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Report on the technical expert review of the first biennial transparency report of Norway*

Addendum

Summary

This addendum to the report on the technical expert review of the first biennial transparency report of Norway, conducted by a technical expert review team in accordance with the modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement, contains the results of the review of the consistency of the information submitted by the Party with those modalities, procedures and guidelines. The review took place from 31 March to 4 April 2025 in Oslo.

* In the symbol for this document, 2024 refers to the year in which the original biennial transparency report was submitted, not to the year of publication.

Please recycle

Abbreviations and acronyms

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*
AD	activity data
BTR	biennial transparency report
CH_4	methane
CO_2	carbon dioxide
CRT	common reporting table
CTF	common tabular format
DC	degradable organic component
dm	dry matter
DOC_f	fraction of degradable organic carbon that decomposes
EF	emission factor
ETF	enhanced transparency framework under the Paris Agreement
F-gas	fluorinated gas
GHG	greenhouse gas
HFC	hydrofluorocarbon
IE	included elsewhere
IPCC	Intergovernmental Panel on Climate Change
LULUCF	land use, land-use change and forestry
MPGs	modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement
N_2O	nitrous oxide
NA	not applicable
NDC	nationally determined contribution
NE	not estimated
NID	national inventory document
NO	not occurring
SOC_{REF}	reference soil organic carbon stock
SWDS	solid waste disposal site(s)
TERT	technical expert review team
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

Areas of improvement[1] identified during the technical expert review of the Party's first biennial transparency report

Tables 1–20 present the results of the review of the consistency with the MPGs[2] of the information submitted by Norway in its BTR1. All recommendations and encouragements contained in the tables are for the next BTR or national inventory report, unless otherwise specified.

A. General reporting provisions

Table 1
Areas of improvement relating to general reporting provisions

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

B. Greenhouse gas emissions and removals

Table 2
Areas of improvement relating to general findings on greenhouse gas emissions and removals

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
2.G.1	Specified in paragraphs 31 and 40 of the MPGs Completeness	Norway reported some blank cells and minor inconsistencies of information in several CRTs across the time series. For example, CRTs 2(I).A-H, 4.Gs2, 6 and 9 contain blank cells; in CRTs 2(I).A-H and 2(II).B-Hs1, descriptions of the AD were not included in the relevant columns; in CRT 2(II).B-Hs2, AD for recovery of HFC-32 under subcategory 2.F.1.a (commercial refrigeration) were reported as "NO" instead of 0.74 t (as indicated in the column "remaining in products at decommissioning"); and in CRT 3.B(b), the nitrogen factors for some animal groups were reported to only two decimal places despite such values normally being reported to several decimal places. During the review, the Party acknowledged the issues and explained that it encountered several technical problems with the ETF GHG inventory reporting tool. For example, it was unable to change the default descriptions of AD in CRTs 2(I).A-H and 2(II).B-Hs1 without losing data; explanations entered for the use of "IE" and "NE" in CRT 9 were lost; some blank cells in CRT 6 (source and indirect emissions) occurred because the correct data were not properly captured during the data transfer to the CRT; and cells that should have been greyed out by the ETF GHG inventory reporting tool in CRT 4.Gs2 instead appeared blank. The Party clarified that the blank cells and inconsistencies identified by the TERT have no impact on the emission estimates. The TERT recommends that Norway make efforts, to the extent possible in the ETF GHG inventory reporting tool, to submit its CRTs ensuring that the information therein is complete.

Table 3
Areas of improvement of the reporting on greenhouse gas emissions and removals – energy sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
3.E.1	Specified in paragraph 36 of the MPGs 1. General (energy sector) – all fuels – CO_2	Norway reported in its NID (section 3.2.1.1, pp.3-27–3-29) that analyses conducted for the national inventory show that the differences in AD and estimates between the reference and sectoral approaches are due mainly to statistical discrepancies in the national energy balance. Accordingly, the difference between the reference and sectoral approaches for total fuel consumption and CO_2 emissions, as reported in CRT 1.A(c), ranges from approximately –17 to +51 per cent for total fuel

[1] As referred to in paras. 7, 8, 146(d) and 162(d) of the MPGs, contained in the annex to decision 18/CMA.1.

