United Nations

FCCC/ARR/2018/POL

Framework Convention on Climate Change

Distr.: General
11 February 2020

English only

# Report on the individual review of the annual submission of Poland submitted in 2018*

## Note by the expert review team

*Summary*

Each Party included in Annex I to the Convention must submit an annual greenhouse gas inventory covering emissions and removals of greenhouse gas emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual inventory review of the 2018 annual submission of Poland, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 8 to 13 October 2018 in Bonn.

* In the symbol for this document, 2018 refers to the year in which the inventory was submitted, not to the year of publication.

GE.20-01970(E)

*2001970*

# Contents

# Abbreviations and acronyms

| | |
|---|---|
| 2006 IPCC Guidelines | *2006 IPCC Guidelines for National Greenhouse Gas Inventories* |
| AAU | assigned amount unit |
| AD | activity data |
| AGB | above-ground biomass |
| Annex A source | source category included in Annex A to the Kyoto Protocol |
| AR | afforestation and reforestation |
| Article 8 review guidelines | "Guidelines for review under Article 8 of the Kyoto Protocol" |
| BEF | biomass expansion factor |
| C | carbon |
| CER | certified emission reduction |
| $CH_4$ | methane |
| CLRTAP | Convention on Long-range Transboundary Air Pollution |
| CM | cropland management |
| $CO_2$ | carbon dioxide |
| $CO_2$ eq | carbon dioxide equivalent |
| CORINE | Coordination of Information on the Environment |
| CP | commitment period |
| CPR | commitment period reserve |
| CRF | common reporting format |
| $\Delta C_{conversion}$ | change in carbon stocks in biomass on land converted to other land-use category |
| EF | emission factor |
| EMEP/EEA | European Monitoring and Evaluation Programme/European Environment Agency |
| ERT | expert review team |
| ERU | emission reduction unit |
| EU | European Union |
| EU ETS | European Union Emissions Trading System |
| F-gas | fluorinated gas |
| $F_I$ | stock change factor for input of organic matter |
| $F_{LU}$ | stock change factor for land-use systems or sub-system for a particular land use |
| FM | forest management |
| $F_{MG}$ | stock change factor for management regime |
| FMRL | forest management reference level |
| GHG | greenhouse gas |
| GM | grazing land management |
| HFC | hydrofluorocarbon |
| IE | included elsewhere |
| IEF | implied emission factor |
| IPCC | Intergovernmental Panel on Climate Change |
| IPCC good practice guidance | *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* |
| IPCC good practice guidance for LULUCF | *Good Practice Guidance for Land Use, Land-Use Change and Forestry* |
| IPPU | industrial processes and product use |
| KP-LULUCF activities | activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol |
| LULUCF | land use, land-use change and forestry |

| | |
|---|---|
| N | nitrogen |
| $N_2O$ | nitrous oxide |
| NA | not applicable |
| NE | not estimated |
| NEU | non-energy use |
| Nex | nitrogen excretion |
| $NF_3$ | nitrogen trifluoride |
| NIR | national inventory report |
| NO | not occurring |
| PFC | perfluorocarbon |
| QA/QC | quality assurance/quality control |
| RMU | removal unit |
| RV | revegetation |
| SEF | standard electronic format |
| $SF_6$ | sulfur hexafluoride |
| SIAR | standard independent assessment report |
| UNFCCC Annex I inventory reporting guidelines | "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" |
| UNFCCC review guidelines | "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" |
| WDR | wetland drainage and rewetting |
| Wetlands Supplement | *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* |

# I. Introduction[1]

1. This report covers the review of the 2018 annual submission of Poland organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (decision 13/CP.20). The review took place from 8 to 13 October 2018 in Bonn and was coordinated by Ms. Claudia do Valle and Mr. Sohel Pasha (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of Poland.

