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

Addendum

Summary

This addendum to the report on the technical expert review of the first biennial transparency report of Poland, 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 13 to 17 April 2026 in Warsaw.

* In the symbol for this document, 2024 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>
2019 Refinement to the 2006 IPCC Guidelines	<i>2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
BCEF	biomass conversion and expansion factor
BEF	biomass expansion factor
BTR	biennial transparency report
C	confidential
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
CRT	common reporting table
CSC	carbon stock change
CTF	common tabular format
EF	emission factor
ETF	enhanced transparency framework under the Paris Agreement
EU	European Union
Eurostat	statistical office of the European Union
GHG	greenhouse gas
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance for LULUCF	<i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MPGs	modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement
N	nitrogen
N ₂ O	nitrous oxide
NA	not applicable
NDC	nationally determined contribution
NE	not estimated
NECP	National Energy and Climate Plan
NFI	national forest inventory
NGO	non-governmental organization
NID	national inventory document
NMVOC	non-methane volatile organic compound
NO	not occurring
NO _x	nitrogen oxides
NR	not reported
PaMs	policies and measures
SO _x	sulfur oxides
TERT	technical expert review team
UA	information not available at the time of reporting
WAM	‘with additional measures’
WM	‘with measures’
WOM	‘without measures’

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

Tables 1–20 present the results of the review of the consistency with the MPGs² of the information submitted by Poland in its BTR1. All recommendations and encouragements contained in the tables are for the next BTR or national inventory report, unless otherwise specified.

A. General reporting provisions

Table 1

Areas of improvement relating to general reporting provisions

<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

B. Greenhouse gas emissions and removals

Table 2

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
2.G.1	Specified in paragraph 31 of the MPGs CRTs	In several instances in the CRTs, Poland appears to have reported “NA” inappropriately or without providing an explanation in accordance with the MPGs. For example, in CRTs 5 and 5.D, all cells for category 5.D.3 other were prepopulated with “NA” without an explanation of which activities are included under this category or why these do not result in emissions or removals of GHGs. In CRT 5.A, the Party reported “NA” for subcategories 5.A.1.b semi-aerobic and 5.A.1.c active-aeration under category 5.A.1 managed waste disposal sites, without explaining why activities in these subcategories do not result in emissions or removals of GHGs. In CRT 5.C, the Party reported category 5.C.2 open burning of waste as “NA”, despite the NID (section 7.4.1) stating that national statistics do not include any data on the open burning of waste and the Party does not estimate GHG emissions from this subsector owing to Polish law strictly prohibiting the open burning of waste. During the review, Poland explained that some of these issues are related to the functionality and default settings of the CRT reporting tool, which it had reported to the software help desk. The TERT notes that the ETF GHG inventory reporting tool provides a function that allows users to autofill selected categories with “NA”. This feature is intended to facilitate the process of populating cells with “NA”, but still allows Parties to enter or import any of the notation keys (“NO”, “NE”, “NA”, “IE” and “C”) for AD and emissions and removals in the data entry grids. The Party further explained that emissions do not occur in Poland for (sub)categories 5.A.1.b, 5.A.1.c or 5.C.2, acknowledged that “NO” would be more appropriate for these (sub)categories, and indicated that it will revise the notation keys reported for (sub)categories 5.A.1.b, 5.A.1.c and 5.C.2 in the next submission. The TERT recommends that Poland use appropriate notation keys where numerical data are not available when completing its CRTs and indicate the reasons why emissions from sources and removals by sinks and associated data for specific sectors, categories and subcategories or gases are not reported.
2.G.2	Specified in paragraph 35 of the MPGs Other	In its NID, Poland partly provided references and sources of information used for the AD and EFs applied to compile its GHG inventory. However, the TERT was unable to access or locate several references. For example, in the NID (p.310), Poland reported that it calculated shares of managed and unmanaged solid waste disposal sites for 1950–2001 on the basis of “elaboration”, alongside a reference to

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

² Decision 18/CMA.1, annex.

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
		“Gworek (2003)”. Poland also reported in the NID (p.311) that it calculated the composition of municipal waste for 1950–1985 “on the basis of publication”, alongside a reference to “Rosik-Dulewska Cz. (2000)”. However, the Party did not provide any further information on these two references (e.g. the full title of the reference, the type of publication, publication details or an accessible link). During the review, Poland indicated that it did not include a list of references in the 2024 NID, but that the list has since been included in subsequent submissions. The TERT recommends that Poland implement quality control procedures, including by providing in its NID complete and sufficiently detailed references and sources of information used for the AD and EFs applied to compile the GHG inventory.
2.G.3	Specified in paragraph 51 of the MPGs Other	Poland reported emissions of NO_x, CO, NMVOCs and SO_x as “NA, NO” in all sectoral report tables and included emissions of SO_x under category 6 other in CRT Summary1. However, the Party reported emissions of NO_x, CO and NMVOCs under category 6 in CRT 6 without specifying the nature of this category in CRT Summary1 or providing country-specific explanations in the NID as suggested in note 7 to CRT Summary1. At the same time, NID section 8 states that no other emissions were identified in the Polish GHG inventory apart from those reported in CRTs 1–5. The reporting of precursor gases and SO_x is therefore inconsistent between the NID and the CRTs and within the CRTs. During the review, Poland explained that the information on precursor gases and SO_x is presented as aggregated values at the national level and it was therefore not possible to report the emissions from these gases in CRTs 1–5; instead, they are reported under category 6. Poland further clarified that more detailed and sectoral data for these gases can be found in a database compiled by the Convention on Long-range Transboundary Air Pollution (see https://www.ceip.at/webdab-emission-database/reported-emissiondata). Poland noted that it may explore alternative approaches to reporting these gases in the CRTs other than under category 6. The TERT encourages Poland to report clear and consistent information on precursor gases (CO, NO_x and NMVOCs), as well as SO_x, in appropriate sections in both the NID and the CRTs and, where information is available at a disaggregated level, to report information at the category level.

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 1.A.1 Energy industries – solid fuels and biomass – CH ₄	In NID section 3.1.1 (p.47), Poland described how it established country-specific CH₄ EFs for coal, lignite and biomass through a country-specific study based on direct measurements (Energopomiar, 2022). It developed these EFs on the basis of an analysis of the types of boiler used in Poland and their corresponding share of use in combustion plants for 2011–2021 and subsequently applied the country-specific EFs across the entire time series. In NID section 3.2.6.2.1 (p.57), the Party indicated that the country-specific CH₄ EFs for coal (0.11 kg CH₄/TJ), lignite (0.335 kg CH₄/TJ) and biomass (0.6 kg CH₄/TJ) are much lower than the default IPCC values. However, the TERT could not find further information in the NID explaining why these country-specific CH₄ EFs are much lower than the default EFs. Considering the technology-specific nature of the CH₄ EFs for the main combustion categories in relation to the economic transition described throughout the NID for the 1990s onward (i.e. as the Polish economy developed, increased investment in energy industries likely enabled the application of more advanced technologies in later years), the NID omits information on the assumptions justifying the use of these EFs across the entire time series. The TERT observed that for hard coal and in particular biomass, the CH₄ EFs fall well outside the respective default IPCC range of 0.3–3 kg CH₄/TJ for hard coal and 10–100 kg CH₄/TJ for biomass (2006 IPCC Guidelines, vol. 2, chap. 2.3.2, table 2.2). For biomass, the CH₄ EF is also lower than for other countries in the region (e.g. the range of IEFs for biomass across Eastern Europe for 2022 is 28.5–120.84 kg CH₄/TJ).