[2] Decision 18/CMA.1, annex.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		consumption and –15 to +57 per cent for CO_2 emissions across the time series. However, it was not clear from the information provided in the NID whether the Party plans to improve its energy data collection procedures to reduce discrepancies between the reference and sectoral approaches. During the review, the Party explained that it is strengthening its energy data collection process by enhancing collaboration with relevant stakeholders and performing qualitative reviews of petroleum and biofuel sales data as well as cross-checks with tax and environmental records. A key analytical report was expected by March 2025. The Party clarified that, although discrepancies between the reference and sectoral approaches were more pronounced in earlier years of the time series, they are now relatively minor compared with Norway's total energy production, where exports dominate. Consequently, small statistical deviations can appear proportionally significant owing to the limited scale of domestic energy supply. The TERT encourages Norway to report the reasons for the significant discrepancy resulting from the comparison of the reference and sectoral approaches in its NID and, where feasible, take steps to reduce the difference in AD and estimates between the two approaches.
3.E.2	Specified in paragraph 40 of the MPGs 1.A Fuel combustion – sectoral approach – biomass – CO_2, CH_4 and N_2O	Norway reported in its NID (section 3.2.1.1, pp.3-28–3-29) that the AD for and emissions from the combustion of waste under the sectoral approach (reported under other fossil fuels) include the non-fossil (biogenic) fraction of the waste. The TERT noted that the biogenic and non-biogenic fractions of waste should be reported separately. Specifically, the non-biogenic fraction should be accounted for in the inventory, with the associated CO_2, CH_4 and N_2O emissions reported under the relevant fuel category, while the biogenic fraction should be reported under biomass, with the associated CH_4 and N_2O emissions accounted for in the inventory and the associated CO_2 emissions reported as an information item in CRTs 1.A(a)s1 and 1.A(a)s2. During the review, the Party explained that work to address this issue is ongoing and that some improvements have already been implemented in the 2025 inventory submission, with CO_2 emissions from combustion of the biogenic fraction of waste reported under subcategory 5.C.1.a.i (municipal solid waste). However, owing to insufficient data on the allocation of AD and emissions between the energy and waste sectors, these emissions have not yet been fully disaggregated between the sectors. The Party indicated that efforts are under way to improve data collection and clarify the method for allocating emissions from the combustion of waste. The TERT recommends that Norway disaggregate the AD for the combustion of waste into biogenic and non-biogenic fractions in CRTs 1.A(a)s1 and 1.A(a)s2, and report CO_2, CH_4 and N_2O emissions from combustion of the non-biogenic fraction under the relevant fuel category and report the biogenic fraction under biomass, with CH_4 and N_2O emissions accounted for in the inventory and CO_2 emissions reported as an information item.
3.E.3	Specified in paragraph 39 of the MPGs 1.A.3.b Road transportation – liquid fuels – CO_2	Norway applied EFs of 71.30 t CO_2/TJ for gasoline and 73.55 t CO_2/TJ for diesel to calculate CO_2 emissions from liquid fuels under road transportation. In its NID (section 3.2, p.3-20), the Party explained that these CO_2 EFs are based on historical data from the Norwegian Petroleum Institute. According to the Party, the EFs were derived from carbon content data from a 1993 study and have been applied as constant values across the time series. The TERT noted that the EFs have not been updated since then, and the Party has not assessed whether they remain representative of more recent fuel characteristics. During the review, the Party clarified that the EFs have not been revised because the carbon content of gasoline and diesel is assumed to have remained stable over time. The Party explained that the EFs were validated against the IPCC default values and other international references and indicated that they will continue to be reviewed as new or updated data become available. The TERT recommends that Norway report in the NID the methods applied, including the rationale for their selection, to calculate the CO_2 EFs for gasoline and diesel in accordance with the good practice elaborated in the 2006 IPCC Guidelines and provide underlying assumptions, data sources and references to clarify how the continued use of constant EFs derived from a 1993 study remains representative of