Table 1
**Composition of the expert review team that conducted the review of Poland**

| *Area of expertise* | *Name* | *Party* |
|---|---|---|
| Generalist | Ms. Agita Gancone | Latvia |
| | Ms. Emma Salisbury | United Kingdom of Great Britain and Northern Ireland |
| Energy | Mr. Sangay Dorji | Bhutan |
| | Mr. Erick Masafu | Kenya |
| | Mr. Dingane Sithole | Zimbabwe |
| IPPU | Ms. Ingrid Person | Brazil |
| | Ms. Ann Marie Ryan | Ireland |
| | Ms. Kristina Saarinen | Finland |
| Agriculture | Mr. Paulo Cornejo | Chile |
| | Mr. Steen Gyldenkaerne | Denmark |
| | Ms. Janka Szemesova | Slovakia |
| LULUCF | Mr. Nagmeldin Elhassan | Sudan |
| | Ms. Inge G.C. Jonckheere | Belgium |
| | Mr. Dinh Hung Nguyen | Viet Nam |
| Waste | Mr. Gustavo Mozzer | Brazil |
| | Mr. Hans Oonk | Netherlands |
| Lead reviewers | Ms. Person | |
| | Ms. Salisbury | |

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2018 annual submission in accordance with the Article 8 review guidelines. The ERT notes that the individual inventory review of Poland's 2017 annual submission did not take place during 2017 owing to insufficient funding for the review process.

[1] At the time of publication of this report, Poland had submitted its instrument of ratification of the Doha Amendment; however, the Amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the Amendment.

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

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

5. Annex I shows annual GHG emissions for Poland, including totals excluding and including the LULUCF sector, indirect $CO_2$ emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, if elected, by gas, sector and activity for Poland.

6. Information to be included in the compilation and accounting database can be found in annex II.

# II. Summary and general assessment of the 2018 annual submission

7. Table 2 provides the assessment by the ERT of the annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2
**Summary of review results and general assessment of the inventory of Poland**

| *Assessment* | | | *Issue or problem ID#(s) in table 3 and/or 5[a]* |
|---|---|---|---|
| Dates of submission | Original submission: 10 April 2018 (NIR), 10 April 2018, version 1 (CRF tables), 10 April 2018 (SEF-CP1-2017 and SEF-CP2-2017) | | |
| | Revised submission: 25 May 2018 (NIR), 25 May 2018, version 3, and 23 November 2018, version 4 (CRF tables) | | |
| | Unless otherwise specified, the values from the latest submission are used in this report | | |
| Review format | Centralized | | |
| Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable) | 1. Have any issues been identified in the following areas: | | |
| | (a) Identification of key categories | No | |
| | (b) Selection and use of methodologies and assumptions | Yes | L.11, L.15, L.16, L.18, L.19, W.5 |
| | (c) Development and selection of EFs | Yes | E.8, E.9, I.13, I.14, L.4, L.9, L.39, KL.9 |
| | (d) Collection and selection of AD | Yes | I.3, L.14 |
| | (e) Reporting of recalculations | Yes | L.1, W.3 |
| | (f) Reporting of a consistent time series | Yes | E.1, L.8 |
| | (g) Reporting of uncertainties, including methodologies | Yes | A.12 |

[2] Issues are defined in decision 13/CP.20, annex, paragraph 81.
[3] Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

| *Assessment* | | | *Issue or problem ID#(s) in table 3 and/or 5[a]* |
|---|---|---|---|
| | (h) QA/QC | QA/QC procedures were assessed in the context of the national system (see para. 2 in this table) | |
| | (i) Missing categories/completeness[b] | Yes | L.2, L.40 |
| | (j) Application of corrections to the inventory | No | |
| Significance threshold | For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines? | Yes | |
| Description of trends | Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable? | Yes | |
| Supplementary information under the Kyoto Protocol | 2. Have any issues been identified related to the national system: | | |
| | (a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements | No | |
| | (b) Performance of the national system functions | No | |
| | 3. Have any issues been identified related to the national registry: | | |
| | (a) Overall functioning of the national registry | No | |
| | (b) Performance of the functions of the national registry and the technical standards for data exchange | No | |
| | 4. Have any issues been identified related to reporting of information on ERUs, CERs, AAUs and RMUs and on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR? | No | |
| | 5. Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission? | No | |
| | 6. Have any issues been identified related to the reporting of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as follows: | | |
| | (a) Reporting requirements in decision 2/CMP.8, annex II, paragraphs 1–5 | No | |
| | (b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14 | Yes | KL.3 |
| | (c) Reporting requirements of decision 6/CMP.9 | No | |

