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

Addendum

Summary

This addendum to the report on the technical expert review of the first biennial transparency report of Liechtenstein, conducted by a technical expert review team in accordance with the modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement, contains the results of the review of the consistency of the information submitted by the Party with those modalities, procedures and guidelines. The review took place from 4 to 8 May 2026 in Vaduz.

* In the symbol for this document, 2025 refers to the year in which the biennial transparency report was submitted, not to the year of publication.



Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
BTR	biennial transparency report
CC	combination category
CH ₄	methane
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRT	common reporting table
CTF	common tabular format
EF	emission factor
EMIS	Emission Information System of Switzerland
EU	European Union
GHG	greenhouse gas
HFC	hydrofluorocarbon
IE	included elsewhere
IHCD Act	International Humanitarian Cooperation and Development Act
IPCC	Intergovernmental Panel on Climate Change
ITMO	internationally transferred mitigation outcome
LULUCF	land use, land-use change and forestry
MCF	methane conversion 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
N	nitrogen
N ₂	nitrogen gas
N ₂ O	nitrous oxide
NA	not applicable
NDC	nationally determined contribution
NE	not estimated
NH ₃	ammonia
NID	national inventory document
NIR	national inventory report
NO	not occurring
NO _x	nitrogen oxides
OECD	Organisation for Economic Co-operation and Development
PaMs	policies and measures
PFC	perfluorocarbon
QC	quality control
SDG	Sustainable Development Goal
TERT	technical expert review team
UA	information not available at the time of reporting
WAM	‘with additional measures’
WM	‘with measures’
WOM	‘without measures’
Y _m	methane conversion rate

I. Areas of improvement¹ identified during the technical expert review of the Party's first biennial transparency report

1. Tables 1–20 present the results of the review of the consistency with the MPGs² of the information submitted by Liechtenstein 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
NA	NA	No areas of improvement identified

B. Greenhouse gas emissions and removals

Table 2

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

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
2.G.1	Specified in paragraph 39 of the MPGs Other	In some instances, Liechtenstein explained in the NID that elements of information, including the methodologies used, EFs and AD, are based on those used for the GHG inventory of Switzerland. For example, a number of EFs are based on Swiss EFs, with the assumption that they more accurately represent the Party's emissions compared with the IPCC default EFs. However, in some cases where the Swiss GHG inventory reports are referenced, the EFs and AD used by Liechtenstein for the emission estimates do not match or correlate with those used by Switzerland (e.g. for categories 4.C grassland (CO₂), 5.C.2 open burning of waste (CO₂, CH₄ and N₂O) and 5.D.1 domestic wastewater (N₂O). This created difficulties for the TERT in assessing the emission estimates produced by Liechtenstein. During the review, the Party explained that country-specific EFs, assumptions and expert judgments were taken into account in developing its emission information. For example, the EFs for fossil waste used by Switzerland for category 5.C open burning of waste were modified by applying the AD of Liechtenstein, which include the total amount of waste, including biogenic and fossil waste. However, the Party did not explain in the NID how the data were adjusted. The TERT recommends that Liechtenstein, rather than repeating the reference to the NIR of Switzerland, include in its NID information on the methods, EFs, AD and approaches used, including on how they were developed to reflect the Party's circumstances, particularly where elements were based on Switzerland's GHG inventories and modified for Liechtenstein, in order to facilitate an understanding of Liechtenstein's GHG inventories by third parties, including the TERT, in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 8.4, p.8.9).

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 39 of the MPGs	The Party reported that fuel consumption data were derived from national energy statistics supplemented by surveys, estimates and data from external sources, including Swiss statistics (NID pp.84–87). However, the NID does not clearly explain how aggregated fuel consumption data derived from national energy statistics and external sources were disaggregated, allocated and applied across GHG

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.

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
	1.A Fuel combustion – sectoral approach – all fuels – all gases	inventory categories. The TERT noted that, according to the MPGs, Parties shall report information on the assumptions used for the AD. During the review, the Party clarified that, owing to the customs and monetary union with Switzerland, some fuel consumption data were available only in aggregated form through the national energy statistics that incorporate information derived from Swiss statistics. The Party explained that this approach does not result in double counting, as the aggregated fuel consumption data were used directly in the inventory without additional allocation or adjustment. It further explained that no additional allocation methodology is applied within the GHG inventory framework and that potential systematic biases, such as those related to fuel tourism, are described qualitatively in the NID. The TERT recommends that the Party enhance the transparency of its reporting by clearly documenting in the NID how aggregated fuel consumption data derived from national energy statistics and Swiss statistics were allocated and applied across GHG inventory categories, including any assumptions used in this process.
3.E.2	Specified in paragraph 39 of the MPGs 1.A Fuel combustion – sectoral approach – all fuels – all gases	The Party reported that EFs used for the energy sector were derived from multiple sources and were based on, inter alia, 2006 IPCC Guidelines default values, country-specific estimates, Swiss GHG inventory data, measurement campaigns and model-based approaches (NID p.80). The Party indicated that it used EFs reported by Switzerland, citing the assumption of similar fuel properties (NID p.116). However, the NID does not clearly explain the criteria used to select and combine EFs derived from different sources and approaches, including the Swiss inventory, the use of model-based estimates and other reference information sources, across the time series. During the review, the Party explained that it relies on Swiss methodologies and data owing to limited national capacity and because its national circumstances are similar to those of Switzerland under the customs union. The Party indicated that experts involved in both inventories consider the Swiss inventory to be a reasonable source of EFs. The Party acknowledged the potential for inconsistencies associated with the use of EFs from multiple sources and indicated that the EFs represent the best available data under the Party's national circumstances. The TERT recommends that the Party enhance the transparency and consistency of the EFs used for the energy sector by clearly documenting the criteria for selecting EFs from different sources, as well as the approaches used to ensure methodological consistency across sources and over time. In particular, the TERT recommends that the Party provide further information on how assumptions (e.g. equivalence of fuel properties), data sources and methodologies are aligned or validated when combining EFs derived from different approaches.
3.E.3	Specified in paragraph 44 of the MPGs 1.A Fuel combustion – sectoral approach – all fuels – all gases	The Party reported that uncertainty estimates were partly based on expert judgment and on information reported in Switzerland's NID, and that a simplified approach 1 methodology was applied (NID p.50). The Party indicated that it applied Swiss EFs and the associated uncertainties on the basis of the assumption of equivalent fuel properties as a result of the customs and monetary union (NID pp.115–116). However, the NID does not clearly document how uncertainty values derived from the EFs from Switzerland's inventory were applied under Liechtenstein's national inventory and reflected in the uncertainty analysis framework. During the review, the Party clarified that, owing to limited national capacity for report preparation, it applied the uncertainty values for EFs used by Switzerland, with no adjustments. The Party explained that the uncertainty values associated with these EFs are considered to be representative of Liechtenstein's national circumstances given the customs and monetary union between Liechtenstein and Switzerland and the similarity of fuel characteristics between the two countries. It noted that experts are involved in inventory reviews and in assessing the applicability of Switzerland's uncertainty estimates when inventory updates are made. In addition, the Party indicated that correlations between uncertainty parameters are considered in its approach 2 uncertainty analysis, which is conducted every five years and was performed for the latest inventory submission, as documented in annex A2.2.3 to the NID. The TERT recommends that the Party enhance the transparency of its reporting by clearly documenting in the NID the rationale for applying uncertainty values derived

