR linking N_2O emissions from the application of sewage sludge to soil to settlements was outdated and has been removed from the NIR to avoid any possible misunderstanding. The Party also explained that it has not identified other potential cross-sectoral issues between the waste and LULUCF sectors. With regard to the issue raised in the previous review in relation to landfill gas and biogas used for energy purposes, the Party clarified that incineration of waste is strongly regulated in Norway. Data are collected on the amount of waste incinerated per incineration plant; each facility has a unique identification code, thereby ensuring good-quality data and avoiding double counting. The ERT considers that the recommendation has not yet been fully addressed since the NIR (e.g. section 1.2.3) contains no information on the verification of cross-sectoral issues in QA/QC activities.
W.2	5.A.1 Managed waste disposal sites – CH_4	Include the missing emissions attributed to the management of demolition and construction waste or	Not resolved. The Party did not report emissions attributed to the management of demolition and construction waste or demonstrate that

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(W.14, 2018) Completeness	demonstrate that these emissions are insignificant in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	these emissions are insignificant in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines in its NIR, only referring to an explanation provided during the previous review (NIR table 10.9). During the current review, the Party clarified that a project was implemented in 2018 to investigate the type of waste that is generated from the construction industry. The project confirmed that waste from the construction industry mainly consists of slightly polluted stone and masses, concrete, bricks, gypsum waste and insulation materials, as well as some waste containing glass, plastics and wood. The energy from wood and wood as part of mixed waste is recovered. Construction and demolition waste that is likely to end up in landfill is almost exclusively inert waste.
W.3	5.B Biological treatment of solid waste – CH_4 and N_2O (W.15, 2018) Accuracy	Apply, in line with the 2006 IPCC Guidelines, the tier 2 method, using country-specific EFs, to estimate CH_4 and N_2O emissions from the biological treatment of solid waste.	Addressing. Norway indicated in its NIR (section 7.4.1, p.445) that the recommendation to report CH_4 and N_2O emissions from the biological treatment of solid waste in accordance with the tier 2 method, using country-specific EFs, has been taken into account in its improvement plan. During the review, the Party clarified that a survey was sent to all plants in 2019 to collect plant-specific information. In total, 70 per cent of plants have responded to the survey. Information collected via the survey on the amount of biogas produced, how the biogas is used and how waste is treated will be used for the 2021 submission.
W.4	5.D Wastewater treatment and discharge – CH_4 (W.7, 2018) (W.8, 2016) (W.8, 2015) Transparency	Present total organic product data in the NIR and in CRF table 5.D.	Addressing. The Party reported total organic product data for domestic and industrial wastewater in CRF table 5.D and total organic product data for industrial wastewater in its NIR (section 7.6.3.2, p.459). During the review, Norway provided total organic product data for domestic wastewater for the whole time series (1990–2018), which had been omitted from the NIR. The ERT considers that the recommendation will be resolved with the inclusion of this information in the next NIR.
W.5	5.D.2 Industrial wastewater – N_2O (W.12, 2018) (W.11, 2016) (W.11, 2015) Transparency	Provide in the NIR information consistent with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines to demonstrate the insignificance of N_2O emissions from industrial wastewater.	Addressing. Norway reported in the NIR (section 7.6.4, p.461) that N_2O emissions from on-site industrial wastewater treatment plants were not included in the inventory. The Party conducted a quantitative assessment using emissions from other European countries to demonstrate that the emissions are well below the significance threshold (para. 37(b) of the UNFCCC Annex I inventory reporting guidelines). In the NIR (table 1.9, p.30), the Party provided information on the order of magnitude of 1,000 t CO_2 eq estimated in 2017 and the estimated emissions are stable over 1990–2017. However, the Party did not provide sufficient information on how the quantitative assessment was performed to demonstrate the insignificance of N_2O emissions from industrial wastewater in its NIR.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
W.6	5.D.2 Industrial wastewater – N_2O (W.17, 2018) Completeness	Report N_2O emissions from the industrial wastewater treated in domestic wastewater treatment plants.	Not resolved. The Party did not report N_2O emissions from the industrial wastewater treated in domestic wastewater treatment plants. During the review, Norway provided the ERT with an estimation of the N from industrial wastewater which is sent to domestic wastewater treatment plants but is not included in the calculations. The Party estimated that, in 2017, this represented approximately 1 per cent of the total N treated in domestic wastewater treatment plants. N_2O emissions are calculated on the basis of the N amounts. It can then be considered that the corresponding emissions also amount to 1 per cent of N_2O emissions. For 2017, this equates to around 800 t CO_2 eq. The quantity of emissions is below the threshold for the application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11. The ERT considers that the issue will be resolved if the Party includes N_2O emissions from the industrial wastewater treated in domestic wastewater treatment plants in its estimates for the category across the time series.
KP-LULUCF			
KL.1	General (KP-LULUCF) – CO_2, CH_4 and N_2O (KL.3, 2018) Consistency	Ensure the equivalence of areas between each pair of CRF tables NIR-2 so that the area of each activity at the start of year X is the same (without any rounding) as the final area in year X–1 for the same activity.	Addressing. The ERT noted some minor inconsistencies in the data on the total area of a land-use category at the beginning of year X, which should be equal to the total final area of that land-use category at year X–1 in CRF tables NIR-2 (e.g. the area under FM at the beginning of 2018 is reported as 12,085.90 kha, while at the end of 2017 it is reported as 12,085.73 kha). The Party explained that there were technical issues with the software code and that a QC method has been implemented which is expected to resolve this issue for the 2021 submission (see ID# L.11 above).
KL.2	General (KP-LULUCF) – CO_2, CH_4 and N_2O (KL.5, 2018) Transparency	Clarify the definition of the litter pool in line with changes implemented under the Convention.	Not resolved. In the NIR (table 10.9) the Party explained that owing to the ongoing revision of the method used (see ID# L.4 above), the definition of the litter pool will be evaluated to ensure consistency with the definition of the SOC pool. During the review, the Party clarified that the definition will be updated for use in the 2021 NIR.
KL.3	General (KP-LULUCF) – CO_2, CH_4 and N_2O (KL.6, 2018) Accuracy	Replace the current method used to estimate SOC changes in mineral soils with a good practice methodology consistent with the 2006 IPCC Guidelines and the *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*.	Addressing. In the NIR (table 10.9), the Party referred to the activities undertaken in the LULUCF sector. The Party clarified that it is currently identifying which data on soil type, climate zone and management practice are available for the development of a tier 1 method consistent with the IPCC methodology (see ID#s L.3, L.5 and L.15 above).
KL.4	General (KP-LULUCF) –	Ensure the consistent use of IPCC default CO_2 EFs for	Resolved. The IPCC default CO_2 EFs for drained soils were consistently

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	CO_2, CH_4 and N_2O (KL.6, 2018) Accuracy	drained soils, for all activities, in line with changes implemented under the Convention.	applied (see also ID# L.5 above).
KL.5	General (KP-LULUCF) – CO_2, CH_4 and N_2O (KL.6, 2018) Accuracy	Revise the use of the Yasso07 model in line with changes implemented under the Convention.	Addressing. No changes were made to the Party's use of the Yasso07 model. However, during the review, the Party clarified that it is working to implement a dynamic climate model and plans to include the results in the 2021 NIR (see ID# L.14 above).
KL.6	General (KP-LULUCF) – CO_2, CH_4 and N_2O (KL.6, 2018) Accuracy	Revise the methodology used for estimating CSC in perennial crops in line with changes implemented under the Convention.	Not resolved. No changes were made in the 2020 submission to the methodology used for estimating CSC in perennial crops. The Party clarified in the NIR (table 10.9, p.504) and confirmed during the review that it is investigating the possibility of developing a methodology in accordance with the recommendations made by the previous ERT. The goal is to develop a methodology for estimating the national age-class distribution of perennial crops and for accounting for the net changes in living biomass of perennial crops over time (see ID# L.17 above).
KL.7	General (KP-LULUCF) – CO_2, CH_4 and N_2O (KL.6, 2018) Accuracy	Ensure the consistent use of CSC factors for annual crop biomass in line with changes implemented under the Convention.	Not resolved. The Party clarified that it is investigating the possibility of developing a methodology in accordance with the recommendations made by the previous ERT. The goal is to develop a methodology for estimating the national age-class distribution of annual crops and for accounting for the net changes in living biomass of annual crops over time.
KL.8	Deforestation – CO_2 (KL.9, 2018) Completeness	Report carbon stock gain for any conversion of forest land to grassland.	Not resolved. The Party clarified in its NIR (table 10.9) that it is still addressing this issue. During the review, the Party explained that it is not yet possible to report carbon stock gain for any conversion of forest land to grassland and although a study is underway, the preliminary results are yet to be available. Given the number of changes to the methodology planned for the 2021 submission and the substantial changes that have occurred during the last four reporting years owing to the extrapolation of measured sample plots (see the NIR, section 10.2.4, p.457), any preliminary estimates would have been highly uncertain (see ID# L.22 above).
KL.9	FM – CO_2, CH_4 and N_2O (KL.8, 2018) Comparability	Clarify why forest land that fulfils the FM definition is reported under GM instead of under the hierarchically higher activity of FM, or report those areas of land that are reported under GM but that meet the definition of FM under FM.	Not resolved. Norway continued to report a fraction of forest area that meets the threshold of the forest land-use category under grassland since that forest area is subject to grazing. The Party clarified in its NIR and confirmed during the review that it will investigate how to report grazed forest areas under a separate subdivision (see ID# L.21 above).
KL.10	FM – CO_2, CH_4 and N_2O (KL.8, 2018) Transparency	Provide information on the impact on accounted quantities of excluding grazed forest from FM in the NIR.	Not resolved (see ID# KL.9 above).