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
3.E.2	Specified in paragraphs 21 and 23 of the MPGs 1.A.2 Manufacturing industries and construction – other fossil fuels – CO₂ 1.A.3.c Railways – CO₂ 1.A.4 Other sectors – solid fuels and biomass – CH₄	During the review, Poland shared detailed information on how it developed its country-specific EFs. Results for the available years (2011–2021) indicate that calculating the average of the CH₄ EFs for the given fuel does not significantly affect the emissions. The Party explained that this allowed it to apply the country-specific EFs to the years preceding 2011, especially as the National Centre for Emissions Management does not have detailed data on boiler types for earlier years (the national database was established in 2010). A comparison of the measurements from the study by Energopomiar with the default IPCC values indicated that the country-specific CH₄ EF result for lignite falls within the default IPCC range. The Party explained that the lower value obtained for the hard coal CH₄ EF for category 1.A.1 energy industries is a result of the national structure of the boilers used in the calculation. However, the Party stated that the reason for the much lower CH₄ EF for biomass was not immediately apparent and would be explored further. The Party also observed that CH₄ emissions are not frequently measured for individual installations, meaning that limited measurement results are available. The TERT recommends that Poland include information in its NID on the descriptions and assumptions used for the country-specific CH₄ EFs, especially for hard coal and biomass, applied in category 1.A.1 across the time series, in accordance with good practice elaborated in the 2006 IPCC Guidelines. In its NID (respectively in chapters 3.1, 3.2.8.2.3, and annex 5.3, table 28), the Party indicated that it applied tier 1 methods for the following key categories: category 1.A.2 manufacturing industries and construction – other fossil fuels (CO₂), subcategory 1.A.3.C railways (CO₂) and category 1.A.4 other sectors – biomass (CH₄) and solid fuels (CH₄). However, the TERT could not identify explanatory information in the NID on the underlying reasons for not using tier 2 methods for these key categories in line with the decision trees in the 2006 IPCC Guidelines. During the review, the Party clarified that: (a) For category 1.A.2, it followed a tier 1 approach owing to difficulties in developing a country-specific CO₂ EF for this fuel group as a result of it including waste fuels (industrial waste and the non-biogenic fraction of municipal waste). The Party added that these waste fuels are highly diverse and non-standardized, and their composition and properties can vary significantly. No data are currently available to develop a country-specific EF to enable a tier 2 approach; (b) For subcategory 1.A.3.c, emissions from railways decreased substantially over the time series (hard coal was phased out from the railways in Poland after 1998 and limited data are available) and the subcategory represents a very small share of national total GHG emissions in recent years; (c) For category 1.A.4, the Party referred in the NID (section 3.2.9.6) to a planned analysis into the possibility of developing country-specific CH₄ EFs for solid fuels and biomass. However, not enough measurement data for households are available to allow the Party to develop representative EFs for solid fuel and biomass combustion and the studies needed to develop such CH₄ EFs would be costly. The financial and technical constraints limiting the Party's ability to develop country-specific CH₄ EFs for category 1.A.4 currently prevent the use of a tier 2 approach for this category. The TERT recommends that Poland include in the NID the explanations provided during the review on why it implemented a tier 1 method for the following key categories owing to limited resources and a lack of data: category 1.A.2 manufacturing industries and construction – other fossil fuels (CO₂), subcategory 1.A.3.C railways (CO₂) and category 1.A.4 other sectors – biomass (CH₄) and solid fuels (CH₄). The TERT encourages the Party to make every effort to use a higher-tier method in line with good practice in the 2006 IPCC Guidelines and to report on how it is addressing or intends to address the issue for each key category.
3.E.3	Specified in paragraphs 26 and 39 of the MPGs	In NID table 3.2.9.2, Poland reported fuel consumption in PJ for subcategory 1.A.4.b residential for 1988–2022. Based on this table, the TERT observed that several significant developments seem to have occurred in relation to biomass

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
	1.A.4.b Residential – biomass – CH ₄	consumption (e.g. sudden fluctuations from around 34 PJ in 1992 to around 106 PJ in 1993, corresponding to an increase in CH₄ emissions reported in the CRT for subcategory 1.A.4.b from around 10.4 kt CH₄ to around 31.8 kt CH₄, and from around 109 PJ in 2017 to around 237 PJ in 2018, corresponding to an increase in CH₄ emissions from around 32.9 kt CH₄ to around 71.3 kt CH₄). Additionally, the TERT observed that for several other years, biomass fuel consumption seems to have remained at the same level. However, the TERT could not find any descriptions of these developments in the NID. During the review, Poland provided detailed explanatory information on these specific increases in biomass consumption, which are due largely to more comprehensive data becoming available (such as through the National Population and Housing Census 2021, which provided new and more detailed household data on solid biofuel consumption for 2018–2020). The Party clarified that biomass consumption sometimes remains at the same level from one year to the next owing to the estimation methodology used, which is based on climate adjustments using the heating degree days index from Eurostat databases. In years when this index reported a very similar value for two consecutive years, the climate adjustment did not result in a noticeable change in the estimated volume of biomass, which in practice resulted in the same level of biomass consumption being reported for consecutive years. The TERT recommends that Poland include information in its NID on the assumptions, references and sources of information used for reporting biomass AD for subcategory 1.A.4.b, in accordance with good practice elaborated in the 2006 IPCC Guidelines, and encourages the Party to use the same methods and a consistent approach to underlying AD for each reported year.
3.E.4	Specified in paragraphs 31 and 47 of the MPGs 1.A.5 Other (not specified elsewhere) – liquid fuels – CO₂	In CRT 1.A(a), Poland reported relevant fuels for category 1.A.5 other as “NO” for the entire time series, but reported the underlying subcategories 1.A.5.a stationary and 1.A.5.b mobile as “NA”. The TERT noted that footnote 15 to CRT 1.A(a) requires Parties to include military fuel use under category 1.A.5, in line with the 2006 IPCC Guidelines (vol. 2, chap. 3, sections 3.5.1 and 3.6.1, pp.3.47, 3.48 and 3.57). In NID section 3.2.8.2.1 (p.77), Poland reported that all military activities requiring fuel to be used are incorporated into its energy balance, which is used to compile the national inventory for the energy sector, but that no specific data on the share of military fuel use in overall fuel consumption are available for reasons of confidentiality. The TERT could not identify any further references to emissions from military activities in other sections of the NID or in the CRTs to clarify how the Party allocated emissions from military fuel use. During the review, Poland clarified that, in its energy balance, military fuel use is not based on direct data provided by the armed forces or military organizations, but is instead estimated indirectly as part of the total national final consumption data (balancing production, imports, exports, changes in inventories and known consumption flows). According to the EU regulation on energy statistics (regulation 1099/2008) and the methodological manuals of Eurostat and the International Energy Agency, fuel consumption for military purposes should be reported in the energy balance under “other sectors”. For this reason, and owing to the lack of specific data on military fuel use for reasons of confidentiality, the Party explained that it did not report military fuel use separately in category 1.A.5, but instead reported it in category 1.A.4 other sectors. The Party indicated that it will include updated information on this issue in the CRTs and change the notation keys reported in category 1.A.5 from “NO” and “NA” to “IE” in the next submission. It also indicated that it will expand the explanatory information on military-related emissions provided in the NID. The TERT recommends that Poland report disaggregated emissions associated with military fuel use in accordance with the 2006 IPCC Guidelines; if these emissions are included elsewhere for reasons of confidentiality, the TERT recommends that the Party apply the appropriate notation keys in the CRTs in accordance with the 2006 IPCC Guidelines and include in its NID explanatory information to clarify how it allocated emissions associated with military fuel use.

