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

Addendum

Summary

This addendum to the report on the technical expert review of the first biennial transparency report of Lebanon, 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, and presents capacity-building needs identified by the Party and by the technical expert review team in consultation with the Party during the review. The review took place from 9 to 13 March 2026 in Bonn.

* 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.

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
BTR	biennial transparency report
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRT	common reporting table
CTF	common tabular format
EF	emission factor
ESA	European Space Agency
ETF	enhanced transparency framework under the Paris Agreement
F-gas	fluorinated gas
$Frac_{LEACH-(H)}$	fraction of nitrogen input to managed soils that is lost through leaching and run-off
GHG	greenhouse gas
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
MMS	manure management system(s)
MPGs	modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement
MSW	municipal solid waste
N_2O	nitrous oxide
NA	not applicable
NDC	nationally determined contribution
NE	not estimated
NF_3	nitrogen trifluoride
NID	national inventory document
NIR	national inventory report
NMVOC	non-methane volatile organic compound
NO	not occurring
NO_X	nitrogen oxides
PaMs	policies and measures
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
SF_6	sulfur hexafluoride
SO_X	sulfur oxides
TERT	technical expert review team

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

1. Tables 1–14 present the results of the review of the consistency with the MPGs[2] of the information submitted by Lebanon in its BTR1. All recommendations and encouragements contained in the tables are for the next BTR or NIR, 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*
1.1	Specified in paragraph 6 of the MPGs	Lebanon reported in its BTR1 (table 28) that it applied flexibility with respect to its reporting of information on the GHG inventory (time series) and for tracking progress in implementing and achieving the NDC (estimates of expected and achieved GHG emission reductions and GHG emission projections). However, the TERT identified that the Party's use of flexibility was not transparently reported in the BTR1 for two reasons. Firstly, Lebanon did not clearly indicate in BTR1 table 28 the specific flexibility provisions of the MPGs (provision number) that it applied. For the flexibility applied in relation to the GHG inventory, Lebanon referred to time-series consistency in BTR1 table 28 but referred to paragraphs 48 (option to report fewer GHGs) and 57 (option to report a shorter time series) of the MPGs in both CRT Flex_Summary and NID table 6. Secondly, Lebanon did not indicate capacity constraints or self-determined estimated time frames for improvements in relation to the application of the flexibility provided for in paragraph 48 of the MPGs. During the review, Lebanon clarified that it applied flexibility with respect to the following provisions of the MPGs: (a) Time series for the GHG inventory: flexibility applied with respect to paragraph 57 of the MPGs; (b) No reporting of PFCs, SF_6 or NF_3 in the GHG inventory: flexibility applied with respect to paragraph 48 of the MPGs; (c) Estimates of expected and achieved GHG emission reductions for PaMs: flexibility applied with respect to paragraphs 85–90 of the MPGs; (d) GHG emission projections: flexibility applied with respect to paragraph 92 of the MPGs. Lebanon indicated that in future it will explicitly indicate the relevant paragraph numbers from the MPGs for each flexibility provision applied. The TERT recommends that Lebanon clearly reference the specific provision of the MPGs for each instance where the Party applies flexibility with respect to its reporting of information on the GHG inventory and tracking progress in implementing and achieving the NDC, for example by completing CRT Flex_Summary (for reporting the flexibility applied in relation to the GHG inventory) and/or completing section VII of the BTR outline, as contained in annex IV to decision 5/CMA.3 (for both the reporting of information on the GHG inventory and tracking progress in implementing and achieving the NDC) and ensuring consistency between the BTR and NIR. The TERT also recommends that Lebanon clearly indicate capacity constraints and provide self-determined estimated time frames for improvements in relation to the application of flexibility with respect to paragraph 48 of the MPGs (not reporting of PFCs, SF_6 or NF_3).

[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.

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 25 and 42 of the MPGs Key category analysis	In CRT 7, the Party reported the results of the key category analysis by level and trend (with and without LULUCF). However, Lebanon did not report the individual and cumulative percentage contributions from key categories for the trend assessment in the NID and such information is provided only for the level assessment for the latest reporting year (2022) (NID table 3 and the table in annex I to the NID). During the review, the Party explained that the omission is due to time constraints when preparing the submission. The TERT recommends that the Party report the individual and cumulative percentage contributions from key categories for both the level and trend assessment, with and without LULUCF, for the starting year and the latest reporting year.
2.G.2	Specified in paragraph 35 of the MPGs QA/QC and verification	The Party reported in its NID (section 1.5, p.24) and annex III thereto the QA/QC plan for the GHG inventory in accordance with the 2006 IPCC Guidelines. However, the TERT identified frequent inconsistencies in the use of notation keys in the CRTs, including the incorrect use of "IE" for CH_4 emissions for subcategories in CRT 5.A (e.g. subcategories 5.A.1.a anaerobic, 5.A.1.b semi-aerobic, 5.A.2 unmanaged waste disposal sites and 5.A.3 uncategorized waste disposal sites), the use of "NO" instead of "NE" for AD and the use of "NO" instead of "IE" for subcategory 5.A.1.c active-aeration. The TERT also identified discrepancies between the NID and CRTs (differences in the data on MSW between NID table 82 and CRT 5.A) and internal discrepancies within the NID, which, for example, states in section 1.4 (p.23) that the key category analysis was conducted for both the level and trend assessment, but only reports information on the level assessment in NID table 3 and annex I thereto. During the review, the Party explained that the inconsistencies are mostly due to the migration of some data to a new IPCC inventory software (version 2.930.8992.13493) and a shortage of time and human resources for proper QC. Furthermore, Lebanon explained that the misuse of notation keys identified in the CRTs is also attributable to technical challenges encountered when migrating the 1994–2022 inventory time series to the new IPCC inventory software and exporting inventory results from this software to the ETF reporting tool for the automatic generation of the CRTs. These data export processes led to inconsistencies and, in some cases, mixed up the application of notation keys across categories and gases. These factors limited the Party's ability to conduct extensive and systematic QA/QC of the CRTs prior to their submission. Lebanon stated that it will ensure that it implements more robust QA/QC procedures to prevent similar reporting issues. The TERT recommends that the Party strengthen its QA/QC procedures for the GHG inventory, CRTs and NID to ensure information is presented consistently.
2.G.3	Specified in paragraphs 31 and 38 of the MPGs Completeness	The TERT noted that CRT 9 does not include explanations for the categories reported as "NE" or information on the allocation of emissions for the categories reported as "IE". During the review, Lebanon acknowledged that CRT 9 does not fully provide explanatory information for categories reported as "NE" or information on approaches to the allocation of emissions where "IE" is reported. The Party explained that these omissions resulted primarily from technical and formatting constraints encountered during the migration of the inventory to the new version of the IPCC inventory software and that the explanations were not systematically replicated in the corresponding fields of CRT 9 prior to submission. Resource constraints and tight timelines associated with the submission of the BTR1 limited the Party's ability to complete a detailed consistency check of narrative explanations across all CRTs. Lebanon recognizes that including such explanations directly within CRT 9 enhances transparency and facilitates assessment of the submission. Lebanon will ensure that in future it includes explanatory notes for all "NE" entries directly in CRT 9, provide clear descriptions of the allocation methods used when "IE" is reported and strengthen its internal QA/QC procedures for verifying consistency between the NID and CRTs prior to submission. The TERT recommends that Lebanon complete CRT 9 by providing the required information in the "Explanation" column for categories reported as "NE" and in the

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		"Allocation as per IPCC Guidelines", "Allocation used by the Party", and "Explanation" columns for categories reported as "IE".