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
3.E.4	Specified in paragraphs 21 and 39 of the MPGs 1.A.2.g Other (manufacturing industries and construction) – liquid fuels – all gases	from Switzerland's NID, as well as how the uncertainties were applied in the national inventory and reflected in the uncertainty analysis. The Party reported that diesel consumption from private industrial fuel tanks was allocated using fixed shares, with 30 per cent attributed to subcategory 1.A.2.g non-road machinery and 70 per cent to subcategory 1.A.3.b road transport. This allocation was applied consistently over the entire time series (1990–2022) (NID p.87). However, the NID does not clearly explain how these allocation factors were derived or demonstrate whether they reflect changes in fuel consumption patterns over time. During the review, the Party clarified that the allocation is based on expert judgment (Acontec, 2006) and has not been validated against national or sector-specific data. The Party explained that it applied a constant allocation share across the time series because Liechtenstein's industrial structure is relatively stable and the Party lacked detailed, disaggregated data. The TERT noted that the basis for the allocation assumption and its continued applicability across the time series were not sufficiently demonstrated. The TERT recommends that the Party enhance transparency with regard to the fuel allocation method used and enhance its robustness, including by providing a clear justification for the allocation factors applied and, where possible, validating these assumptions using available national or proxy data. The TERT also recommends that the Party assess whether the use of constant allocation factors across the entire time series remains appropriate.
3.E.5	Specified in paragraph 39 of the MPGs 1.A.3.b Road transportation – liquid fuels – CO ₂	The Party reported the use of biofuels in road transportation under subcategory 1.A.3.b road transportation; however, the NID does not clearly describe how the Party identified CO₂ emissions from the fossil component of biofuels, distinguished them from the biogenic fraction and included them in national total emissions. Although the NID (p.102) indicates that fossil fuel blended into biofuels is included under diesel sold and is therefore not accounted for separately, it does not clearly explain how this was accounted for across the time series. The TERT noted that the Party has included this issue under the planned improvements for future inventory submissions. According to the 2006 IPCC Guidelines (vol. 2, chap. 3, pp.3.17–3.18), fossil carbon in biofuels should be included in national totals, while biogenic CO₂ is to be reported separately. During the review, the Party indicated that emissions from the fossil part of biofuels are accounted for in its NID. The Party confirmed that emissions from the fossil component of biofuels are included in diesel sold under subcategory 1.A.3.b and are therefore not accounted for separately. The TERT recommends that the Party clearly document in the NID and the CRTs how CO₂ emissions associated with the fossil component of the carbon content of biofuels were identified, distinguished from the biogenic fraction and included in national total emissions for the relevant subcategories under subcategory 1.A.3.b in accordance with the 2006 IPCC Guidelines (vol. 2, chap. 3).
3.E.6	Specified in paragraph 47 of the MPGs 1.A.3.b Road transportation – all fuels – all gases	The Party reported aggregated emissions from road transportation under subcategory 1.A.3.b.i cars, while emissions for other vehicle categories (subcategories 1.A.3.b.ii, 1.A.3.b.iii and 1.A.3.b.iv) were reported as "IE" owing to limited availability of disaggregated AD (NID pp.101 and 286). The TERT noted that, according to the MPGs, Parties shall report emission estimates at the most disaggregated level possible; however, the Party did not clearly demonstrate how its approach achieves this. During the review, the Party reiterated that it was not possible to estimate emissions by vehicle category because the available fuel consumption and transport AD do not provide enough detail, including as a result of the use of aggregated fuel sales data under the customs and monetary union with Switzerland. The Party indicated that constraints related to data availability and the absence of AD at the vehicle category level have limited progress in improving disaggregation. The TERT recommends that the Party report disaggregated emissions from road transportation under subcategory 1.A.3.b road transportation, including by using modelling approaches or relevant data sources, with a view to reporting emission estimates at the most disaggregated level possible.

Table 4

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
4.I.1	Specified in paragraph 39 of the MPGs 2.D.1 Lubricant use – CO ₂	Liechtenstein reported in NID table 1-2 (p.41) that it calculated CO₂ emissions for category 2.D.1 lubricant use using a tier 1 method and default EFs, whereas “NA” was reported in CRT Summary 3 for the method applied and EF for that category. The Party also reported in NID table 1-2 that it used country-specific methods and country-specific EFs to calculate emissions for category 2.G.3 N₂O from product uses, but “NA” was reported for the corresponding method applied and EF in CRT Summary 3. During the review, Liechtenstein explained that CRT Summary 3 does not display the correct notation keys in every case for the applied methods and EFs, and as a result the Party adapted the information reported in NID table 1-2 where necessary, which is why the reporting differs between the CRT and the NID table in some cases. Liechtenstein noted that this explanation was provided in NID table 1-2 and confirmed that the notation keys reported for categories 2.D.1 and 2.G.3 in CRT Summary 3 are not accurate and the information reported in NID table 1-2 is correct. The TERT recommends that Liechtenstein ensure consistency with regard to the information reported on methods, sources of AD and EFs between the CRTs and the NID.
4.I.2	Specified in paragraph 47 of the MPGs 2.D.3 Other (non-energy products from fuels and solvent use) – CO ₂	Liechtenstein did not report in the CRTs any CO₂ emissions for category 2.D.3 other from the use of urea in selective catalytic reduction catalysts (e.g. diesel exhaust fluid) in diesel engines in either road or off-road transportation. The NID (p.128) notes that CO₂ emissions under category 2.D non-energy products from fuels and solvent use only occurred for category 2.D.1 lubricant use. However, the TERT notes that diesel fuel is used in Liechtenstein and diesel exhaust fluid is often used in diesel engine cars and off-road vehicles to reduce emissions of NO_x. During the review, Liechtenstein explained that there is no available information on cars with diesel engines, and emissions are estimated to be minimal and the uncertainties associated with the data are very high. The Party plans to revise its transport emission calculation model to include information on different types of vehicles. Liechtenstein expects the revised model to enable more accurate estimation of emissions from selective catalytic reduction catalysts used in diesel engines in road transportation. The TERT recommends that Liechtenstein calculate CO₂ emissions from the use of urea (e.g. diesel exhaust fluid) for the whole time series using equation 3.2.2 from the 2006 IPCC Guidelines (vol. 2, chap. 3) to ensure that all emissions are included in the inventory in accordance with the 2006 IPCC Guidelines.
4.I.3	Specified in paragraphs 31, 32 and 47 of the MPGs 2.F Product uses as substitutes for ozone-depleting substances – HFCs and PFCs	Liechtenstein reported in the NID (p.131) that there are no available data on HFC and PFC emissions in the country, which is why they were derived using data from EMIS, Switzerland’s national inventory database, as a best estimate. In order to estimate Liechtenstein’s HFC and PFC emissions under source category 2.F product uses as substitutes for ozone-depleting substances, the most relevant source categories were determined using a relative threshold as a first step. Emissions sources for the category in Switzerland’s EMIS inventory database were analysed with respect to a chosen threshold. For every emissions source and F-gas, the contribution to total GHG emissions was calculated for subcategories 2.F.1, 2.F.2 and 2.F.4. A threshold of 10 per cent was defined and applied for each subcategory, and HFC and PFC emissions were only calculated for the F-gases that exceed this threshold. Switzerland’s inventory reports F-gases below the threshold as “NO”. During the review, Liechtenstein clarified that the 10 per cent threshold was chosen to optimize the reporting process and to ensure that the most significant sources of F-gases were included in the inventory. The relevant emissions sources and gases are checked on a regular basis (usually every three to five years, using different published data and reports) by the Federal Office for the Environment of Switzerland in collaboration with national experts. The Party explained that the use of some F-gases may not occur in Liechtenstein, and therefore “NO” was correctly reported for the corresponding categories. However, the TERT noted that if Liechtenstein only calculated emissions of the gases exceeding the 10 per cent

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
		threshold, some emission estimates exceeding the threshold mentioned in paragraph 32 of the MPGs might be missing. Also, gases below the threshold according to MPGs are considered to be insignificant and should be reported as “NE”. The TERT recommends that Liechtenstein clarify whether F-gases that do not meet the 10 per cent threshold are used in Liechtenstein and estimate whether emissions thereof are over the significance threshold according to paragraph 32 of the MPGs. The TERT also recommends that Liechtenstein provide a quantitative estimate of F-gas emissions where the likely level is below the 10 per cent threshold, but over the threshold according to the MPGs. The TERT further recommends that Liechtenstein report emissions that are below the threshold according to the MPGs as “NE” instead of “NO” in accordance with paragraph 31(a–b) of the MPGs.
4.I.4	Specified in paragraphs 21 and 35 of the MPGs 2.F.4 Aerosols – HFCs	Liechtenstein reported in the NID (pp.137–139) that the AD reported in the CRTs for subcategory 2.F.4.a metered dose inhalers were calculated on the basis of Switzerland’s AD, applying factors such as number of inhabitants of Switzerland and Liechtenstein, as per NID table 4-10. The TERT tried to calculate the AD for 2022 but was unable to replicate the results reported in Liechtenstein’s CRTs. The TERT noted that the EF used by Liechtenstein (product life factor, HFC-134a) differs from the EF reported by Switzerland; however, the NID (pp.133–137) notes that EFs were taken from EMIS, Switzerland’s national inventory database, and therefore the EFs reported by the Parties ought to be the same. The TERT further noted that Liechtenstein reported AD and emission estimates for HFC-134a filled into new manufactured products, whereas Switzerland did not. During the review, Liechtenstein explained that there were mistakes in the reporting, which will be corrected for the next inventory submission. The TERT recommends that Liechtenstein calculate HFC emissions for subcategory 2.F.4.a using the correct AD and EFs and report the estimates.