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		current fuel compositions with a view to enhancing the transparency of the emission estimates for fossil fuel combustion for road transportation, which is a key category.
3.E.4	Specified in paragraphs 39, 40 and 53 of the MPGs 1.A.3.d Domestic navigation – liquid fuels, gaseous fuels and biomass – CO_2, CH_4 and N_2O	In its NID (section 3.2.9.2, p.3-72), Norway reported that emissions from navigation were estimated using tier 2 methodology in accordance with the 2006 IPCC Guidelines. Emissions from international marine bunkers were excluded from the national totals and reported separately. However, the Party did not clearly describe the methodological approach or verification procedures used to ensure the accurate allocation of fuel consumption between domestic and international navigation. During the review, the Party explained that the allocation of fuel consumption between domestic and international navigation is derived from the national energy balance. Petroleum sales data reported by oil companies are classified by organization number to identify the end-use sector, and reseller sales are distributed on the basis of end-user sales statistics and tax refund records. In addition, data on natural gas use in shipping are collected through annual surveys of gas suppliers, which distinguish between domestic and international navigation. The TERT recommends that Norway include in its NID a detailed description of the methodology applied to allocate fuel consumption between domestic and international navigation, including data sources, classification procedures and verification steps for ensuring energy statistics consistency, and document any quality checks, cross-references or expert judgment applied to validate assumptions for reseller and end-user sales.
3.E.5	Specified in paragraphs 21 and 23 of the MPGs 1.B.1.a Coal mining and handling – CH_4	Norway reported in its NID (section 3.3.1.1, p.3-86) that CH_4 emissions from coal mining are identified as a key category according to approach 2 from the 2006 IPCC Guidelines for both level (for 1990 and 2022) and trend assessments. While CH_4 emissions from coal mining activities were calculated using a tier 2 approach, the Party applied a tier 1 approach to estimate CH_4 emissions from abandoned underground coal mines and did not provide an explanation in the NID as to why the methodological choice was not in line with the corresponding decision tree in the 2006 IPCC Guidelines. During the review, the Party clarified that no country-specific EF is currently available for estimating CH_4 emissions from abandoned underground coal mines, but indicated that work is ongoing to develop such an EF for future inventory submissions. The TERT recommends that Norway use an appropriate method for estimating emissions for key categories in accordance with the 2006 IPCC Guidelines. If this is not possible, the TERT recommends that the Party document in the NID the reasons for not following the relevant decision tree in the 2006 IPCC Guidelines.
3.E.6	Specified in paragraphs 31 and 47 of the MPGs 1.B.2.a Oil – gaseous fuels – CO_2	Norway reported in its NID (section 3.3.2.1, p.3-92) that emissions estimates for the entire time series for all exploration wellbores are included under subcategory 1.B.2.a.i (exploration – oil), and therefore "IE" is reported under subcategory 1.B.2.b.i (exploration – natural gas). However, the TERT noted that CO_2 emissions under subcategory 1.B.2.a.i were reported as "NE" in CRT 1.B.2. During the review, the Party explained that it included CO_2 venting and flaring emissions from oil and gas production for the first time in this inventory submission, but, owing to data and capacity constraints, it was unable to include estimates of fugitive CO_2 emissions from exploration activities. The TERT recommends that Norway estimate CO_2 emissions from exploration for oil and gas (subcategories 1.B.2.a.i and 1.B.2.b.i) using tier 1 methods and default parameters provided in the 2006 IPCC Guidelines (vol. 2, chap. 4). If such estimation is not possible, the TERT recommends that Norway apply the appropriate notation key ("NE") to report the emissions and provide a detailed explanation in the NID, outlining data gaps, planned improvements and the timeline for incorporating emissions from exploration into the inventory.

Table 4
Areas of improvement of the reporting on greenhouse gas emissions and removals – industrial processes and product use sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
4.I.1	Specified in paragraph 52 of the MPGs 2.D.3 Other (non-energy products from fuels and solvent use) – CO_2	Norway reported indirect CO_2 emissions for category 2.D.3 (other – non-energy products from fuels and solvent use) in CRT 2(I).A-H. However, these emissions are included in the national total (without indirect CO_2) as presented in CRT Summary2. According to the MPGs, Parties that decide to report indirect CO_2 emissions shall present national totals both with and without indirect CO_2. Accordingly, all indirect CO_2 emissions reported under category 2.D.3 should have been reported in CRT 6 to ensure that indirect emissions are correctly allocated and that the national totals are accurately presented both with and without indirect CO_2. During the review, the Party explained that its reporting of indirect CO_2 emissions under the industrial processes and product use sector (category 2.D.3) aims to ensure the highest possible consistency with the 2006 IPCC Guidelines in terms of the guidance on the reporting of non-energy products from fuels and solvent use. The Party mentioned that reporting indirect CO_2 emissions under the industrial processes and product use sector follows the description of the reporting categories under category 2.D in the 2006 IPCC Guidelines (vol. 1, chap. 8, table 8.2). The Party clarified that the CRTs include predefined subcategories for solvent use and road paving with asphalt, which allow detailed and transparent information to be reported. The TERT recommends that Norway reallocate indirect CO_2 emissions reported under category 2.D.3 to CRT 6, ensuring that national totals in CRT Summary2 are presented both with and without indirect CO_2 emissions in accordance with paragraph 52 of the MPGs.
4.I.2	Specified in paragraphs 39–40 of the MPGs 2.F Product uses as substitutes for ozone-depleting substances – HFCs	Norway provided in its NID (section 4.6.3.4, table 4-46, p.4-82) recovery efficiency values for all source categories except for subcategory 2.F.1.b (domestic refrigeration) and stand-alone commercial applications under subcategory 2.F.1.a (commercial refrigeration), which were reported as "NE", accompanied by a footnote stating that "in sources where Norway only uses reported figures of destructed F-gas, recovery efficiency is reported as NE". However, the NID (p.4-81) also states that "at the moment it is not assumed that F-gas from stand-alone commercial and domestic refrigeration is included in the destructed amounts". The TERT noted that these two statements appear contradictory and observed that recovery efficiency could, in principle, be estimated for these two sources, as both AD and emissions related to end of life are reported in CRT 2(II).B-Hs2. During the review, the Party clarified that emissions from disposal and recovery estimates are derived using an EF approach, whereby the amount of gas destroyed is subtracted from the disposal emissions. The Party explained that, until the 2024 inventory submission, the second above-mentioned statement in the NID was valid; however, owing to the inclusion of new information from two collection facilities, the first above-mentioned statement in the NID accurately reflects the methodology applied for the 2024 submission. The Party confirmed that the second above-mentioned statement will not be included in the 2026 inventory submission to ensure consistency with the current approach. The TERT recommends that Norway improve the transparency and consistency of the methodological description in the NID by clarifying the approach applied to estimating emissions for recovery and disposal, namely that recovery and disposal emissions for stand-alone commercial applications and domestic refrigeration are estimated using both end-of-life EFs and AD from the destruction of gas. The TERT also recommends that the Party update the NID to remove outdated statements and include recovery efficiency values for stand-alone commercial applications and domestic refrigeration in table 4-46.
4.I.3	Specified in paragraph 20 of the MPGs 2.F.1 Refrigeration and air conditioning – HFCs	Norway reported in its NID (section 4.6.3.2, p.4-77) that, for subcategory 2.F.1.e (mobile air conditioning), a hybrid of the mass-balance and EF approaches was applied to calculate emissions. Under this method, it is assumed that HFCs imported in bulk for use in mobile air conditioning are primarily used to refill systems after leakage. A restriction is applied in the model: when the imported bulk amount is lower than 10 per cent of the total F-gas bank, the EF approach is