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 Fuel combustion – reference approach – CO_2	Lebanon reported in its NID (section 3.2.1) the comparison between the sectoral and the reference approach to estimating CO_2 emissions from fuel combustion for 2022 and explained the main reasons for the discrepancy in the estimates calculated between the approaches observed for that year (2.21 per cent). However, the NID does not explain the main reasons for the discrepancies observed for 2020 and 2021. In particular, no assessment or further explanation is provided for 2020, where the difference between the estimates is 5.06 per cent (CRT 1.A(c)). The TERT noted that this is not in accordance with the MPGs and that the reference approach is used to independently check and verify the sectoral approach as part of the QA/QC for the energy sector. When significant discrepancies or time-series deviations occur, the main reasons are to be provided (table note 6 to CRT 1.A(c) indicates that differences in estimates between the approaches of more than 5 per cent are to be investigated and explained). The reference approach is a useful means of checking the sectoral approach for every year of the time series and not just the latest reporting year, and Parties should complete CRT 1.A(c) for every year of the time series, including by providing explanations of differences in estimates between the approaches of more than 5 per cent. During the review, the Party explained that the latest reporting year for its BTR1 is 2022 and that the comparison of CO_2 emissions from fuel combustion and the explanation of the differences provided in the NID refer to that year in line with the MPGs. The Party noted that the MPGs do not require a detailed comparison or explanation to be provided for each year of the time series, and, consequently, it did not include explanations for 2020 or 2021 in its submission. The TERT encourages Lebanon to include in the NID a clear explanation of the main reasons for discrepancies between the sectoral and the reference approach whenever differences in estimates between the two approaches are more than 5 per cent for a given year of the time series.
3.E.2	Specified in paragraphs 40 and 47 of the MPGs 1.A Fuel combustion – sectoral approach – liquid fuels – CO_2, CH_4 and N_2O	Lebanon did not estimate emissions for subcategory 1.A.3.e.ii other (other transportation) and instead reported this subcategory as "NO" in CRT 1.A(a)s3 owing to a lack of disaggregated fuel consumption data. In its NID (table 5, p.28), Lebanon reported "NE" for subcategory 1.A.2 manufacturing industries and construction and explained below the table (p.30) that subcategories 1.A.2.a iron and steel to 1.A.2.f non-metallic minerals are not reported in a disaggregated way and that related emissions are all reported under subcategory 1.A.2.g.viii other (manufacturing industries and construction). The Party further explained in the NID (section 3.2.5.2, p.53) that this is due to the absence of disaggregated AD per industry. During the review, the Party explained that it does not have a national energy balance that allows fuel consumption data to be disaggregated across specific categories and subcategories. The Party clarified that the absence of a national energy balance has been identified in the NID as a key barrier to consistent and reliable data collection and reporting across the energy sector. The TERT recommends that Lebanon develop a national energy balance to enable it to properly allocate fuel consumption data to the relevant categories and subcategories in the energy sector and thereby improve the accuracy and completeness of its emission estimates for the energy sector.
3.E.3	Specified in paragraphs 21 and 23 of the MPGs 1.A.2 Manufacturing industries and construction – liquid fuels – CO_2	In NID table 3 and annex I thereto (p.143), Lebanon identified subcategories 1.A.2 manufacturing industries and construction, 1.A.3.b road transportation and 1.A.4 other sectors as key categories for CO_2 emissions. However, the Party estimated these emissions using a tier 1 approach (i.e. in deviation from the tier recommended in the 2006 IPCC Guidelines (vol. 2, chap. 2, figure 2.1, and vol. 2, chap. 3, figures 3.2.2 and 3.2.3), which recommend using a higher tier for categories identified as key categories) and reported in its NID (p.23) that it used the tier 1 approach owing to a lack of AD, lack of country-specific EFs and resource limitations in the inventory team.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
	1.A.3.b Road transportation 1.A.4 Other sectors	During the review, the Party explained that it did not use a higher-tier approach for these key categories owing to a lack of information on the specific carbon content of the fuels used. The TERT encourages Lebanon to make every effort to use a higher-tier method for estimating emissions for key subcategories 1.A.2, 1.A.3.b and 1.A.4 in line with the 2006 IPCC Guidelines (vol. 2, chap. 2, figure 2.1, and vol. 2, chap. 3, figures 3.2.2 and 3.2.3) and report how it is addressing or intends to address this issue. If a higher-tier method cannot be used, the TERT recommends that the Party explain in the NID the reasons for this.
3.E.4	Specified in paragraphs 39 and 40 of the MPGs 1.A.1.a Public electricity and heat production – liquid fuels – CO_2	Lebanon reported in its NID (annex IV, section 2) the methodology applied to develop a country-specific CO_2 EF for diesel oil under subcategory 1.A.1.a.i electricity generation and explained in NID section 3.2.4.6 that the country-specific CO_2 EF is only used instead of the default EF for 2020–2022 (as it reflects the quality of the fuel consumed during this period) and that it has not been used for previous years. The Party applied the flexibility provided for in paragraph 57 of the MPGs in relation to the time series and submitted GHG emission estimates for 2011 and 2020–2022. However, the Party reported limited information to substantiate why the country-specific CO_2 EF is not considered representative for 2011 based on the available evidence and why it is only used for 2020–2022. During the review, the Party explained that the country-specific CO_2 EF for diesel oil applied for 2020–2022 was derived in coordination with the Ministry of Energy and Water from laboratory test results reflecting the actual specifications of fuel imported during that period. These results indicated characteristics that differed slightly from the default IPCC values, which justified the application of a country-specific CO_2 EF for those years. However, laboratory data are not available for 1994–2019 to confirm that diesel specifications were equivalent to those observed for 2020–2022. In the absence of historical analytical data, and following technical guidance from the Ministry of Energy and Water, Lebanon does not consider it methodologically justifiable to retroactively apply the 2020–2022 country-specific CO_2 EF to earlier years. Consequently, it is not planning to perform any recalculations for the historical time series (1994–2019), as there is no evidence that the country-specific CO_2 EF would be more representative than the default IPCC values previously applied. For future inventories, Lebanon intends to continue applying the country-specific CO_2 EF for diesel oil, subject to validation by the Ministry of Energy and Water that the specifications of imported diesel remain consistent with those measured for 2020–2022. Should future evidence indicate changes in fuel specifications, the Party will review the EFs accordingly and implement any necessary recalculations in line with the guidance on time-series consistency provided in the 2006 IPCC Guidelines (vol. 1, chap. 5, section 5.2). The TERT recommends that Lebanon include in its NID information explaining why the country-specific CO_2 EF for diesel oil under subcategory 1.A.1.a.i is not considered representative for 2011 based on the available evidence. The TERT also recommends that the Party continue assessing whether the country-specific CO_2 EF may be representative for historical years in the event that relevant historical analytical data become available, noting that any expert judgment used should be elicited in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 2, annex 2A.1).
3.E.5	Specified in paragraph 31 of the MPGs 1.A.2 Manufacturing industries and construction – liquid fuels – CO_2, CH_4 and N_2O	In its NID (table 5, p.28), Lebanon reported "NE" for subcategory 1.A.2 manufacturing industries and construction and explained below the table (p.30) that subcategories 1.A.2.a iron and steel to 1.A.2.f non-metallic minerals are not reported in a disaggregated way and that related emissions are all reported under subcategory 1.A.2.g.viii other (manufacturing industries and construction). The Party further explained in its NID (section 3.2.5.2, p.53) that the emissions are reported under subcategory 1.A.2.g.viii given the absence of disaggregated AD per industry. On the basis of this explanation, the TERT noted that the incorrect notation key is used in this instance, as the emissions are estimated for these subcategories but included elsewhere in the inventory instead of under the expected source or sink category; "IE" should therefore be reported. During the review, Lebanon acknowledged that it should have reported "IE" instead of "NE" for these subcategories alongside a clear explanation. The Party indicated that it will amend this and will strengthen its QA/QC to ensure consistency between the NID and CRTs.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		The TERT recommends that Lebanon ensure that it reports the correct notation key ("IE" instead of "NE") for subcategories 1.A.2.a to 1.A.2.f in the NID and CRTs.
3.E.6	Specified in paragraphs 39–40 of the MPGs 1.A.2 Manufacturing industries and construction – liquid fuels – CO_2, CH_4 and N_2O	Lebanon reported in its NID (section 3.2.5.2) that it included the consumption of diesel oil in neighbourhood generators under subcategory 1.A.2 manufacturing industries and construction, explaining that these generators supply electricity to households during power outages. However, the Party reported limited information on the assumptions used to allocate fuel consumption related to electricity production by neighbourhood generators to subcategory 1.A.2. During the review, the Party explained that neighbourhood generators in Lebanon operate as decentralized, privately run electricity generation units that supply power during public utility outages. These generators function as small-scale power generation facilities and distribute electricity directly to households and commercial users through localized private wiring networks and do not feed electricity into the national grid managed by Electricity of Lebanon. Although significant in number, they operate informally and are not officially licensed. As a result, there is no national census or centralized database providing information on their numbers, installed capacity, technologies, operating hours or annual fuel consumption. Fuel consumption is therefore estimated indirectly, on the basis of stakeholder consultations and the sectoral information available. The Party indicated that the 2006 IPCC Guidelines (vol. 2, chap. 2) do not explicitly refer to private or decentralized informal generators. Instead, the 2006 IPCC Guidelines indicate that emissions from stationary combustion should be reported under the sector in which the fuel is combusted. However, the Guidelines do not provide specific guidance for neighbourhood generators that are privately operated and distribute electricity to households, commercial establishments and small workshops not connected to the national grid. In the absence of disaggregated data and given the informal nature of neighbourhood generators, Lebanon allocated diesel consumption from neighbourhood generators to subcategory 1.A.2, considering that many operate as independent electricity production facilities with capacities comparable to industrial generators. The Party reports private generators owned and operated by commercial or institutional entities without electricity distribution functions under subcategory 1.A.4.a commercial/institutional. The TERT recommends that Lebanon allocate fuel consumption related to electricity production by neighbourhood generators to the appropriate subcategory to better reflect the guidance provided in the 2006 IPCC Guidelines stating that emissions should be estimated and reported under the category or subcategory in which they occur (this could include under subcategories 1.A.4.a, 1.A.4.b residential or 1.A.5.a stationary if the emissions cannot be specified elsewhere). If it is not possible to reallocate the emissions, the TERT recommends that Lebanon include in its NID clearer information on the assumptions followed when allocating fuel consumption related to electricity production by neighbourhood generators to subcategory 1.A.2.
3.E.7	Specified in paragraph 32 of the MPGs 1.A.3.a Domestic aviation – liquid fuels – CO_2, CH_4 and N_2O	In its NID (table 5, p.28), Lebanon reported "NE" for subcategory 1.A.3.a domestic aviation and explained below the table (p.30) that emissions for this subcategory are not estimated because they are considered negligible and data are not readily available. In accordance with the MPGs, Parties may report "NE" when the estimates would be insignificant in terms of level. However, the NID does not provide further information indicating whether Lebanon assessed whether emissions for subcategory 1.A.3.a are below the significance threshold established in the MPGs. During the review, the Party explained that it conducted an analysis to assess whether emissions for subcategory 1.A.3.a for 2019 can be considered insignificant in accordance with the MPGs. Emissions from domestic aviation were estimated to be 11.69 Gg CO_2 eq in 2019. Compared with the total national GHG emissions excluding LULUCF in 2019 (30,089 Gg CO_2 eq), this represents approximately 0.04 per cent of total emissions, which is below the 0.05 per cent threshold specified in the MPGs. On this basis, Lebanon considers emissions for subcategory 1.A.3.a to be insignificant in terms of level and therefore reported them as "NE" in its NID. The TERT encourages Lebanon to include in its NID a description of the analysis undertaken to determine that the likely level of emissions for subcategory 1.A.3.a can be considered insignificant in accordance with the MPGs, for example by using approximated AD and default IPCC EFs to derive an indicative estimate of emissions to demonstrate that the subcategory remains below the significance threshold.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
3.E.8	Specified in paragraphs 39 and 40 of the MPGs 1.A.3.b Road transportation – liquid fuels – CO_2, CH_4 and N_2O 1.A.4.a.ii Off-road vehicles and other machinery – liquid fuels – CO_2, CH_4 and N_2O	Lebanon reported in its NID (section 3.2.4.2, p.50) that, as insignificant amounts of lubricant are used in industries and other facilities in the country, it assumes that all imported lubricants are consumed by major power plants (Electricity of Lebanon power plants) in co-combustion processes. However, the NID does not provide further information on whether any portion of the imported lubricants is intentionally mixed with fuels and combusted in road or off-road vehicles. This would need to be reported under subcategory 1.A.3.b road transportation or subcategory 1.A.4.a.ii off-road vehicles and other machinery in accordance with the 2006 IPCC Guidelines (vol. 2, chap. 3, box 3.2.4). During the review, the Party explained that it does not have any disaggregated national data on lubricant consumption by end-use sector. Import data for lubricants are available through customs statistics; however, these data are not broken down by final use (e.g. power generation, industry, transport) and there is no national energy balance or reporting system that tracks lubricant consumption by sector. The Party further explained that it did not separately estimate lubricant combustion in the transport sector owing to the absence of sector-specific consumption data and considering time and resource constraints during the preparation of the inventory. The Party clarified that, based on stakeholder consultations, Electricity of Lebanon power plants are considered to be the main buyers of imported lubricants. It therefore decided to allocate all related emissions to subcategory 1.A.1 energy industries. On this basis, the Party did not allocate lubricant consumption to subcategory 1.A.3 transport nor did it account separately in the inventory for specific emissions from lubricant use in road vehicles. The TERT recommends that Lebanon include in its NID further information on the assumptions used to allocate lubricant consumption exclusively to subcategory 1.A.1, including the basis for concluding that Electricity of Lebanon power plants are the main consumers of imported lubricants, noting that any expert judgment used as an assumption in the estimations should be elicited in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 2, annex 2A.1). The TERT also recommends that the Party assess the potential use of lubricants under subcategories 1.A.3.b and 1.A.4.a.ii and other machinery and estimate and report the associated emissions under subcategories 1.A.3.b and 1.A.4.a.ii in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 3, sections 3.2–3.3).
3.E.9	Specified in paragraphs 39–40 of the MPGs 1.A.3.d Domestic navigation – liquid fuels – CO_2, CH_4 and N_2O	In its NID (table 5, p.28), Lebanon reported “IE” for subcategory 1.A.3.d domestic navigation and stated in NID section 3.2 (p.48) that emissions from fishing are not reported under subcategory 1.A.3 transport, but rather under subcategory 1.A.4.c.iii fishing. However, the Party provided limited information on the assumption that all fuel consumption related to domestic navigation is considered to originate from fishing activities and the rationale for reporting “IE” for subcategory 1.A.3.d. During the review, the Party explained that domestic navigation activities in Lebanon are extremely limited. There are no navigable inland rivers or waterways used for transport and domestic navigation is therefore largely restricted to marine fishing vessels operating along the coast. Lebanon also has a small number of private recreational boats and yachts; however, there is no official registry that consolidates information on their number or associated fuel consumption. Furthermore, Lebanon does not maintain a comprehensive national energy balance and fuel sales data are disaggregated at the level of individual fuel distributors and are not centrally aggregated in a way that would allow the annual fuel quantities supplied to private yacht clubs or other recreational marine users to be identified. Given the very limited scale of domestic navigation activities and the absence of disaggregated national data, emissions from domestic navigation are considered to be included elsewhere, primarily under fishing activities in subcategory 1.A.4.c.iii. The TERT recommends that Lebanon include in its NID more detailed information on the assumption that all fuel consumption related to domestic navigation is considered to originate from fishing activities and the rationale for reporting “IE” for subcategory 1.A.3.d.
3.E.10	Specified in paragraphs 31 and 47 of the MPGs 1.A.3.e.ii Other (other transportation) –	Lebanon reported in its NID (section 3.2.6.1, p.56) that subcategory 1.A.3.b road transportation covers all internal combustion vehicles used for transporting passengers and goods in the country, with the exception of farm tractors and public work vehicles. However, the Party did not provide additional information on why other transport activities, such as ground activities at airports and harbours and off-road activities, are reported as “NO” in CRT 1.A(a)s3.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
	liquid fuels – CO_2, CH_4 and N_2O	During the review, the Party explained that fuel consumption data for ground activities at airports and harbours as well as other off-road transport activities are not centrally collected or aggregated at national level. There is no national energy balance that would allow fuel consumption to be disaggregated by specific off-road subcategories, and fuel sales data are recorded at the distributor level without being classified by end use. Owing to these data limitations, and considering time and resource constraints during the preparation of the inventory, Lebanon did not prioritize these activities for targeted data collection. As a result, the Party did not estimate emissions for these subcategories. Lebanon acknowledges that it was not appropriate to report "NO" in this case and that the reporting will be corrected to "NE" to reflect how the activities may occur, but emissions are not estimated for them owing to lack of data. The TERT recommends that Lebanon review the information on ground activities at airports and harbours and off-road activities and estimate the related CO_2, CH_4 and N_2O emission estimates under subcategory 1.A.3.e.ii other (other transportation) or ensure that the correct notation key is reported.