[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 2019 annual submission of Norway was not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2018 annual review report. For the same reason, 2019 and 2017 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 2020 annual submission of Norway, 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 Norway

ID#	*Previous recommendation for the issue*	*Number of successive reviews issue not addressed*[a]
General	No issues identified.	
Energy		
E.1	Continue work to analyse the reasons for the differences between the reference and sectoral approach.	4 (2014–2020)
E.2	Continue to implement improvements to reduce the differences between the reference and the sectoral approach and provide in the NIR a detailed account of the measures that have been undertaken.	3 (2015/2016–2020)
E.3	Improve the data collection procedures for solid fuels (coal and coke oven coke).	4 (2014–2020)
E.4	Report on the time frame and progress of the revised energy balance system, highlighting the resulting reduction in statistical differences for solid fuels.	3 (2015/2016–2020)
E.5	Continue the work to analyse the reasons for the differences between the inventory and IEA statistics.	4 (2014–2020)
E.6	Transparently describe the technical solution that aims to improve the consistency between the energy balance and the IEA reporting, including by providing any preliminary results in the submission, and then improve the alignment of the energy balance and the IEA reporting.	3 (2015/2016–2020)
E.15	Investigate and ensure the appropriate use of notation keys for the subcategories under category 1.B.2; specifically ensure that there is a logical relationship between the AD reported and the emissions.	3 (2015/2016–2020)
E.17	Report emissions at the level of data entry in CRF table 1.B.2, providing AD and CO_2 and CH_4 emission estimates (or notation keys) for all subcategories, as appropriate.	3 (2015/2016–2020)
IPPU	No issues identified.	
Agriculture	No issues identified.	
LULUCF	No issues identified.	

ID#	*Previous recommendation for the issue*	*Number of successive reviews issue not addressed*[a]
Waste		
W.4	Present total organic product data in the NIR and in CRF table 5.D.	3 (2015/2016–2020)
W.5	Provide in the NIR information consistent with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines to demonstrate the insignificance of N_2O emissions from industrial wastewater.	3 (2015/2016–2020)
KP-LULUCF	No issues identified.	

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

V. Additional findings made during the individual review of the Party's 2020 annual submission

10. Tables 5–6 present findings made by the ERT during the individual review of the 2020 annual submission of Norway that are additional to those identified in table 3. In accordance with paragraph 76(b) of the UNFCCC review guidelines, the ERT has prioritized in table 5 recalculations that changed the total emissions or removals for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent for any of the recalculated years.

Table 5
Additional findings made during the individual review of the 2020 annual submission of Norway related to recalculations

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
Energy			
E.24	1.B.2.a Oil – liquid fuels – CO_2	Recalculations were made to the subcategory 1.B.2.a.4 (refining/storage) that changed its emission/removal estimate by more than 2 per cent. The Party did not include in its NIR (section 10.2.1, pp.169−170) information on these recalculations. During the review, the Party clarified that the recalculations of CO_2 emissions were carried out to correct an error in the reporting from one of the refineries under the EU ETS. The ERT noted that this lack of reporting is not in accordance with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines, which state that the NIR shall include information on changes in estimates of emissions and removals, and clearly indicate the reason for the changes compared with previously submitted inventories, including error corrections. The ERT recommends that the Party improve its QC checks to ensure that information for all recalculations is provided in the NIR, including those linked to the correction of errors, in line with paragraphs 43−45 of the UNFCCC Annex I inventory reporting guidelines.	Yes. Convention reporting adherence
IPPU			
I.8	2.D.3 Other (non-energy products from fuels and	Recalculations were made to this category that changed its emission/removal estimate by more than 2 per cent. The ERT noted that the CO_2 emissions reported for subcategory 2.D.3.d (use of urea) for 2017 changed between the 2019 and 2020 submissions (17.10 versus 15.93 kt, a decrease of 6.9 per cent) according to the information	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
	solvent use) – CO_2	provided in CRF table 2(I).A-Hs2 in both submissions. However, section 4.5.5.7 of the NIR states that no recalculations were performed for this category. During the review, the Party clarified that recalculations of emissions for subcategory 2.D.3.d for 2017 are described in chapter 10 of the NIR (p.471) and should also have been reflected in NIR chapter 4. The ERT recommends that the Party report consistently on recalculations performed between submissions in all relevant chapters of its NIR.	
I.9	2.G Other product manufacture and use – SF_6	Recalculations were made to this category that changed its emission/removal estimate by more than 2 per cent. The Party reported in CRF table 8s4 recalculated values for 2017 for SF_6 emissions for categories 2.G.1 (electrical equipment) and 2.G.2 (SF_6 and PFCs from other product use), each resulting in a difference of more than 4 per cent compared with the emissions reported in the previous submission, while the NIR (section 4.8.1.7) states that no recalculations were performed for the 2020 submission. During the review, the Party clarified that it received updated information from the relevant industry justifying the recalculations. The changes amount to approximately 1,160 and 1,370 t CO_2 eq, for categories 2.G.1 and 2.G.2, respectively. The Party explained that it considered the changes to be too small to be reported as a recalculation in chapters 4 and 10 of the NIR. The ERT noted that this is not in accordance with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines, which state that the NIR shall include information on any recalculations relating to previously submitted inventory data, including changes in the AD used. The ERT recommends that the Party report on recalculations performed in the relevant chapters of its NIR, in line with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines.	Yes. Convention reporting adherence
I.10	2.F.1 Refrigeration and air conditioning – HFCs	Recalculations were made to most subcategories under category 2.F.1 that changed their emission/removal estimates by more than 2 per cent. For example, for commercial refrigeration, the recalculations performed between the 2019 and 2020 submissions resulted in a decrease of 22,494.61 t CO_2 eq (5.5 per cent) in the HFC emission estimate for 2017 and increases in emissions by 15.2 to 18.1 per cent for 2014–2016. For industrial refrigeration, the recalculations resulted in reductions in emission estimates across the entire time series, with decreases in 2012–2016 of more than 7.00 kt CO_2 eq. The Party reported in its NIR (section 4.7) that this was due to a redistribution of the destruction data between 2004 and 2017, without further explaining the nature of this redistribution. During the review, the Party clarified that every year, SN receives information on the total annual amount of gas destructed in Norway. As this destruction is carried out by a single plant, the inventory team has access to information on the amounts of F-gas that are removed from the total stocks. However, SN does not receive detailed information on the subcategories under category 2.F that relate to the destructed substances. To ensure an even distribution of the destructed gas, Norway uses a calculation based on the stocks in each subcategory. Sources such as foam blowing agents, fire protection, aerosols, solvents and other applications (categories 2.F.2–2.F.6) were assumed to have zero recovery from destruction. The Party stated that by adding this assumption, it ensured a balanced distribution of amounts destructed over the main sources of the different F-gases in the subcategories under category 2.F.1. The ERT recommends that the Party include transparent information on recalculations in its NIR, including the rationale for recalculations and information on any methodological or AD updates (e.g. the information provided during the review on the allocation of destructed gas).	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
Agriculture			
A.12	3.D.b Indirect N_2O emissions from managed soils – N_2O	Recalculations were made to this category that changed its emission/removal estimate by more than 2 per cent. In the NIR (section 10.2.3, p.474), the Party explained that the AD were updated for indirect N_2O emissions for subcategory 3.D.2.1 (managed soils – atmospheric deposition). The information provided indicates that the N-model changes due to the updated AD and a correction of an error related to emissions of NO_X changed the amount of N available to form N_2O emissions. Estimated N_2O emissions decreased for 2017 by 8.5 per cent compared with the estimates reported in the 2019 submission. The whole time series back to 1990 has been revised, resulting in a decrease in emissions of between 6 and 9 per cent. However, according to the information provided in the NIR, it is not clear what fraction of the variation derives from revised AD and what fraction derives from model changes and the error correction of NO_X emission estimates. During the review, the Party reported that the correction of the NO_X error alone contributes to a reduction of 8.5 per cent for 2017 in the amount of N available to form N_2O for subcategory 3.D.2.1 (CRF table 3.D), while the updated AD contributed to a decrease of 0.9 per cent. The model changes are related to updated AD, and therefore have no separate effect on the calculations. The ERT notes the explanation provided and encourages the Party, when providing information on the recalculations resulting from the joint effect of several factors, to indicate their respective share in the reported overall recalculations.	Not an issue/problem
LULUCF			
	4. General (LULUCF)	Recalculations made to the LULUCF sector changed the emission/removal estimate for some categories by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	
Waste			
W.7	5.A Solid waste disposal on land – CH_4	The Party reported in its NIR (section 7.2.1.7, p.443) recalculations of AD for 2014 but did not report recalculations in CRF table 8 or in section 10.2 of the NIR. During the review, the Party clarified that NIR section 7.2.1.7 has not been updated since the previous submission and the recalculations described relate to those performed for the 2019 submission. Emissions were not recalculated for the 2020 submission for this category. The ERT recommends that the Party improve its QA/QC activities in order to ensure the accuracy of the reporting of recalculations and ensure that they are consistent between the NIR and CRF tables.	Yes. Convention reporting adherence
KP-LULUCF			
	General (KP-LULUCF)	Recalculations made to KP-LULUCF activities changed the emission/removal estimate for some categories by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	

[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.

11. Table 6 contains additional findings made by the ERT during the individual review of the 2020 annual submission that are not covered in table 3 or 5, but are within the scope of the desk review as specified in paragraph 76 of the UNFCCC review guidelines or paragraph 65 of the Article 8 review guidelines and are findings that the ERT wishes to convey to the Party.