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
3.E.5	Specified in paragraph 39 of the MPGs 1.B.1.a Coal mining and handling – solid fuels – CH ₄	In NID table 3.3.1, Poland reported the AD used to calculate CH₄ emissions from coal mining for the entire time series. The TERT noted that, while total underground coal production decreased significantly (from around 193,015,000 Mg in 1988 to 52,829,352 Mg in 2022), the corresponding decrease in CH₄ emissions from mining activities was less sharp (from around 555.63 kt in 1988 to around 383.81 kt in 2022) and the annual CH₄ EF increased from 2.88 kg/t in 1988 to 7.27 kg/t in 2022. The TERT could not find any information in the NID to explain this change in the EF. The TERT also observed that the Party estimated fugitive emissions of CH₄ from post-mining activities by applying the average CH₄ EF from the 2006 IPCC Guidelines (vol. 2, chap. 4, section 4.1.3.2, p.4.12) of 2.5 m³ CH₄/t. The 2006 IPCC Guidelines also include a low CH₄ EF of 0.9 m³ CH₄/t and a high CH₄ EF of 4.0 m³ CH₄/t. The mining depth is used to determine which EF is used (e.g. the high CH₄ EF is appropriate for depths greater than 400 m). The TERT could not identify information in the NID on average mining depths in Poland to substantiate the Party's choice of EF. During the review, Poland confirmed that the trends in CH₄ emissions and the associated IEF directly correlate with the evolving geological and technical landscape of the Polish coal mining sector and are indicative of a non-linear relationship between declining coal production and the sustained release of CH₄. The Party explained that this non-linear relationship is due primarily to a structural shift towards coal production being concentrated in deeper, CH₄-rich seams, following the decommissioning of shallower, low-CH₄ mines. As mining reaches greater depths, the gas content per tonne of coal naturally increases, which is reflected in the rising IEF, which is based on actual measurements. The Party also explained that ventilation and drainage systems must manage the gas released from the entire disturbed strata, which does not scale linearly with the tonnage of coal extracted. The Party stated that, taking into account geological data from 2019 by the Polish Geological Institute – National Research Institute, indicating average mining depths of approximately 700 m, it will apply the high CH₄ EF of 4.0 m³ CH₄/t from the 2019 Refinement to the 2006 IPCC Guidelines (vol. 2, chap. 4, section 4.1.4) for underground post-mining activities across the relevant time series. The Party also indicated that it will explain the increase in the CH₄ IEF for underground mining activities and the new EF for underground post-mining activities in the next submission. The TERT recommends that Poland explain that its choice of EF for underground post-mining activities reflects the national circumstances and is in line with the 2006 IPCC Guidelines (for mining at depths greater than 400 m) or revise the value, if needed. The TERT also recommends that the Party improve the description of the structural shift in the geological and technical landscape of the coal mining sector and the average mining depths considered across the time series, which affect the estimates provided for this subcategory.
3.E.6	Specified in paragraph 40 of the MPGs 1.B.1.a Coal mining and handling – solid fuels – CH ₄	In CRT 1.B.1, Poland reported “NO” for the recovery/flaring of CH₄ for all reported years. In NID section 3.3.1.2 (p.105), the Party stated that CH₄ burning on flares accompanying the extraction of hard and brown coal does not occur in the country. However, the TERT could not identify any additional explanatory information on the potential (non-)recovery or utilization of CH₄ for energy purposes from coal mining. The TERT noted that NID table 3.3.1, which presents the AD used to calculate CH₄ emissions from coal mining in 1988–2022, includes a column for CH₄ used for energy production, which provides data for the entire time series. During the review, Poland explained that data on CH₄ recovery comes from primary measurement sources provided by the State Mining Authority in its mandatory annual safety reports. These data on CH₄ recovery represent CH₄ captured via drainage systems, which are closely monitored as part of safety and occupational health protocols in Polish coal mines. Owing to the fluctuating volume and composition of CH₄ in Polish coal mines, which can only be injected into municipal grids following costly treatment, energy installations (combined heat and power and trigeneration systems) are typically located directly at mine sites. CH₄ is primarily used for energy purposes and reported under category 1.A.1 energy industries, while unutilized surpluses are vented into the atmosphere. The Party clarified that, while it reported these volumes of CH₄ in

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
		detail in NID table 3.3.1 under the column on CH₄ used for energy production, it did not present them as separate entries in CRT 1.B.1. To enhance consistency between the NID and the CRTs, the Party confirmed that data from NID table 3.3.1 will be incorporated into the CRTs in the next submission. The TERT recommends that Poland incorporate information on the recovery of CH₄ from mining activities, in accordance with the 2006 IPCC Guidelines, by reporting it using the CRTs and including a descriptive summary in the NID.
3.E.7	Specified in paragraphs 21 and 39 of the MPGs 1.B.1.a Coal mining and handling – solid fuels – CH₄	Poland reported in NID table 3.3.3 data on the number of abandoned underground coal mines and the EFs applied. These EFs are held constant in the Polish inventory from 2016 onward for both the 1976–2000 and 2001–present time intervals, while from 2016 to 2022 an additional eight closed coal mines were added to the 2001–present time interval. The TERT recognizes that the EFs used are in line with the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.1.6). However, the TERT considers that using the same EFs for 2016 onward may result in CH₄ emissions from abandoned underground coal mines being increasingly overestimated and is not fully consistent with the approach for EFs for the reporting years up until 2016. The TERT also observed some higher-than-expected total emissions for 2001 onward, especially at the start of the time interval, which may be the result of double counting coal mines that were closed in the earlier time interval. For instance, for 2001, the TERT would expect CH₄ emissions from abandoned coal mines of around 70 kt instead of 103.75 kt based on the values in NID table 3.3.3 when multiplying the number of abandoned coal mines per time interval with the relevant EF and conversion factor. During the review, Poland explained that it is aware of this issue and that it has since adjusted the data reported in the 2026 submission by applying the updated EFs for abandoned coal mines provided in the 2019 Refinement to the 2006 IPCC Guidelines (vol. 2, table 4.1.6) for 2017–2024. Additionally, the Party corrected the double counting of coal mines closed before 2001, as they were previously also added to the group of coal mines closed since 2001. This double counting caused the higher-than-expected values for 2001 onward. The TERT recommends that Poland avoid double counting across time intervals and ensure that the estimation of CH₄ emissions from abandoned underground coal mines is in line with IPCC guidelines. The TERT also recommends that the Party document in the NID the methodological approach and AD and EFs applied, including any implemented improvements, enabling a consistent approach to underlying AD and EFs for each reported year. The Party may consider applying the updates to the EFs for abandoned coal mines provided in the 2019 Refinement to the 2006 IPCC Guidelines for the years following 2016 if they better reflect the national circumstances.

Table 4

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

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
4.I.1	Specified in paragraph 39 of the MPGs 2. General (IPPU) – CO₂	In NID section 4, the TERT was unable to find descriptions of the methodological tiers used for the following key categories in the IPPU sector, identified in NID section 4.1: 2.A.1 cement production, 2.A.4 other process uses of carbonates, 2.B.1 ammonia production and 2.C.1 iron and steel production. During the review, Poland provided the methodological tiers used for each of the key categories in the IPPU sector and explained that it applied a tier 2 method for all key categories in the IPPU sector. The TERT recommends that Poland enhance the description of its methodology by reporting in its NID the methodological tiers used to estimate emissions for all key categories in the IPPU sector.
4.I.2	Specified in paragraph 39 of the MPGs	In NID section 4.2.2.2, Poland stated that it used a tier 1 method to estimate emissions for category 2.A.2 lime production, which was identified as a key category. However, the TERT could not find an explanation in the NID as to why the Party used a tier 1 method for this key category.

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
	2.A.2 Lime production – CO ₂	During the review, Poland explained that it estimated CO₂ emissions from lime production in much more detail than required for a tier 1 method and that the methodology used for the Polish GHG emissions inventory for category 2.A.2 should be classified as a tier 2 method. The TERT recommends that Poland enhance the description of its methodology for estimating emissions from lime production by reporting further information on the correct method used (tier 2) in the NID, consistently with the requirements of the MPGs.

Table 5

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
5.A.1	Specified in paragraphs 39 and 43 of the MPGs 3.A Enteric fermentation – CH ₄	In NID section 5.2.5 (p.193), Poland reported source-specific recalculations for category 3.A enteric fermentation following an update to animal waste management systems for cattle and swine for 2013 onward. However, the TERT could not find further details in the NID on the update to the animal waste management systems and how this update influenced emissions from enteric fermentation. The TERT notes that there is no direct relationship between animal waste management systems and emissions from enteric fermentation. During the review, Poland clarified that information on recalculations for this category relates to cattle only. As the calculation of gross energy for cattle takes into account their feeding situation, including pasture calcium, and as cattle in Poland only spend part of the year on pastureland, the percentage of time spent on pastureland is used to calculate the net energy for activity of cattle. The TERT recommends that Poland provide in the NID explanatory information and justifications for recalculations of emissions from enteric fermentation (i.e. how changes made to animal waste management systems have impacted emissions from enteric fermentation).
5.A.2	Specified in paragraph 39 of the MPGs 3.A.4 Other livestock – CH ₄	Poland reported in NID section 5.2.2 (p.184) that data on rabbits and fur-bearing animal populations are available in public statistics for selected years only (1983, 1996, 2002, 2010, 2013, 2016 and 2021), when agricultural censuses were performed or other periodic studies were published containing the required data. The statistical data related to rabbits cover female rabbits capable of reproduction, while fur-bearing animals include female foxes, minks, polecats, nutrias, polecat-ferrets, chinchillas and raccoons. The Party also reported that no statistical information is available on the deer population. However, the TERT could not identify information on the statistical method used to populate the historical series for category 3.A.4 other livestock. During the review, Poland clarified that, because the public statistics on the population sizes of rabbits and fur-bearing animals are rather scarce, the number of animals as published by Statistics Poland was used for selected years and interpolation was applied for the years in between. The TERT recommends that Poland include in its NID a description of the statistical method used to fill in the historical series for category 3.A.4.
5.A.3	Specified in paragraph 21 of the MPGs 3.B.3 Swine – CH ₄	Poland reported in NID section 5.3.2.1 (p.198) that it used a tier 1 method to estimate CH₄ emissions from manure management for horses, sheep, goats, swine, poultry, rabbits and fur-bearing animals. However, the TERT noted that the NID (p.200) provides additional information on the methodology used for swine, including a reference to an equation considered to be part of a tier 2 method. Specifically, the NID states that the Party used equation 10.23 from the 2006 IPCC Guidelines (vol. 4, chap. 10) and the default values for the volatile solids excreted, maximum CH₄-producing capacity and CH₄ conversion factor from the 2006 IPCC Guidelines to calculate CH₄ emissions from manure management for breeding swine. The TERT also noted that swine make a significant contribution to CH₄ emissions from manure management and are identified as a key category. Therefore, it was not clear to the TERT which methodology (tier 1 or 2) the Party applied to determine CH₄ emissions from swine. During the review, Poland stated that it generally follows a tier 2 method as elaborated in the 2006 IPCC Guidelines (vol. 4, chap. 10, pp.10.41–10.43).