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 paragraphs 30, 45 and 47 of the MPGs 2.C.1 Iron and steel production 2.C.7 Other (metal industry) – SO_X, NO_X, CO and NMVOCs	In CRT 2(I), the Party reported SO_X, NO_X, CO and NMVOCs as "NE" and CO_2 and CH_4 as "NO" under subcategories 2.C.1 iron and steel production and 2.C.7 other (metal industry). During the review, the Party clarified that CO_2 and CH_4 emissions do not occur for subcategories 2.C.1 and 2.C.7 in Lebanon and specified that no primary iron and steel facilities operate within the country. Therefore, all gases under subcategories 2.C.1 and 2.C.7 should have been reported as "NO". The Party explained that the inconsistent use of notation keys resulted from technical challenges during the migration of the 1994–2022 time series to the new IPCC inventory software and the export of results to the ETF reporting tool, which caused inconsistent notation keys to be used across gases, categories and subcategories, and limited comprehensive QA/QC before the submission. The TERT recommends that the Party report the appropriate notation key ("NO") for SO_X, NO_X, CO and NMVOCs emissions for subcategories 2.C.1 and 2.C.7 in CRT 2(I).
4.I.2	Specified in paragraphs 39–40 of the MPGs 2.F.1 Refrigeration and air conditioning – HFCs	The Party reported in the NID (pp.70 and 75) that it prepared the GHG inventory for the IPPU sector using tier 1 and 2 methods and that it used tier 2 methods for the two subcategories identified as key categories for the IPPU sector (subcategories 2.A.1 cement production and 2.F.1 refrigeration and air conditioning). However, the description of the methodology, data and data sources used in estimating emissions for subcategory 2.F.1 is limited. During the review, the Party clarified that IPPU data remain limited and fragmented, that the latest industrial census is from 2007 and that, although the Management Information System for Climate Action in Lebanon transparency platform centralizes reported information, it cannot compensate for missing primary AD. The Party further clarified that data gaps will remain a fundamental constraint until sectoral task forces improve data availability. The TERT recommends that the Party include in the NID a transparent explanation of the AD used in the estimations for subcategory 2.F.1, including the source of the AD.
4.I.3	Specified in paragraphs 21 and 39–40 of the MPGs 2.F.1 Refrigeration and air conditioning – HFCs	The Party reported using a tier 2b method for estimating emissions for subcategory 2.F.1 refrigeration and air conditioning in the NID (p.75). The TERT noted that Parties are required to transparently report methods, assumptions and sources of information, including the availability of national data and/or regulatory frameworks concerning the recovery and destruction of refrigerants at end of life, where applicable. The TERT further noted that the treatment of end-of-life emissions under the tier 2b method lacks transparency and may affect accuracy when national data are not available. During the review, the Party explained that no national mandatory reporting system exists for the recovery or destruction of refrigerants at end of life. Recovery practices are being strengthened but quantified national data on end-of-life recovery and destruction are not yet available. In the text of its BTR1 (p.32) and NID (p.76) relating to category 2.F

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		product uses as substitutes for ozone-depleting substances, the Party confirms its reliance on AD and tier 2b life cycle assumptions pending improved national data sets. The TERT recommends that the Party strengthen its collection of end-of-life recovery and destruction data (e.g. through targeted reporting requirements and industry registers) and document in the NID the methods, assumptions and sources of information used to estimate HFC emissions for subcategory 2.F.1.
4.I.4	Specified in paragraphs 39–40 of the MPGs 2.F.1 Refrigeration and air conditioning – HFCs 2.F.3 Fire protection – HFCs	The Party reported HFC emissions for subcategories 2.F.1 refrigeration and air conditioning and 2.F.3 fire protection estimated using tier 2b methods in the NID (p.76) and CRT Summary3, including quantities of refrigerant blends (R404A, R407C and R410A). The TERT noted that the NID (p.76) references the 2006 IPCC Guidelines (vol. 3, chap. 7, table 7.8) when commenting on blend composition, but does not document the national assumptions, parameters or national data sources (e.g. National Cooling Plan surveys, customs data and expert consultations) used to disaggregate refrigerant blends, which limits transparency. During the review, the Party explained that it systematically disaggregates refrigerant blends into their constituent HFC species in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 7, table 7.8), applying the default IPCC mass-composition ratios. The Party clarified that this approach is supported by data compiled under the National Cooling Plan, which includes surveys, customs data and expert consultations on market shares and appliance types. The default mass fractions used are: (a) R404A: 44 per cent HFC-125, 52 per cent HFC-143a and 4 per cent HFC-134a; (b) R407C: 23 per cent HFC-32, 25 per cent HFC-125 and 52 per cent HFC-134a; (c) R410A: 50 per cent HFC-32 and 50 per cent HFC-125. The Party further confirmed that these composition ratios are applied consistently across the time series, which ensures methodological consistency and comparability, and that the approach aligns with reporting practices used under Article 7 of the Montreal Protocol. The TERT recommends that the Party include in its NID the national assumptions, parameters and national data sources used to disaggregate refrigerant blends.
4.I.5	Specified in paragraphs 39–40 of the MPGs 2.G.3 N_2O from product uses – N_2O	The Party reported 121 t N_2O used for medical purposes for 2022 in NID table 44 under subcategory 2.G.3 N_2O from product uses. The TERT noted that the NID does not explain whether reported quantities reflect net imports or whether stock handling assumptions are applied. During the review, the Party clarified that the reported value of 121 t N_2O used for medical purposes represents net imports, as no exports were recorded for 2022 in the official customs database. The Party explained that all imported quantities of medical-grade N_2O are assumed to be fully consumed within the same calendar year, consistently with the information presented in the NID. The TERT recommends that the Party include in the NID a clear description of the net-import accounting method, the annual assumptions on stock consumption and data sources, and outline a clear pathway to transition from assumed annual consumption levels to data on observed stock consumption and stock changes.

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*
5.A.1	Specified in paragraphs 21 and 23 of the MPGs 3.A Enteric fermentation – CH_4 3.B Manure management – CH_4	Despite identifying categories 3.A enteric fermentation and 3.B manure management as key categories in its NID (section 5.2), the Party used tier 1 methods to calculate emissions for them. During the review, the Party explained that it used tier 1 methods owing to significant data and capacity constraints. For category 3.A, applying higher-tier methods (tier 2 or above) would require detailed national data on livestock characteristics, including animal weights, feed intake, feed digestibility, production systems, milk yield, dietary regimes, pregnancy rates and other herd performance parameters. For category 3.B, the Party explained that applying higher-tier methods would require detailed information on MMS, storage durations, temperature conditions, volatile solids excretion rates and system-specific CH_4 conversion factors. The Party further indicated that improving

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		methodologies for these key categories remains a medium-term objective. Planned improvements include the development of structured livestock surveys to collect data on feeding regimes, productivity parameters and herd characteristics; the collection of detailed information on MMS and manure management practices; strengthened coordination between relevant institutions; and capacity-building in higher-tier emission estimation methodologies and database development. The TERT encourages the Party to make every effort to apply higher-tier methods for estimating emissions for key categories 3.A and 3.B in line with IPCC good practice and report how it is addressing or intends to address this issue. If the Party is unable to apply higher-tier methods, the TERT recommends that the Party explain in the NIR that this is due to a lack of resources for collecting the necessary data.
5.A.2	Specified in paragraphs 35 and 40 of the MPGs 3.A Enteric fermentation – CH_4	In NID table 47 (p.84), the Party reported CH_4 EFs for dairy and non-dairy cattle as 117 and 57 kg CH_4/head/year respectively. However, in CRT 3.A, the Party reported the IEFs for the same subcategories as 0.12 and 0.06 kg CH_4/head/year respectively, resulting in an apparent inconsistency between the NID and CRTs. During the review, the Party clarified that the discrepancy was due to a reporting unit issue encountered when migrating the inventory from the IPCC inventory software to the ETF reporting tool for the automatic generation of the CRTs. In CRT 3.A, the livestock population is required to be reported in thousands of heads. During the data transfer process, the livestock population for dairy and non-dairy cattle was inadvertently entered in heads rather than in thousands of heads. As the IEFs are automatically calculated as total emissions divided by population, this resulted in IEFs appearing approximately 1,000 times lower than expected. The Party explained that when the population is correctly expressed in thousands of heads, the resulting IEFs are consistent with the EFs reported in the NID, with only minor rounding differences. The Party also explained that the CH_4 emission estimates reported in CRT 3.A are correct. The Party indicated that it will correct this issue and implement additional QA/QC checks to ensure consistency between parameters reported in the NID and automatically generated IEFs in the CRTs. The TERT recommends that the Party report the AD for dairy and non-dairy cattle in the correct unit (thousands of heads) in CRT 3.A and ensure consistency between the NID and CRTs, including through the correct application of reporting units.
5.A.3	Specified in paragraphs 35, 39 and 40 of the MPGs 3.B Manure management – N_2O	In the NID (table 46 and p.83), the Party reported that several MMS are used in Lebanon and presented the fraction of manure nitrogen allocated to different MMS for the entire reporting period. However, in CRT 3.B(b), the Party only reported N_2O emissions for a limited number of MMS (solid storage, daily spread and pasture range and paddock), resulting in an apparent inconsistency between the information provided in the NID and the MMS reflected in the CRTs. During the review, the Party clarified that CRT 3.B(b) does not fully reflect the actual emissions from the different MMS and that some values were lost during the automatic generation of the CRTs. The Party indicated that this issue occurred during the generation of the CRTs and confirmed that the reported values will be reviewed and corrected to ensure consistency. The TERT recommends that the Party ensure consistency between the information reported in the NID and the emissions reported in the CRTs, including by verifying that all MMS used to estimate emissions are correctly reflected in CRT 3.B(b).
5.A.4	Specified in paragraph 47 of the MPGs 3.B.4 Other livestock – CH_4	In CRTs 3.A and 3.B(a), the Party reported subcategories 3.A.4.a buffalo (enteric fermentation) and 3.B.4.a buffalo (manure management) as "NO". However, in the NID (p.82), the Party indicates that buffalo populations, although very limited, do exist in the country. Therefore, the TERT considers that the subcategory cannot be reported as not occurring. During the review, the Party clarified that "NE" is the appropriate notation key for reporting buffalo owing to the absence of reliable and complete AD for this livestock type. The Party explained that the misuse of notation keys is mainly attributable to resource constraints and tight timelines associated with the submission of the BTR1, as well as to technical challenges encountered when migrating the 1994–2022 inventory time series to the new version of the IPCC inventory software and exporting inventory results from this software to the ETF reporting tool for the automatic generation of the CRTs. The Party indicated that these processes resulted in inconsistencies and, in some