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 paragraph 39 of the MPGs 3.A.1 Cattle	In its NID (p.152), Liechtenstein stated that the other mature cattle category includes only mature cows that produce offspring for meat. As a result, bulls and steers do not appear to be represented in this category or in other cattle categories. During the review, Liechtenstein clarified that only small numbers of steers and bulls are present in the country. Since the agriculture model is based on the Swiss model, Liechtenstein uses the Swiss animal classification system, which is based on Switzerland’s Animal Tracing Database. Since the database does not contain a separate category for steers or bulls, they are included in breeding cattle third year and fattening cattle, and their emissions are reported under the category growing cattle in the CRTs. The TERT recommends that Liechtenstein clarify in its NID under which categories bulls and steers are included.
5.A.2	Specified in paragraph 39 of the MPGs 3.A.1 Cattle – CH ₄	In NID table 5-6 (p.155), Liechtenstein reported the Y _m value for different livestock categories. According to the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10A.2), the Y _m value for juveniles consuming only milk is zero. In the NID table, the Y _m value was reported as 0 per cent for fattening calves and 4.1 per cent for pre-weaned calves. This seems counter-intuitive as, typically, pre-weaned calves primarily consume milk, whereas fattening calves are generally weaned and their diets may include significant proportions of concentrates. During the review, Liechtenstein explained that its definition of pre-weaned calves refers to suckler calves on pastures with their mothers. They are being nursed but also eat grass on the pastures. The Y _m value for pre-weaned calves is therefore weighted (milk/fattening calves: 0 per cent, grass/breeding cattle: 6.5 per cent). The TERT recognized the feeding practices for pre-weaned calves described by the Party and agrees that the applied methodology, including the use of a weighted Y _m value, is reasonable in the light of the Party’s explanation. However, the TERT considers that the Party’s definitions for the livestock categories pre-weaned calves and fattening calves do not fully align with commonly accepted classifications and may

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		therefore be misleading. In particular, pre-weaned calves are generally understood to predominantly consume milk, whereas fattening calves are typically weaned animals and are fed solids.
		The TERT recommends that the Party improve the transparency of its reporting by clarifying the definitions for fattening calves and pre-weaned calves in its NID.
5.A.3	Specified in paragraph 39 of the MPGs 3.B Manure management – CH ₄	To estimate CH₄ emissions from deep litter for category 3.B manure management, Liechtenstein calculated a country-specific MCF of 10 per cent using the average of the default values from the 2006 IPCC Guidelines (vol. 4, chap. 10) (table for storage time shorter than one month and storage time longer than one month; 3 and 17 per cent respectively). The NID does not clearly document how the average storage time for the deep litter system was estimated or the rationale for using the arithmetic mean of the two default values. During the review, the Party explained that the average storage time for deep litter was estimated on the basis of an expert judgment from Agroscope, the Swiss agricultural research centre. The Party referred to chapter 5.3.2.2 of its NID (p.164), which states that the use of an MCF of 10 per cent is justified by a number of studies, which show that this value is representative of country-specific manure management conditions in Liechtenstein and Switzerland. The TERT does not consider that the use of the applied MCF is supported by a sufficiently transparent explanation in the NID regarding the underlying distribution of storage times. Furthermore, the NID does not summarize the key findings of the studies referred to by the Party, making it difficult to assess their relevance and validity. In addition, deep litter systems are mainly used for sheep and goats, which typically graze in summer. This may indicate that deep litter systems are primarily used in winter conditions, when storage times are generally longer owing to limited opportunities for manure application. The TERT recommends that Liechtenstein clearly describe in its NID the basis for the assumed duration of storage for deep litter systems, noting that the use of the arithmetic mean implies that storage times shorter than and longer than one month are equally distributed.
5.A.4	Specified in paragraph 40 of the MPGs 3.B Manure management – CH ₄	In its NID (p.184), Liechtenstein stated that other organic fertilizers applied to soils include solid digestate. However, Liechtenstein reported “NO” for the MMS digesters in CRT 3.B(a). During the review, the Party clarified that no agricultural biogas facilities exist in Liechtenstein. Therefore, no solid digestate is applied to agricultural soils. The TERT recommends that Liechtenstein provide transparent and consistent information in its NID that no agricultural biogas facilities exist in Liechtenstein and that solid digestate is not used as organic fertilizer on agricultural land.
5.A.5	Specified in paragraphs 21 and 39 of the MPGs 3.B Manure management – N ₂ O	In its NID (p.167), Liechtenstein described the EFs applied for estimating N₂O emissions from manure management, noting that for liquid/slurry systems an EF of 0.002 kg N₂O-N/kg N, as suggested in the 2006 IPCC Guidelines (vol. 4, chap. 10) for pit storage below animal confinements, was used. However, in CRTs 3.B(a) and 3.B(b), AD were reported under the MMS liquid/slurry rather than under pit storage. In addition, to estimate CH₄ emissions from the liquid/slurry system, Liechtenstein used the MCF for liquid systems. Therefore, although the MMS was classified as liquid/slurry according to the description of AD and for the estimation of CH₄ emissions, an EF associated with pit storage was applied to estimate N₂O emissions. During the review, the Party explained that in Liechtenstein there are various, partially individual MMS, some of which could be interpreted as a combined system of pit storage and liquid/slurry tanks. However, for the purpose of the calculations, a single EF was selected, namely the EF for pit storage. This EF was selected on the basis of expert judgment, reflecting Liechtenstein’s national circumstances. To ensure consistency between the classification of MMS and the selection of EFs for different gases under category 3.B manure management, the TERT recommends that Liechtenstein improve the transparency of its reporting, in particular by including in the NID the rationale for applying an EF associated with pit storage to estimate N₂O emissions from the liquid/slurry MMS while applying an EF associated with liquid/slurry to estimate CH₄ emissions from the same system, and describing the MMS as liquid/slurry in both the AD in the CRTs and in the NID. Alternatively, the TERT recommends that Liechtenstein consistently use an EF associated with

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		liquid/slurry when estimating emissions of both N ₂ O and CH ₄ from liquid/slurry systems.
5.A.6	Specified in paragraph 31 of the MPGs 3.B.5 Indirect N ₂ O emissions – N ₂ O	In its NID (p.172), Liechtenstein described the methodology used to estimate total N losses during storage in MMS. The methodology covers losses from volatilization of NH ₃ , NO _x and N ₂ but N losses due to leaching and run-off are not mentioned. However, in CRT 3.B(b), N losses from leaching and run-off were reported as “NO”. During the review, Liechtenstein clarified that indirect N ₂ O emissions from leaching of nitrate were reported under source category 3.D.2 indirect N ₂ O emissions from managed soils. The TERT recommends that Liechtenstein report the appropriate notation key (“IE”) in the CRTs for source category 3.B and include explanation in the NID to clarify where and how indirect N ₂ O emissions from leaching and run-off are accounted for.
5.A.7	Specified in paragraph 39 of the MPGs 3.B.5 Indirect N ₂ O emissions – N ₂ O	CRT 3.B(b) reports total N excretion for all MMS (excluding pasture, range and paddock), along with N lost as N ₂ O, as well as volatilization losses of N as NH ₃ , NO _x and N ₂ , while leaching and run-off were reported as zero. On the basis of these values, the remaining N after storage losses can be calculated. However, a comparison with the amount of N from animal manure applied to soils, as reported in CRT 3.D, highlights a discrepancy between the measured N remaining after storage and the N applied to soils. During the review, Liechtenstein explained that this inconsistency is due to an error in the amount of N volatilized reported in CRT 3.B(b) but the correct value can be derived from the data reported in NID table 5-18. The TERT notes that indirect N ₂ O emissions from atmospheric deposition reported under category 3.B were not underestimated as a result of this issue as the discrepancy relates to N reported as N ₂ , which does not contribute to indirect N ₂ O emissions. The TERT recommends that Liechtenstein correct the reported amount of N volatilized in CRT 3.B(b).
5.A.8	Specified in paragraph 39 of the MPGs 3.D.1.d Crop residues – N ₂ O	In its NID (p.181), Liechtenstein reported the equation used to estimate the amount of N in crop residues from meadows and pastures returned to soils (referred to as F _{CR,MP}). The equation does not include a parameter accounting for the fraction of pasture area renewed annually, which would ensure that N inputs from pasture residues are only considered at the time of renewal, as outlined in the 2006 IPCC Guidelines (vol. 4, chap. 11, equation 11.6). During the review, the Party clarified that there is mainly permanent grassland in Liechtenstein (i.e. pastures are not renewed). Therefore, the equation from the 2006 IPCC Guidelines had to be adjusted. Liechtenstein explained that the method for estimating crop residues has been optimized in the Swiss agriculture model and GHG inventory for future reporting. Since Liechtenstein updates the agriculture model in accordance with the Swiss model every five years, this optimization regarding crop residues will also be implemented for Liechtenstein’s GHG inventory (likely for the 2028 submission). The TERT recommends that Liechtenstein provide information in the NID on its national circumstances related to permanent grassland, as clarified during the review, and explain how its circumstances are reflected in the methodology used to estimate emissions from crop residues.