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		used. This assumption means that the product-life factor will never be lower than 10 per cent. The TERT noted that this hybrid model, which combines elements of tier 2a (EF) and tier 2b (mass-balance) methodologies, is not fully consistent with the decision tree in the 2006 IPCC Guidelines (vol. 3, chap. 7, figure 7.6) for estimating actual emissions from refrigeration and air-conditioning applications. The TERT considered that the application of a mixed methodological approach could result in potential overestimation of emissions, particularly for years for which both approaches are combined. During the review, the Party confirmed that it uses a hybrid methodology and clarified that the 10 per cent leakage rate is applied only for the first and last years of the time series. The TERT recommends that Norway review the methodological approach applied for estimating emissions from leakage for subcategory 2.F.1.e (mobile air conditioning) in accordance with the 2006 IPCC Guidelines, ensuring that the same method is used across the time series.

Table 5
Areas of improvement of the reporting on greenhouse gas emissions and removals – agriculture sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 6
Areas of improvement of the reporting on greenhouse gas emissions and removals – land use, land-use change and forestry sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
6.L.1	Specified in paragraph 20 of the MPGs 4. General (LULUCF) – CO_2	Norway reported CO_2 emissions from drained organic soils under the land-use categories 4.A (forest land), 4.B (cropland), 4.C (grassland), 4.D (wetlands) and 4.E (settlements) using a tier 1 approach from the 2006 IPCC Guidelines. The TERT noted that this approach does not account for off-site CO_2 emissions resulting from waterborne carbon losses, particularly dissolved organic carbon. However, the Wetlands Supplement, which each Party is encouraged to use under paragraph 20 of the MPGs, provides a methodology and default values for reporting such waterborne off-site CO_2 emissions for land remaining and land converted to subcategories under all the above-listed land-use categories. During the review, Norway explained that it has not previously considered this aspect and indicated that it will explore the possibility of applying the methodology from the Wetlands Supplement for future inventory submissions. The TERT encourages Norway to use the methodology from the Wetlands Supplement, which considers off-site CO_2 emissions from waterborne carbon losses, to estimate CO_2 emissions from drained organic soils under categories 4.A–E.
6.L.2	Specified in paragraphs 21 and 23 of the MPGs 4. General (LULUCF) – CO_2, CH_4 and N_2O	Norway reported CO_2, CH_4 and N_2O emissions from drained organic soils under the land-use categories 4.A (forest land), 4.B (cropland), 4.C (grassland), 4.D (wetlands) and 4.E (settlements) using a tier 1 approach from the 2006 IPCC Guidelines. However, drained organic soils were identified as key categories within these land-use categories. According to the 2006 IPCC Guidelines (vol. 4, chap. 2, figure 2.5, p.2.33), when changes in carbon stocks in organic soils is a key category, data should be collected to enable the application of higher-tier methods. During the review, Norway explained that the national data required for developing and applying tier 2 or 3 methods are currently not available. The TERT recommends that Norway use an appropriate method for estimating emissions for key categories in accordance with the 2006 IPCC Guidelines. If this is not possible, the TERT recommends that the Party document in the NID why the methodological choice is not in line with the corresponding decision tree in the 2006 IPCC Guidelines.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
6.L.3	Specified in paragraphs 39–40 of the MPGs 4.A.1 Forest land remaining forest land – CO_2, CH_4 and N_2O	Norway reported in the NID (section 6.4.1.1.3, p.6-55) that, according to the national forest inventory for 2018–2022, an area of 469 kha of drained mineral soils was identified under category 4.A.1 (forest land remaining forest land). The Party explained that no specific method is currently available for estimating annual carbon stock changes for drained mineral forest soils, either for forest land remaining forest land or for estimating SOC_{REF} (in tonnes of carbon per hectare) and stock change factors following land-use conversion; thus, carbon stock changes in drained mineral soils are estimated using the same methods applied for other mineral soils for both forest land remaining forest land and land-use conversions. During the review, the Party explained that drained mineral soils may have higher soil organic carbon contents than undrained mineral soils. The Party clarified that the modelling software used for forest land remaining forest land (Yasso07) does not account for drainage status and therefore assumes soils to be well aerated, similar to other mineral soils. As a result, decomposition processes are assumed to be dominated by aerobic conditions and to be comparable to those of mineral soils in Norway. The Party considers that the structure and parameters of the Yasso07 