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		cases, the incorrect application of notation keys across categories, subcategories and gases, and limited its ability to conduct a comprehensive QA/QC of the CRTs prior to their submission. The Party further indicated that it will correct this issue and implement more robust QA/QC procedures to prevent similar reporting issues. The TERT recommends that the Party collect and develop the necessary AD and estimate and report CH_4 emissions from buffalo for subcategories 3.A.4.a and 3.B.4.a, given that buffalo populations exist in the country.
5.A.5	Specified in paragraph 47 of the MPGs 3.B.5 Indirect N_2O emissions – N_2O	In CRT 3.B(b), the Party reported indirect N_2O emissions from nitrogen leaching and run-off as "NE". However, the 2006 IPCC Guidelines (vol. 4, chap. 11, section 11.2.1.3) include a methodology and default EF for estimating these emissions. During the review, the Party clarified that indirect N_2O emissions from nitrogen leaching and run-off should have been calculated and that they were calculated in the latest biennial update report. However, during the upgrade and migration to the latest version of the IPCC inventory software, not all parameters and EFs were successfully transferred. In particular, key parameters such as $Frac_{LEACH-(H)}$ and the EF for N_2O emissions from nitrogen leaching and run-off (EF5) were not properly migrated, which prevented the software from automatically estimating emissions for subcategory 3.B.5 indirect N_2O emissions. As a result, the Party reported this subcategory as "NE" in CRT 3.B(b). The TERT recommends that the Party report N_2O emissions for subcategory 3.B.5 and explain the recalculations performed for this subcategory in the NID.
5.A.6	Specified in paragraph 47 of the MPGs 3.D.1 Direct N_2O emissions from managed soils – N_2O	In CRT 3.D, Lebanon reported subcategory 3.D.1.e mineralization/immobilization associated with loss/gain of soil organic matter as "NE". This subcategory is included in the 2006 IPCC Guidelines (vol. 4, chap. 11, section 11.2.1) as a potential source of nitrogen input relevant for the calculation of direct N_2O emissions from managed soils, and the Guidelines include methodologies and default EFs and parameters for estimating these emissions. During the review, the Party clarified that subcategory 3.D.1.e was reported as "NE" owing to the absence of sufficient national AD required to apply the methodology specified in the 2006 IPCC Guidelines. The Party noted that estimating emissions for subcategory 3.D.1.e would require national data on soil organic carbon stock changes associated with land-use change or management practices; however, the Party explained that such data are unavailable and no quantified soil carbon stock changes have been identified that would allow the amount of nitrogen in mineral soils that is mineralized, in association with loss of soil carbon from soil matter due to changes to land use or management practices, to be calculated in accordance with the methodology specified in the 2006 IPCC Guidelines. The TERT recommends that the Party enhance its data collection and inter-institutional coordination mechanisms to enable it to estimate emissions for subcategory 3.D.1.e, if these emissions occur, or provide further explanations in the NID if this source of emissions does not occur.
5.A.7	Specified in paragraphs 39, 40 and 47 of the MPGs 3.D.1.b.iii Other organic fertilizers applied to soils – N_2O	In its NID (p.89), the Party indicated that the 2006 IPCC Guidelines do not provide a method for estimating nitrogen inputs from other organic amendments to be included under the fraction of organic nitrogen applied as fertilizer and therefore it did not estimate emissions for subcategory 3.D.1.b.iii other organic fertilizers applied to soils (reported as "NE" in CRT 3.D). However, the 2006 IPCC Guidelines (vol. 4, chap. 11, section 11.2.1.3) include a methodology for estimating nitrogen inputs from other organic amendments, which should be included under the fraction of organic nitrogen applied as fertilizer when calculating direct N_2O emissions from managed soils. During the review, the Party clarified that it acknowledges the existence of the IPCC methodology for estimating nitrogen inputs from other organic amendments. The Party explained that its decision not to estimate emissions for subcategory 3.D.1.b.iii is related to the lack of detailed and consolidated national AD on the quantities and nitrogen content of organic amendments applied to soils, such as compost from municipal waste, agro-industrial residues, sewage sludge and other organic materials. The Party further clarified that this is a data-related and capacity constraint rather than a misinterpretation of the 2006 IPCC Guidelines. The Party indicated that it will focus on strengthening coordination with the Ministry of Agriculture and waste management authorities to enhance data-collection systems for compost production, sludge management and

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		organic residue application, which will enable it to apply the methodology included in the 2006 IPCC Guidelines. The TERT recommends that the Party estimate and report N_2O emissions for subcategory 3.D.1.b.iii using at least the methodology and default EF and parameters specified in the 2006 IPCC Guidelines (vol. 4, chap. 11, section 11.2.1.3). The TERT also recommends that the Party improve transparency in the NID by clearly distinguishing between methodological availability and data limitations and, where feasible, take steps to collect the necessary AD for applying the IPCC methodology for other organic amendments.
5.A.8	Specified in paragraphs 39–40 and 46–47 of the MPGs 3.D.2 Indirect N_2O emissions from managed soils – N_2O	In CRT 3.D, the Party reported $Frac_{LEACH-(H)}$ as "NE". This fraction is required to calculate indirect N_2O emissions from managed soils under category 3.D direct and indirect N_2O emissions from agricultural soils in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 11, section 11.2.2.1). Reporting "NE" for $Frac_{LEACH-(H)}$ in CRT 3.D therefore represents an omission of a key parameter. The Party also reported the AD, IEF and N_2O emissions for subcategory 3.D.2.b nitrogen leaching and run-off as "NE" in CRT 3.D. During the review, the Party clarified that, during the migration of the inventory to the updated IPCC inventory software, the default value for $Frac_{LEACH-(H)}$ (0.3, as provided in the 2006 IPCC Guidelines) was not automatically transferred into the new software environment. As a result, the parameter was not inputted into CRT 3.D when it was automatically generated. The Party explained that this is a technical issue related to the software migration process rather than a methodological deviation. The Party confirmed that the default IPCC value of 0.3 is applied in the calculation of indirect N_2O emissions from managed soils. The Party indicated that it will correct this issue to ensure consistency between the calculation files and CRTs. The TERT recommends that the Party estimate and report N_2O emissions for subcategory 3.D.2 indirect N_2O emissions from managed soils using at least the methodology and default EF and parameters specified in the 2006 IPCC Guidelines (vol. 4, chap. 11, section 11.2.2.1). The TERT also recommends that the Party ensure that all parameters required in accordance with the 2006 IPCC Guidelines, including $Frac_{LEACH-(H)}$, are accurately reflected in the CRTs.
5.A.9	Specified in paragraphs 39, 40 and 47 of the MPGs 3.F Field burning of agricultural residues – CH_4 and N_2O	In NID tables 57–58, the Party reported total nitrogen in crop residues by crop type. However, in CRT 3.F, the Party reported emissions from the field burning of agricultural residues for individual crop categories as "NE", with the exception of subcategory 3.F.5 other, resulting in an apparent inconsistency between the information presented in the NID and CRTs. During the review, the Party clarified that nitrogen in crop residues is estimated at the aggregate national level using crop production statistics, as presented in the NID. However, it further clarified that disaggregated estimates by individual crop subcategory, as required for reporting under CRT 3.F, are constrained by data limitations. Specifically, while total crop production data are available, the Party does not have sufficiently disaggregated and consistent time-series information on crop-specific residue management practices (e.g. fractions removed, burned, left on the field or incorporated into soils) or the associated nitrogen content parameters required to estimate emissions separately for each crop subcategory in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 11, section 11.2.1). As a result, the Party did not estimate emissions at the individual crop subcategory level and reported subcategories 3.F.1 cereals, 3.F.2 pulses, 3.F.3 tubers and roots and 3.F.4 sugar cane in CRT 3.F as "NE". The Party explained that subcategory 3.F.5 other reflects the aggregated national estimation approach rather than the aggregation of crop-specific emission estimates. The TERT concludes that emissions are reported in an aggregated form rather than as crop-specific estimates. The Party indicated that improvements in collecting data on crop-specific residue management practices and associated parameters are required to enable disaggregated estimates and reporting under CRT 3.F. The TERT noted that, until country-specific information is available, the Party could assess the possibility of using expert judgment elicited in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 2, annex 2A.1) to ascertain values for some of the parameters.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		The TERT recommends that the Party improve the consistency between the NID and CRT 3.F by estimating and reporting emissions for individual crop subcategories 3.F.1, 3.F.2, 3.F.3 and 3.F.4 in CRT 3.F, where there are sufficient data to do so, in accordance with the 2006 IPCC Guidelines. Where such disaggregated estimates are not feasible owing to data limitations, the TERT recommends that the Party clearly explain in the NID the methodological basis for using aggregated approaches and for reporting individual crop subcategories as "NE".