Table 6

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
6.L.1	Specified in paragraph 40 of the MPGs 4. General (LULUCF) – CO ₂ , CH ₄ and N ₂ O	Liechtenstein reported in its NID (chap. 6.1.1) that it used a new calculation model for LULUCF emissions for the 2024 inventory submission. However, the TERT noted that the Party did not include clear explanations with regard to technical information on the new model, changes in the input data and the impact of the new model on emission estimates. During the review, the Party examined the impact of the new model on emission estimates and confirmed that the new model was applied consistently across the

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
		entire time series (1990–2022). While the model used for the 2024 inventory submission was replaced with a georeferenced approach for the 2026 submission, the Party maintained that the 2024 version served to refine the inventory through the use of a wider range of methods and time series in accordance with the 2006 IPCC Guidelines.
		The TERT recommends that the Party provide documentation in the NID regarding the logic and parameters of the calculation model for LULUCF emissions with a view to ensuring that the chosen calculation approaches are transparent, accurately reflect sectoral emissions and are consistent with IPCC guidelines.
6.L.2	Specified in paragraph 39 of the MPGs 4.C Grassland	Liechtenstein reported in its NID (p.233) that it used Swiss proxy values to estimate living biomass for several grassland subcategories, including shrub vegetation (CC32), copse (CC34), stony grassland (CC36) and unproductive grassland (CC37). The TERT noted that the NID lacks a country-specific validation or justification confirming that these proxies, such as the brush forest equivalent for shrubs or the 35 per cent cover assumption for stony grassland, accurately reflect the localized ecological and climatic conditions of Liechtenstein. Additionally, it was unclear whether these values were cross-checked against the <i>2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands</i>, where relevant. During the review, the Party clarified that for shrub vegetation (CC32), while plant species may differ from the Swiss brush forest category (CC13), total biomass is expected to be similar according to the Swiss Land Use Statistics land-use definitions. Regarding unproductive grassland (CC37), the Party explained that it is uncertain whether the carbon stock is higher or lower than that of permanent grassland (CC31); however, estimates were weighted by elevation zone with a view to ensuring that the climatic stresses correspond to national conditions. The TERT recommends that the Party revise the documentation for all grassland subcategory proxy biomass values by including technical information on how the proxy values of grassland subcategories for Liechtenstein were identified. The TERT notes that detailed information on the use of elevation zone weighting to align Swiss data with Liechtenstein's climatic conditions would provide a stronger technical justification for the use of this estimation method.
6.L.3	Specified in paragraphs 21 and 40 of the MPGs 4.C.1 Grassland remaining grassland – CO ₂	Liechtenstein reported in its NID (pp.235 and 238) that, for land-use transitions within the grassland category (specifically between permanent grassland (CC31) and unproductive grassland (CC37)), it revised the conversion period for mineral soil carbon from the IPCC default of 20 years to one year. However, the NID does not provide a technical justification for this deviation from the IPCC default value or a quantitative assessment of how this change impacts estimates of net CO₂ emissions and removals for the grassland category across the time series (1990–2022). During the review, the Party clarified that it started using a one-year conversion period to align its methodology with the Swiss GHG inventory, and this change was not based on a specific national study. The Party confirmed that this revision was applied consistently across the entire time series. In addition, the Party explained that the quantitative impact on the emission estimates is negligible, as the mineral soil carbon stocks for subcategories permanent grassland (CC31), shrub vegetation (CC32), copse (CC34) and unproductive grassland (CC37) are virtually identical, and land-use changes involving vineyards (CC33) are minimal. The TERT recommends that Liechtenstein provide scientific information on how the conversion period of one year for land-use transitions is best applicable for mineral soil carbon, in order to justify the use of it in estimating emissions and removals for land-use transitions within the grassland category.
6.L.4	Specified in paragraph 39 of the MPGs 4.E Settlements – CO ₂	Liechtenstein reported a significant reduction in the soil carbon loss factor for unsealed land (non-CC51) converted to sealed settlements (CC51), which was reported as 20 per cent in the current inventory submission compared with 50 per cent in the 2023 GHG inventory submission under the Convention. However, the Party did not provide a reason for this change, an explanation of whether the factor applies to both mineral and organic soils or a quantitative assessment of how this change impacts the CO ₂ emission trends for 1990–2022.

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		During the review, the Party explained that the 20 per cent loss factor for paved settlement areas is based on the default value from the 2006 IPCC Guidelines (vol. 4, chap. 8.3.3.2). The Party also clarified that the 50 per cent factor used in previous inventory submissions was an initial estimate and that the 20 per cent factor was applied to both mineral and organic soils for the current submission (although no land-use conversion to sealed settlements (CC51) on organic soil occurred). Liechtenstein provided a quantitative impact assessment, noting that for 2019, in which the largest area was converted over the time series, the change results in a reduction in estimated soil carbon losses (amounting to approximately 396 t carbon on mineral soils and 6 t carbon on organic soils), applied over a 20-year conversion period. The TERT recommends that the Party provide transparent information on the justification for using 20 per cent as the soil carbon loss factor for sealed settlements (CC51), illustrating that the new loss factor value is more accurate and aligned with the 2006 IPCC Guidelines (vol. 4, chap. 8.3.3.2).

Table 7

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
7.W.1	Specified in paragraph 21 of the MPGs 5.B.1 Composting – CH₄ and N₂O	The amount of waste treated with composting decreased between 2021 (2.114 kt dry matter) and 2022 (0.687 kt dry matter) despite an increasing trend from 2018 onward, which resulted in a sudden decrease in CH₄ and N₂O emissions in 2022 (from a total of 0.087 kt CO₂ eq in 2021 to a total of 0.028 kt CO₂ eq in 2022). However, the reason for this sudden decrease was not explained in the NID. During the review, the Party explained that the decrease was due to an oversight, which was corrected for the 2025 NIR. The Party also explained that, following the correction, there is still a clear reduction between 2021 and 2022, and one reason for the general fluctuations in the AD could be annual variations in climatic conditions, which lead to lower levels of biomass production and consequently lower quantities of green waste. The Party further explained that it used Swiss AD for backyard composting, taken from table 7-13 of Switzerland's NID, to estimate the per capita amounts, which were then multiplied by Liechtenstein's population. Therefore, any fluctuations in AD compared with the Swiss trend are due to fluctuations in the population of Liechtenstein. The TERT considers that this still does not explain the noticeable reduction between 2021 and 2022. The TERT recommends that the Party further investigate the cause of changes in the trend in emissions from composting for 2022 in order to avoid discrepancies in future inventory submissions and correct the emission estimates, as appropriate.
7.W.2	Specified in paragraph 35 of the MPGs 5.D.1 Domestic wastewater – CH₄	In the NID (p.270), Liechtenstein explained that sewage gas is used in boilers and in cogeneration plants, and is flared and refined, and these sewage gas amounts are obtained through measurements. The TERT notes that in annex 4 to the NID, Liechtenstein provided information on QC efforts, including the QC checklists designed by the Office of Environment, sectoral experts and authors of the NID. However, this information does not cover measures taken for measured data provided by the wastewater plant operator, such as the QC checks implemented and standards of the International Organization for Standardization applied. During the review, Liechtenstein explained that the inventory team carries out plausibility checks on the data, and, in the event of significant outliers or discrepancies, it contacts data providers to investigate possible causes and rectify any errors. Liechtenstein noted that it cannot influence the accuracy of data collected or quality assurance/QC carried out by other entities or third parties. The Party added that it requested additional QC checks from external data providers, which confirmed the validity of the data. Taking into account the Party's efforts to collaborate with the external data providers and noting the guidance on measured data provided in the 2006 IPCC Guidelines (vol. 1, chap. 6, on QA/QC), the TERT encourages the Party to include in the NID information on the measures taken as QC checks aimed at ensuring the