| *Assessment* | | | *Issue or problem ID#(s) in table 3 and/or 5*[a] |
|---|---|---|---|
| | (d) Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34 | NA | |
| CPR | Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18? | Yes | |
| Adjustments | Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol? | NA | |
| | Did the Party submit a revised estimate to replace a previously applied adjustment? | NA | Poland does not have a previously applied adjustment |
| Response from the Party during the review | Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties? | Yes | |
| Recommendation for an exceptional in-country review | On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review? | No | |
| Questions of implementation | Did the ERT list any questions of implementation? | No | |

[a] The ERT identified additional issues and/or problems in the energy, IPPU, agriculture, LULUCF and waste sectors and for KP-LULUCF activities that are not listed in this table but are included in table 3 and/or 5.

[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

# III. Status of implementation of issues and/or problems raised in the previous review report

8. Table 3 compiles all the recommendations made in previous review reports that were included in the previous review report, published on 20 June 2017.[4] For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2018 annual submission and provided the rationale for its determination, which takes into consideration the publication date of the previous review report and national circumstances.

Table 3
**Status of implementation of issues and/or problems raised in the previous review report of Poland**

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| General | | | |
| G.1 | Uncertainty analysis (G.5, 2016) (G.5, 2015) (15, 2014) (15 and 123, 2013) Adherence to the UNFCCC Annex I | Include the uncertainty for KP-LULUCF activities. | Resolved. Poland included the uncertainties for KP-LULUCF activities in the NIR (annex 8, p.420). |

[4] FCCC/ARR/2016/POL. The ERT notes that the individual inventory review of Poland's 2017 annual submission did not take place in 2017. As a result, the latest published annual review report reflects the findings of the review of the Party's 2016 annual submission.