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 paragraphs 21 and 40 of the MPGs Land representation	In its BTR1 (p.57), the Party reported a national surface area of 1,045.2 kha. However, the sum of the areas reported in CRTs 4.A–4. F amounts to only 779.7 kha for 2011 (74.6 per cent of the national territory) and 952.7 kha for 2022 (91.1 per cent of the national territory). The TERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 3, section 3.3), which require the total national territory to be divided across the land-use categories. The sum of all land-use categories must equal the total national territory to ensure that all emissions and removals are captured. During the review, the Party explained that the discrepancy arises from several factors, including the use of geographic information system data sets that exclude certain disputed territories (e.g. Shebaa Farms and Ghajar) and technical issues related to boundary generalization and map projections. Furthermore, the Party encountered specific technical issues for 2011 during the migration of LULUCF data to the new IPCC inventory software, which resulted in missing information. The TERT recommends that the Party ensure that the land representation is complete (including by ensuring that the sum of the areas reported in CRTs 4.A–4.F is equal to the total national territory) and covers the entire national territory (1,045.2 kha) reported in its BTR. The TERT also recommends that the Party clearly document in the NID any remaining discrepancies in land coverage or geographical exclusions and, where appropriate, report the reasons for these discrepancies.
6.L.2	Specified in paragraph 39 of the MPGs Land representation	The Party reported in its NID (p.101) that it used the 2021 global land-cover map (10 m resolution) in conjunction with the 2013 national land-cover and land-use map to assess specific land-use transitions, such as the conversion of forest land to cropland, grassland or wetlands. The TERT noted that this approach is not fully transparent, as the land-use change matrix requires a clear description of how different data sources with potentially different land-use definitions were aligned. During the review, the Party explained that the 2021 global land-cover map was derived from the ESA WorldCover 2021 product. The TERT noted that, without a description of the "cross-walking" or mapping between the ESA WorldCover classes and the classes used in the 2013 national land-cover/land use map, it is difficult to assess the consistency between and accuracy of the reported land-use conversions. The Party also explained that it applied a harmonization process at both the thematic (i.e. between the global map from ESA and the national map) and spatial level. Specifically, the legend in the 2013 national map was aligned with a common, simplified classification scheme (level 1 of the 2021 global land-cover map), ensuring that both data sets shared identical land-use classes. The Party clarified that it then identified transitions using a change matrix approach to extract relevant conversions while minimizing classification-related uncertainty and ensuring methodological consistency. The TERT is comfortable with the approach used to assess the consistency and accuracy of the land-use conversions. The TERT recommends that the Party include in its NID the details of the alignment table or classification mapping used to harmonize the ESA WorldCover 2021 product with the 2013 national land-cover and land-use map to demonstrate the methodological consistency of the land-use change matrix and enhance transparency.
6.L.3	Specified in paragraphs 26 and 39 of the MPGs	The Party reported in its NID (section 6.4.2, p.101) that it used multi-temporal satellite images (Landsat 8, 1994–2022) to map land-use changes and used interpolation to calculate annual variations between 2013 and 2021; however, it was unable to calculate these changes for 2022 owing to a lack of global and national data. The TERT noted that switching from remote sensing to interpolation for intermediate years could potentially

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
	Land representation	affect time-series consistency, but the Party did not clearly explain the rationale for making this switch. During the review, the Party explained that, although some satellite imagery was available, it did not allow for a reliable annual quantification of specific land-use conversions (e.g. forest land to cropland or grassland to wetlands) and key transitions cannot be consistently or accurately detected using satellite imagery alone on an annual basis owing to spectral similarities between land-cover types and mixed land-use signals. The Party clarified that harmonized national land-cover maps are available only for 2013 and 2021 and that it performed robust estimations using these two reference years, applying interpolation to derive annual variations in between these years. To achieve time-series consistency, the Party produced the land-cover data sets used for the pivot years (2013 and 2021) using a methodology consistent with the approach applied for earlier mapping years. In particular, the classification scheme, land-use definitions and interpretation rules followed the land-use categories (4.A forest land, 4.B cropland, 4.C grasslands, 4.D wetlands, 4.E settlements and 4.F other land) and were aligned with the categories used in the earlier satellite-based analyses. This ensured that land-use classes remained comparable throughout the time series. The TERT recommends that, to enhance transparency, the Party include in the NID a more detailed justification for the use of interpolation, including a description of the national land-cover map used to create anchor points and an explanation of why an annual satellite-based classification was deemed technically unreliable for specific land-use conversions. The TERT also recommends that the Party demonstrate how its approach ensures time-series consistency.
6.L.4	Specified in paragraph 47 of the MPGs 4.E.2.1 Forest land converted to settlements – CO_2	In CRT 4.E, the Party reported carbon stock changes in two carbon pools (living biomass and mineral soils) for subcategory 4.E.2.a forest land converted to settlements. However, the Party did not report estimates for the dead organic matter (litter and deadwood) carbon pools for this subcategory. During the review, the Party explained that it performed the estimates for forest land converted to settlements by accounting for the loss of above-ground biomass only, which represents the most significantly affected carbon pool during land-use conversion, and not for below-ground biomass. The Party adopted this approach owing to current data limitations and methodological constraints. The Party also explained that there is a lack of nationally representative data for other carbon pools in dead organic matter, such as deadwood and litter, for the relevant land-use conversions because estimating dead organic matter stock changes requires parameters describing the annual transfer of biomass into dead organic matter pools and the annual decay or disturbance losses from these pools. Lebanon does not have nationally representative data for these parameters. As a result, the information available is not sufficient to perform the gain-loss calculation required for the dead organic matter pools. The Party recognizes that the inclusion of additional carbon pools would further enhance the completeness of the inventory. Lebanon considers its current approach to be conservative, as it focuses on the largest and most directly affected carbon pool (above-ground biomass), while avoiding the introduction of highly uncertain estimates for other pools in the absence of robust national data. The Party stated that it will continue to progressively incorporate additional carbon pools as part of its inventory improvement plan. The TERT recommends that the Party estimate and report the emissions and removals from the litter and deadwood carbon pools under dead organic matter for subcategory 4.E.2.a.
6.L.5	Specified in paragraphs 30, 31, 47 and 56 of the MPGs 4.G HWP – CO_2	In NID section 1.7 (p.27), the Party reported HWP as “NE” owing to a lack of AD. However, in NID section 6.3.3 (p.100), the Party stated that HWP were excluded from the inventory owing to technical issues and time constraints during the transfer of data from the previous version of the IPCC inventory software. The TERT noted that the NID provides contradictory explanations for the exclusion of a category, which undermines the consistency and clarity of the submission. During the review, the Party explained that the exclusion of HWP is strictly methodological and is due to the absence of a national data-collection framework for industrial roundwood, wood product manufacturing and stock changes. The Party clarified that wood harvesting for commercial purposes is not widely practised in

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		Lebanon. The Party also acknowledged the contradiction in the NID and committed to correcting the statement in future submissions to reflect how the lack of AD is the actual cause of the use of "NE" for reporting HWP. The TERT recommends that the Party report HWP emissions in its NID and CRT 4.G. If this is not possible, the TERT recommends that Lebanon clearly document the lack of AD for HWP in accordance with the MPGs to justify reporting them as "NE".
6.L.6	Specified in paragraphs 39 and 55 of the MPGs 4(IV) Biomass burning – CO_2, N_2O and CH_4	The Party reported in its BTR1 (pp.61–62) on the existence of wildfires and mentioned in its NID (p.100) the methodologies used to assess them. However, the Party indicated in its NID (p.104) that almost all burned areas in Lebanon are the result of human-induced fires. The Party also reported the memo item emissions and subsequent removals from natural disturbances on managed land as "NE" in CRT 4. The report contains a conceptual inconsistency regarding the classification of fires, which creates ambiguity as to whether paragraph 55 of the MPGs is applicable. While the Party attributes the rise in wildfires to climatic factors such as extreme heatwaves and droughts in its BTR1 (pp.61–62), which are factors typically associated with natural disturbances, it simultaneously classifies almost all fires as human-induced in its NID (p.104). Furthermore, the detailed description of methodologies for assessing natural disturbances provided in the NID (p.100) appears redundant if no such disturbances are recorded. The TERT noted that this creates ambiguity as to whether the Party applies an approach for addressing emissions and removals from wildfires on managed lands and, if so, whether the associated estimates are included in the national totals, as specified in the MPGs. During the review, the Party explained that, in the national context, no fire events are classified as natural disturbances and that all recorded burned areas are considered anthropogenic. This assessment is based on historical records, the rarity of lightning-induced fires in Lebanon's Mediterranean climate and national fire investigations. Consequently, Lebanon confirmed that it does not apply the approach referred to in the MPGs for addressing emissions and removals from natural disturbances on managed lands; it includes all emissions and removals associated with fires in the national GHG totals without any background level adjustment or technical filtering. The TERT recommends that the Party harmonize the information between its BTR and NID by explicitly stating that all wildfires are treated as anthropogenic and that paragraph 55 of the MPGs is not applicable. The TERT also recommends that the Party ensure that the methodological description of the associated emissions is consistent with the approaches actually applied.

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 47 of the MPGs 5. General (waste)	The Party reported AD for annually generated clinical and hazardous wastes for 2019–2022 in NID tables 79–80. However, it reported the corresponding subcategories for clinical and hazardous waste (subcategories 5.C.1.a.ii.2 hazardous waste (biogenic), 5.C.1.a.ii.3 clinical waste (biogenic), 5.C.1.b.ii.2 hazardous waste (non-biogenic) and 5.C.1.b.ii.3 clinical waste (non-biogenic)) as "NE" in CRT 5.C. During the review, the Party explained that it does not estimate clinical waste separately as the specific subcategory is not available in the IPCC model applied. Instead, it includes amounts of clinical waste incinerated under industrial waste (subcategories 5.C.1.a.ii.1 industrial solid wastes (biogenic) and 5.C.1.b.ii.1 industrial solid wastes (non-biogenic)). The Party further explained that it manages hazardous waste through various treatment pathways. It only reports the fraction treated domestically through combustion processes under category 5.C incineration and open burning of waste using default IPCC EFs. The Party applies notation keys (e.g. "NE" or "NO") in cases where hazardous waste is treated outside national boundaries or where reliable AD are not available. The TERT considers that the reporting issue is related to the identification of the pathways of different types of clinical and hazardous waste (e.g. landfilling, incineration, burying or exporting) and is therefore also linked to the composition of the industrial waste. The TERT further considers that this issue affects the completeness of reporting across clinical, hazardous and industrial solid waste streams.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		The TERT recommends that the Party make every effort to examine the pathways for all types of clinical and hazardous waste, assess their relative shares in the total annual generation of waste and subsequently use these data to adjust the industrial waste parameters (composition) for categories 5.A solid waste disposal and 5.C. The TERT also recommends that the Party provide this information in a detailed description of the subcategories in the NID as well as report emission estimates for these subcategories in the corresponding CRTs according to the final destinations of different portions of clinical and hazardous waste. The TERT further recommends that, on the basis of the corrected or updated composition of the industrial waste stream, the Party recalculate its estimates for subcategory 5.A.3 uncategorized waste disposal sites and category 5.C.
7.W.2	Specified in paragraph 31 of the MPGs 5. General (waste)	The TERT noted that the notation keys reported in CRTs 5–5.D were frequently inappropriate, as confirmed by the Party during the review. For example, "NO" rather than "NE" should be reported for subcategories 5.A.1 managed waste disposal sites, 5.A.2 unmanaged waste disposal sites and 5.A.3 uncategorized waste disposal sites; AD for subcategory 5.A.1.c active-aeration (managed waste disposal sites) should be reported as "NO" instead of "NE"; and CH_4 emissions for subcategory 5.A.1.c should be reported as "NO" instead of "IE". During the review, the Party explained that the errors were caused by technical challenges encountered when migrating the 1994–2022 inventory time series to the new IPCC inventory software and exporting inventory results from this software to the ETF reporting tool for the automatic generation of the CRTs. Such export processes led to inconsistencies and, in some cases, mixed up the application of notation keys across categories and gases. The TERT recommends that the Party use the correct notation keys for reporting the subcategories in the waste sector in CRTs 5–5.D, including by replacing "NE" with "NO" under subcategories 5.A.1, 5.A.2 and 5.A.3; replacing "NE" with "NO" for reporting AD under subcategory 5.A.1.c active-aeration (managed waste disposal sites); and reporting CH_4 emissions for subcategory 5.A.1.c as "NO" instead of "IE".
7.W.3	Specified in paragraphs 39–40 of the MPGs 5.A Solid waste disposal – CH_4	The Party reported in the NID (p.118) that category 5.A solid waste disposal is a key category and the CH_4 emissions were estimated using a tier 2 method and country-specific EFs and AD. However, the TERT noted that the description of the category in the NID lacks information about the method used to estimate CH_4 emissions from solid waste disposal. The TERT also noted that the NID does not provide a full list of AD and EFs used to calculate CH_4 emissions. During the review, the Party explained that it estimated CH_4 emissions for category 5.A using the first-order decay model in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3, section 3.2.1) and that it used the IPCC waste model embedded in the IPCC inventory software to perform the calculations. The Party provided the TERT with lists of the AD and EFs used in these calculations. The TERT recommends that the Party transparently report in its NID the methods, AD and EFs used to estimate CH_4 emissions for category 5.A.
7.W.4	Specified in paragraphs 20 and 40 of the MPGs 5.A.3 Uncategorized waste disposal sites – CH_4	In CRT 5.A, the Party reported CH_4 emissions from MSW for subcategories 5.A.1 managed waste disposal sites, 5.A.2 unmanaged waste disposal sites and 5.A.3 uncategorized waste disposal sites. In addition to MSW, the GHG inventory reports emissions from industrial waste. The Party reported industrial solid waste separately in CRT 5.C (and as "NO" in CRT 5.B) in accordance with the classification provided in the 2006 IPCC Guidelines (vol. 5, chaps. 4–5). During the review, the Party clarified that, under category 5.A solid waste disposal, it allocates industrial solid waste to uncategorized MSW with a MCF of 0.6. The TERT considers that this creates confusion because the differentiation between industrial and municipal waste is based on differences in composition, whereas the differentiation between managed, unmanaged and uncategorized waste disposal sites is related to management practices. In the NID (section 7.5), the Party provided a short description of the composition of industrial solid waste, indicating that it only differs slightly from that of MSW. Nevertheless, the Party calculates emissions from both municipal and industrial waste streams separately, but in parallel, using the first-order decay model together with the same IPCC waste model (2006 IPCC Guidelines, vol. 5, chap. 3, section 3.2.1.1). The