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		quality of the data used for estimating the amount of CH ₄ recovered from sewage gas.
7.W.3	Specified in paragraph 21 of the MPGs 5.D.1 Domestic wastewater – N ₂ O	In the NID (p.271), Liechtenstein explained that annual protein consumption data were based on Switzerland's reporting, assuming that similar conditions prevail in Liechtenstein. The TERT noted that the protein consumption of Liechtenstein reported in CRT 5.D fluctuates over the time series. In the early years of the time series, between 1990 and 2002 (reported as 38.14 and 35.90 kg/head/year respectively), there is a general decreasing trend, but with a sudden increase in 2000 and a decrease in 2002. For 2005–2012, there is an increasing trend, with a peak in 2012 (38.68 kg/head/year) and a decreasing trend thereafter until 2022 (35.40 kg/year/cap), except for increase in 2016. In comparison, the TERT noted that the protein consumption of Switzerland decreased steadily throughout the time series (from 43.27 kg/head/year in 1990 to 32.28 kg/head/year in 2022). During the review, the Party provided two different data sources used for the time series: the NID of Switzerland and the statistical yearbook of Swiss agriculture and nutrition (Agristat and the Swiss Farmers' Union, 2024), which provided data on daily nutrient consumption per capita. However, the Party did not explain how it ensured time-series consistency for those data for Liechtenstein. The TERT recommends that the Party assess its protein consumption data for all years of the time series, rectify them where needed and recalculate N₂O emissions from protein consumption for the time series, if necessary, as well as explaining why this factor fluctuates and describing the trend over the time series.
7.W.4	Specified in paragraph 39 the MPGs 5.D.1 Domestic wastewater – CH ₄	In the NID (p.270), Liechtenstein explained that sewage gas is used in boilers and in cogeneration plants, and is flared and refined, and these sewage gas amounts were obtained through measurements. The Party also explained that there is a slight inconsistency between the sewage gas generated and the total sewage gas used in boilers and cogeneration plants, and flared and refined (NID p.273). During the review, the Party clarified this by providing additional information on the approach used to determine the amount of CH₄ recovered from sewage gas (0.039 kt), including on how the data obtained through measurements carried out by the treatment facility were used for estimating the amount of CH₄ recovered. Noting that Liechtenstein plans to assess the AD for future inventory submissions (see NID p.273), the TERT recommends that the Party explain the approach used to estimate the recovered amount of CH₄, including the QC checks carried out to assess the quality of measurement data reported in the NID (see ID# 7.W.2).
7.W.5	Specified in paragraphs 39 and 47 of the MPGs 5.D.2 Industrial wastewater – CH ₄ and N ₂ O	The Party reported CH₄ and N₂O emissions from industrial wastewater as "IE" in CRT 5.D. AD and CH₄ recovery data for industrial wastewater were also reported as "IE". However, in the NID (p.268), Liechtenstein explained that in some industries (food processing and metal processing) wastewater is treated on site in order to reduce the load of organically polluted wastewater, and wastewater is further processed in Liechtenstein's domestic wastewater treatment plant. During the review, the Party explained that, in fact, on-site wastewater treatment carried out by the dairy product manufacturer only involves the correction of pH values. Wastewater from the meat producer is collected in a tank after separating particles and is then transported by road to the domestic wastewater treatment plant. Therefore, no biological processing of particles takes place on site at the meat producer. This implies that on-site treatment of industrial wastewater does not involve the process of reducing organic loads. The TERT recommends that the Party report transparent information in the NIR and explain that the methods used for estimating emissions from domestic wastewater reflect the organic load from industrial wastewater.

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 60 of the MPGs	BTR1 figure 26 (p.24) presents the time series of transport sector emissions, with a decreasing trend from 2012 onward despite an increasing or stable number of domestically registered combustion engine vehicles. In the BTR1 the Party explained that this disparity may be related to the phenomenon of fuel tourism, as fuel prices are often lower in neighbouring countries. However, it was not sufficiently clear to what extent the fuel tourism phenomenon explains the continuous decrease from 2012 onward, and whether there are additional reasons for a continuous decrease, such as the CO₂ levy on fossil fuels. During the review, the Party clarified that it is difficult to track fuel tourism to Austria. However, according to consultations with the main gas station operators in Liechtenstein and Switzerland, fuel sales are expected to decline by 3–4 per cent/year. The reduction is only slightly higher in border areas. This suggests that fuel tourism has remained relatively stable over time. In addition, the CO₂ Act incentivizes the import of increasingly efficient vehicles into Liechtenstein, contributing to a gradual improvement in the overall energy efficiency of the car fleet. The Party also clarified that under Article 37 of the CO₂ Act, CO₂ emissions generated by the use of fuels shall be compensated by levy values that increase gradually over time, from 2 per cent in 2014 to 17 per cent of the CO₂ emitted in 2022. Moreover, additional tax is usually levied on sales of mineral oils, meaning that transport fuel prices are higher in Liechtenstein compared with several other EU member States. The TERT recommends that Liechtenstein provide more detailed information on how its national circumstances affect GHG emissions and removals over time, for example by reporting more clearly on the impact of cross-cutting policies.

Table 9

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

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
9.1	Specified in paragraph 64(e–f) of the MPGs	In BTR1 table 11, Liechtenstein reported that all sectors are covered in the NDC, including LULUCF. However, the baseline value corresponding to 1990 was reported excluding LULUCF in the BTR1 (p.32) and CTF NDC table 4. The TERT noted that this may cause confusion in tracking the NDC target. In addition, in BTR1 section II.A.8.1, Liechtenstein reported that it is currently negotiating a bilateral agreement under Article 6, paragraph 2, of the Paris Agreement and that it aims to use the EU registry to record the ITMOs. It was not sufficiently clear whether Liechtenstein is willing to buy or sell ITMOs, and the TERT was unsure which registry the Party intends to use. During the review, Liechtenstein clarified that, although the NDC states that the scope of the first NDC covers all sectors relevant to the Party's GHG emissions including LULUCF, what the Party meant by that is that it will work on implementing mitigation actions for all sectors. The Party also clarified that the 1990 base-year GHG emissions reported in the NDC exclude LULUCF. Regarding ITMOs, Liechtenstein clarified that it is still in the negotiation phase of developing an agreement under Article 6, paragraph 2, of the Paris Agreement with Ghana with regard to buying ITMOs. Liechtenstein further clarified that the registry options are part of the negotiation process with the partner country, and the options will depend on, inter alia, the timing of the transfer, especially since the EU registry, which Liechtenstein is part of, is not yet ready to record ITMOs. The TERT recommends that Liechtenstein provide a clear description regarding its NDC scope and coverage and clearly report on its intention to use cooperative approaches that involve the use of ITMOs under Article 6 of the Paris Agreement

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		towards NDCs, for example by providing further information on the intended use of ITMOs.