Table 6
Additional findings made during the individual review of the 2020 annual submission of Norway

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
G.13	CRF tables	The Party reported estimates for indirect CO_2 emissions from CH_4 and NMVOCs for several categories under the energy and IPPU sectors and reported those emissions together with the direct emissions in the CRF background and sectoral tables (see ID# E.15 in table 3 and ID#s E.28 and I.11 below). In NIR table 9-2, the Party reported the indirect CO_2 emissions disaggregated by sector and as a total, but did not include this information in CRF table 6. In CRF table 6, the Party reported indirect CO_2 emissions from the energy and IPPU sectors as "IE", commenting that "Indirect CO_2 emissions are included with the direct emission in subsectors. They are excluded here in order to avoid double counting in Summary 2 totals". As a result, total emissions with and without LULUCF and excluding indirect emissions are reported in the CRF tables (e.g. Summary 2 and CRF table 10) with the indirect emissions already included. "NA" is reported in the cells for the total emissions, including indirect CO_2, both with and without LULUCF. During the review, the Party explained that it reported emissions in accordance with the established reporting practices in Norway before CRF table 6 was added to the set of CRF tables. The Party referred to NIR chapter 9, which explains that the indirect CO_2 emissions are included in the emission estimates for each source category at the most disaggregated level and in the calculations for "Total CO_2 equivalent emissions without land use, land-use change and forestry" and "Total CO_2 equivalent emissions with land use, land-use change and forestry" in the CRF summary tables. Thus, in order to ensure correct totals for emissions including indirect CO_2, the Party did not include indirect CO_2 emissions in CRF table 6, as this would have led to double counting in the summary table totals "including indirect CO_2". The ERT noted that this reporting is not in accordance with paragraph 29 of the UNFCCC Annex I inventory reporting guidelines, which states that for Parties that decide to report indirect CO_2, the national totals shall be presented with and without indirect CO_2. Furthermore, combining indirect and direct CO_2 emissions in the sectoral CRF tables reduces comparability and transparency. The ERT recommends that Norway report in the CRF tables and in the NIR the national totals with and without indirect CO_2 in line with paragraph 29 of the UNFCCC Annex I inventory reporting guidelines, making relevant changes to its sectoral level reporting as necessary (see ID#s E.28 and I.11 below).	Yes. Convention reporting adherence
G.14	Follow-up to previous reviews	Norway has made progress with regard to a number of recommendations from previous reviews, as described in the NIR (pp.486–511). The Party is undertaking several improvements resulting from multi-year projects involving a number of experts across institutions and a number of data providers (e.g. improvements to the energy balance, the uncertainty assessment, the estimates of F-gases, and land representation). Many of these projects are ongoing, with completion expected in 2021. To enable it to appropriately assess the outcomes of the improvement process, in line with the workplans outlined for the sectors, and particularly for the energy, IPPU and LULUCF sectors, the ERT included a recommendation	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		for an in-country review once the projects have been completed in 2021 (see annex III.B for additional information).	
Energy			
E.25	1.A Fuel combustion – sectoral approach – all fuels – CO_2, CH_4 and N_2O	In the light of the large differences between the reference and sectoral approaches (see ID#s E.1–E.2, E.4 and E.11 in table 3 and ID# E.26 below), Norway has undertaken several projects focused on the national energy balance aimed at identifying the underlying reasons for these differences and at reducing the differences. The Party reported a summary of these projects in section 3.6.2 of the NIR (pp.182–184), indicating that a project was launched in 2012 with the aim of addressing bias and involving possible corrections to the energy balance using the updated AD for petroleum products (the outcomes were reported in the 2013 and 2014 NIRs). The Party further reported that SN is conducting a project over several years aimed at improving the energy balance and 'energy accounts' and that the results of the project's main phase were published in 2017. In addition, section 10.4.1 of the NIR (pp.514 and 516) refers to a 2013–2015 reference approach–sectoral approach project that made several findings, mostly in relation to new data sources. During the review, the Party clarified that (1) the project launched in 2012 had several components and that the 2013–2015 reference approach–sectoral approach project referred to in section 10.4.1 of the NIR was one of its components; (2) although the project conducted by SN was an independent project entailing revisions of the methodology for many items of the energy balance, several findings from the 2013–2015 reference approach–sectoral approach project were introduced to the inventory when the results were first published in 2017; and (3) the revised energy balance resulting from the SN project was subsequently included in the emissions inventory in the 2019 submission. Although section 3.6.2 of the NIR provides a summary of the projects associated with the energy balance, the individual projects are rather difficult to distinguish since they have not been given a specific title and the detailed information dates from 2013. Given the significance of the differences between the reference and sectoral approaches on the national inventory of Norway and the recurrent and unresolved nature of this issue, the ERT recommends that the Party improve the summary in the NIR concerning the different projects that it has already undertaken, particularly those that are associated with reducing the differences between the reference and sectoral approaches, by clearly distinguishing the timeline and the results of the projects undertaken.	Yes. Transparency
E.26	1.A Fuel combustion – sectoral approach – all fuels – CO_2	A comparison of the Party's CO_2 emission estimates from the reference and sectoral approaches reveals differences between –17.1 per cent (for 1990) and +45.7 per cent (for 2000). For 18 out of the 29 years of the time series 1990–2018, the positive differences were within the range of 3.0–45.7 per cent, while for the 11 years for which the differences were negative, the values were between –17.1 and –0.7 per cent. The Party reported in its NIR (section 3.6.1, p.180) that previous and ongoing analyses have shown that (1) the differences between the reference and sectoral approaches were mainly caused by statistical differences in the energy balance; and (2) "important parts of the consumption block in the energy balance are unlikely to have major completeness issues". The Party further explained that if the statistical differences are associated with problems regarding the supply side of the energy balance, these problems would affect the results of the reference approach but would not affect the national CO_2 emission estimates under the sectoral approach. During the review, the Party indicated that the conclusion of an earlier project described in the 2013 and 2014	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		NIRs (see ID# E.25 above) was that final fuel consumption (including energy use and NEU) was unlikely to result in major completeness issues. The Party clarified that the project included a broad assessment of the consistency of the energy balance and extensive checks of the consumption side of the energy balance, which provides the data used under the sectoral approach. In addition, the Party noted that the use of the data from the newly revised energy balance for the 2019 submission (see ID# E.25 above) resulted in an increase of approximately 1.0–1.5 per cent in the estimated CO_2 emissions from fuel combustion for the time series 1990–2016. On the basis of the magnitude of the increase in the CO_2 emission estimates, the Party maintained that the results supported its claim that the statistical differences in the energy balance mainly affect the CO_2 emission estimates under the reference approach. Given the magnitude of the increase in CO_2 emissions under the sectoral approach as a result of using the newly revised energy balance in relation to the magnitude of the differences in the CO_2 emission estimates between the reference and sectoral approaches, the ERT agrees with the Party's view that the statistical differences in the energy balance are likely to affect the reference approach more than the sectoral approach. However, the CO_2 emissions under the sectoral approach recalculated for 1995–2016 for the 2019 submission were between 0.7 and 2.7 per cent higher than those in the 2018 submission. This would imply that there was some underestimation of CO_2 emissions when the previous energy balance was used.	
		In the absence of a definitive assessment of the causes of the large differences between the reference and sectoral approaches, preventing a reliable verification of the CO_2 emissions reported under the sectoral approach, the ERT recommends that Norway provide in its NIR an improved discussion of the reliability of the national CO_2 emission estimates for fuel combustion (estimated using the sectoral approach) that better supports its claim of the accuracy and completeness of reported emissions from fuel combustion (category 1.A).	
E.27	1.B Fugitive emissions from fuels – all fuels – CO_2 and CH_4	The Party has made efforts to develop and implement a new tier 3 method to estimate fugitive emissions from oil and natural gas (see ID#s E.18 and E.20 in table 3). However, the NIR does not provide verification information consistent with the 2006 IPCC Guidelines as indicated in paragraph 41 of the UNFCCC Annex I inventory reporting guidelines (see ID# E.21 in table 3).	Yes. Convention reporting adherence
		During the review, the Party confirmed that no verification with respect to the venting/fugitive emissions was included in the 2020 NIR. The Party then compared the tier 3 emission estimates with the emission estimates based on IPCC tier 1 EFs and indicated that a similar analysis may be included in the 2021 NIR. The results of this comparison show that the reported CO_2 emissions were higher than those estimated using the IPCC default EFs, whereas the opposite was true for the CH_4 emission estimates. To explain these differences, the Party indicated that the IPCC tier 1 EFs differ substantially between oil and natural gas production, whereas the Norwegian data show little difference between fields used primarily for oil production and those used primarily for gas production. The Party further indicated that information on the reasons for the low CH_4 emissions (e.g. technology and regulatory and reporting regimes) was reported in section 3.4.4.1 of the NIR (pp.150–151).	
		The ERT welcomes the development and implementation of the new tier 3 method and acknowledges the comparison of the estimates with the tier 1 method from the 2006 IPCC Guidelines (vol. 2, chap. 4.2.2.2) undertaken by the Party during the review. Moreover, in addition to section 3.4.4.1 of the NIR, section 3.4.4.2 (pp.151–156) contains information that would allow the Party to obtain a more specific verification than that conducted against the IPCC tier 1 method and EFs. In particular, the ERT is of the view that for verification purposes, the Party may wish to use the information showing the comparison between EFs for natural gas and oil	