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		TERT noted that the application of a uniform MCF (0.6) for all industrial waste is not consistent with the structure and logic of the IPCC waste model, which differentiates between managed, unmanaged and uncategorized subcategories for both municipal and industrial waste streams, with corresponding MCF coefficients for each subcategory. The TERT considers that the Party's current approach to categorizing solid waste is a general issue affecting the waste sector and creates confusion regarding emissions reported under categories 5.A, 5.B (reported as "NO") and 5.C. The TERT recommends that the Party make the categorization of solid waste consistent with the 2006 IPCC Guidelines and describe in detail the estimations for the different solid waste streams in its NID.
7.W.5	Specified in paragraphs 39 and 47 of the MPGs 5.C.1 Waste incineration – CO_2 and CH_4	In CRT 5.C, the Party reported only N_2O emissions from industrial solid waste under subcategories 5.C.1.a.ii.1 industrial solid wastes (biogenic) and 5.C.1.b.ii.1 industrial solid wastes (non-biogenic); it reported all other subcategories and gases under category 5.C.1 waste incineration (i.e. hazardous waste, clinical waste, sewage sludge and fossil liquid waste) as "NE". The Party did not provide any reasons for not estimating or reporting these emissions. During the review, the Party explained that only industrial solid waste was incinerated in the country because the sole incinerating facility incinerates only paper, cardboard and plastics (both biogenic and non-biogenic fractions) considered as industrial waste. The Party did not provide any additional information to explain why it did not estimate CO_2 or CH_4 emissions. The TERT recommends that the Party estimate CH_4 and CO_2 emissions from industrial waste from non-biogenic sources (under subcategory 5.C.1.b non-biogenic) and CH_4 from biogenic sources (under subcategory 5.C.1.a biogenic) where possible and explain the estimations in the NID or provide a clear justification for not estimating these emissions. The TERT also recommends that the Party improve its description of the emission estimates for the subcategories under subcategory 5.C.1, including any notation keys reported.
7.W.6	Specified in paragraphs 21 and 23 of the MPGs 5.D Wastewater treatment and discharge – CH_4	The Party reported in its NID (p.23) and CRT 7 that category 5.D wastewater treatment and discharge is a key category (for both level and trend assessment) for CH_4. However, the TERT noted that, as stated in the NID (p.132), the Party uses a tier 1 method to estimate emissions for category 5.D. This is not in accordance with the decision tree in the 2006 IPCC Guidelines (vol. 5, chap. 6, figures 6.2 and 6.3) and, as a result, with the MPGs. During the review, the Party explained that it did not use a higher-tier method for estimating emissions for category 5.D owing to the lack of availability of country-specific AD and EFs. It also explained that it is planning to improve the quality and quantity of data collected for category 5.D. The TERT encourages the Party to enhance its AD collection process and make every effort to use a method at the recommended tier level for estimating CH_4 emissions for category 5.D in line with IPCC good practice and report how it is addressing this issue. If a higher-tier method cannot be used, the TERT recommends that the Party explain in the NID the reasons for this.
7.W.7	Specified in paragraph 47 of the MPGs 5.D.2 Industrial wastewater – N_2O	The Party reported N_2O emissions for subcategory 5.D.2 industrial wastewater as "NE" in CRT 5.D without explaining the reasons for not estimating these emissions. During the review, the Party explained that it did not estimate these emissions owing to the unavailability of detailed AD. The TERT recommends that the Party enhance its AD collection process and estimate and report N_2O emissions for subcategory 5.D.2 industrial wastewater in CRT 5.D and explain the estimations in the NID.
7.W.8	Specified in paragraphs 40 and 47 of the MPGs 5.E Other (waste) – CH_4	The Party reported the country-specific subcategory CH_4 and N_2O emissions from CH_4 flaring at waste facilities under category 5.E other as "NA" for CO_2, as "NO" for CH_4 and N_2O and as "IE" for SO_X, NO_X, CO and NMVOC in CRT 5. During the review, the Party explained that CH_4 emissions from CH_4 flaring and recovery do in fact occur and that these emissions should have been reported as "NE". The Party further explained that it did not estimate these emissions owing to the unavailability of detailed AD and that the use of "IE" for other GHGs was due to technical problems following the switch to the new IPCC inventory software.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		The TERT recommends that the Party discontinue reporting the country-specific subcategory CH_4 emissions from CH_4 flaring at waste facilities under category 5.E in CRT 5 and enhance its AD collection process for CH_4 capture and management (including flaring), reporting those CH_4 emissions under the appropriate subcategories, and explain any recalculations in the NID.

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*
8.1	Specified in paragraph 59 of the MPGs	Lebanon described in its BTR1 the national circumstances relevant to progress in implementing and achieving the NDC as required under the MPGs. The TERT noted, however, that this information is dispersed across multiple sections of the BTR1, limiting the reader's ability to gain a clear and comprehensive overview. For example, the population profile is included in the socioeconomic overview in BTR1 section 1.1, where the Party presents national circumstances relevant to the inventory. The geographical profile and climate profile are described in BTR1 section 3.1, where the Party describes national circumstances related to climate change impacts and adaptation. During the review, Lebanon explained that it only reported information on national circumstances once to avoid duplication and acknowledged that clearer cross-referencing to the MPGs could enhance transparency. Lebanon expressed its intention to improve structural alignment in future (e.g. by adding explicit cross references to the section of the BTR in which it reports on national circumstances), particularly for the population, geographical and climate profiles, to ensure that all relevant information is easily accessible and aggregately presented.
8.2	Specified in paragraph 62 of the MPGs	The Party did not report in its BTR1 complete information in accordance with the MPGs on how it organizes the archiving of information on the implementation and achievement of the NDC. During the review, Lebanon explained that the Ministry of Environment, through its climate change projects, coordinates the archiving of information, including: (a) Calculation files, spreadsheets, EF documentation, methodological descriptions, projection scenarios and major socioeconomic assumptions in a digital format; (b) Supporting documentation received from ministries and sectoral institutions (e.g. for the energy, agriculture, LULUCF and waste sectors); (c) Previous NDC scenarios to ensure time-series traceability; (d) Mitigation-related studies, sectoral strategies and project documentation used to assess progress towards NDC targets; (e) Documentation received from national stakeholders in both digital and, where applicable, hard-copy formats; (f) Minutes of meetings with all stakeholders in a digital format. While archiving arrangements exist in practice, Lebanon acknowledged that it has not yet formalized procedures in a standardized national archiving protocol fully aligned with the MPGs. The Party confirmed that strengthening documentation management and establishing more structured digital archiving systems are areas identified for improvement under the ongoing Capacity-building Initiative for Transparency and BTR-related capacity-building efforts. Lebanon explained that it will aim to explicitly describe these archiving procedures in future BTRs to enhance transparency and compliance with the MPGs. The TERT recommends that Lebanon include in its BTR a description of how it archives information related to the implementation and achievement of the NDC.

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(a) of the MPGs	Lebanon reported an inconsistent target type in table 6 of its BTR1 for its GHG emission target. Specifically, under "scope and coverage", Lebanon reported that its target is an economy-wide absolute GHG emission target. However, the TERT considers that, according to the description of the NDC targets, Lebanon's target type seems to be an emission reduction below a projected baseline. During the review, Lebanon acknowledged that its mitigation target is a reduction below a projected baseline and explained that the reference in the BTR1 to an economy-wide absolute GHG emission target reflects the fact that the target applies to the entire economy and that an absolute emission figure is provided in the NDC. Lebanon plans to refine the description of the target type to clearly indicate that the NDC represents an emission reduction below a projected baseline, ensuring full consistency with the MPGs. The TERT recommends that Lebanon report its target as an emission reduction below a projected baseline instead of an economy-wide absolute GHG emission target.