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
10.1	Specified in paragraph 75(g) of the MPGs	Information on methodologies used to track progress arising from the implementation of PaMs was not reported by Liechtenstein in either the BTR1 or the CTF tables, and the reason for this was not clear to the TERT. During the review, the Party clarified that it had meant to report three indicators (gross domestic product, population and number of vehicles registered) but that, owing to a technical problem, these did not get reported in the CTF tables. The Party noted that more detailed information on this matter can be found in the annual monitoring reports of the Energy Advisory Office, which tracks some additional indicators. The Party also clarified that it aims to provide more information on the methodology for tracking progress arising from the implementation of PaMs in the next BTR. The TERT recommends that Liechtenstein report information, as available, on the methodologies used to track progress arising from the implementation of PaMs, as applicable.
10.2	Specified in paragraphs 78(c) and 79 of the MPGs	Although Liechtenstein's NDC does not refer to adaptation actions or economic diversification plans resulting in mitigation co-benefits, BTR1 section II.D.10 addresses the economic and social consequences of the Party's response measures. However, the economic diversification plans corresponding to the response measures were not reported. In addition, the challenges in and barriers to addressing such consequences were not clearly reported, and CTF NDC table 12 was not filled in, and the reasons for this were not clear to the TERT. During the review, the Party clarified that the CO₂ levy affects households' financial situations. Since the initial investment required to switch to non-fossil heating systems is beyond the financial means of many households, support measures (subsidies) for climate-friendly heating systems will continue. In addition, around two thirds of the levy revenues originating from the industrial and commercial sector are returned to businesses by subsidizing employers' contributions to their employees' insurance under old age and survivors' insurance. The Party also clarified that the subsidy system is demand driven and therefore accessible to all, unlike in some other countries where a first come, first served principle is applied. However, elderly homeowners in particular may be reluctant to invest in fossil-free heating systems or may not be in a position to do so, as such investments may not be amortized within their remaining planning horizon. To address this barrier, the Party will introduce subsidies for energy performance certificates for older buildings. These certificates are intended to guide homeowners in making targeted investments, such as investments in insulation improvements. Regarding the corresponding CTF table, the Party clarified that many of the shared response measures are monitored by Switzerland, and tracking progress is therefore dependent on the work of Switzerland. The Party further clarified that it was not able to establish such a tracking process and that it aims to tackle this issue for the next inventory submission. The TERT recommends that Liechtenstein report on the economic diversification plans corresponding to its response measures, as well as on the challenges in and barriers to addressing the economic and social consequences of such response measures. The TERT also recommends that Liechtenstein report on the challenges in and barriers to addressing the consequences of its response measures in the appropriate CTF table (CTF NDC table 12).

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
11.1	Specified in paragraph 82(b) of the MPGs	The Party's BTR1 does not clearly describe some of the PaMs, for example there is a lack of information on the values under the CO₂ levy, a key element of the CO₂ Act, relating to thermal fuels; the factors determining the amount of annual CO₂ emissions to be offset by fuel importers under the measure "partial compensation of CO₂ emissions from motor fuel use"; the reasons for excluding the renewable energy mitigation actions from the reported actions; and the action related to industrial energy efficiency. During the review, the Party clarified that the CO₂ levy has increased progressively and was set at 60 Swiss francs, 84 Swiss francs, 96 Swiss francs and 120 Swiss francs/t CO₂ for 2014, 2016, 2018 and 2022 respectively. For the "partial compensation of CO₂ emissions from motor fuel use" measure, the Party explained that while the CO₂ Act sets the legal range (5 –90 per cent), the annual offset percentage is determined through the CO₂ Act and government decisions and is based on several factors, such as the national climate target trajectory, and the cost of domestic emission reduction certificates. As for excluding the renewable energy actions, the Party explained that while there are two domestic combined heat and power plants fired by natural gas, they supply less than 1 per cent of total electricity consumed in the country. Therefore, the Party does not expect any significant reductions in the use of the two power plants owing to any additional domestic renewable power capacity. Finally, with regard to the industrial energy efficiency measure, the Party clarified that any large industrial site that is subject to the CO₂ levy is able to waive the levy by participating in a process for identifying energy efficiency and fuel-switching measures with a certified industrial energy consultant. Companies may either commit to implementing specific measures or agree to achieve a defined CO₂ reduction target. If the agreed measures are not implemented or the reduction target is not met, the levy is not reimbursed. The TERT recommends that Liechtenstein report, to the extent possible, additional information, such as the information provided during the review, on the CO₂ levy, the "partial compensation of CO₂ emissions from motor fuel use" measure, and the action related to industrial energy efficiency, as well as on other key PaMs, and provide additional information on any PaMs that were excluded from the reporting, including the reasons for their exclusion.
11.2	Specified in paragraph 85 of the MPGs	In its BTR1, the Party did not provide estimates of expected and achieved GHG emission reductions for most of its PaMs. The Party reported the expected impacts for some PaMs as "NE" or "IE" without providing a reason or explaining where the reductions were included. Achieved emission reductions were not provided for any PaMs except the action relating to the motor vehicle tax exemption. In addition, the Party did not report the challenges faced in estimating the emission reductions for PaMs, or its plan for tracking associated emission reductions in future. Furthermore, the TERT identified some inconsistencies in the emission reduction estimates, and there was a lack of clarity regarding the reasons for the increased fuel sales in 2023, and therefore the reasons for the impact of the transport sector actions deviating from the expected emission reduction pathway. During the review, the Party clarified that it has limited institutional capacity for quantifying emission reductions on a policy-by-policy basis and therefore relies more heavily on a top-down approach. Regarding its reporting of "IE" for several PaMs, the Party clarified that since the Emission Trading Act establishes the overall goal of climate neutrality and interim climate targets, as well as the legal framework for enabling measures to be taken to achieve these targets, any emission reduction under a policy or measure is also indirectly attributable to the Act. Similarly, many of the measures under the Energy Strategy 2030 are indirectly attributable to the CO₂ Act. The "partial compensation of CO₂ emissions from motor fuel use" and the mineral oil tax reduction on biofuels and natural gas were reported as "IE" as they could impact both the modal shift and fuel switching and can therefore be attributed to the Energy Strategy 2030 and the Climate Strategy 2050. The Party noted that the only measure with emission reductions achieved

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
11.3	Specified in paragraph 86 of the MPGs	estimated with high certainty is the motor vehicle tax exemption because complete statistics exist on registered vehicles with the relevant propulsion type, while the distances driven are estimated; in contrast, no comparable reliable data currently exist for other systems (e.g. heating-based systems). With regard to the impact of transport sector actions deviating from the expected pathway, the Party clarified that the increase in fuel sales in 2023 was unexplained; however, the fuel sales data show a clear decline in 2024 and 2025. The TERT recommends that Liechtenstein (1) report, to the extent possible, estimates of expected and achieved GHG emission reductions for its actions and PaMs, as relevant, accompanied by an explanation where it faced constraints in producing estimates; (2) enhance the transparency of its explanation of the impact of mitigation actions, including any deviation from the expected pathway, and conduct the necessary procedures for ensuring consistency across BTR sections, and between the BTR and the corresponding CTF table; and (3) enhance the transparency of its explanation of the relationships between the actions and the emission reductions by, for example, considering updating its reporting so that emission reductions are presented in terms of bundles of actions. In its BTR1, Liechtenstein did not report on the methodologies and assumptions used to estimate the GHG emission reductions or removals due to each action, policy or measure, and the reasons for this were not clear to the TERT. During the review, the Party clarified that its BTR1 does not provide quantified GHG mitigation estimates on a policy-by-policy basis; instead, it applied a scenario-based approach using projections associated with different levels of mitigation ambition. The Party explained that the methodologies and assumptions used to construct the WM and WAM scenarios are described in BTR chapter II.F.3 and that its projection methodology is aligned with, and the projections are partly derived from, Swiss projection frameworks. The Party also clarified that it follows a more aggregated modelling approach for two main reasons. Firstly, its energy system, fuel markets, transport system and regulatory framework are closely integrated with those of Switzerland, which makes it difficult to develop and apply a separate national mitigation model. Secondly, as a very small country, Liechtenstein has limited institutional capacity for quantifying emission reductions on a measure-by-measure basis. Nevertheless, Liechtenstein is committed to progressively improving its reporting over time and plans to further refine the representation of policies within the WM and WAM scenarios as data availability and institutional capacities improve. The TERT recommends that Liechtenstein enhance the transparency of its description of the methodologies and assumptions used to estimate the GHG emission reductions or removals due to each action, policy or measure, to the extent possible, in its BTR, including by referring to the corresponding methodologies reported under the chapter on projections.
11.4	Specified in paragraph 89 of the MPGs	Throughout its BTR1, Liechtenstein reported that the Climate Strategy 2050 is its overarching strategy that summarizes the concrete measures for achieving the 2030 and 2050 targets. The strategy is also referenced in the section on modifying longer-term trends in GHG emissions and removals; however, the Party did not provide much information on the key actions included in the strategy under the various sectors or on how the actions result in modifications to longer-term trends in GHG emissions and removals. During the review, the Party clarified that the Climate Strategy 2050 outlines how it intends to reach net zero GHG emissions by 2050, a target legally anchored under the Emission Trading Act. The strategy includes reduction pathways across all major emitting sectors and emphasizes a complete phaseout of fossil fuels by the middle of this century. Liechtenstein has integrated climate policy into its individual sectoral policies, specifically those covering energy, environment, transport, agriculture and forestry. The main purpose of adopting the strategy has been to provide a coherent framework for coordinating measures across the aforementioned sectors. The strategy is structured around several action areas that describe concrete measures in the following sectors: (a) Energy and buildings, with actions including phasing out oil and gas heating systems and replacing them with heat pumps and renewable district heating;