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		fields depicted in figure 3.18 of the NIR based on the EFs expressed in terms of t CO_2 eq per million standard cubic metres and the share of natural gas in total fuel production in different oil and gas fields (NIR, p.156). The ERT recommends that Norway provide verification information in the NIR that not only uses the comparative assessment with the IPCC tier 1 method and EFs, but also explores the relevant country-specific information that the Party already has available (e.g. on field- and plant-specific EFs collected at various oil and natural gas fields).	
E.28	1.B Fugitive emissions from fuels – all fuels – CO_2, CH_4 and NMVOCs	The Party reported in its NIR (section 9.1, pp.464–465) that indirect CO_2 emissions from the atmospheric oxidation of CH_4 and NMVOCs fugitive emissions from coal mining, oil and natural gas were estimated and reported in sectoral CRF tables 1.B.1 and 1.B.2 (see ID# E.15 in table 3). The Party further indicated that indirect CO_2 emissions from the energy sector were reported as "IE" in CRF table 6 and that indirect CO_2 emissions were included in the national totals with and without LULUCF in CRF summary table 2. As a result, the national totals including indirect CO_2, with and without LULUCF, were reported as "NA" in CRF summary table 2 (see ID# G.13 above). During the review, the Party explained that the reason for reporting indirect CO_2 emissions in sectoral CRF tables 1.B.1 and 1.B.2 instead of in CRF table 6 was that it started reporting indirect CO_2 emissions before the existence of CRF table 6 and that changing the reporting would entail significant effort. The Party clarified that indirect CO_2 emissions are included in the emission estimates for each source category at the most disaggregated level and reported in the NIR (table 9.2, p.466) for transparency. During the review, the Party further clarified that the same estimates for NMVOC emissions are used in the national GHG inventory and for the reporting under the Convention on Long-range Transboundary Air Pollution. The ERT recommends that the Party make efforts to report indirect CO_2 emissions in CRF table 6, excluding them from sectoral CRF tables 1.B.1 and 1.B.2. In addition, the ERT encourages Norway to clarify in the NIR that the NMVOC emission estimates used to estimate indirect CO_2 emissions for the national GHG inventory are the same as those reported under the Convention on Long-range Transboundary Air Pollution.	Yes. Comparability
E.29	1.B.2 Oil, natural gas and other emissions from energy production – liquid and gaseous fuels – CO_2, CH_4 and N_2O	The Party reported in the NIR (section 3.4.4, pp.150–157) an improvement in the methodology used to estimate emissions from oil and natural gas. Despite this progress, the Party has thus far been unable to improve the level of resolution in the reporting of fugitive and venting emissions from oil and natural gas systems and continues to report most of these emissions in an aggregated manner (see ID#s E.17–E.18 in table 3). The ERT is of the view that using the outcomes of the new tier 3 method would enable the Party to significantly disaggregate fugitive emissions by subcategory, thereby avoiding the use of the notation key "IE" as recommended in previous reviews. During the review, the Party acknowledged that in relation to improving the level of resolution in the reporting, it is faced with two different tasks: (1) disaggregating fugitive (diffuse emissions such as leaks, storage losses and pipeline breaks) and venting emissions and (2) disaggregating oil and natural gas production. Norway considers that the new tier 3 method should in principle allow it to separate the reporting of fugitive and venting emissions. However, the Party considers that assigning shares of the emissions to oil and gas production (subcategories 1.B.2.a and 1.B.2.b, and under subcategory 1.B.2.c venting) will be more challenging because, as the Party explained to the ERT, the Norwegian oil and gas extraction system covers a wide range of fields, from pure oil fields to almost pure natural gas fields. Nevertheless, the Party has evaluated two potential methods for	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		disaggregating emissions between oil and natural gas: by emissions source or by field. Both options present challenges as information on the oil/gas split is not available for a number of sources, and even when a split by field is technically possible, most fields have both oil and natural gas production; as a result, the information on AD and the resulting IEFs may be difficult to determine. However, the Party noted that a possible option for disaggregating emissions between oil and natural gas would be to assign the emissions under "crude oil extraction" and "natural gas extraction", in line with the practice followed in the Norwegian Business Registry. During the review, the Party indicated that it will include the disaggregation of fugitive and venting emissions in the improvement plan for the 2022 submission. The ERT welcomes the willingness shown by the Party to achieve a higher resolution in the reporting of fugitive emissions from oil and natural gas and recommends that Norway undertake the first step of this task (i.e. disaggregating fugitive and venting emissions) as soon as possible and report on its progress in its NIR.	
E.30	1.C.1 Transport of CO_2 – gaseous fuels – CO_2	The Party indicated that the IPCC tier 1 method was used to estimate emissions from the pipeline associated with the CO_2 capture and storage system at the Hammerfest liquified natural gas plant (NIR, section 3.5.3.2, p.174) and that the estimated CO_2 emissions were equal to 0.2 kt CO_2, which is below the threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (see ID# E.23 in table 3). The Party considered that this value was an overestimation of CO_2 emissions from the pipeline and reported these emissions as "NE" in CRF table 1.C. Although the Party reported information on the monitoring of emissions from the pipeline in the NIR, the description of the monitoring and inspection provided in the NIR was not entirely specific to the pipeline; for example, it included two-dimensional and three-dimensional seismic surveys that are not suitable for pipeline monitoring. In addition, there was no indication of whether CO_2 leakage was detected. During the review, Norway clarified that (1) the text in the NIR describing the monitoring and inspection of the pipeline was misleading with respect to the two-dimensional and three-dimensional seismic surveys, which are pertinent to the section of the NIR on "Reservoir monitoring by seismic" (pp.174–177) and (2) the monitoring methods did not detect any signs of CO_2 leakage from the pipeline. The ERT recommends that the Party correct the text describing the monitoring methods used for the CO_2 pipeline in the NIR, and include in the text the relevant results regarding the detection of CO_2 leakage. If no CO_2 leakage is detected, the ERT further recommends that the Party revise the notation key used in CRF table 1.C in line with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines.	Yes. Transparency
IPPU			
I.11	2. General (IPPU) – CO_2	The Party reported in its NIR that it estimated indirect CO_2 emissions from CH_4 and NMVOCs for several categories under the IPPU sector (NIR table 9.1). The Party added indirect CO_2 emissions to direct CO_2 emissions in the sectoral CRF tables for the relevant categories under the IPPU sector and reported indirect CO_2 emissions for the IPPU sector as "IE" in CRF table 6. In addition, as a result of including indirect CO_2 emissions with direct CO_2 emissions under the IPPU sector in the CRF tables, the IEFs are not comparable with those of other reporting Parties or lead to different values being reported between the Party's CRF tables and its NIR (e.g. for key category 2.B.5.a (silicon carbide production), NIR table 4.20 states that the applied EF is 2.62 kg/kg crude silicon carbide, which is for direct CO_2 emissions only, while the CRF tables report an IEF of ~2.7 kg/kg crude silicon carbide for a number of years (2010–2018), which, as explained by the Party during the review, is	Yes. Comparability