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 65 of the MPGs	Lebanon identified the percentage of heat demand in the building sector met by renewable energy as an indicator to track progress in implementing and achieving the NDC in CTF table 1. However, the TERT noted that, although the indicator has been identified, it has not yet been clearly defined and linked to the NDC target. Lebanon indicated, in the description of the indicator in CTF NDC table 1, that no parameter has been identified to track this NDC target. During the review, Lebanon explained that it identified the indicator in question for tracking progress in implementing and achieving the NDC target. However, the Party did not formally define or operationalize the indicator in measurable terms in the BTR1, which led to it being reported as not yet identified. Lebanon also explained that the underlying concept behind this indicator exists within national energy planning documents, but that this has not yet been translated into a fully quantified, regularly monitored indicator consistent with the MPGs. The Party further explained that the main difficulty in defining and operationalizing this indicator lies in data availability and methodological constraints. Lebanon does not have a comprehensive and regularly updated data set for the total heat demand in the building sector or a disaggregated breakdown of renewable versus non-renewable heat sources. Lebanon acknowledges this gap and intends to further develop and formalize this indicator in future reporting cycles. The TERT recommends that Lebanon clearly describe in the BTR and CTF NDC table 1 how the indicator percentage of heat demand in the building sector met by renewable energy is relevant to the NDC target.
10.2	Specified in paragraph 65 of the MPGs	In CTF table 1, Lebanon identified total GHG emissions (without LULUCF and F-gases) as the relevant indicator for its NDC target to limit its GHG emissions. However, the TERT questioned the relevance of this indicator, as it does not cover LULUCF despite LULUCF being covered by the NDC target. During the review, Lebanon clarified that its NDC target includes LULUCF (and excludes F-gases) and confirmed that the 'business as usual' scenarios that serve as the baseline for tracking progress towards the NDC target also include LULUCF (and exclude F-gases). Lebanon acknowledged that its indicator should also include LULUCF emissions (and exclude F-gases). The TERT noted that this indicator can be calculated using the information in the GHG inventory and reported in the CRTs and CTF tables. The TERT recommends that Lebanon report the relevant indicator for tracking progress towards its NDC target to limit its GHG emissions, that is "total GHG emissions (including LULUCF and excluding F-gases)".

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
10.3	Specified in paragraph 67 of the MPGs	Lebanon did not provide all the necessary information in CTF NDC tables 4.2 and 4.3 for the level for the indicator relating to the percentage of heat demand in the building sector met by renewable energy and for the level and baseline for the indicator relating to the percentage reduction in power demand resulting from energy efficiency measures. During the review, the Party explained the main difficulties in operationalizing and calculating the indicators. For the indicator relating to the percentage of heat demand in the building sector met by renewable energy, Lebanon does not have a comprehensive and regularly updated data set for the total heat demand in the building sector or a disaggregated breakdown of renewable versus non-renewable heat sources. For the indicator relating to the percentage reduction in power demand resulting from energy efficiency measures, Lebanon does not have disaggregated data to allow it to identify the share of the reduction in the power demand that is specifically attributable to energy efficiency measures. The TERT recommends that the Party provide in the BTR and CTF NDC tables 4.2 and 4.3 the necessary information on the levels and baselines for the indicators.
10.4	Specified in paragraph 68 of the MPGs	Lebanon did not provide in its BTR the most recent information for each selected indicator for each reporting year during the implementation period of its NDC. Specifically, information is missing on two indicators: the percentage of heat demand in the building sector met by renewable energy and the percentage reduction in power demand resulting from energy efficiency measures. For the latter of these two indicators, the Party reported information on the percentage reduction in power demand in BTR1 table 10 without clarifying whether this reduction is attributable to energy efficiency measures. During the review, Lebanon explained that the information in BTR1 table 10 on the percentage reduction in power demand resulting from energy efficiency measures refers only to the percentage reduction in power demand because Lebanon does not have disaggregated data to allow it to identify the share of the reduction in the power demand that is specifically attributable to energy efficiency measures. As such, it is not possible to clearly distinguish emission reductions resulting from energy efficiency measures from reductions driven by other factors (e.g. economic contraction, fuel shortages or supply constraints). The collection of data on the percentage of heat demand in the building sector met by renewable energy remains fragmented owing to the decentralized nature of heating systems in Lebanon. Although information is available on installed renewable heating technologies (e.g. solar water heaters), comprehensive national data enabling the Party to calculate the annual share of the total heat demand in the building sector met by renewable energy for 2020–2022 were not fully consolidated at the time of the submission. The TERT recommends that the Party report in its BTR and CTF NDC table 4.2 the most recent information for each reporting year during the implementation period of the NDC for the percentage of heat demand in the building sector met by renewable energy. The TERT also recommends that the Party report in its BTR complete information on the percentage reduction in power demand, including by identifying the share of the reduction attributable to energy efficiency measures.
10.5	Specified in paragraph 69 of the MPGs	Lebanon did not compare in its BTR1 the most recent information for each selected indicator with the information provided pursuant to paragraph 67 of the MPGs to track progress in implementing the NDC. Specifically, it did not perform comparisons for two indicators (for which certain information was not reported; see finding ID# 10.3 above): the percentage of heat demand in the building sector met by renewable energy and the percentage reduction in power demand resulting from energy efficiency measures. The TERT recommends that the Party compare, in the BTR, the most recent information on the percentage of heat demand in the building sector met by renewable energy and the percentage reduction in power demand resulting from energy efficiency measures with the baseline information reported.
10.6	Specified in paragraph 73 of the MPGs	Lebanon did not provide in its BTR1 all the definitions needed to understand the NDC. Specifically, Lebanon did not provide a definition of its indicator relating to the percentage of heat demand in the building sector met by renewable energy. It also did not define other specific elements of its indicators relating to renewable power and the reduction in power demand resulting from energy efficiency measures, for example by

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		providing definitions of renewable power, renewable heat and energy efficiency measures. During the review, Lebanon provided additional clarification on the definition of renewable power and heat and acknowledged that it did not provide sufficient definitions in its BTR1 for the indicators relating to renewable power and the reduction in power demand. Lebanon stated that to enhance transparency it will present more comprehensive information on its indicators in the next submission. The TERT recommends that the Party provide, in its BTR, a definition of its indicator relating to the percentage of heat demand in the building sector met by renewable energy and provide the necessary definitions for its indicators relating to renewable power and the reduction in power demand resulting from energy efficiency measures.
10.7	Specified in paragraphs 73, 74(c) and 75(a) of the MPGs	Lebanon did not provide in its BTR1 complete information in accordance with paragraph 75 of the MPGs. The TERT noted that two sets of information are missing: (a) Data sources and models used for the indicators relating to renewable power, renewable heat and the reduction in power demand; (b) Conditions and assumptions relevant to the achievement of the NDC, as the conditions for the conditional NDC are only described in general terms (“the provision of additional international support in the form of grants”). During the review, Lebanon provided information on the data sources and models used for its indicators relating to renewable power and the reduction in power demand. Lebanon explained that, owing to limited analytical and technical capacity, it has not yet quantified the international support required to implement its conditional NDC targets. The Party identified the assessment of investment and financing needs for the implementation of the conditional NDC as a priority area requiring further technical work, including the development of methodologies and tools for estimating mitigation costs and support requirements. The TERT recommends that Lebanon report in its BTR the data sources and models used for the indicators relating to renewable power and the reduction in power demand. The TERT also recommends that Lebanon quantify the level of international support needed to implement the conditional NDC (even by providing a broad figure or range of figures) or explain in the BTR why such information is not available or applicable.
10.8	Specified in paragraphs 74(b) and 75 of the MPGs	Lebanon did not describe in its BTR1 each methodology and/or accounting approach used to construct its baselines. Specifically, the Party did not provide a description of the calculation of the ‘business as usual’ scenario serving as a baseline for its NDC targets relating to the reduction in GHG emissions and the use of energy efficiency measures to reduce power demand. During the review, Lebanon explained that a description of the methodology used to construct the ‘business as usual’ scenario serving as the baseline for its NDC targets is included in annex I to its updated NDC of 2020. This section of the NDC provides information on the modelling approach, key assumptions, sectoral coverage, data sources and main drivers (such as demographic and macroeconomic parameters) used to estimate ‘business as usual’ emission projections. Lebanon acknowledged the need to include a clear, self-contained description of the methodology used to construct the baseline for its NDC targets in its BTR to enhance transparency and facilitate the technical expert review. Lebanon indicated that its next submission will include a detailed description of the methodology used to construct the ‘business as usual’ baseline, covering the modelling framework, assumptions, sectoral scope and reference data, in accordance with the MPGs. The TERT recommends that the Party, as applicable, include in its BTR the methodology for calculating the ‘business as usual’ scenario in accordance with the MPGs.
10.9	Specified in paragraph 76(d) of the MPGs	Lebanon did not describe in its BTR1 how it avoided the double counting of net GHG emission reductions, including in accordance with guidance developed in relation to Article 6, if relevant. The TERT recommends that Lebanon describe how it has avoided the double counting of net GHG emission reductions in accordance with the MPGs.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
10.10	Specified in paragraph 77(a) of the MPGs	Lebanon did not provide in its structured summary in the BTR1 all the elements required in accordance with the MPGs. Specifically, Lebanon did not report in its structured summary on the indicators relating to renewable heat and the reduction in power demand resulting from energy efficiency measures (for which certain information was not reported; see finding ID# 10.3). The TERT recommends that the Party include in the structured summary the information referred to in the MPGs for all indicators.