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		However, owing to a lack of information, it used some default parameters for the estimates. Following internal discussions, the Party decided to use a tier 1 method to estimate emissions for category 3.B.3 swine. The Party added that, to improve the transparency of its reporting, it will further investigate the methodological tier used for category 3.B.3 swine to ensure that it applies the correct tier. The TERT recommends that Poland make every effort to use a recommended method (tier level) for key categories in accordance with the 2006 IPCC Guidelines, including by developing category-specific input data for the volatile solids excreted, maximum CH₄-producing capacity and CH₄ conversion factor to improve the accuracy of the estimates.

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 47 of the MPGs 4.A Forest land – CO₂, CH₄ and N₂O	Poland reported data showing decreases and increases in emissions and removals for category 4.A forest land across the entire time series (NID figure 6.2). However, the TERT could not find an explanation for such fluctuations in the time series. During the review, Poland clarified that the fluctuations observed in emissions and removals for category 4.A reflect the combined effects of natural disturbances, climatic conditions, forest management practices and changes in forest dynamics over time. The Party attributed variations in the early 1990s to natural disturbances affecting forest growth and attributed the later fluctuations to differences in harvesting levels, afforestation activities, age-class structure and increment estimates calculated from NFI data. Poland explained that the decline in the forest sink observed between 2019 and 2021 was driven by multiple stressors, including prolonged drought, windstorm events, forest ageing and the increased decomposition of deadwood. This period was followed by a partial recovery in 2022 due to increased timber growth. During the review, Poland shared with the TERT figures on the annual harvest of timber and GHG fluxes from the deadwood pool. The TERT noted that both of these variables show stable trends and do not explain the sharp reduction in the forest sink reported for 2018–2019. The TERT recommends that Poland include in its NID a descriptive summary of the underlying emission and removal trends for category 4.A.
6.L.2	Specified in paragraphs 22 and 39 of the MPGs 4.A.1 Forest land remaining forest land – CO₂ for living biomass	Poland used the stock-difference method to estimate emissions and removals for category 4.A.1 forest land remaining forest land. The TERT noted that, when using this method, it is important to ensure that the area of land between two points in time (times t1 and t2) is identical to avoid confounding stock-change estimates with changes in area (2006 IPCC Guidelines, vol. 4, chap. 2, p. 2.10). In its NID (pp.238–242), Poland reported that it performed the stock-difference method using spatially explicit data, which allowed it to track the same parcels of land between inventory years. However, it also reported that data from the State Forest Holding are available as annual statistics aggregated by species and age class. The information reported in the NID does not make it entirely clear how the Party ensured that the same area was used to estimate carbon changes given that species and age classes vary over time. During the review, Poland clarified that it used cadastral data to estimate the area of parcels of forest land (area of land used as forest land) and that NFI sample plots provide measurements for standing stock volume and biomass estimates and not area. This means that cadastral records track parcels of land (area) consistently over time, while NFI sample plots estimate standing stocks at t1 and t2 by performing repeated measurements on permanent sample plots (on a 4 x 4 km grid). These repeated measurements capture tree growth, mortality and harvest data (20 per cent of all sample plots are remeasured annually within a five-year inventory cycle). The data gathered from the NFI sample plots are extrapolated nationally. The stock difference (t2 minus t1) is calculated directly from paired observations of NFI plots. Standing stocks in parcels of land without direct NFI

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
		plot data are estimated indirectly using statistics aggregated from the broader NFI sample network. From the demonstration provided by the Party during the review, the TERT understands that, although the parcels of land and NFI sample plots are spatially explicit, the way in which they are made available (i.e. aggregated by species and age class) limits the Party's ability to analyse and implement the stock-difference method. To ensure the same area is used at t1 and t2, Poland uses tabular format data (State Forest National Forest Holding, 2026) and deducts the CSCs from land converted to forest land from the total CSCs for the youngest age classes (IA and IB; 1–20 years) according to the proportion of afforested area. The TERT noted during the review that this procedure is not undertaken for areas of forest conversion, which could lead to lower net removals being reported for category 4.A.1. Poland also informed the TERT that it is progressing to full tier 3 methods using detailed, country-specific stock-change calculations that integrate national land-use maps – which are under development at the National Centre for Emissions Management – with NFI measurements, yielding spatially explicit and temporally consistent insights into forest-area changes, biomass stocks, age-class structures and land transitions. Together, these advancements will align Poland's LULUCF reporting with the EU regulation on the governance of the Energy Union and climate action (regulation 2018/1999). The TERT recommends that Poland include in the NID a detailed explanation of how it integrates cadastral and NFI data into stock-difference calculations in accordance with the 2006 IPCC Guidelines, including by commenting on the limitations of the data available and how it addresses these limitations. The TERT also recommends that the Party make every effort to ensure estimates are accurate and stock-change estimates are not confounded with changes in area, in line with the 2006 IPCC Guidelines, and report information in the NID on how it is addressing or intends to address the issue.
6.L.3	Specified in paragraphs 24 and 39 of the MPGs 4.A.1 Forest land remaining forest land – CO₂	Poland converted data on growing stock volume by species and age class from annual aggregated statistics to biomass using the following conversion: BEF × wood density (which is equivalent to BCEF, the biomass conversion and expansion factor for expansion of merchantable growing stock volume to above-ground biomass). Wood density is derived from country-specific values, while the BEFs are the lower end of the range of default values from the IPCC good practice guidance for LULUCF (chap. 3, table 3A.1.10, p.3.178). The TERT noted that the 2006 IPCC Guidelines (vol. 4, chap. 4, box 4.2) indicate that applying this conversion from BEF to BCEF requires caution because basic wood density and BEFs tend to be correlated and their applicability should ideally be checked locally. Given that the same sample of trees was not used to determine wood density and the BEF, the conversion from BEF to BCEF may introduce errors. The TERT also noted that the values selected by Poland (NID table 6.10) are at the lower end of the default IPCC ranges for coniferous and broadleaf trees and below the lower end for pine trees (IPCC good practice guidance for LULUCF, chap. 3, table 3A.1.10). During the review, Poland clarified that it used the conversion BEF × wood density as a practical, country-specific proxy for BCEF, in line with the 2006 IPCC Guidelines, because directly measured BCEF values were not available for all species and age classes. Poland shared a study with the TERT that concluded that the BCEFs proposed in the 2006 IPCC Guidelines are not adequate for Polish conditions (Jablonski and Budniak, 2014). The same study reported generalized BEFs of 1.265 for coniferous species and 1.170 for deciduous species. Poland also shared the details of other national studies that confirm that total biomass exceeds stem biomass by approximately 15 per cent under Polish forest conditions (Orzeł et al., 2006 and 2022; Deptuła et al., 2017; and Wojtan et al., 2011), thus supporting its selection of a BEF (1.15) at the lower end of the default IPCC range for spruce, fir and other coniferous (NID table 6.10). The TERT recommends that Poland provide in the NID a clear justification for the method used to convert growing stock volume to biomass, including the rationale for selecting BEFs that are at the lower end of or deviate from the default IPCC values provided in table 3A.1.10 of the IPCC good practice guidance for LULUCF, and a description of how the potential correlation