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		based on both direct and indirect CO_2 emissions).	
		The ERT recommends that Norway improve the comparability and transparency of its reporting by excluding indirect CO_2 emissions from sectoral (direct) CO_2 emissions in the IPPU sectoral CRF tables and reporting indirect CO_2 emissions from the IPPU sector in CRF table 6.	
I.12	2.A.4 Other process uses of carbonates – CO_2	In CRF table 2(I).A-Hs1 the Party reported the AD unit for subcategory 2.A.4.d (other process uses of carbonates – other) as consumption of limestone and dolomite. However, in the NIR (section 4.2.7.4, p.207), Norway stated that it used an EF based on fly ash use to estimate CO_2 emissions from the plant that neutralizes sulfuric acid waste that is included under subcategory 2.A.4.d together with other four plants. For 1997–2009 and 2017–2018 the Party used an EF of about 68 kg CO_2/t fly ash based on fly ash use, while the reported range for 2010–2016 is 40–140 kg CO_2/t fly ash (NIR, p.207). The chosen value of about 68 kg CO_2/t fly ash is lower than the mathematical average of the reported range (90 kg CO_2/t fly ash) and thus at the lower end of the reported range.	Yes. Transparency
		During the review, the Party provided annual plant data on emissions from fly ash use for 2010–2016, from which an IEF was derived which has an average of 72.7 kg CO_2/t fly ash. The Party further clarified that for 1997–2009, the CO_2 EF for fly ash used (68.5 kg CO_2/t fly ash) relates to the value for the closest year for which data were available (i.e. 2010). For 2017 and 2018, the AD for fly ash were estimated from verified CO_2 emissions reported under the EU ETS using the EF (68.2 kg CO_2/t fly ash) of the most recent year reported (i.e. 2016). The ERT considers this to be a valid approach to performing gap-filling of the time series in the absence of underlying data.	
		The ERT recommends that the Party report more transparently on the EF applied and the methodologies used to complete the time series of data for subcategory 2.A.4.d (other process uses of carbonates – other) for years for which no direct plant-specific data are available in order to ensure consistency across the time series. The ERT further encourages the Party to amend the description of the AD in CRF table 2(I).A-Hs1 for subcategory 2.A.4.d (other process uses of carbonates – other) to reflect the use of fly ash as AD.	
I.13	2.B.1 Ammonia production – CO_2	In the NIR (section 4.3.1.2), the Party indicated that fuel combustion CO_2 emissions from ammonia production (category 2.B.1) are reported under the energy sector and not included under the IPPU sector. The ERT noted that this is not in line with the 2006 IPCC Guidelines (vol. 3, chap. 3.2.2, p.3.11). During the review, the Party clarified that detailed data enabling the separation of the energy use and the corresponding emissions from direct heating and boilers were provided by the ammonia plant. These uses were not considered to fall under the process emissions of IPPU since they are not from feedstock and the resulting emissions are reported under the energy sector. Double counting is avoided by allocating energy consumption, as reported in the NIR, to the energy sector, and reporting the remainder of the consumption as AD for emissions under the IPPU sector.	Yes. Comparability
		The ERT recommends that the Party report all emissions from ammonia production (category 2.B.1) under the IPPU sector in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 1, box 1.1) and ensure that the related fuel consumption is excluded from the emissions reported under the energy sector to avoid double counting.	
I.14	2.B.5 Carbide production – CO_2	The Party reported in the NIR (section 4.3.3.5, p.215) that CH_4 was used as AD for estimating indirect CO_2 emissions from NMVOCs for category 2.B.5. This appears contradictory to the ERT given the different definitions of both substances (CH_4 and NMVOCs). During the review, the Party clarified that it used the amount of crude silicon carbide produced as the AD for calculating CO_2, CH_4 and NMVOC emissions. The Party	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		confirmed that the text in the NIR should have been more clearly formulated with regard to the methodology applied to estimate indirect CO_2 emissions; the Party's intention was to state that indirect CO_2 emissions were estimated on the basis of CH_4 and NMVOC emissions. The ERT recommends that the Party report more transparently on the methodology applied to estimate CO_2 emissions from carbide production and ensure that it provides an accurate explanation of the AD used to estimate indirect CO_2 from CH_4 and NMVOC emissions for this category.	
I.15	2.D Non-energy products from fuels and solvent use – CH_4 and N_2O	In CRF table 2(I).A-Hs2, the Party reported CH_4 and N_2O recovery from lubricant use and solvent use (categories 2.D.1 and 2.D.3.a) as "IE", while CH_4 and N_2O emissions were reported as "NA". During the review, the Party confirmed that recovery of CH_4 and N_2O should have been reported as "NA". The ERT recommends that the Party apply correct notation keys for recovery of CH_4 and N_2O for lubricant use and solvent use (categories 2.D.1 and 2.D.3.a) in CRF table 2(I).A-Hs2.	Yes. Comparability
I.16	2.D.1 Lubricant use – CO_2	The CO_2 IEF (2.95 t/t) for lubricant use reported by the Party for 1990–2018 is outside the default range (0.24–0.96 t/t) provided in the 2006 IPCC Guidelines (vol. 3, chap. 5.2.2.2) and the highest among reporting Parties (0.01–2.95 t/t). During the review, the Party clarified that the high IEF can be explained by the reported AD in the CRF tables, which reflect the amount of lubricant that is assumed to be fully oxidized (i.e. sold lubricants (expressed in m^3) multiplied by density (t/m^3), net calorific value (GJ/t) and country- and fuel-specific oxidation factors (NIR, p.246)). The Party reported the total sold amount of lubricant, densities, net calorific value and oxidized during use factors in the NIR (tables 4.34–4.37). However, in CRF table 2(I).A-Hs2, the AD reported by the Party are noted as lubricant consumed and not as lubricant oxidized as described in the NIR. The ERT recommends that the Party report clearly on the AD (description and corresponding units) for lubricants in CRF table 2(I).A-Hs2 and provide a clear explanation of the CO_2 EF and IEF in the NIR.	Yes. Transparency
I.17	2.E.1 Integrated circuit or semiconductor – SF_6	Norway reported SF_6 emissions from manufacturing of semiconductors using a 1999 study conducted by the Norwegian Pollution Control Authority (SFT, 1999) for the EF and assumed a constant value for the AD (100 kg SF_6 sales) for 1999–2018 based on data from 1998 (NIR section 4.6.1.2). The Party also reported in its NIR (section 4.6.1.8) that no improvement plans are foreseen for this category. The ERT considers that, given the dates of completion of the study and the data used by the Party, the assumptions may no longer be accurate. During the review, the Party confirmed that the study is old, but a potential improvement project for SF_6 emissions is being considered. The Party clarified that, if implemented, the project could improve the SF_6 emission estimates for categories 2.E.1 (integrated circuit or semiconductor) and 2.G.2 (SF_6 and PFCs from other product use). It added that the improvement is planned for 2021, but it will depend both on funding and on being prioritized. Until the plan has been approved, the Party does not plan to include it under the planned inventory improvements. The contribution of the source (1.14 kt CO_2 eq) is below the significance threshold and any revisions to the estimates are expected to keep emissions for the category below the threshold for the application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11. The ERT recommends that that the Party provide further justification for the assumption of constant values for the AD and EF in the NIR and, provided that funding is available and the project is prioritized, report on the use	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		of up-to-date studies and assumptions to estimate SF_6 emissions for category 2.E.1.	
I.18	2.F Product uses as substitutes for ozone-depleting substances – HFCs and PFCs	For subcategories under category 2.F in the IPPU sector, Norway reported in the NIR (e.g. tables 4.48 and 4.50) the use of the Revised 1996 IPCC Guidelines in addition to the use of the 2006 IPCC Guidelines. However, it is not clear which parameters or other elements of the Revised 1996 IPCC Guidelines were used. During the review, the Party clarified that it made three references to the Revised 1996 IPCC Guidelines with regard to categories 2.F.1 (refrigeration and air conditioning) and 2.F.6 (other applications); in all three cases the Party referred both to the 2006 IPCC Guidelines and to the Revised 1996 IPCC Guidelines. The Party confirmed that it seemed sufficient to refer only to the 2006 IPCC Guidelines. The ERT recommends that the Party remove the references to the Revised 1996 IPCC Guidelines in the descriptions for categories 2.F.1 and 2.F.6 in the NIR in cases where the methodology and/or parameters applied are based on the 2006 IPCC Guidelines.	Yes. Transparency
I.19	2.F.1 Refrigeration and air conditioning – HFCs	The ERT noted a considerable drop in HFC emissions for category 2.F.1 between 2017 and 2018 in the 2020 submission: a reduction from 1,312.71 kt CO_2 eq in 2017 to 807.96 kt CO_2 eq in 2018 (−504.75 kt CO_2 eq, or −38.5 per cent on a category basis). In terms of the total GHG emissions excluding LULUCF for 2018 (52,022.40 kt CO_2 eq), the difference constitutes a share of 1.0 per cent. The substances contributing most to the emission reduction were HFC-125 and HFC-143a in all subcategories under category 2.F.1. In its NIR, the Party provided the following reasons for the decrease in emissions: (1) the introduction of a GWP-related tax on F-gas imports from 2003 onward, with increased tax levels in 2014 (NIR, pp.260−261) and (2) the simplified assumption used for average equipment lifetime for associated devices (NIR, pp.5, 44, 62 and 260). Norway also mentioned an ongoing project related to the calculation of HFC emissions for category 2.F.1 (NIR section 4.7.1.8). In response to a question raised by the ERT during the review on the time frame for this project, the Party replied that the goal of the project is to implement the revision and recalculations for the 2021 submission and that minor changes and adjustments may still be carried out until the 2022 submission. During the review, the ERT observed that although a tax has been in place from 2003 onward, the affected F-gases (HFC-125 and HFC-143a) were still imported and imports were reported after that year. The Party explained that those imports served mainly to compensate losses from existing stocks, not to increase the stock with new appliances. With regard to the average equipment lifetime, the Party confirmed that a lifetime of 15 years was assumed. Although the ERT could understand that GWP-related import taxes may affect device deployment and the emissions related to new fillings, operation and decommissioning, it raised concerns regarding the reported magnitude of the emission decrease between 2017 and 2018. In response, the Party provided a detailed time-series of AD and emissions explaining the observed emission reduction in 2018. The Party also provided information on and the preliminary results of an updated F-gas model, which shows a different time series with less extreme inter-annual differences compared with the 2020 submission. These results are still undergoing a thorough QA/QC process before being confirmed. The comparison, however, shows similar values for 2018 while changing the preceding trend downward. On the basis of this information, the ERT concluded that the estimates are consistent with the statistical data provided and the assumptions used in the applied methodology. The ERT welcomes the information on the improvements undertaken for the estimation of emissions from F-	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		gases for category 2.F.1 and recommends that the Party provide the recalculated time series for category 2.F.1 based on the updated F-gas model presented during the review. The ERT recommends that the Party report transparent and complete information on any new methodologies applied, including a comprehensive comparative analysis of the previous and new results of the applied models for estimating F-gas emissions and the underlying rationales for any differences. The ERT also recommends that the Party investigate, analyse and report on any remaining considerable inter-annual changes in emission trends in future submissions in order to increase the transparency of the reported emission trends. If the existing methods are still in use, the ERT recommends that the Party report more transparently on the assumptions and methodology applied, including loss factors from amounts filled in new products, lifetime EFs and destruction rates, and provide a comprehensive justification for the considerable decrease in HFC emissions for category 2.F.1 between 2017 and 2018.	
I.20	2.F.1 Refrigeration and air conditioning – HFCs	For stationary air conditioning, the Party reported values in CRF table 2(II).B-Hs2 for "recovery" of HFC-143a for 2004–2018, while "NO" was reported for "remaining in products at decommissioning" and emissions from "disposal" for all years of the time series. The Party did not provide any underlying information in the NIR to explain this reporting. During the review, the Party clarified that the value for "recovery" is not only dependent on what is "remaining in products at decommissioning" and on what is available from "disposal", but also on the fact that some installations are decommissioned before reaching their end of life and consequently contribute to the emission values reported under "recovery" in the applied methodology. The ERT recommends that the Party report more transparently on the inclusion of early decommissioned appliances contributing to HFC-143a emissions from "recovery" and on the use of notation keys in combination with the values reported for the inherently interrelated AD and emissions sources for this category.	Yes. Transparency
Agriculture			
A.13	3. General (agriculture) – CH_4, N_2O and CO_2	In the NIR (pp.15–16), the Party stated that a technical committee on agricultural emissions was established in Norway at the end of 2017 and is due to deliver a final report in July 2019. The committee aims to explore methods of improving the emissions inventory to ensure that it better reflects the mitigation measures in place and to provide a comparison with the methodologies used in other countries. In response to a question raised by the ERT during the review on the status of the final report, the Party provided a reference to the document (in Norwegian only) (https://www.regjeringen.no/contentassets/0f1af0ca7efe493e8e48b46b6fba5ffd/rapport-tbu-jordbruk_siste.pdf). The ERT commends Norway for the initiatives undertaken in the sector. The ERT encourages the Party to enhance the transparency of its reporting by including a reference to and summary information on the above-mentioned report in the NIR, in addition to considering its results in its improvement plan for the sector.	Not an issue/problem
LULUCF			
L.27	Land representation – all gases	In relation to the recommendation for calculating annual land use and land-use change matrices for 1971–1989 (see ID# L.7 in table 3), in the absence of a complete time series of data on land use and land-use change areas, the previous ERT suggested that Norway apply a statistical approach for geolocalizing the gap-filled data on land-use change from 1971 to 1989 in accordance with the dynamic observed in the reported period (1990–2016) and estimate CSCs and associated GHG fluxes consistent with this dynamic (see document	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		FCCC/ARR/2018/NOR, ID# L.7, in table 5). This encouragement was not followed by the Party in the 2020 submission. Although the previous ERT noted that the 2006 IPCC Guidelines contain techniques for gap-filling (vol. 1, chap. 5) such as the surrogate method, where the gross domestic product or urban/rural population can be used as a proxy, it also acknowledged that when approach 3 for land representation is implemented, an additional level of complexity stems from the need to geolocalize extrapolated data, and the 2006 IPCC Guidelines do not provide good practice for doing so. However, the ERT notes that additional guidance can now be found in the 2019 Refinement to the 2006 IPCC Guidelines. During the review, the Party clarified that it is in the process of developing a methodology for backcasting land uses and land-use changes and estimating related emissions (see ID# L.7 in table 3). The ERT notes this new information and encourages the Party to report on these developments in the next NIR and take note of the approaches suggested in the 2019 Refinement to the 2006 IPCC Guidelines (vol. 4, chap. 3).	
L.28	4.A.2.3 Wetlands converted to forest land – CO_2	The Party reported the net CSCs in litter per area in CRF table 4.A. Several inter-annual changes in the net CSC in litter per area were noted as significant, including for 2014–2015 (–12.0 per cent), 2015–2016 (–14.1 per cent), 2016–2017 (–19.8 per cent) and 2017–2018 (–23.4 per cent), but the NIR did not contain an explanation of the trend. During the review, the Party explained that the negative trend in the CSC factor in recent years was a result of the CRF Reporter software dividing the CSCs by the total area. Norway clarified that CSCs for litter are only calculated for the area of mineral soils and a constant CSC factor of 3.05 t C/ha was used (NIR, section 6.4.2.1). The decline in the area of mineral soils on wetlands converted to forest land since 2009 resulted in a decline in the CSCs and a change to the CSC factor in CRF table 4.A. The ERT recommends that the Party include the explanation for the trend in inter-annual changes in the net CSCs in litter per area in the next NIR.	Yes. Transparency
Waste			
		No findings for the waste sector additional to those included in table 3 were made by the ERT during the review.	
KP-LULUCF			
KL.11	General (KP-LULUCF) – all gases	The previous ERT noted that according to Norwegian forest legislation, both forest land types (those under FM and AR) are subject to the same sustainable management activities, although the frequency and intensity of specific management practices likely differ between forest land under FM and forest land under AR (see document FCCC/ARR/2018/NOR, ID# KL.7 in table 5). The previous ERT encouraged Norway to clarify which activities qualify as AR regarding the conversion of other land and wetlands to forest land, noting that because of the AR definitions, those activities cannot be limited to tree planting and direct seeding. During the current review, the Party clarified that it has initiated a process to address several issues regarding the reporting of land use (see ID# L.21 in table 3). A description of how Norway intends to address the issue and the status of implementation of the encouragement was included in the NIR (section 10.4, table 10.9) and will be updated for the next NIR. The Party will revise the description in the NIR when the results of the ongoing work are available.	Not a problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT encourages the Party to revise the description of the management practices and activities under AR and FM for the next NIR.	
KL.12	General (KP-LULUCF) – all gas(es)	The Party reported figures for the FMRL and the technical correction in its NIR (p.537). However, the values were not included in the CRF accounting table. During the review, the Party clarified that it has been in contact with the secretariat on several occasions regarding this recurring technical issue for these two elements when exporting reporting tables; however, the problem persists. Noting that this technical issue seems to be uncommon for the reporting Parties that report the values for the FMRL and technical correction in their CRF tables, the ERT encourages Norway to try to find a solution (in collaboration with the secretariat) and report the FMRL and the technical correction in its CRF accounting table.	Not a problem