model, which are derived from data sets based on mineral soils from various regions worldwide, adequately represent decomposition processes in these soils. The Party noted that the current modelling approach does not capture potential long-term carbon accumulation under anaerobic conditions prior to drainage, and therefore potential GHG emissions associated with the decomposition of old carbon (legacy effects from pre-drainage anaerobic soil conditions) are not included in the current inventory submission. The Party indicated that the majority of forest drainage ditches in Norway were established prior to 1970. The Party also explained that definitions of organic soils differ across countries. Norway applies a national definition under which organic soils are defined as having a peat layer with a thickness of at least 40 cm, whereas the IPCC default definition considers organic soils to have a peat layer greater than 10 cm (and, where peat depth is less than 20 cm, a carbon concentration exceeding 12–20 per cent when mixed to a depth of 20 cm), while allowing the use of national definitions in accordance with the Wetlands Supplement. As the definition of mineral soils depends on the definition of organic soils, the Party clarified that direct comparisons with mineral soils across countries are not appropriate without detailed knowledge of the national soil classification criteria applied in those countries. The TERT noted that the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1, p.2.39) state that tier 3 modelling approaches are capable of addressing the influence of land use and management with a dynamic representation of environmental conditions that affect the processes controlling soil carbon stocks, such as weather, edaphic characteristics and other variables. The TERT recommends that Norway describe in its NID the rationale for the methodological choice and assumptions used to estimate carbon stock changes in drained mineral soils under forest land remaining forest land, including the applicability and limitations of the Yasso07 model, and include a discussion of the potential effects of drainage status, legacy effects and national soil classification differences on the reported estimates, in line with the 2006 IPCC Guidelines.
6.L.4	Specified in paragraphs 39–40 of the MPGs Land representation – CO_2, CH_4 and N_2O	According to the 2006 IPCC Guidelines (vol. 4, chap. 3, annex 3A.5), it is good practice to apply a consistent soil classification system (either default or country-specific) across all land-use categories. However, the information reported in the NID (section 6.2.3, p.6-26) suggests that Norway applied different soil classification criteria for forest land, cropland and grassland, which may have affected the estimation of soil carbon stock changes when land-use changes occurred between these categories. For forest land, organic soils are classified on the basis of the occurrence of an organic layer deeper than 40 cm, with no minimum carbon content requirement. For cropland and intensive grassland, soils are partly classified as organic when designated as histosols according to the World Reference Base for Soil Resources (2015) classification system and partly on the basis of historical economic maps, where organic soils were defined by a topsoil organic layer deeper than 20 cm for cropland or 30 cm for grassland, also without a minimum carbon content requirement. The TERT noted that the methodological

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		description provided in the NID regarding how emissions are calculated when land-use changes occur between categories with different soil classifications is not transparent. During the review, Norway clarified that it applies a hierarchical method for the classification of organic soils during land-use changes, ensuring that consistent soil classification is used throughout the time series for each plot. Under this hierarchy, the classification from the national forest inventory takes precedence, followed by the National Soil Survey (which covers only agricultural soils) and finally the historical economic map Arealressurskart 1:5000 (Norway's national land resource map developed by the Norwegian Institute of Bioeconomy Research). The Party explained that this approach presumes that the organic layer thickness remains constant over time, thereby allowing the same tier 1 methodology to be applied consistently across the time series, either for mineral soils or for organic soils, when land-use changes occur. The TERT acknowledges that, on the basis of Norway's explanation, the approach used did not result in either underestimation or overestimation of emissions in the event of land-use changes. The TERT recommends that Norway improve transparency in its NID by clearly describing how emissions and removals from organic soils under forest land, cropland and grassland were estimated when land-use changes occurred between these categories, specifically by explaining how the hierarchical soil classification approach is applied in practice to ensure consistency across the time series and by explaining any assumptions or limitations that may affect the accuracy and comparability of soil carbon stock change estimates.