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
		between BEFs and wood density has been considered in line with the 2006 IPCC Guidelines.
6.L.4	Specified in paragraphs 21 and 23 of the MPGs 4.A.2 Land converted to forest land – CO ₂ 4.B.1 Cropland remaining cropland – CO ₂ 4.E.2 Land converted to settlements – CO ₂ 4(I) Direct and indirect N ₂ O emissions from N input to managed soils – N ₂ O	Poland did not explain its use of tier 1 methods for the following key categories: CO₂ emissions for categories 4.A.2 land converted to forest land, 4.B.1 cropland remaining cropland and 4.E.2 land converted to settlements, and direct N₂O emissions from N mineralization for category 4(I) direct and indirect N₂O emissions from N inputs to managed soils. During the review, Poland clarified that it considered tier 1 methods to be the most transparent and consistent option given current data limitations, in particular limitations due to the lack of sufficiently detailed and spatially disaggregated data. Poland explained that, while it applied tier 1 methods in the current submission, improvements are under way to enable it to use higher-tier methods for these key categories, in line with annex V, part 3 of the EU regulation on the governance of the Energy Union and climate action (regulation 2018/1999). In particular, Poland stated that it has already implemented an interim tier 2 approach for category 4.A.2 for its BTR2 and that further methodological developments and data improvements may support a future transition to tier 3 methods. The TERT recommends that Poland provide an explanation in the NID when it uses a tier 1 approach for a key category owing to lack of resources and encourages the Party to make every effort to use a higher-tier method for key categories, where possible, in accordance with the relevant IPCC guidelines.
6.L.5	Specified in paragraph 39 of the MPGs 4.A.2 Land converted to forest land – CO ₂	In the NID (p.250), Poland reported that it used equation 2.16 from the 2006 IPCC Guidelines (vol. 4, chap. 2) to estimate emissions and removals from living biomass for category 4.A.2 land converted to forest land. This approach corresponds to a higher-tier method suitable for use with a key category. However, Poland also reported in the NID (p.251) that it used equation 2.7 from the 2006 IPCC Guidelines (vol. 4, chap. 2) for the same purpose. This is a tier 1 gain-loss method relying on default parameters. Therefore, the TERT was not able to gain a full understanding of which method Poland used to estimate emissions and removals from living biomass for category 4.A.2. During the review, Poland clarified that for the current submission it transitioned from the tier 1 gain-loss approaches used in previous GHG inventories by implementing a two-tiered approach using equation 2.16. The method involved subtracting CSCs for category 4.A.1 forest land remaining forest land from total CSCs calculated using the stock-difference approach, thus isolating the net effects of conversions in category 4.A.2. Poland clarified that by leveraging data compiled for category 4.A.1, this approach delivered more realistic CSC estimates than the prior tier 1 defaults, without requiring new data to be collected. The TERT recommends that Poland include in the NID an explanation of the interim methods used to estimate emissions and removals from living biomass for category 4.A.2.
6.L.6	Specified in paragraph 21 of the MPGs 4.A.2 Land converted to forest land – CO ₂	In the NID (p. 246), Poland assumed balanced emissions and removals in the dead organic matter pool, including the deadwood and litter pools, for category 4.A.2 land converted to forest land. Accordingly, Poland reported net CSCs in deadwood and litter as “NA” and “NO” in CRT 4.A. The TERT noted that, according to the 2006 IPCC Guidelines (vol. 4, chap. 4, p.4.37), the tier 1 assumption for category 4.A.2 is that deadwood and litter pools increase linearly from zero (in the non-forest land-use category) to the default values for the climate region over a default period of 20 years. During the review, Poland explained that it deviated from the tier 1 method owing to its application of flexibility with respect to non-source pools like dead organic matter on land converted to forest land, as provided for in Article 5, paragraph 4, of the EU LULUCF regulation (regulation 2018/841). The TERT acknowledges that this regulation allows EU member States to exclude carbon pool changes from their accounts if the pool is not a net source (i.e. if emissions do not exceed removals). However, the MPGs require Parties to use the 2006 IPCC Guidelines for reporting purposes.

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
6.L.7	Specified in paragraphs 39–40 of the MPGs 4.B.1 Cropland remaining cropland – CO ₂ 4(IV) Biomass burning – CO ₂ , CH ₄ and N ₂ O 4. General (LULUCF) – mineral soils – CO ₂	The TERT recommends that Poland estimate emissions and removals from deadwood and litter for category 4.A.2 using a relevant method (e.g. tier 1) in accordance with the 2006 IPCC Guidelines. The TERT could not find in the NID clear information on some of the methods, assumptions and data sources used for categories 4.B.1 cropland remaining cropland and 4(IV) biomass burning and those related to the calculation of annual changes in organic carbon stocks in mineral soils for categories 4.A.1 forest land remaining forest land, 4.B.1 and 4.C.1 grassland remaining grassland. The TERT could not fully understand how Poland derived a percentage share of soil types by land-use system for 2002 and 2022 (NID table 6.13) and used these shares to estimate AD for estimating annual changes in organic carbon stocks in mineral soils for categories 4.A.1, 4.B.1 and 4.C.1 (using equation 2.25 from the 2006 IPCC Guidelines (vol. 4, chap. 2)). The TERT was unable to identify which tier, method and parameters Poland used to estimate CSCs in living biomass for perennial crops for category 4.B.1. The TERT was also unable to find in NID table 6.17 the parameters and data sources for the mass of available fuel used to estimate non-CO₂ emissions from wildfires. During the review, Poland explained that it derived the percentage share of soil types reported in NID table 6.13 from national land-cover and soil valuation data sets, which classify mineral soils by habitat and soil valuation class. The Party then translated these soil valuation classes into AD by combining the area shares of each combination of habitat and soil valuation class with information on areas of particular land-use categories (e.g. arable land, grassland and forest land) obtained from the national land-use database. For CSC in living biomass in category 4.B.1, the Party clarified that it estimates emissions and removals from living biomass for perennial crops using a tier 1 method based on equation 2.8 from the 2006 IPCC Guidelines (vol. 4, chap. 2), supported by national inventory data for agroforestry systems. Poland also clarified that it applied the same parameters as those used in its national inventory report, as its non-forest woody areas consist of “potentially forest-forming tree species” with the same species as those found in its forests. For orchards (fruit trees), which fall outside the scope of the NFI, the Party applied a tier 1 gain-loss method from the 2006 IPCC Guidelines (vol. 4, chap. 2, equation 2.7) with default EFs (vol. 4, chap. 5, table 5.1). For all other agroforestry systems, Poland applied tier 2 stock-difference methods, leveraging NFI input data and using country-specific expansion factors, in line with the requirements for tier progression under part 3 of annex V to the EU regulation on the governance of the Energy Union and climate action (regulation 2018/1999). For biomass burning, Poland clarified that the mass of available fuel used to estimate non-CO₂ emissions from wildfires was based on weighted average growing stock data derived from the NFI (NFI, 2020–2024, table 3a.1). The TERT recommends that Poland report in its NID detailed information on the methods, assumptions, data sources and parameters used to derive AD for mineral soils to estimate emissions and removals from living biomass in perennial crops, and to determine the mass of available fuel used to estimate non-CO₂ emissions from wildfires.
6.L.8	Specified in paragraph 44 of the MPGs 4.A Forest land – CO ₂ 4.E Settlements – CO ₂	Poland reported in its NID (annex 2, p.370) that it relied on literature values and expert judgment to estimate uncertainty for LULUCF categories. However, the TERT could not find a clear justification in the NID for the decision to apply 5 per cent uncertainty for AD and 30 per cent uncertainty for the CO₂ EFs for categories 4.A forest land and 4.E settlements from the ranges provided in the source referenced (Laitat et al., 2000). During the review, Poland clarified that the selection of uncertainty values (5 per cent for AD and 30 per cent for EFs) was based on expert judgment and informed by the 2006 IPCC Guidelines, relevant literature and an analysis of national historical data. Poland indicated that it considered information from countries with similar national circumstances (Czechia, Slovakia and Romania) when determining these uncertainty ranges. The TERT recommends that Poland fully document in the NID the sources of the uncertainty values and any assumptions and expert judgment used in line with the

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		2006 IPCC Guidelines (vol. 1, chap. 3, section 3.5), including details on who made the expert judgment and the logical basis for the judgment.