[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

12. The ERT did not identify the need to apply any adjustments for the 2020 annual submission of Norway.

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

13. Norway elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF is not applicable to the 2020 review.

VIII. Questions of implementation

14. No questions of implementation were identified by the ERT during the individual review of the Party's 2020 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 Norway in its 2020 annual submission

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

Table I.1

Total greenhouse gas emissions for Norway, base year[a]–2018

(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions[b]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c]*	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)[d]*	*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								–11 400.00[e]
Base year	41 367.37	51 459.02	NA	NA	NA		1 679.83	
1990	41 367.37	51 459.02	NA	NA				
1995	37 668.07	51 620.17	NA	NA				
2000	30 573.27	55 114.75	NA	NA				
2010	29 009.22	55 468.97	NA	NA				
2011	26 668.12	54 643.09	NA	NA				
2012	29 584.55	54 121.12	NA	NA				
2013	28 690.37	53 969.36	NA	NA		1 625.79	1 765.07	–29 059.34
2014	31 809.54	53 930.25	NA	NA		1 654.08	1 761.21	–25 981.05
2015	33 123.29	54 353.97	NA	NA		1 679.09	1 759.48	–25 070.65
2016	31 658.43	53 472.21	NA	NA		1 785.69	1 757.07	–25 779.01
2017	29 365.45	52 386.53	NA	NA		1 797.84	1 743.68	–26 978.60
2018	28 354.94	52 022.40	NA	NA		1 937.37	1 753.84	–27 740.51

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

[a] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases except NF_3, for which the base year is 2000. The base year for CM and GM under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

[b] The Party did not report indirect CO_2 emissions in CRF table 6 (see ID# G.13 in table 6).

[c] 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 report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Norway.

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

[e] This value was not provided in the CRF tables and is only available in the NIR (section 11.5.5, p.538).

Table I.2

Greenhouse gas emissions by gas for Norway, excluding land use, land-use change and forestry, 1990–2018

(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	35 321.33	6 032.03	4 112.29	0.04	3 894.80	NA, NO	2 098.54	NA, NO
1995	38 707.50	6 209.90	3 716.90	92.00	2 314.05	NA, NO	579.82	NA, NO
2000	42 518.55	5 975.45	3 827.60	383.27	1 518.45	NA, NO	891.41	NA, NO
2010	46 231.65	5 389.77	2 474.66	1 065.90	238.39	NA, NO	68.59	NA, NO
2011	45 513.36	5 236.98	2 469.02	1 106.83	262.64	NA, NO	54.26	NA, NO
2012	45 038.31	5 212.15	2 474.06	1 142.55	200.51	NA, NO	53.54	NA, NO
2013	44 982.40	5 146.70	2 446.84	1 156.10	181.04	NA, NO	56.28	NA, NO
2014	44 916.61	5 087.82	2 454.43	1 242.38	178.94	NA, NO	50.07	NA, NO
2015	45 350.50	5 055.27	2 491.42	1 240.57	146.41	NO, NA	69.79	NO, NA
2016	44 472.73	4 949.49	2 424.09	1 376.06	186.19	NO, NA	63.64	NO, NA
2017	43 562.54	4 867.32	2 380.63	1 386.02	130.97	NO, NA	59.04	NO, NA
2018	43 817.66	4 804.55	2 349.12	846.49	148.10	NO, NA	56.50	NO, NA
Percentage change 1990–2018	**24.1**	**–20.3**	**–42.9**	**1 928 163.0**	**–96.2**	**NA**	**–97.3**	**NA**

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

[a] Norway did not report indirect CO_2 emissions in CRF table 6 (see ID# G.13 in table 6).