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*
11.1	Specified in paragraph 80 of the MPGs	The Party reported some sectoral actions and PaMs for the energy sector in both narrative and tabular format (BTR1 pp.50–53 and CTF table 5), including in relation to renewable energy and energy efficiency with a total expected emission reduction of 120.29 kt CO_2 eq by 2030. In addition, the Party reported information on actions and PaMs in narrative format for the transport, forestry and waste sectors (BTR1 pp.53–55) but did not report the total expected emission reductions of these PaMs. For the forestry sector, the country reported on the implementation of a series of strategic programmes, including the National Afforestation and Reforestation Program and the National Forest Fire Management Strategy. Lebanon also reported in narrative format that between 2019 and 2022 reforestation and a reduction in forest fires increased forest carbon removals by 30.70 kt CO_2 eq (BTR1 figure 6). It further reported that, in 2022, coordinated forest fire mitigation measures resulted in 220.86 kt CO_2 eq of avoided emissions. The TERT noted that this reporting is not in accordance with the MPGs, as Lebanon only presented some of the information on its actions and PaMs for the energy sector in both narrative and tabular format. For the transport, forestry and waste sectors, it only reported information in narrative format. Furthermore, the Party did not report on actions and PaMs for the agriculture and IPPU sectors in either narrative or tabular format. During the review, the Party explained that it gave priority to the energy sector actions and PaMs, given the extent to which these PaMs contribute to reductions in its national GHG emissions. It further explained that it had limited time and resources for reporting actions and PaMs for other sectors. The Party stated that it assessed its actions and PaMs further after making its submission and that it plans to include the results of this assessment in the BTR2. The TERT recommends that the Party report in both its BTR and CTF table 5 on the actions and PaMs for all sectors that support the implementation and achievement of its NDC, including actions and PaMs that address the key categories reported in the national GHG inventory, focusing on those that have the most significant impact on GHG emissions or removals.
11.2	Specified in paragraph 83 of the MPGs	Lebanon did not report on the costs or non-GHG mitigation benefits of its actions and PaMs or on how the mitigation actions interact with each other. During the review, Lebanon explained that it did not systematically estimate or track cost estimates for individual actions and PaMs. The country clarified that there is no consolidated framework for consistent cost reporting across all actions and PaMs. Additionally, it lacks a structured national methodology for assessing non-GHG mitigation benefits and the interactions between mitigation actions. The TERT encourages Lebanon to provide in its BTR information for each action, policy and measure reported on the costs, non-GHG mitigation benefits and how the mitigation actions interact with each other or, if appropriate, to explain why it has not provided this information.
11.3	Specified in paragraph 86 of the MPGs	Lebanon did not report the assumptions used to estimate the GHG emission reductions or removals resulting from each action, policy or measure. During the review, the Party provided additional information on the assumptions used for the actions and PaMs in the energy and LULUCF sectors, including the use of a bottom-up approach, methodologies in line with the methodology provided in the 2006 IPCC Guidelines and national AD and EFs consistent with the national GHG inventory.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		The Party explained that the omission was primarily due to how the documentation of methodologies and assumptions varied by sector. Lebanon plans to include the assumptions used to estimate the GHG emission reductions or removals resulting from each action, policy or measure in the BTR2. The TERT recommends that the Party, to the extent possible, report on the assumptions used to estimate GHG emission reductions or removals resulting from each action, policy or measure.
11.4	Specified in paragraph 89 of the MPGs	The Party did not provide information on how its actions and PaMs are modifying longer-term trends in GHG emissions and removals. During the review, the Party explained that it did not report this information owing to time and resource constraints. Lebanon clarified that it is working on assessing actions and PaMs and reflecting the results in 'with measures', 'with additional measures' and 'business as usual' scenarios to be included in its BTR2. The TERT encourages the Party to report, to the extent possible, on how its actions and PaMs are modifying longer-term trends in GHG emissions and removals.
11.5	Specified in paragraph 88 of the MPGs	Lebanon did not identify the actions and PaMs that influence GHG emissions from international transport. During the review, the Party explained that it did not report this information owing to limitations in data and institutional information. It clarified that it prioritized its efforts and resources on the key emitting sector (the energy sector). The TERT encourages the Party, to the extent possible, to identify the actions and PaMs that influence GHG emissions from international transport.
11.6	Specified in paragraph 90 of the MPGs	Lebanon did not provide any detailed information on the assessment of economic and social impacts of response measures. During the review, the Party clarified that it has not assessed the impact of its response measures. It explained that despite making an effort to assess certain sector-specific response measures, it did not report this information. The TERT encourages the Party to provide information, to the extent possible, on the assessment of economic and social impacts of all response measures.
11.7	Specified in paragraph 85 of the MPGs	Lebanon applied flexibility in relation to the reporting of information on estimates of expected and achieved GHG emission reductions for its actions and PaMs. The Party reported information on its use of flexibility and its capacity constraints, including limited time resources and issues with data availability, in BTR1 table 28. Despite these limitations, the BTR1 includes emission reduction estimates for selected PaMs for the energy sector. The Party also reported planned improvements and estimated time frames for these improvements in BTR1 table 28. As part of its planned improvements, the Party intends to allocate additional time for estimating emission reductions and work with key stakeholders to identify and validate data gaps and relevant indicators to improve emission reduction estimates. In the longer term, and subject to the availability of financial resources, Lebanon plans to develop and apply methodologies for establishing and tracking policy-related indicators and for better estimating the expected GHG emission reductions resulting from domestic policies, with implementation targeted for the BTR3 in 2028. During the review, the Party confirmed its planned improvements and capacity-building needs. The TERT encourages the Party to report estimates of expected and achieved GHG emission reductions for its actions and PaMs in the tabular format referred to in paragraph 82 of the MPGs, as per the estimated time frame for improvement reported.

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*
13.1	Specified in paragraphs 92–102 in conjunction with paragraph 6 of the MPGs	Lebanon did not report GHG emission projections in its BTR1 and applied flexibility in this regard, reporting a lack of data and time and capacity constraints. The Party reported information on its use of flexibility and capacity constraints, planned improvements and estimated time frames for these improvements in BTR1 table 28, where it indicated that it intends to conduct a study on GHG emission projections. During the review, the Party confirmed these planned improvements and its capacity-building needs. The TERT encourages the Party to report GHG emission projections in its BTR2, as per the estimated time frame for improvement reported.

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

II. Capacity-building needs[3] identified by the Party and by the technical expert review team in consultation with the Party during the technical expert review of its first biennial transparency report

2. Table 15 presents capacity-building needs identified by the Party and by the TERT in consultation with the Party during the technical expert review of its BTR1.

Table 15
Capacity-building needs identified in consultation with the Party

ID#	*Reporting requirement*	*Area in which capacity-building is needed*
General reporting		
NA	NA	No capacity-building needs identified
NIR – general		
2.G_CBN.1	Specified in paragraphs 40 and 57 of the MPGs	Enhancing technical capacity to complete the transfer of time-series data from version 2.69 to version 2.930 of the IPCC inventory software) by checking data previously transferred and correcting any errors; ensuring the transfer of remaining data (for 1994 onward); recovering, estimating and extrapolating time-series data covering 1990 (base year) to 1994 and inputting these data into the software; and checking the accuracy of data that have been fully migrated (high priority)
2.G_CBN.2[a]	Specified in paragraphs 34–35 of the MPGs	Enhancing the existing inventory QA/QC plan to ensure its proper functioning, including to facilitate the identification and correction of discrepancies between the NID and CRTs (e.g. as regards selection of categories and use of notation keys), inconsistencies within the CRTs (e.g. use of different notation keys for the same data or parameters within the same category and the use of "included elsewhere" without an explanation in the relevant documentation box) and inconsistencies within the NID (high priority)
NIR – energy		

[3] As referred to in paras. 7, 8 and 162(d) of the MPGs.

ID#	*Reporting requirement*	*Area in which capacity-building is needed*
3.E_CBN.1[a]	Specified in paragraph 21 of the MPGs	Enhancing institutional arrangements and technical capacity to develop a national energy balance to enable the appropriate allocation of fuel consumption to the relevant energy sector category or subcategory, thereby improving the accuracy and completeness of emission estimates for the energy sector, and developing country-specific EFs to support the use of higher-tier methods for estimating emissions for key categories in accordance with the 2006 IPCC Guidelines (high priority)
3.E_CBN.2[a]	Specified in paragraphs 39–40 of the MPGs	Enhancing institutional arrangements and technical capacity to improve approaches to collecting or estimating data on privately owned generators for residential properties, including developing methodologies or surveys to better estimate their number, installed capacity, operating hours and fuel consumption (high priority)
NIR – IPPU		
4.I_CBN.1	Specified in paragraphs 39–40 of the MPGs	Enhancing institutional arrangements and technical capacity to carry out a new census and establish mandatory reporting by industrial establishments to improve the collection of AD and facilitate greater time-series consistency (high priority)
4.I_CBN.2	Specified in paragraphs 39, 40 and 45 of the MPGs	Enhancing institutional arrangements and technical capacity to develop and operationalize a national system for quantifying refrigerant recovery, recycling, reclamation and destruction at end of life across all relevant categories in the IPPU sector, including documenting the methods, assumptions and data sources and addressing data gaps
NIR – agriculture		
5.A_CBN.1	Specified in paragraph 21 of the MPGs	Enhancing technical capacity to apply higher-tier methodologies for estimating emissions and removals for key categories in accordance with the 2006 IPCC Guidelines, developing country-specific parameters (e.g. nitrogen excretion rates, feed digestibility factors, manure management fractions and residue management fractions) and strengthening institutional coordination and formal data-sharing arrangements between relevant ministries and agencies to collect the appropriate AD (high priority)
5.A_CBN.2	Specified in paragraphs 39–40 of the MPGs	Enhancing institutional arrangements and technical capacity to develop a structured and periodic livestock survey for collecting detailed data on animal characteristics, feeding practices, productivity parameters and MMS; establishing a centralized and integrated livestock and agricultural database linking data from the Ministry of Environment with data from the Ministry of Agriculture; and improving systems for collecting data on manure management pathways, including data on storage duration, treatment systems, composting and land application practices (high priority)
NIR – LULUCF		
6.L_CBN.1	Specified in paragraphs 26 and 39 of the MPGs	Strengthening technical capacity to use advanced remote-sensing tools to better distinguish between complex land-use changes (thus reducing the need for interpolation) and ensure time-series consistency and the accuracy of emission estimates relating to land-use changes (high priority)
6.L_CBN.2	Specified in paragraph 55 of the MPGs	Enhancing institutional arrangements and technical capacity to establish a structure responsible for collecting data on HWP
NIR – waste		
7.W_CBN.1	Specified in paragraphs 47–48 of the MPGs	Enhancing the collection of AD on solid waste composition by identifying all pathways of hazardous and clinical waste streams and their proportional distribution by pathway; recalculating the composition of municipal and industrial waste that is landfilled, incinerated or treated in any other way; and reporting emissions from hazardous and clinical

ID#	*Reporting requirement*	*Area in which capacity-building is needed*
		waste streams separately in the CRTs (under category 5.E other) (high priority)
7.W_CBN.2	Specified in paragraphs 47–48 of the MPGs	Enhancing the collection of CH_4 recovery and flaring data and reporting these data in the corresponding CRTs (where applicable)
7.W_CBN.3	Specified in paragraphs 47–48 of the MPGs	Enhancing the collection of AD for estimating N_2O emissions from industrial wastewater
Information necessary to track progress in implementing and achieving the NDC under Article 4 of the Paris Agreement		
8_CBN.1[b]	Specified in paragraph 92 of the MPGs	Enhancing technical capacity for producing GHG projections, including by collecting relevant data and receiving training on the development of 'with measures' projections for all GHG emissions and removals (high priority)
8_CBN.2[b]	Specified in paragraphs 85–86 and 89–90 of the MPGs	Enhancing technical capacity for improving estimation of and reporting on the impacts of PaMs by selecting appropriate models, determining assumptions and parameters, evaluating results, assessing how each policy or measure contributes to achieving the NDC targets and reporting on PaMs and their impacts in line with the MPGs (high priority)
8_CBN.3	Specified in paragraph 83(a–c) of the MPGs	Enhancing technical capacity for improving the reporting of actions and PaMs through the development of reporting methods, improved data collection, and technical capacity-building support in economic modelling, cost-analysis and integrated policy assessment
11_CBN.1	Specified in paragraphs 65, 68–69, 73 and 77 of the MPGs	Enhancing technical capacity in relation to the Party's indicators for tracking progress towards the NDC (in particular indicators for tracking the percentage of heat demand in the building sector met by renewable energy and the percentage reduction in power demand resulting from energy efficiency measures), developing methods for defining the indicators in measurable terms consistently with paragraph 65 of the MPGs; establishing comprehensive data sets of disaggregated information on renewable versus non-renewable heat sources and on the share of the reduction in power demand that is specifically attributable to energy efficiency measures; and integrating the indicators into a regular monitoring and reporting framework for NDC tracking (high priority)
11_CBN.2	Specified in paragraph 75 of the MPGs	Enhancing the technical capacity for estimating the level of international support needed to implement Lebanon's conditional NDC targets, including through strengthening national analytical and technical capacities to assess investment needs, mitigation costs and financing requirements associated with more ambitious climate actions

[a] Capacity-building need identified by the Party in its BTR1.
[b] Capacity-building need identified by the TERT in consultation with the Party relating to the flexibilities applied by it as per the MPGs.

Annex

Documents and information used during the review

A. Reference documents

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

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

CRTs of Lebanon. 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.

"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.

NDC of Lebanon. Available at https://unfccc.int/NDCREG.

NID of Lebanon. Available at https://unfccc.int/first-biennial-transparency-reports.

B. Additional information provided by the Party

Responses to questions during the review were received from Lea Kai (Ministry of Environment of Lebanon), including additional material.