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		strengthening minimum energy performance requirements for buildings; and supporting large-scale expansion of renewable electricity production (particularly with regard to solar photovoltaic systems);
		(b) Transport, with actions including promoting electromobility through supportive infrastructure (charging stations) and the use of incentives; reducing transport emissions by encouraging a shift to public transportation, cycling and walking; and increasing efficiency of the imported car fleet (indirect effect via CO ₂ levy and market incentives);
		(c) Industry and industrial gases, with actions including phasing out fluorinated gases with high global warming potential and encouraging energy efficiency improvements in industrial processes;
		(d) Agriculture, with actions including reducing emissions of CH ₄ and N ₂ O through improved manure and fertilizer management and encouraging sustainable livestock management;
		(e) Waste and wastewater, with actions including enhancing CH ₄ capture from waste streams, improving energy efficiency in wastewater treatment and achieving lower process emissions from wastewater treatment;
		(f) LULUCF, with actions including strengthening forest management and restoration of peatland to enhance carbon sinks, and encouraging reforestation and climate-resilient forest strategies.
		In addition, Liechtenstein's Emission Trading Act allows for the purchase of ITMO certificates to compensate up to 15 per cent of the Party's domestic emissions.
		The TERT encourages Liechtenstein to provide information, to the extent possible, about how its actions and PaMs are modifying longer-term trends in GHG emissions and removals, including by providing more details about the actions covered by the Climate Strategy 2050.

Table 12

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
NA	NA	No areas of improvement identified

Table 13

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
13.1	Specified in paragraph 94 of the MPGs	In its BTR1, Liechtenstein did not include information on the WOM scenario or provide the reasons for not preparing a WOM projection. During the review, the Party clarified that a WOM scenario has not yet been prepared since it may involve high levels of uncertainty. The TERT encourages Liechtenstein to report a WOM scenario, or, in the absence of a WOM scenario, to explain the reasons for not preparing a WOM projection.
13.2	Specified in paragraph 96(a), (c) and (d) of the MPGs	The Party described the methodology used to develop the projections in the BTR1; however, several points were not reported or not clear to the TERT. Firstly, information was not provided on the reasons for assuming that the level of total LULUCF emissions is constant in 2023–2040, solely on the basis of the average for the last five inventory years (2018–2022). Secondly, information was not provided on the assumed annual technology penetration rate for the energy sector mitigation measures; in addition, the same EF (0.219 t CO₂/MWh) was used for PaMs even though they varied in nature (e.g. industrial energy efficiency, renewable heat, commercial and residential applications), and the source of this EF was not provided. Thirdly, a sensitivity analysis for the WAM scenario was not reported. During the review, the Party provided a number of clarifications. Firstly, it agreed that high levels of uncertainty are associated with its estimation of LULUCF emissions projections and clarified that forests in alpine regions are highly vulnerable to climate change impacts, which is why the national forest strategy has the target of strengthening the resilience of forests in the face of climate change. On

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		the basis of this target, the assumption was made that LULUCF emissions remain more or less constant. Secondly, the Party clarified that it reported the assumptions used for the penetration rates of the key PaMs, including those related to buildings, electrification of transport, industrial efficiency and renewable heat, in the BTR1. Liechtenstein explained that the EF, which was used in the Energy Strategy 2030, was calculated in 2020 on the basis of the EFs for oil and natural gas for heating, with their relative shares in the total fuel mix in 2007. The Party noted that it is in the process of improving the accuracy of these EFs for future reporting cycles. Thirdly, the Party clarified that a sensitivity analysis was not conducted for the WAM scenario owing to limited differences between the WM and WAM scenarios. Specifically, the WAM scenario only includes two additional PaMs for the energy sector compared with the WM scenario, and it did not include the use of a bottom-up approach for other sectors. The Party plans to include a simple sensitivity analysis for the WAM scenario at the sectoral level in a future inventory submission. The TERT encourages Liechtenstein to: (a) Clearly describe the methodologies used to develop the projections, including models and/or approaches and key underlying assumptions and parameters used, including for the LULUCF sector, by, for example, providing the information shared during the review; (b) Provide clear information about assumptions on PaMs included in the WM and WAM projections, for example by reporting the assumed penetration rates of technologies, updating the EFs for different PaMs and indicating the source of the EFs; (c) Provide information on the sensitivity analysis for all projections, together with a brief explanation of the methodologies and parameters used, or, in the absence of a sensitivity analysis, report transparently on the reasons for not providing such an analysis.
13.3	Specified in paragraph 97 of the MPGs	The Party's BTR1 does not include projections of the key indicator(s) for determining the progress towards its NDC, and the reason for this was not clear to the TERT. During the review, the Party clarified that it omitted the reporting on the projections of key indicators as the result of an oversight. The TERT recommends that Liechtenstein provide projections of the key indicator(s) for determining progress towards its NDC.

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
NA	NA	No areas of improvement identified

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

Table 15

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
15.1	Specified in paragraph 119(c) of the MPGs	In its BTR1, Liechtenstein provided information on experience and good practices in relation to public climate finance but did not include information on experience and good practices in relation to public policy and regulatory frameworks for incentivizing further private climate financing and investment. During the review, Liechtenstein provided information on this topic, noting that as a member of the European Economic Area, it has implemented EU regulations such as the Corporate Sustainability Reporting Directive and tools such as the EU

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		taxonomy for sustainable activities which incentivize private sector investments aligned with the Paris Agreement. Liechtenstein also noted the existence of public–private partnerships as examples of frameworks mobilizing private climate finance. The TERT encourages Liechtenstein to include information on its experience and good practices in relation to public policy and regulatory frameworks for incentivizing further private climate financing and investment, including with regard to its implementation of relevant EU regulations and tools and existing public–private partnerships.

Table 16

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
16.1	Specified in paragraph 121(d), (h), (l), (p) and (t) of the MPGs	In its BTR1, Liechtenstein provided a description of the bilateral, regional and multilateral channels for its contributions, stated that it applied OECD definitions and an OECD methodology for determining the type of support and climate-specific amounts, and noted that support must comply with the IHCD Act to ensure that support provided through public interventions effectively addresses the needs and priorities of developing country Parties. Furthermore, with regard to the information reported on multilateral finance, Liechtenstein stated that the amounts reported constitute its inflow contributions to the multilateral institution. However, the BTR does not: (a) Include a definition of the multilateral channel or clarify the standards used to classify contributions as multilateral; (b) Specify which OECD methodology was applied to determine the type of support; (c) Specify which approach was applied to identify climate-specific support or how climate-specific amounts were quantified; (d) Clarify how the Party ensured that support addresses the needs and priorities of developing country Parties; (e) Explain whether the Party calculated a climate-specific share of its core contributions to multilateral institutions, and if not, why not. During the review, Liechtenstein clarified that: (a) Its multilateral funding constitutes unearmarked core contributions and earmarked contributions to international organizations, funds and research institutes and under conventions, and that classification is based on recipient type; (b) Rather than applying a specific OECD methodology, it initially filters climate-related projects using classifications related to the SDGs (SDGs 6, 7, 13 and 15), and then assesses the type of support on a case-by-case basis; (c) It identifies climate-specific support by filtering projects classified under SDGs 6, 7, 13 and 15, and that 100 per cent of the face value of all projects tagged under these SDGs is reported as climate finance; (d) Articles 1 and 6 of the IHCD Act contain provisions establishing principles of sustainability, partnership, ownership and environmental protection in the context of development cooperation and humanitarian projects, with local needs taking precedence in project design. Liechtenstein also clarified that it works through local non-governmental organizations and civil society organizations rather than maintaining direct contact with governments of recipient countries; (e) No climate-specific share is calculated for its core contributions to multilateral institutions as it does not currently have a corresponding methodology. The TERT encourages Liechtenstein to include in the BTR: (a) A clear definition of what it considers to be multilateral support and an explanation of how it classifies contributions across bilateral and multilateral channels;