Table 7
Areas of improvement of the reporting on greenhouse gas emissions and removals – waste sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
7.W.1	Specified in paragraph 24 of the MPGs 5.A.1 Managed waste disposal sites – CH_4	Norway reported in its NID (section 7.2.4, table 7-4, p.7-9) the parameters used to calculate CH_4 emissions for subcategory 5.A.1.a (anaerobic – managed waste disposal sites). The TERT noted that for the DOC_f parameter the Party applied the default value of 0.5, which is recommended for bulk waste when limited data on waste composition are available. However, the Party has access to data on the composition and quantities of different waste materials, as presented in NID tables 7-2 and 7-3 (section 7.2.3, pp.7-7–7-8), including food, paper, wood, textiles, sewage sludge and plastics. The TERT also noted that the 2019 Refinement to the 2006 IPCC Guidelines provides updated default DOC_f values for different waste types (vol. 5, chap. 3.2.3, table 3, p.3.12). While the application of the 2019 Refinement to the 2006 IPCC Guidelines is not mandatory in accordance with paragraph 28 of decision 5/CMA.3, the TERT considered that applying updated DOC_f values specific to each waste type would improve the accuracy of the estimates of CH_4 emissions from SWDS. During the review, the Party explained that it will consider applying waste-type-specific DOC_f values from the 2019 Refinement to the 2006 IPCC Guidelines for the 2026 inventory submission. The TERT encourages Norway to consider applying updated waste-type-specific DOC_f values as provided in the 2019 Refinement to the 2006 IPCC Guidelines with a view to improving the accuracy of the estimates of CH_4 emissions from SWDS.
7.W.2	Specified in paragraph 40 of the MPGs 5.A.1 Managed waste disposal sites – CH_4	The TERT noted a discrepancy between the amount of CH_4 recovered from landfills reported under category 5.A.1 (managed waste disposal sites) (NID section 7.2.1, p.7-2) and the amount of landfill gas flared or used for energy purposes reported under category 5.C.1 (waste incineration) (NID section 7.5.3, table 7-8, p.7-18). The amount of CH_4 recovered from SWDS was reported as 4,608 t in 2022, while NID table 7-8 indicates that 3,074 t landfill gas was flared, 1,033 t used for public electricity and heat production, and 1,534 t used in other sectors (commercial/institutional) in the same year. During the review, the Party explained that the discrepancy between the amount of CH_4 recovered from SWDS and the quantities of landfill gas flared or used for energy purposes arose because the figures in NID table 7-8 include biogas from

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		other sources in addition to landfill gas. The Party informed the TERT that these inconsistencies have been identified and will be corrected in its next inventory submission. The TERT recommends that Norway ensure that the information provided in the NID on the amounts of CH_4 recovered from landfills, flared and used for energy purposes under categories 5.A.1 and 5.C.1 is consistent and coherent. The TERT also recommends that the Party clearly distinguish and separately report the quantities of biogas from other sources to avoid cross-category aggregation.
7.W.3	Specified in paragraph 21 of the MPGs 5.B.1 Composting – CH_4 and N_2O	Norway reported in its NID (section 7.4.4, p.7-14) that it applied a tier 1 method using default EFs to estimate CH_4 and N_2O emissions for category 5.B.1 (composting), which was identified as a key category according to the trend assessment (1990–2022). During the review, the Party explained that it has developed a tier 2 method and country-specific EFs for estimating emissions from the composting of municipal solid waste and that the 2025 inventory submission will reflect these updated parameters and methodological improvements. The Party clarified that the revised approach differentiates between composting facility types and applies EFs adjusted to specific composting methods, thereby improving the accuracy of the emission estimates. The TERT recommends that Norway use an appropriate method for estimating CH_4 and N_2O emissions for category 5.B.1 (composting), which is a key category, in accordance with the 2006 IPCC Guidelines.
7.W.4	Specified in paragraphs 39–40 of the MPGs 5.D.1 Domestic wastewater – CH_4	Norway reported in its NID (section 7.6.1, p.7-21) that sludge is produced in all wastewater treatment plants in the country. The Party explained that in Norway wastewater sludge is managed through several treatment and disposal pathways. Some wastewater facilities treat sludge aerobically, with the associated emissions reported under category 5.B.1 (composting), while others treat sludge anaerobically, producing CH_4 (biogas) for energy use, with these emissions reported under the energy sector. Emissions of CH_4 from unintentional leakage in wastewater facilities that treat sludge anaerobically are included under subcategory 5.B.2.b (other – anaerobic digestion at biogas facilities). In addition, sludge is also disposed of in municipal SWDS (subcategory 5.A.1.a, anaerobic – managed waste disposal sites) and applied to agricultural soils (subcategory 3.D.1.b.ii, sewage sludge applied to soils). The amount of sludge removed from domestic wastewater reported in CRT 5.D was 132.82 kt DC in 2022. In the NID (section 7.2.3, table 7-2, p.7-7), the Party reported that 6 kt sewage sludge was disposed of in municipal SWDS in 2022, while 1,284.86 kt dm was reported as leakage under subcategory 5.B.2.b in CRT 5.B. However, the TERT could not identify in the NID the conversion factors applied to convert between sludge in dry mass (kt), nitrogen (t nitrogen/year) and DC (kt). The amount of sludge used for energy purposes could also not be identified. The TERT noted that the use of different reporting units for sludge across categories, without transparent conversion factors, makes it difficult to verify the consistency of the AD reported for sludge management and to ensure that no double counting of emissions occurs across categories. During the review, the Party explained that all wastewater treatment plants report the annual amount of sludge removed to the competent authority in tonnes of dry mass. The Party clarified that information is available on the total amount of sludge produced and its subsequent management across sectors, ensuring consistency between the total sludge removed from wastewater treatment and the total sludge allocated for treatment and disposal across inventory categories. For 2022, a total of 132,818 t dm of sludge was removed from wastewater treatment plants and reported in other sectors as follows: 69,071 t dm applied to agricultural soils (subcategory 3.D.1.b.ii), 31,257 t dm applied to managed soils (category 4(I)), 22,817 t dm treated biologically (subcategory 5.B.2.b), 3,994 t dm incinerated (category 5.C.1) and 5,680 t dm disposed of in SWDS (subcategory 5.A.1.a). The TERT recommends that Norway include in its NID the AD on sludge removed from wastewater treatment plants and its subsequent management pathway across all relevant categories in kt dry matter for the relevant years of the time series, in tabular format. The TERT also recommends that the Party describe in its NID the