Table I.3

Greenhouse gas emissions by sector for Norway, 1990–2018

(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	29 385.76	15 079.68	4 764.43	–10 091.65	2 229.15	–
1995	32 707.40	12 094.03	4 707.13	–13 952.10	2 111.61	–
2000	35 849.97	12 906.16	4 548.76	–24 541.48	1 809.86	–
2010	40 695.28	8 955.42	4 321.25	–26 459.75	1 497.02	–
2011	39 822.47	9 047.45	4 296.90	–27 974.98	1 476.28	–
2012	39 406.86	8 950.06	4 314.18	–24 536.57	1 450.03	–
2013	39 109.74	9 080.35	4 362.96	–25 278.99	1 416.30	–
2014	38 934.91	9 205.17	4 423.94	–22 120.71	1 366.22	–
2015	39 323.50	9 259.25	4 472.84	–21 230.68	1 298.37	–
2016	38 362.97	9 346.52	4 517.77	–21 813.78	1 244.96	–

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2017	37 287.44	9 390.61	4 538.20	–23 021.07	1 170.27	–
2018	37 528.66	8 859.27	4 480.33	–23 667.47	1 154.14	–
Percentage change 1990–2018	**27.7**	**–41.3**	**–6.0**	**134.5**	**–48.2**	**NA**

Notes: (1) Norway did not report emissions or removals in the sector other (sector 6); the corresponding cells in the CRF tables were left blank; (2) Norway did not report indirect CO_2 emissions in CRF table 6 (see ID# G.13 in 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[a]–2018, for Norway

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	*Activities under Article 3.3 of the Kyoto Protocol*		*FM and elected activities under Article 3.4 of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				–11 400.00[c]				
Technical correction				–1 170.46[c]				
Base year	NA				1 786.60	–106.78	NA	NA
2013		–565.06	2 190.85	–29 059.34	1 763.58	1.49	NA	NA
2014		–553.25	2 207.33	–25 981.05	1 767.80	–6.59	NA	NA
2015		–531.12	2 210.21	–25 070.65	1 767.69	–8.21	NA	NA
2016		–501.03	2 286.73	–25 779.01	1 765.58	–8.51	NA	NA
2017		–480.94	2 278.78	–26 978.60	1 757.18	–13.49	NA	NA
2018		–490.85	2 428.22	–27 740.51	1 759.50	–5.67	NA	NA
Percentage change base year–2018					**–1.5**	**–94.7**	**NA**	**NA**

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

[a] The base year for CM and GM under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol, and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

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

[c] This value was not provided in the CRF tables and is only available in the NIR (section 11.5.5, p.538).

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

Table I.5
Key relevant data for Norway under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2020 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: commitment period accounting (e) GM: commitment period accounting (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	CM and GM
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF	1 817.262 kt CO_2 eq (14 538.096 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA
4. CM	NA
5. GM	NA

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.6 include the information to be included in the compilation and accounting database for Norway. 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 2018, including on the commitment period reserve, for Norway
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
CPR	314 022 874	–	–	314 022 874
Annex A emissions				
CO_2	43 817 657	–	–	43 817 657
CH_4	4 804 546	–	–	4 804 546
N_2O	2 349 116	–	–	2 349 116
HFCs	846 488	–	–	846 488
PFCs	148 096	–	–	148 096
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	56 502	–	–	56 502
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources	**52 022 405**	–	–	**52 022 405**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–490 855	–	–	–490 855
Deforestation	2 428 224	–	–	2 428 224
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–27 740 506	–	–	–27 740 506
CM	1 759 504	–	–	1 759 504
CM for the base year	1 786 605	–	–	1 786 605
GM	–5 667	–	–	–5 667
GM for the base year	–106 777	–	–	–106 777

Table II.2
Information to be included in the compilation and accounting database for 2017 for Norway
(t CO_2 eq)

	Original estimate	*Revised estimate*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	43 562 541	–	–	43 562 541
CH_4	4 867 318	–	–	4 867 318
N_2O	2 380 632	–	–	2 380 632
HFCs	1 386 022	–	–	1 386 022
PFCs	130 974	–	–	130 974
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	59 037	–	–	59 037
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources	**52 386 525**	–	–	**52 386 525**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	Original estimate	*Revised estimate*	*Adjustment*	*Final value*
AR	–480 942	–	–	–480 942
Deforestation	2 278 781	–	–	2 278 781
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–26 978 599	–	–	–26 978 599
CM	1 757 176	–	–	1 757 176
CM for the base year	1 786 605	–	–	1 786 605
GM	–13 491	–	–	–13 491
GM for the base year	–106 777	–	–	–106 777

Table II.3
Information to be included in the compilation and accounting database for 2016 for Norway
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions				
CO_2	44 472 730	–	–	44 472 730
CH_4	4 949 494	–	–	4 949 494
N_2O	2 424 095	–	–	2 424 095
HFCs	1 376 064	–	–	1 376 064
PFCs	186 191	–	–	186 191
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	63 640	–	–	63 640
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources	**53 472 212**	–	–	**53 472 212**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–501 033	–	–	–501 033
Deforestation	2 286 727	–	–	2 286 727
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–25 779 012	–	–	–25 779 012
CM	1 765 582	–	–	1 765 582
CM for the base year	1 786 605	–	–	1 786 605
GM	–8 510	–	–	–8 510
GM for the base year	–106 777	–	–	–106 777

Table II.4
Information to be included in the compilation and accounting database for 2015 for Norway
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions				
CO_2	45 350 496	–	–	45 350 496
CH_4	5 055 275	–	–	5 055 275
N_2O	2 491 423	–	–	2 491 423
HFCs	1 240 568	–	–	1 240 568
PFCs	146 410	–	–	146 410
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	69 794	–	–	69 794
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources	**54 353 967**	–	–	**54 353 967**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–531 118	–	–	–531 118
Deforestation	2 210 210	–	–	2 210 210

	Original submission	*Revised estimate*	*Adjustment*	*Final*
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–25 070 652	–	–	–25 070 652
CM	1 767 694	–	–	1 767 694
CM for the base year	1 786 605	–	–	1 786 605
GM	–8 212	–	–	–8 212
GM for the base year	–106 777	–	–	–106 777

Table II.5
Information to be included in the compilation and accounting database for 2014 for Norway
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions				
CO_2	44 916 606	–	–	44 916 606
CH_4	5 087 818	–	–	5 087 818
N_2O	2 454 433	–	–	2 454 433
HFCs	1 242 380	–	–	1 242 380
PFCs	178 945	–	–	178 945
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	50 066	–	–	50 066
NF_3	NA, NO	–	–	NA, NO
Total Annex A sources	**53 930 248**	–	–	**53 930 248**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–553 255	–	–	–553 255
Deforestation	2 207 330	–	–	2 207 330
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–25 981 045	–	–	–25 981 045
CM	1 767 801	–	–	1 767 801
CM for the base year	1 786 605	–	–	1 786 605
GM	–6 587	–	–	–6 587
GM for the base year	–106 777	–	–	–106 777

Table II.6
Information to be included in the compilation and accounting database for 2013 for Norway
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions				
CO_2	44 982 395	–	–	44 982 395
CH_4	5 146 698	–	–	5 146 698
N_2O	2 446 842	–	–	2 446 842
HFCs	1 156 100	–	–	1 156 100
PFCs	181 040	–	–	181 040
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	56 282	–	–	56 282
NF_3	NA, NO	–	–	NA, NO
Total Annex A sources	**53 969 358**	–	–	**53 969 358**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–565 062	–	–	–565 062
Deforestation	2 190 849	–	–	2 190 849
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–29 059 344	–	–	–29 059 344

	Original submission	*Revised estimate*	*Adjustment*	*Final*
CM	1 763 584	–	–	1 763 584
CM for the base year	1 786 605	–	–	1 786 605
GM	1 488	–	–	1 488
GM for the base year	–106 777	–	–	–106 777

Annex III

Additional information to support findings in table 2

A. Missing categories that may affect completeness

1. 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) 4.C.2 land converted to grassland (other land, wetlands and settlements) (CO_2) (see ID# L.22 in table 3);

(b) 4.D.2 land converted to wetlands (land converted to peat extraction – organic soils) (CO_2) (see ID# L.1 in table 3);

(c) 4(V) biomass burning (forest land (controlled burning) and managed grassland (wildfires)) (CH_4 and N_2O) (see ID# L.1 in table 3);

(d) 5.A.1 managed waste disposal sites (demolition and construction waste at managed waste disposal sites) (CH_4) (see ID# W.2 in table 3);

(e) 5.D.2 industrial wastewater (treated in domestic wastewater treatment plants) (N_2O) (see ID# W.6 in table 3);

(f) 4(KP)A.2 deforestation (conversion of forest land to grassland, biomass gain) (CO_2) (see ID# KL.8 in table 3).

B. Recommendation for an in-country review: list of issues

2. The ERT recommends that the 2021 or next review for Norway, pending the completion of the ongoing projects specified below (see paras. 4–9 below), be conducted as an in-country review. The ERT noted that a number of issues, many of which are recurring, associated with the national system and the LULUCF and KP-LULUCF sectors remained unresolved at the end of the 2020 review cycle, in addition to a number of issues (e.g. in the energy and IPPU sectors) regarding the GHG inventory calculations that are mainly related to the methodological choice and availability of robust AD. During the review, Norway stated that it plans to resolve most of these issues in 2020 or 2021 and reflect the changes in the 2021 annual submission. A comprehensive assessment of the Party's progress in resolving these issues is only possible if the ERT can assess during an in-country visit the functionality of general and specific functions of the national system; access the relevant documents; assess the results of the workplan to improve the reporting under the reference and sectoral approaches, including the revision of the energy balance and the verification of the estimates of CO_2 emissions from fuel combustion; assess and review the tier 3 model implemented by the Party to estimate fugitive emissions from oil and natural gas; and assess and review the new model for F-gases and the planned improvements for the LULUCF sector that are under development with the staff involved.

3. In accordance with decision 13/CP.20, annex, paragraph 64, the ERT has set out below a list of questions and issues additional to those identified in tables 3 and 5–6 that should be addressed during the in-country review. Key areas that the next ERT conducting the in-country review should consider are listed in paragraphs 4–9 below.