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 paragraphs 21 and 24 of the MPGs 5.A Solid waste disposal on land – CH ₄	Poland reported in the NID (p.308) that no disaggregated data are available on the share of nappies, rubber and leather in municipal solid waste so these are reported under textiles. The Party estimated emissions from these waste streams using factors including degradable organic carbon and the methane generation rate (k) of textiles. The TERT noted that applying the same EFs for rubber and leather as for textiles may lead to inaccurate emission estimates owing to differences in their degradable organic carbon values (2006 IPCC Guidelines, vol. 5, chap. 2, p.2.14) and their methane generation rates (2006 IPCC Guidelines, vol. 5, chap. 3, p.3.17, and 2019 Refinement to the 2006 IPCC Guidelines, vol. 5, chap. 3, p.3.16). The TERT also noted that the regional default municipal solid waste composition data for Eastern Europe provided in the 2019 Refinement to the 2006 IPCC Guidelines (vol. 5, chap. 2, p.2.12) include separate fractions for nappies, and for rubber and leather, suggesting that these waste components may not be negligible and that their separate consideration could improve the accuracy of the emission estimates. During the review, Poland explained that the composition of landfilled waste is derived from a database using codes from the European Waste Catalogue, and that nappies, rubber, leather and textiles in the municipal waste stream are aggregated under textiles. The Party stated that no other data or studies on the composition of landfilled municipal waste are available for use. The TERT recommends that Poland report information and data on waste composition consistently with the methods in the 2006 IPCC Guidelines and the 2019 Refinement to the 2006 IPCC Guidelines, or provide further clarification of the methodology applied. The TERT notes that the Party could explore approaches for disaggregating nappies, rubber and leather from the textile category, for example by using available regional waste composition data to estimate their respective shares, highlighting that this could support the application of more appropriate EFs for each waste component in the GHG emission estimation. Additionally, the TERT encourages Poland to develop country-specific EFs for this aggregated waste category or to provide information on plans to develop them. The TERT notes that such country-specific EFs could better reflect the composition of the aggregated waste materials, including textiles, nappies, rubber and leather.
7.W.2	Specified in paragraph 40 of the MPGs 5.A Solid waste disposal on land – CH ₄	The Party reported in its NID (p.313) that it did not include GHG emissions from the landfilling of waste from furniture manufacturing in category 5.A solid waste disposal on land owing to a lack of information on the composition of materials in furniture waste. However, the TERT cannot determine the possible extent of emissions from this waste stream or whether these emissions are insignificant enough to justify their exclusion from the GHG inventory. The TERT notes that the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.11) stipulate that furniture can be divided into material-based waste categories (wood, plastic and metal) when estimating emissions from solid waste disposal sites. During the review, Poland explained that the calculation of the morphological composition of landfilled waste is based on amounts of waste split by type according to the European Waste Catalogue. The Catalogue does not provide a code for waste from furniture manufacturing, meaning that amounts of this type of waste are aggregated with other wood waste in waste databases, where relevant. Poland indicated that contaminated wood (e.g. impregnated or painted wood) is handled as hazardous waste and is treated thermally, while uncontaminated wood residues from furniture manufacturing are handled as fuel and are usually combusted. In 2024, approximately 80 per cent of the total direct energy consumption in the furniture manufacturing sector was supplied by wood combustion. The TERT recommends that Poland provide information on the category and gas, and the methodologies, EFs and AD used at the most disaggregated level, to the

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
7.W.3	Specified in paragraphs 31 and 40 of the MPGs 5.D.1 Domestic wastewater – N ₂ O	extent possible, according to the 2006 IPCC Guidelines, by clarifying how waste from furniture manufacturing is accounted for within the GHG inventory, including its allocation to relevant categories, and ensure that the approach taken does not lead to omissions of GHG emissions from furniture for category 5.A. For category 5.D.1 domestic wastewater in CRT 5.D, Poland reported N₂O emissions from plants, but reported N₂O emissions from effluent as “NA”. However, the NID (p.328) indicates that the Party estimated N₂O emissions for category 5.D.1 using the default method provided in the 2019 Refinement to the 2006 IPCC Guidelines (vol. 5, chap. 6), which typically includes emissions associated with effluent. This creates a lack of clarity regarding the completeness and allocation of reported N₂O emissions. During the review, Poland explained that, owing to a technical problem with its data structure identified during the final stage of the inventory compilation process for the 2024 submission, N₂O emissions from effluent were reported in aggregation with emissions from plants in category 5.D.1, following the previous reporting scheme used. Poland indicated that it has addressed this issue for subsequent submissions and that it now reports emissions from effluent separately in the CRTs. The TERT recommends that Poland ensure that it report N₂O emissions from plants and effluent separately and consistently in the CRTs, in line with the methodology applied, and ensure that the use of notation keys reflects the actual treatment and allocation of emissions.

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

<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 9

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

<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 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>
NA	NA	No areas of improvement identified

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 83(a–c) of the MPGs	Poland did not report in its BTR1 or CTF NDC table 5 on the costs or non-GHG mitigation benefits of its PaMs or on how its PaMs interact with each other. During the review, Poland explained that information on costs, non-GHG mitigation benefits and interactions between PaMs is not available owing to

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		insufficient data. PaMs are designed and implemented by different ministries and departments in Poland, and the National Centre for Emissions Management, which is responsible for preparing the Party's BTRs, cannot collect the necessary information because exchanging information between institutions is complicated and time-consuming. The TERT encourages Poland to provide information on the costs and non-GHG mitigation benefits of its PaMs and on how its PaMs interact with each other, as appropriate, in its BTR.
11.2	Specified in paragraph 85 of the MPGs	Poland reported the estimates of expected and achieved GHG emission reductions for some of its PaMs in its BTR1 and CTF NDC table 5. However, the Party reported "NE" in several cells owing to a lack of data, including for PaMs that were included in the WM scenario projections. For measure 66 ("support for the development of water and wastewater management"), it was not clear to the TERT why the expected GHG emission reductions in 2030 are significantly smaller than the achieved GHG emission reductions in 2022. Furthermore, Poland reported "NA" for some PaMs without providing an explanation. During the review, Poland clarified its use of notation keys. The Party explained that the estimated GHG emission reductions attributable to individual policies or measures should be included in CTF NDC table 5, but that in many cases it is difficult to determine these values because some PaMs may affect more than one emission category and vice versa. In addition, the Party explained that it can be difficult to allocate emission reductions to individual PaMs owing to the need to avoid double counting. Poland also explained that, while it estimated the expected GHG emission reductions in 2030 for measure 66 on the basis of the difference between projected GHG emissions for 2030 and base-year emissions based on the 2023 GHG inventory submission, it estimated the achieved GHG emission reductions in 2022 on the basis of the difference between the actual emissions in 2022 and the base-year emissions based on the recalculated 2024 GHG inventory submission. Therefore, the expected GHG emission reduction estimates for 2030 are smaller than the achieved GHG emission reductions in 2022 due to methodological differences between the 2023 and 2024 GHG inventory submissions. The TERT recommends that Poland provide and update, to the extent possible, estimates of the expected and achieved GHG emission reductions for its PaMs. The TERT notes that explaining the reasons for using notation keys in CTF NDC table 5 would improve the transparency of the reporting.

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	Poland did not report projections for a WOM scenario, and the TERT was unable to identify information in the BTR1 on the reasons for which the Party did not prepare and report a WOM scenario. Furthermore, Poland did not report clear information on which PaMs are included in the WAM scenario, which, according to the definition in the footnote to paragraph 94 of the MPGs, encompasses implemented, adopted and planned PaMs. All the PaMs provided in CTF NDC table 5 are reported as "implemented". During the review, Poland clarified that it did not report a WOM scenario, as this is not a mandatory requirement of the MPGs. The Party added that developing a WOM scenario would require additional resources, including modelling, and the reconstruction of historical climate policy, which would result in only negligible value added to the current policymaking process and achievement of future goals. Instead, the Party gave priority to developing reliable WM and WAM scenarios.