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | inventory reporting guidelines | | |
| G.2 | Uncertainty analysis (G.7, 2016) (G.7, 2015) (16, 2014) (52, 2013)<br>Adherence to the UNFCCC Annex I inventory reporting guidelines | Improve the uncertainty data for F-gases, distinguishing between the AD and EFs. | Resolved. Poland provided in the NIR (annex 8, p.419) the requested improvement regarding the uncertainty analysis for F-gases. |
| G.3 | QA/QC and verification (G.9, 2016)<br>Adherence to the UNFCCC Annex I inventory reporting guidelines | Improve QA/QC procedures so that inconsistencies between the NIR and the CRF tables are minimized in future submissions (namely between data in NIR tables 2.2 and 2.8 and CRF table 10 for IPPU, LULUCF sectors and category 1.A.5 (other)). | Not resolved. There are inconsistencies between the NIR and the CRF tables, including for total $N_2O$ emissions in 2016, for which the amount reported in the NIR (table 2.2, p.27) under LULUCF (0.01 kt) differs from the amount reported in cell AC38 in CRF table 10s4 (4.10 kt). In addition, the total $CO_2$ eq emissions with LULUCF for the base year reported in NIR table 2.8 (554,102.60 kt) differ from the amount reported in cell B66 of CRF table 10s1 (553,914.07 kt). During the review, in response to the list of potential problems raised by the ERT, the Party resubmitted the CRF tables and the new value reported for the base year in cell B66 of CRF table 10s1 is 555,299.77 kt $CO_2$ eq. |
| Energy | | | |
| E.1 | 1. General (energy sector) (E.2, 2016) (E.2, 2015) (25, 2014) (24, 2013) (39, 2012)<br>Transparency | Elaborate on the description of how the Party maintains time-series consistency while using different sources of AD. | Addressing. Poland explained in the NIR (section 3.2.6.4, p.57) that both databases used for the inventory (International Energy Agency database for 1988 and 1989 and Eurostat database for 1990 onward) are fed by the central statistical office of Poland, which is responsible for the QA/QC of collected and published data. Both data sets are based on the same questionnaires and are therefore fully consistent. According to the Party, national enterprises are obliged to report to the central statistical office of Poland, including companies participating in the EU ETS. The Party also included in the NIR an explanation of the reasons for the variation in emissions from 1989 to 1990. However, more clarity is needed on how the Party ensures consistency with some of the EU ETS data incorporated into the inventory for years after 2005. |
| E.2 | 1. General (energy sector) (E.3, 2016) (E.3, 2015) (25, 2014) (26, 2013) (41, 2012)<br>Transparency | Improve the reporting of the details of the annual QA/QC measures implemented in the energy sector, and provide information on the cross-checks made among the national statistics data, the Eurostat data and the EU ETS data, as well as information on any validation of EFs by | Addressing. Poland provided information in the NIR (section 3.2.6.4, p.57) on the annual cross-checks and QA/QC procedures. More clarity is needed on the data from the EU ETS and on the information related to any validation of EFs by comparison with the EU ETS data. |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | | comparison with the EU ETS data. | |
| E.3 | Feedstocks, reductants and other NEU of fuels (E.7, 2016) (E.7, 2015) (31, 2014) (32, 2013) (48, 2012) Transparency | Further clarify the reporting of feedstocks and NEU of fuels in CRF table 1.A(d) and in the NIR, and provide detailed information on the allocation of the associated emissions in the inventory. | Resolved. Poland reported clearly in CRF tables 1.A(d) and 2(I).A-Hs2 the allocation of feedstocks (lubricant use and paraffin wax use). Further explanation is provided in the NIR (sections 3.2.3 (p.50), 4.5.2.1 (p.145) and 4.5.2.2 (p.146)). |
| E.4 | Feedstocks, reductants and other NEU of fuels liquid fuels – $CO_2$ (E.14, 2016) (E.14, 2015) Transparency | Improve the transparency of the NIR by including more detailed information on AD and EFs for feedstocks and NEU of fuels. | Resolved. See ID# E.3 above. |
| E.5 | International aviation (E.5, 2016) (E.5, 2015) (29, 2014) (30, 2013) Consistency | Document any recalculations of the emissions from international aviation for 1988–2011 undertaken to ensure time-series consistency in accordance with the IPCC good practice guidance. | Resolved. Poland documented the method used to calculate emissions from international aviation in the NIR. The Party used in the 2018 submission Eurostat data (for 1990–2016) and International Energy Agency data (for 1988 and 1989) and the split between domestic and international aviation from EUROCONTROL, the European Organisation for the Safety of Air Navigation (available for 2005–2016). The Party clarified in the NIR (section 3.2.2.1, p.48) that EUROCONTROL data are generated to support both the European Environment Agency and EU member States. The Party used a five-year average of EUROCONTROL data for 2005–2009 to calculate the shares of domestic and international aviation for 1988–2004. |