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		(b) A description of its approach involving the use of SDGs to filter projects and the manual assessment of projects on a case-by-case basis for classifying them as adaptation, mitigation or cross-cutting; (c) A description of the SDG-based approach used to identify climate-specific support, including an explanation that 100 per cent of the face value of projects is reported as climate finance; (d) A reference to the relevant provisions of the IHCD Act; (e) An explanation as to why it does not report a climate-specific share of its core contributions to multilateral institutions. The TERT also encourages the Party to consider how it could more systematically draw on developing country Parties' country-driven strategies, such as BTRs, when identifying the needs and priorities its support seeks to address, and to consider applying existing methodologies used by other Parties or institutions, for example, for estimating the climate-specific share of its core contributions to multilateral institutions.
16.2	Specified in paragraph 122 of the MPGs	In its BTR1, Liechtenstein referred to sections III.A and III.D for information on technology development and transfer and capacity-building support without describing the underlying assumptions, definitions and methodologies used to identify and report on such support. In section III.B.5, Liechtenstein acknowledged that capacity-building and technology transfer are not specifically mentioned in the IHCD Act and that no dedicated technology transfer framework is in place. During the review, Liechtenstein confirmed that it does not have a framework to support technology development and transfer and capacity-building within its financing for international humanitarian cooperation and development. The TERT encourages Liechtenstein to consider developing a framework for identifying, classifying and recording support related to technology development and transfer and capacity-building within its financing for international humanitarian cooperation and development, and to provide a description of the underlying assumptions, definitions and methodologies used to provide information on such support.

Table 17

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
17.1	Specified in paragraph 123(i) of the MPGs	In almost all columns of CTF support table 1 on financial support provided through bilateral, regional and other channels for 2021, including those related to the recipient country and amounts in both domestic currency and United States dollars, Liechtenstein reported "UA" or left the cells completely blank, and no explanation was provided in the BTR. Additionally, in CTF support table 1 for 2022, several projects were reported under the sector other with no further information provided, making it unclear in which sector the activities were carried out. During the review, Liechtenstein explained that the BTR was meant to be prepared on the basis of the 2022 and 2023 reporting periods and provided the data for those years as additional information. The Party clarified that activities reported under the sector other should have been reported under the agriculture sector. The TERT encourages Liechtenstein to use appropriate notation keys where information is not available and provide an explanation in the BTR where this is the case, and to report the corresponding sector from the sector list or, where the sector other is reported, to specify the sector.

Table 18

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
18.1	Specified in paragraph 124 of the MPGs	In CTF support table 2 on financial support provided through multilateral channels for 2021, Liechtenstein reported almost all columns as “UA” or “NA” and no accompanying explanation was provided in the BTR. In addition, institution names appear to have been reported in the column for the title of the project, programme, activity or other, rather than in the institution column. In CTF support table 2 for 2022, amount columns were reported as “NA” for all institutions except the International Renewable Energy Agency, which is inconsistent with BTR1 section III.B, which reports approximately USD 3.64 million of bilateral and multilateral public climate finance. During the review, Liechtenstein explained that the tables were meant to be prepared on the basis of the 2022 and 2023 reporting periods. It provided updated versions of the CTF support tables for 2022 and 2023 as technical information; the tables are complete and address most of the issues identified. Regarding the climate-specific inflow amounts, which were reported using the notation key for not reported for all institutions in the updated tables, Liechtenstein clarified that it is not possible to determine the exact amounts allocated to climate-specific activities by the institutions. The TERT encourages Liechtenstein to use appropriate notation keys where information is not available and provide an accompanying explanation in the BTR.

Table 19

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
19.1	Specified in paragraph 126 of the MPGs	In its BTR1, Liechtenstein referred to sections III.A and III.D for information on technology development and transfer support without providing substantive information in textual format on strategies employed to support technology development and transfer, support provided at different stages of the technology cycle, efforts to enhance endogenous capacities and technologies of developing country Parties, private sector engagement or innovation efforts. While BTR section III.E.5 contains some information on knowledge generated, and BTR sections III.B.5 and III.C(k) briefly refer to technology transfer, the information reported relates to institutional arrangements rather than covering the elements of information listed in paragraph 126 of the MPGs. During the review, Liechtenstein clarified that it does not directly engage in technology development and transfer measures or activities. The TERT encourages Liechtenstein to include in its BTR the explanation shared during the review regarding its engagement in technology development and transfer. The TERT notes that the Party may consider developing a framework for identifying components of its support related to technology development and transfer (see ID# 16.2).
19.2	Specified in paragraph 127 of the MPGs	In CTF support table 4 on technology development and transfer support provided, Liechtenstein reported “UA” in all columns. During the review, Liechtenstein confirmed that it does not currently have any technology development and transfer measures or activities to report in CTF support table III.4. The TERT encourages Liechtenstein to use appropriate notation keys where information is not available and provide an accompanying explanation in the BTR. The TERT notes that the Party may consider developing a framework for identifying components of its support related to technology development and transfer (see ID# 16.2).

Table 20

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
20.1	Specified in paragraph 128 of the MPGs	In its BTR1, Liechtenstein acknowledged that capacity-building is an essential component of almost all of its programmes and projects but did not provide substantive information in textual format on strategies employed to provide capacity-building support, policies that promote such support or how capacity-building support promotes the sharing of lessons learned and best practices. During the review, Liechtenstein confirmed that capacity-building measures are not reported as a distinct category within its financing for international humanitarian cooperation and development and are therefore not reported separately. The TERT encourages Liechtenstein to include in its BTR the explanation shared during the review regarding its provision of capacity-building support. The TERT notes that the Party may consider developing a framework for identifying components of its support related to capacity-building (see ID# 16.2).
20.2	Specified in paragraph 129 of the MPGs	CTF support table 5 on capacity-building support provided is completely empty, with no entries or notation keys. During the review, Liechtenstein confirmed that, while capacity-building is an essential component of most of its programmes and projects, the exact number of capacity-building activities and their scale within projects is not evaluated and this information cannot, therefore, be reported separately. The TERT encourages Liechtenstein to use appropriate notation keys where information is not available and provide an accompanying explanation in the BTR. The TERT notes that the Party may consider developing a framework for identifying components of its support related to capacity-building (see ID# 16.2).

Annex

Documents and information used during the review

A. Reference documents

BTR1 of Liechtenstein. Available at <https://unfccc.int/first-biennial-transparency-reports>.

BTR1 CTF tables of Liechtenstein.

Available at <https://unfccc.int/first-biennial-transparency-reports>.

CRTs of Liechtenstein. 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. 1997. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. JL Houghton, LG Meira Filho, B Lim, et al. (eds). Paris: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency. Available at <https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>.

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

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

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

“Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement”. Annex to decision 18/CMA.1. FCCC/PA/CMA/2018/3/Add.2. Available at <https://unfccc.int/documents/193408>.

NDC of Liechtenstein. Available at <https://unfccc.int/NDCREG>.

NID of Liechtenstein. Available at <https://unfccc.int/first-biennial-transparency-reports>.

NID of Switzerland. 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 Karin Jehle (Office of Environment of the Ministry of Foreign Affairs, Environment and Culture of Liechtenstein), including additional material. The following references were provided by Liechtenstein and may not conform to UNFCCC editorial style as some have been reproduced as received:

Acontec 2006: Greenhouse Gas Inventory Fürstentum Liechtenstein.
Berechnungsmethoden. Acontec. Schaan [in German].

Swiss animal classification system (Animal Tracing Database).
<https://www.blw.admin.ch/en/specialised-application-atd>

Nahrungsmittelbilanz 2024 Agristat, SBV(the Swiss Farmers' Union),
https://www.sbv-usp.ch/fileadmin/sbvuspch/04_Medien/Publikationen/SES/07_SES2024_Nahrungsmittelbilanz.pdf