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		conversion factors applied to convert between the units used for sludge in dry mass, nitrogen and DC, specifying the factors used for each type of wastewater treatment.

C. Information necessary to track progress in implementing and achieving the nationally determined contribution under Article 4 of the Paris Agreement

Table 8
Areas of improvement of the reporting on national circumstances and institutional arrangements

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 9
Areas of improvement of the description of the nationally determined contribution under Article 4 of the Paris Agreement, including updates

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
9.1	Specified in paragraph 64(e) of the MPGs	Norway reported in its BTR1 (section 2.1.3, p.33) that the NDC covers all GHG inventory sectors and that emissions and removals from the LULUCF sector that are "additional" will be accounted for when assessing achievement of the target. Furthermore, in CTF table 2, Norway indicated that the LULUCF sector is defined differently for the NDC than it is in the national inventory report, specifying that only a subset of emissions and removals from the LULUCF sector (i.e. those identified as "additional") are included in the NDC. The Party also indicated in CTF table 2 that work is ongoing to clarify this methodological approach. However, the TERT noted that the BTR1 does not provide any further definition of "additional" or include details on the subset of emissions and removals, making the scope and coverage of the NDC unclear. During the review, the Party explained that the LULUCF sector in Norway is currently a large net sink and that it does not wish to account for the natural sink in LULUCF, as this could reduce the ambition for emission reductions in other sectors. The Party clarified that "additional" emissions and removals refer to those resulting from new or enhanced policies and measures, and therefore only these additional changes in emissions and removals will be counted towards the NDC target, while the broader net sink will not be accounted for. The TERT recommends that Norway provide in its BTR a clear description of the subset of emissions and removals from the LULUCF sector included in the NDC and explain the definition of "additional" emissions and removals, even if the methodology for their inclusion in the NDC is not yet finalized, thereby facilitating a clear understanding of the scope and coverage of the NDC.

Table 10
Areas of improvement of the reporting of the information necessary to track progress in implementing and achieving the nationally determined contribution under Article 4 of the Paris Agreement

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
10.1	Specified in paragraph 77(c) of the MPGs	Norway reported in its BTR1 (section 2.4.1.1, pp.42–44) and CTF table 1 that the indicator selected to track progress in implementing and achieving the NDC is emissions without LULUCF, which comprises total CO_2 eq emissions, including indirect CO_2, without LULUCF. However, the TERT noted that, according to BTR1 table 2.2 and the CTF table Appendix, the scope and coverage of the NDC also include emissions and removals from the LULUCF sector that are "additional". The TERT also noted that it is unclear how the contribution of LULUCF to the NDC will be assessed and how changes in emissions and removals from the LULUCF sector will be tracked to enable a comprehensive assessment of overall progress in implementing and achieving the NDC.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		During the review, Norway explained that it has not yet finalized the methodology for accounting for emissions and removals from LULUCF that are "additional" (see ID# 9.1). The Party clarified that, as this methodology has not yet been finalized, it is unable to track changes in accounted emissions and removals from the LULUCF sector. The Party also explained that it is currently not accounting for the natural sink in LULUCF, as doing so could reduce the level of ambition for emission reductions in other sectors. The TERT recommends that Norway explain in its BTR the contribution of LULUCF towards the implementation and achievement of the NDC.