| E.6 | International aviation liquid fuels – $CO_2$, $CH_4$ and $N_2O$ (E.21, 2016) (E.21, 2015) Transparency | Improve the transparency of the NIR by including the information on the source of data used to calculate the share of international aviation from national statistics provided to the ERT during the review, as well as the rationale for applying 2005–2009 average data from EUROCONTROL for 1988–2004. | Resolved. Poland included the required information in the NIR (section 3.2.2.1, p.48) (see also ID# E.5 above). |
| E.7 | International navigation (E.6, 2016) (E.6, 2015) (30, 2014) (31, 2013) (47, 2012) Transparency | Include in the NIR information on the split between domestic and international navigation and provide details of the trend in international and domestic bunker fuel use across the time series. | Resolved. Poland included in the NIR (section 3.2.8.2.4 and table 3.2.8.9, pp.84–85) information on the split between domestic and international navigation using data from 'G-03' questionnaires and statistical data on levels of international versus domestic shipping activities (cargo traffic at Polish seaports). The Party also provided information on the trends in international and domestic bunker fuel use (NIR tables 3.2.8.10 (p.85) and 3.2.4 (p.49)). |
| E.8 | 1.A.1 Energy industries – | Complete and report on the planned development of | Addressing. In addition to hard coal and lignite as reported previously, Poland explained during the |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | all fuels – $CO_2$ (E.8, 2016) (E.8, 2015) (32, 2014) (34, 2013) (49, 2012) Accuracy | country-specific $CO_2$ EFs for the significant fuels in the energy sector, and consider applying the country-specific $CO_2$ EF for gasoline used in road transportation to stationary combustion. | review that it applied the country-specific carbon content of the natural gas already used for category 2.B.1 (ammonia production) and developed a country-specific EF for natural gas for the energy sector (NIR, section 3.2.1, p.43). Poland also explained in the NIR (p.44) that the EF used for estimating emissions from gasoline in road transportation cannot be used for stationary sources as it uses COPERT IV to model road transport emissions. The Party continues to use the default $CO_2$ EF for liquid fuels for key categories 1.A.1, 1.A.2 and 1.A.4 and explained during the review that the inventory team is considering the development of country-specific EFs; however, there is not yet a detailed schedule for this improvement. In response to the draft report, Poland informed the ERT that fuels such as diesel, fuel oil and liquefied petroleum gas are considered to be insignificant, because the largest share among them is about 1 per cent of the total for stationary combustion (both in terms of the quantity expressed in TJ and the share in emissions from the combustion of fuels in stationary sources). Therefore, the Party claims that individual fuels from the liquid fuel group are not a significant source of national emissions, and are even insignificant sources in the subcategory covering stationary sources. The ERT understands the Party's national circumstances but notes that the threshold of significance is not applied to methodological choice or AD choice but to emissions in accordance to paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. |
| E.9 | 1.A.1 Energy industries – solid fuels and biomass – $CH_4$ (E.9, 2016) (E.9, 2015) (34, 2014) (40, 2013) Accuracy | Apply a tier 2 method to estimate $CH_4$ emissions from stationary combustion (solid fuels and biomass). | Addressing. Poland explained during the review that the development of country-specific EFs for $CH_4$ (for solid fuels and biomass) is under consideration and that, owing to budgetary constraints, it had to prioritize resources for the development of country-specific EFs (see also ID# E.8 above). |
| E.10 | 1.A.3.b Road transportation – gaseous fuels – $CO_2$ (E.16, 2016) (E.16, 2015) Transparency | Improve the transparency of the NIR by including information in accordance with decision 24/CP.19, paragraph 37(b), to demonstrate that emissions from gaseous fuels are insignificant, and change the notation key to "NE" for gaseous fuels in road transportation. | Resolved. Poland informed the ERT during the review that the use of natural gas in urban buses (category 1.A.3.iii) started only in 2015 and therefore emissions were estimated accordingly for the 2018 submission. The ERT noted that the Party still reports the notation key "NO" for $N_2O$ emissions. |
| E.11 | 1.A.3.d Domestic navigation – liquid fuels – $CO_2$, $CH_4$ and $N_2O$ (E.17, 2016) (E.17, 2015) Transparency | Provide detailed information on the correlation between cargo activity and emissions from navigation and on the cross-checks between emissions estimated using cargo activity and emissions | Not resolved. Poland did not add any further information in the NIR to explain the correlation between cargo activity and emissions from navigation and on the cross-checks between emissions estimated using cargo activity and emissions estimated using Eurostat data. The ERT noted that the Party reported in the NIR (section 3.2.8.6, p.92) that source-specific |