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
13.2	Specified in paragraph 96(a), (c) and (d) of the MPGs	Poland further clarified that it intends its WAM scenario to be a scenario of accelerated transformation. Under this scenario, it assumes an acceleration in the development of renewable energy sources, including solar and both offshore and onshore wind power plants. Furthermore, it anticipates an increase in the level of electrification, the introduction of carbon capture and storage and carbon capture and utilization technologies, and the wider use of hydrogen in industry. The TERT encourages Poland to report projections for a WOM scenario in its BTR or to explain why it did not report a WOM scenario. The TERT also encourages Poland to clearly identify the implemented, adopted and planned PaMs used for its WM and WAM projection scenarios and to clearly distinguish and identify any assumptions that differ between the two scenarios. In the BTR1, Poland: (a) Reported, for both the WM and WAM scenarios, that final energy consumption is assumed to decrease between 2020 and 2050 in all sectors of the national economy (BTR1 table 58 for the WM scenario and table 71 for the WAM scenario). However, the TERT could not identify explanations for these expected trends. The Party also reported different assumed energy mixes for the WM and WAM scenarios (e.g. different values for nuclear power generation across the two scenarios); (b) Reported a lower number of cattle in the WAM scenario than in the WM scenario, indicating that the reduction in cattle numbers is one of the main reasons for the difference in the projections for the agriculture sector between the WM and WAM scenarios (BTR1, p.172). However, the drivers for this expected reduction in cattle numbers were not clear to the TERT; (c) Did not report a sensitivity analysis for any of the projections. During the review, Poland clarified that: (a) The projected reduction in final energy consumption by 2050 is due to projected large-scale electrification, the thermal modernization of buildings, improvements in the energy efficiency of processes and the implementation of new technologies, as well as a decline in the population and climate change (a reduction in heating degree days). The Party explained that the energy mix data applied to the WM and WAM scenarios (presented in BTR1 table 62 for the WM scenario and table 75 for the WAM scenario) come from an interim version of the updated NECP, which was later revised in 2025 owing to changes, including adjustments to the assumptions concerning the Polish Nuclear Power Programme. In the final version of the updated NECP, nuclear power does not appear until 2040 and its share in gross electricity production is higher in the WAM scenario than in the WM scenario. The Party confirmed that the final version of the updated NECP was scheduled to be submitted to the European Commission in April 2026. During the review, Poland presented two distinct sets of assumptions and projection results: one developed during the preparation of the BTR1 and another subsequently updated in accordance with the final version of the updated NECP; (b) The primary factors behind the difference in cattle numbers between the WM and WAM scenarios are market characteristics with the greatest potential to influence farmers' actions, as well as shifts in demand resulting from changes within the EU and global markets and legal changes stemming from the implementation of EU development strategies. The WAM scenario for animal production also took into account changing climate conditions, related strategic solutions and EU climate policy. According to the methodological assumptions adopted, the main factors influencing animal production will be economic factors determining the profitability of production (cost of investment in low-emission technologies for buildings and animal welfare, manure management and fodder costs), as well as production prices, demand for agricultural products and lifestyle impacts, which in the long term may decrease the demand for meat. Most of the economic factors will occur regardless of climate policy, but their impact will depend on legal regulations and public awareness. Therefore, the WAM scenario assumes that these factors will have a stronger impact on cattle numbers than in the WM scenario;

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		(c) It did not report a sensitivity analysis because this is not a mandatory reporting requirement under the MPGs. The Party explained that it only performs a sensitivity analysis once the inventory data set is complete and has been verified. Owing to budget and time constraints, the Party prioritizes fulfilling mandatory reporting requirements, such as the key category analysis. Poland added that one of the barriers to reporting a sensitivity analysis is the fact that the projections data set is becoming increasingly complex each year and that preparing a solid sensitivity analysis would involve different external data providers and require the Party to ensure common methodological approaches across these data providers. The TERT encourages Poland to report detailed information on the methodology used to develop the projections, for instance, by enhancing and updating the description of the key underlying assumptions and parameters used for projections. The TERT also encourages Poland to include in its BTR a sensitivity analysis for any of the projections, together with a brief explanation of the methodologies and parameters used.
13.3	Specified in paragraph 97 of the MPGs	Poland reported projections of key indicators as “NA” in CTF NDC table 10. The TERT could not identify specific information in the documentation box of CTF NDC table 10 or in the BTR1 on the reasons for this approach or on where this information may be available. During the review, Poland clarified that it could not report any projections of key indicators in CTF NDC table 10, as it does not have an individual NDC. Instead, Poland contributes to the achievement of the NDC of the EU. Projections of key indicators for the NDC of the EU are available in CTF NDC table 10 of the BTR1 of the EU. Poland therefore chose to report the information as “NA” in its own CTF NDC table 10. The TERT recommends that Poland include information on projections of key indicators for the NDC of the EU, or provide a reference to the BTR of the EU, in CTF NDC table 10.

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>
NA	NA	No areas of improvement identified

Table 16

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

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
16.1	Specified in paragraph 121(n) and (t) of the MPGs	In its BTR1 (p.258), Poland reported that only projects financed with public funds paid in a given year are included in the report and that projects financed through multilateral channels are reported on an inflow basis. However, the TERT was unable to identify:

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		(a) A definition of public and private finance in cases where entities or funds are mixed; (b) A description of the underlying assumptions, methodologies and definitions, as applicable, used to identify and/or report: (i) Whether multilateral finance has been reported as core/general, with the understanding that the actual climate finance amount it would transfer into depends on the programming choices of the multilateral institutions; (ii) Whether and how multilateral finance has been attributed to the reporting (recipient) Party. During the review, the Party clarified that: (a) It reported in the BTR1 information on public finance, including funds originating from the State budget, government agencies, local government units and other public institutions. The Party also clarified that it did not report private finance or mobilized private finance, as no operational system is available to reliably identify and quantify private resources mobilized through public interventions; (b) It reported multilateral finance as core/general, with the understanding that the actual climate finance amount it would transfer into depends on the programming choices of the multilateral institutions. Poland reports its multilateral contributions on an inflow basis, meaning that the amounts correspond to actual disbursements made in the reporting year. The TERT encourages Poland to report in the BTR, as applicable, the following information or explain why it considers such information not to be applicable: (a) Information on the definition of public and private finance, in particular where entities or funds are mixed; (b) Information related to underlying assumptions, methodologies and definitions, specifically by indicating, where possible: (i) Whether multilateral finance has been reported as core/general, with the understanding that the actual climate finance amount it would transfer into depends on the programming choices of the multilateral institutions; (ii) Whether the support is climate-specific and whether the multilateral finance reported is based on the Party's inflow contribution to a multilateral institution and/or on the Party's share in the outflow of the multilateral institution.

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(c), (e) and (i–k) of the MPGs	In CTF support table III.1, Poland reported several cells as “NA” or as “0.00” for both 2021 and 2022. The financial amounts for some of the projects were reported as “0.00”, while information on the channel and funding source, etc., was reported as “NA” for some projects. In the “Channel” column, Poland reported “donor country-based NGO” or “multi-bilateral” for several projects, but did not define the meaning of these channels in either a table note or in the text of the BTR1. In the “Subsector” and “Additional information” columns, Poland reported “NA” for most projects. During the review, Poland explained that some of these issues were caused by a technical issue encountered with the ETF support reporting tool when submitting the BTR1, which the Party had raised with the secretariat when filling in the CTF support tables. In some cases, the ETF support reporting tool required a cell to be filled in before the user could proceed further with the report and, in other cases, projects only applicable for one year were filled with “0.00” or “NA” for the year that was not relevant. The Party also explained that some of the information categories were not used in its internal reporting system and it therefore reported these categories as “NA”; the Party would rather have left those cells blank and did so when the ETF support reporting tool allowed it. Thus, only three projects include short descriptions in the “Additional information” column and, in all

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		other cases, “NA” is the most relevant representation of the information available. The Party further clarified that it used “multi-bilateral” for projects with multiple donors, while it used “donor country-based NGO” when the entity supported was an NGO based in the donor country. The TERT encourages Poland to report complete information in CTF support table III.1, including by reporting for each project the recipient country, channel, subsector (as available), additional information (as available), and whether the project contributes to capacity-building and/or technology development and transfer objectives (as available), and/or by selecting an appropriate notation key (e.g. “NA”, “NR” or “UA”). The TERT notes that explaining the use of any notation keys applied will improve the transparency of the reporting; if the Party deems that specific information is not relevant, this may be clarified in the BTR.