4. National inventory system: several issues from the previous review report related to the performance of the national inventory system and the change in the inventory team are still being addressed and are expected to be resolved for the 2021 inventory. The issues are linked, for example, to the ongoing activities related to allocating resources for improving the quality of AD, improving the inventory capacity and technical competence of staff, correcting issues related to data reliability linked to the energy balance (see para. 5 below) and updating

the uncertainty analysis. Key areas, besides the issues related to the energy balance listed below, that the next ERT conducting the in-country review should consider are:

(a) Has the system for continued learning and capacity-building established by Norway (described in ID# G.1 in table 3) ensured continuity and enhancement of expertise, as planned?

(b) What are the specific actions taken by NEA and SN on resource allocation to ensure the delivery of a high-quality inventory? (See ID# G.2 in table 3);

(c) Has the uncertainty analysis been updated to use the latest parameters and results? Have the uncertainty estimates been improved, both for the base year and for the latest year reported? (See ID# G.12 in table 3).

5. Energy balance (reliability of AD for the energy sector): the ERT noted long-standing issues related to differences in the data reported under the reference and sectoral approaches, raising questions regarding the established institutional arrangements and the accuracy of the estimates for the energy sector. The ERT also noted the ongoing and planned activities aimed at improving the quality of data in the energy balance for the different types of fuels. Key areas that the next ERT conducting the in-country review should consider are:

(a) Has the workplan for the energy balance been delivered? (See ID#s G.3–G.5 and G.7 in table 3);

(b) Has an annual process been established to keep data providers and stakeholders informed of data requirements? (See ID# G.6 in table 3);

(c) Has a repeatable data compilation system been established that embeds the improved primary petroleum fuel statistics? (See ID# G.8 in table 3);

(d) Has the quality of primary and secondary fuel statistics for solid and gaseous fuels been adequately improved? (See ID#s G.9 and E.3 in table 3);

(e) Has the Party resolved the differences between the reference and sectoral approaches and provided detailed information in the NIR? (See ID#s E.1–E.2 in table 3).

6. Fugitive emissions from oil and gas: the Party has made efforts to develop and implement a new tier 3 method to estimate fugitive emissions from oil and natural gas (see ID#s E.18 and E.20 in table 3). However, the NIR does not provide verification information consistent with the 2006 IPCC Guidelines as indicated in paragraph 41 of the UNFCCC Annex I inventory reporting guidelines (see ID# E.21 in table 3) and, in the light of the format of the present review, the ERT was not able to thoroughly assess and review the tier 3 model implemented by the Party. In addition, the Party has not been able to improve the level of resolution in the reporting of the emissions (i.e. disaggregating fugitive (diffuse) and venting emissions and splitting emissions between natural gas, oil and combined operations). Key areas that the next ERT conducting the in-country review should consider are:

(a) Has the Party improved the level of resolution in the reporting of fugitive emissions, and if not, what are the main challenges presented by the underlying data? What changes to the methods have been applied? (See ID#s E.18 and E.20 in table 3 and ID# E.29 in table 6);

(b) Has the Party provided verification information for its tier 3 method and if so, does the information support the accuracy of the method used? (See ID# E.21 in table 3 and ID# E.27 in table 6).

7. F-gases: the ERT noted a considerable decrease in HFC emissions from refrigeration and air conditioning (category 2.F.1) between 2017 and 2018 (–38.5 per cent). This decrease was not transparently described or explained in the NIR and could not be reproduced from data reported in the CRF tables. The ERT was also not able to completely assess and review the tier 3 methodology applied by the Party. However, the ERT could conclude that the estimates are consistent with the statistical data provided and with the assumptions used in the applied methodology. The Party stated that an update of the F-gas model is underway and the updated model is to be implemented by 2021 or 2022. The

recommended in-country review should assess and review, besides the results, the updated F-gas model and the underlying methodology, assumptions and time series of AD used. Key areas that the next ERT conducting the in-country review should consider are:

(a) Have the identified areas of improvement for refrigeration and air conditioning (HFCs and PFCs) been implemented, and are the methods, data and assumptions consistent with the 2006 IPCC Guidelines? (See ID#s I.6–I.7 in table 3);

(b) Are differences between the results of the current model and the updated model, as well as considerable inter-annual changes, justified and explained, and has the model been verified and transparently explained in the NIR? Does the verification information support the accuracy of the method used? (See ID# I.10 in table 5 and ID# I.19 in table 6).

8. Land representation and estimates under the LULUCF and KP-LULUCF sectors: the ERT noted several recurring recommendations related to land representation in the LULUCF sector and issues linked to KP-LULUCF. During the review, Norway explained that in accordance with its improvement plan, it will improve the data and information on land representation and identify all land-use categories for the time series 1990–2018 for its 2021 submission. Therefore, the next ERT conducting the in-country review should, in relation to the LULUCF sector and KP-LULUCF:

(a) Assess the implementation status of planned improvements;

(b) Assess the data and information provided in relation to land representation;

(c) Check whether all information on the technical correction of the FMRL has been reported and whether the technical correction has been revised to ensure methodological consistency between the FMRL and the actual FM GHG emission estimates;

(d) Check whether all KP-LULUCF have been correctly identified and tracked across the time series;

(e) Consider the following key areas:

(i) Has the Party developed and applied an improved method for backcasting land uses and land-use changes and estimating emissions? (See ID# L.7 in table 3);

(ii) Has a dynamic climate model been applied for forest land remaining forest land? (See ID# L.14 in table 3);

(iii) Has the Party reported grazed forest areas under a separate subdivision? (See ID# L.21 in table 3);

(iv) Have the gains and losses of grass biomass for all land conversions to grassland been implemented? (See ID# L.22 in table 3);

(v) Have land-cover types under settlements been reported under one or more subdivisions? (See ID# L.23 in table 3);

(vi) Has a clear definition of managed land been provided? (See ID# L.24 in table 3);

(vii) Have data on any unmanaged grassland been reported as a subdivision of grassland remaining grassland? (See ID# L.25 in table 3);

(viii) Have the definitions of the litter pool been evaluated and included in the revised method to ensure consistency with the definition of the SOC pool? (See ID# L.4 in table 3);

(ix) Have the Yasso07 model outputs been verified using independent estimates? Does the verification information support the accuracy of the method used? (See ID# L.15 in table 3).

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 1996. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Vol. 1 to 3. Available at https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html.

IPCC. 2000. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.* J Penman, D Kruger, I Galbally, T Hiraishi, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at https://www.ipcc-nggip.iges.or.jp/public/gp/english/.

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.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2012, 2013, 2014, 2015, 2016 and 2018 annual submissions of Norway, contained in documents FCCC/ARR/2012/NOR , FCCC/ARR/2013/NOR, FCCC/ARR/2014/NOR, FCCC/ARR/2015/NOR, FCCC/ARR/2016/NOR and FCCC/ARR/2018/NOR, 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 Norway for 2020. Available at https://unfccc.int/sites/default/files/resource/asr2020_NOR.pdf.

Report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Norway, contained in document FCCC/IRR/2016/NOR. Available at https://unfccc.int/sites/default/files/resource/docs/2017/irr/nor.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Kathrine Loe Bjønness (NEA), including additional material on the methodology and assumptions used. The following references have been reproduced as received:

Add Novatech AS (2016a): Cold Venting and Fugitive Emissions from Norwegian Offshore Oil and Gas Activities. Module 1. M-664/2016. Surveying installations to identify potential emission sources. Available at https://www.miljodirektoratet.no/globalassets/publikasjoner/m664/m664.pdf.

Add Novatech AS (2016b): Kaldventilering og diffuse utslipp fra petroleumsvirksomheten på norsk sokkel. M-511/2016. (in Norwegian). Delrapport 2. Utslippsmengder og kvantifiseringsmetodikk. Available at https://www.miljodirektoratet.no/globalassets/publikasjoner/m511/m511.pdf.

Add Novatech AS (2016c): Cold venting and Fugitive Emissions from Norwegian Offshore Oil and Gas Activities - Module 3A report - Best available technique (BAT) assessments. M-665/2016. Available at https://www.miljodirektoratet.no/globalassets/publikasjoner/M665/M665.pdf.

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Bjønness, K. L. (2013): Emissions of HFCs and PFCs from product use in Norway. Documentation of methodologies: Statistics Norway, Documents 24/2013. Available at https://www.ssb.no/en/natur-og-miljo/artikler-og-publikasjoner/_attachment/126338?_ts=13f85bebb88.

Norwegian Oil and Gas (2019): Guidelines for discharge and emission reporting. Handbook for quantifying direct methane and NMVOC emissions. Norwegian Oil and Gas Association. Available at https://www.norskoljeoggass.no/contentassets/cd872e74e25a4aadac1a6e820e7f5f95/vedlegg-b---handbook-voc-emissions---english-version----guidelines-044---ver-17.pdf.

Poulsen T. S. (2019), ed., F-gas methodologies and measurements in the Nordic Countries, Nord 2019:034, ISBN 978-92-893-6269-6 (PDF). Available at http://dx.doi.org/10.6027/Nord2019-034.

SFT (1999): Materialstrømsanalyse av SF_6. Beregning av potensielt og faktisk utslipp over tid (Material flow analysis of SF_6. Calculation of potential and actual emissions over time), SFTreport 99:14. Oslo: Norwegian Pollution Control Authority (SFT-Statens forurensingstilsyn).

Storlien, T. M. & Harstad, O. M. (2015): Enteric methane emissions from the cattle population in Norway. Method description. (Included in NIR 2016, Annex IX): Norwegian University of Life Sciences. Department of Animal and Aquacultural Sciences.