Table 11
Areas of improvement of the reporting on mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving the nationally determined contribution under Article 4 of the Paris Agreement

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 12
Areas of improvement of the summary of greenhouse gas emissions and removals

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 13
Areas of improvement of the projections of greenhouse gas emissions and removals

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 14
Areas of improvement of other information relevant to tracking progress in implementing and achieving the nationally determined contribution under Article 4 of the Paris Agreement

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

D. Financial, technology development and transfer, and capacity-building support provided under Articles 9–11 of the Paris Agreement

Table 15
Areas of improvement of the reporting on national circumstances and institutional arrangements

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 16
Areas of improvement of the reporting on underlying assumptions, definitions and methodologies relating to financial, technology development and transfer, and capacity-building support provided under Articles 9–11 of the Paris Agreement

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 17
Areas of improvement of the information on financial support provided under Article 9 of the Paris Agreement – bilateral, regional and other channels

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 18
Areas of improvement of the information on financial support provided under Article 9 of the Paris Agreement – multilateral channels

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 19
Areas of improvement of the information on technology development and transfer provided under Article 10 of the Paris Agreement

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
19.1	Specified in paragraph 126(c) of the MPGs	Norway reported information on support provided for technology development and transfer. However, the Party did not report information explicitly addressing how this support contributes to the development and enhancement of endogenous capacities and technologies in developing country Parties. During the review, Norway explained that it does not have a specific policy or framework dedicated to supporting the development and enhancement of endogenous capacities and technologies. However, the Party clarified that it provides general guidance to its partners on sustainability, local ownership and exit strategies, and referred to examples of activities that incorporate these elements. The TERT recommends that Norway provide, to the extent possible, information on how its support for technology development and transfer contributes to building and strengthening endogenous capacities and technologies in developing country Parties, including by referencing the guidance provided to partners and examples of such support, and by describing the practical mechanisms through which this occurs, such as the inclusion of local innovation components, technology co-development or capacity-building measures within supported projects.

Table 20
Areas of improvement of the information on capacity-building support provided under Article 11 of the Paris Agreement

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Annex

Documents and information used during the review

A. Reference documents

BTR1 of Norway. Available at https://unfccc.int/first-biennial-transparency-reports.

BTR1 CTF tables of Norway.
Available at https://unfccc.int/first-biennial-transparency-reports.

CRTs of Norway. Available at https://unfccc.int/first-biennial-transparency-reports.

"Guidance for operationalizing the modalities, procedures and guidelines for the enhanced transparency framework referred to in Article 13 of the Paris Agreement". Decision 5/CMA.3. FCCC/PA/CMA/2021/10/Add.2. Available at https://unfccc.int/documents/460951.

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 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 Buendia, K Tanabe, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc-nggip.iges.or.jp/public/2019rf/.

"Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement". Annex to decision 18/CMA.1. FCCC/PA/CMA/2018/3/Add.2. Available at https://unfccc.int/documents/184700.

B. Additional information provided by the Party

Responses to questions during the review were received from Kristin Alsvik Rieck (Ministry of Climate and Environment of Norway), including additional material. The following references were provided by Norway and may not conform to UNFCCC editorial style as some have been reproduced as received:

Dalsgaard, L., Lange, H., Strand, L. T., Callesen, I., Borgen, S. K., Liski, J., & Astrup, R. (2016). Underestimation of boreal forest soil carbon stocks related to soil classification and drainage. Canadian Journal of Forest Research, 46(12), 1413–1425. Available at https://doi.org/10.1139/cjfr-2015-0466

LISKI, J., ILVESNIEMI, H., MÄKELÄ, A., & STARR, M. (1998). Model analysis of the effects of soil age, fires and harvesting on the carbon storage of boreal forest soils. European Journal of Soil Science, 49(3), 407–416. Available at https://doi.org/10.1046/j.1365-2389.1998.4930407.x

Liski, J., Palosuo, T., Peltoniemi, M., & Sievänen, R. (2005). Carbon and decomposition model Yasso for forest soils. Ecological Modelling, 189(1–2), 168–182. Available at https://doi.org/10.1016/j.ecolmodel.2005.03.005

OECD Creditor Reporting System guidelines. Available at https://www.oecd.org/en/publications/serials/creditor-reporting-system-on-aid-activities_g1gha57a.html

Tuomi, M., Thum, T., Järvinen, H., Fronzek, S., Berg, B., Harmon, M., Trofymow, J. A., Sevanto, S., & Liski, J. (2009). Leaf litter decomposition—Estimates of global variability

based on Yasso07 model. Ecological Modelling, 220(23), 3362–3371. Available at https://doi.org/10.1016/j.ecolmodel.2009.05.016

WRB (2015): World Reference Base for Soil Resources 2014, update 2015 International soil classification system for naming soils and creating legends for soil maps. *World Soil Resources Reports*. Rome