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(b), (d), (f), (m) and (n) of the MPGs	In CTF support table III.2, Poland reported several cells as “NA” or left them blank for both 2021 and 2022. For 2021, the Party left the “Institution” column blank in several rows. For 2021 and 2022, the Party left several cells blank in some rows, while it reported other cells as “NA”. Finally, for both 2021 and 2022, Poland left several cells blank without adding the relevant information or using any notation keys in the columns “Contribution to capacity-building objectives” and “Contribution to technology development and transfer objectives”. During the review, Poland explained that some of these issues were caused by a technical issue encountered with the ETF support reporting tool when submitting the BTR1 (see ID# 17.1). The Party added that some of the information categories were not used in its internal reporting system and it therefore reported these categories as “NA”. Poland clarified that in the columns “Contribution to capacity-building objectives” and “Contribution to technology development and transfer objectives”, it only entered “Yes” for projects for which positive information is available about their contribution to capacity-building or technology development and transfer objectives. It left cells blank in cases where the multilateral institution did not assign the contribution to either of these categories. Poland stated that it did not have access to disaggregated data that would allow such classification. The TERT encourages Poland to report complete information in CTF support table III.2, including by reporting for each relevant year the recipient (as applicable and as available), the subsector (as available), and whether the project contributes to capacity-building and/or technology development and transfer objectives (as applicable and as available), and/or by selecting an appropriate notation key (e.g. “NA”, “NR” or “UA”). The TERT notes that explaining the use of any notation keys applied will improve the transparency of the reporting; if the Party deems that specific information is not relevant, this may be clarified in the BTR.

Table 19

Areas of improvement of the information on technology development and transfer support 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 127(b), (c), (e), (f) and (h) of the MPGs	In CTF support table III.4, the Party reported “NA” in the columns “Recipient entity”, “Description and objectives”, “Subsector”, “Type of technology”, “Activity undertaken by” and “Additional information”. In rows 30–39, the Party reported project titles, but left the other cells blank with the exception of the type of support and sector. During the review, Poland explained that some of these issues were caused by a technical issue encountered with the ETF support reporting tool when submitting the BTR1 (see ID# 17.1). The Party clarified that it left cells blank in rows 30–39

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		because these rows relate to global or multi-component programmes providing a type of support to which the information to be reported in CTF support table III.4 does not apply. The Party also explained that it reported “NA” in cases where the corresponding information does not inherently apply to the type of project reported or cannot be assigned to the project in an objective manner. This includes, in particular, system-level, educational or institutional projects that do not have a single identifiable recipient entity, a defined subsector or a specific type of technology. In such cases, providing a value would not accurately reflect the nature of the project. The TERT encourages Poland to report complete information in CTF support table III.4, including by reporting the recipient entity, description and objectives, subsector, type of technology, whether the activity was undertaken by the public and/or private sector, and additional information (as available), and/or by selecting an appropriate notation key (e.g. “NA”, “NR” or “UA”). The TERT notes that explaining the use of any notation keys applied will improve the transparency of the reporting; if the Party deems that specific information is not relevant, this may be clarified in the BTR.

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 129(b–c) of the MPGs	In CTF support table III.5, the Party reported “NA” in the columns “Recipient entity”, “Description and objectives”, “Subsector”, “Type of technology”, “Status of measure or activity”, “Activity undertaken by” and “Additional information”. In rows 103–115, the Party reported project titles, but left the other cells blank with the exception of the type of support. During the review, Poland explained that some of these issues were caused by a technical issue encountered with the ETF support reporting tool when submitting the BTR1 (see ID# 17.1). The Party clarified that it left cells blank in rows 103–115 because these rows relate to global or multi-component programmes providing a type of support to which the information to be reported in CTF support table III.5 does not apply. The Party also explained that it reported “NA” in cases where the corresponding information does not inherently apply to the type of project reported or cannot be assigned to the project in an objective manner. This includes, in particular, system-level, educational or institutional projects that do not have a single identifiable recipient entity, a defined subsector or a specific type of technology. In such cases, providing a value would not accurately reflect the nature of the project. The TERT encourages Poland to report complete information in CTF support table III.5, including by reporting the recipient entity, description and objectives, subsector (where available), type of technology, status of measure or activity, activity undertaken by and additional information (where available), and/or by selecting an appropriate notation key (e.g. “NA”, “NR” or “UA”). The TERT notes that explaining the use of any notation keys applied will improve the transparency of the reporting; if the Party deems that specific information is not relevant, this may be clarified in the BTR.

Annex

Documents and information used during the review

A. Reference documents

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

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

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

BTR1 CTF tables of the EU. Available at <https://unfccc.int/first-biennial-transparency-reports>.

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

CRTs of the EU. 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. 2003. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. J Penman, M Gytarsky, T Hiraishi, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <https://www.ipcc.ch/publication/good-practice-guidance-for-land-use-land-use-change-and-forestry/>.

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

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

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

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

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

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

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

Report on the technical expert review of the BTR1 of the EU.

FCCC/ETF/TERR.1/2024/EU and Add.1. 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 Monika Bejnar-Bejnarowicz (Ministry of Climate and Environment of Poland) and Anna Serzysko (KOBiZE – National Centre for Emissions Management of Poland), including additional material. The following references were provided by Poland and may not conform to UNFCCC editorial style as some have been reproduced as received:

KOBiZE (2016): *The national methodology for estimating methane emissions from coal mining for reporting to the national inventory of emissions and removals of greenhouse gases*. National Centre for Emission Management. Warsaw, 2016. (in Polish)

ENERGOPOMIAR (2022): *Development of country specific emission factors of methane emission from the combustion of hard coal, lignite and biomass*. Warsaw, 2022. (in Polish)

Emission data officially submitted by the Poland to the Air Convention (Convention on Long-Range Transboundary Air Pollution: CLRTAP) to the EMEP programme (<https://www.ceip.at/webdab-emission-database/reported-emissiondata>)

State Forest National Forest Holding. *Report of National Forest Inventory, Forest Bank Data*. Available at <https://www.bdl.lasy.gov.pl/portal/tworzenie-zestawienia-rw-en> (last accessed April, 2026)

Jablonski and Budniak (2014). *Estimating aboveground woody biomass of forests in Poland for FAO/ECE and UNFCCC reporting*. Lesne Prace Badawcze (Forest Research Papers), Vol. 75 (3): 277–289, DOI: 10.2478/frp-2014-0027.

Orzeł S., Ochal W., Forgiel M., Socha J. (2006). *Biomasa i roczna produkcja drzewostanów debowych Puszczy Niepolomickiej*. Sylwan 5: 30-43.

Orzeł S., Forgiel M., Ochal W., Socha J. (2006). *Nadziemna biomasa i roczna produkcja drzewostanów sosno-wych Puszczy Niepolomickiej*. Sylwan 9: 16-32.

Ochal W., Wertz B., Orzeł S. (2022). *Above-ground biomass allocation and potential carbon sink of black pine – a case study from southern Poland*. Ann. For. Res. 65(2): 71-90. DOI 10.15287/afr.2022.2174.

Deptuła M., Nienartowicz A., Iwicka M. and Filbrandt-Czaja A. (2017). *Biomass of Scots pine-silver birch tree stand 25 years after afforestation of former agricultural land*. Ecological Questions. Vol. 25, 51-66. DOI 10.12775/EQ.2017.005.

Wojtan R., Tomusiak R., Zasada M., Dudek A., Michalak K., Wróblewski L., Bijak Sz., Bronisz K. (2011) *Współczynniki przeliczeniowe suchej biomasy drzew i ich części dla sosny pospolitej (Pinus sylvestris L.) w zachodniej Polsce*. Sylwan 155 (4): 236-243.

NFI 2020-2024. *Wielkoobszarowa inwentaryzacja stanu lasów w Polsce. Wyniki za okres 2020–2024*. ETAP 6.1.b. Praca wykonana na zamówienie Dyrekcji Generalnej Lasów Państwowych zgodnie z umową nr EZ.271.1.10.2020 z dnia 3 sierpnia 2020 r. Available at: <https://www.bdl.lasy.gov.pl/portal/Media/Default/Publikacje/WISL2020-2024.pdf>. Table 3a.1 available at: <https://www.bdl.lasy.gov.pl/portal/Media/Default/Publikacje/WISL%202020-2024%20za%C5%82%C4%85czniki.pdf>.

Laitat É., Karjalainen T., Loustau D., and Lindner M. (2000). Introduction: Towards an integrated scientific approach for carbon accounting in forestry. Biotechnologie, Agronomie, Société et Environnement 2000 4(4): pp. 315-319.