| ID# | Issue and/or problem classification[a,b] | Recommendation made in previous review report | ERT assessment and rationale |
|---|---|---|---|
| | | estimated using Eurostat data. | planned improvements for developing a methodology for estimating fuel structure for domestic navigation are being considered. |
| E.12 | 1.B.1.a Coal mining and handling – solid fuels – $CH_4$ (E.19, 2016) (E.19, 2015) Accuracy | Either justify that the $CH_4$ EF applied appropriately reflects the $CH_4$ content of coal in Poland, or use the default EF from the 2006 IPCC Guidelines (12.06 kg/t for average $CH_4$ emissions) to calculate $CH_4$ emissions from underground mines for the entire time series. | Resolved. Poland informed the ERT that the case study for the elaboration of the domestic methodology for estimating $CH_4$ emissions from coal mining (category 1.B.1.a.1 underground mines) was completed in 2016 and is based on detailed measurement data on $CH_4$ content and emissions from Polish coal mines. A description is given in the NIR (section 3.3.1.2.1, pp.100–101). Poland explained during the review that the IEFs for the entire time series differ and increase depending on the depth of coal mines over time, and they range from 4.57 kg $CH_4$/t in 1988 to 9.40 kg $CH_4$/t in 2016). |
| E.13 | 1.B.1.a Coal mining and handling – solid fuels – $CH_4$ (E.20, 2016) (E.20, 2015) Accuracy | Use the correct AD and EFs for abandoned coal mines. | Resolved. Poland added a table to the NIR (table 3.3.3, p.102) showing the specific EFs for abandoned underground mines corresponding to the years in which coal mines closed (in accordance with the 2006 IPCC Guidelines, table 4.1.6, p.4.25). In addition, CRF table 1.B.1 presents the correct values for the AD and $CH_4$ IEFs. |
| E.14 | 1.B.2.b Natural gas – liquid fuels – $CO_2$ and $CH_4$ (E.12, 2016) (E.12, 2015) (36, 2014) (44, 2013) (55, 2012) Transparency | Use the correct notation key for other leakages in the residential and commercial sectors and provide in the NIR and documentation box of CRF table 1.B.2 an adequate explanation for the notation key used. | Resolved. Poland provided further explanation in the documentation box of CRF table 1.B.2 and made a cross reference to NIR section 3.3.2.2.2 (p.111). |
| IPPU | | | |
| I.1 | 2.A.1 Cement production – $CO_2$ (I.15, 2016) (I.15, 2015) Transparency | Include information clarifying the calculation of $CO_2$ emissions from clinker production, including the derivation of the $CO_2$ EF. | Resolved. Poland provided the required information in the NIR (section 4.2.2.1, p.116). |
| I.2 | 2.A.1 Cement production – $CO_2$ (I.15, 2016) (I.15, 2015) Accuracy | Make an effort to collect data so as to be able to calculate country-specific EFs for 1988–2000. | Resolved. Poland provided information in the NIR (section 4.2.2.1, p.116) on the efforts made, and on the limitations encountered, to gather the necessary data for 1988–2000. The Party explained that data for 1988–2004 were obtained directly from the cement plants; however, the study supporting the country-specific EFs calculated $CO_2$ emissions for 2001–2004 only. Since the calcination factor serving as the basis for the calculation of the country-specific EFs was higher for 2001–2004 than for 1988–2000 (525 kg $CO_2$/t clinker), the Party used the 2001–2004 EF average for 1988–2001. |
| I.3 | 2.C.4 Magnesium production – $SF_6$ (I.8, 2016) (I.8, 2015) (58, 2014) Accuracy | Implement the new data from the Polish Geological Institute and ensure the consistent reporting of $SF_6$ arising from magnesium | Addressing. Poland informed the previous ERT that new data from the Polish Geological Institute would be explored. During this review, Poland clarified that the data were not sufficient and that it is investigating other data sources to update the estimated emissions from magnesium casting. The Party explained that for |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | | production across the time series. | the 2018 submission it used the same values as in previous years as the best option available. |
| I.4 | 2.F.1 Refrigeration and air conditioning – HFCs (I.11, 2016) (I.11, 2015) (49 and 50, 2014) (63(b), 2013) (72, 2012) Transparency | Change the notation key used for HFC-23 and HFC-152a under the subcategory refrigeration and air-conditioning equipment in CRF table 2(II). | Resolved. During the review, Poland provided evidence that the F-gas market does not import HFC-23 and HFC-152a (including no blends of R508A and R508B) (see also ID# I.5 below). CRF table 2(II) contains blank cells for HFC-23 and HFC-152a emissions for this category and no notation keys were reported. However, it happens because no AD were reported in CRF table 2(II)B-Hs2 (nodes for HFC-23 and HFC-152a were not reported). |
| I.5 | 2.F.1 Refrigeration and air conditioning – HFCs (I.11, 2016) (I.11, 2015) (49 and 50, 2014) (63(b), 2013) (72, 2012) Transparency | Include in the NIR a relevant analysis of the national F-gas market and an explanation for the lack of HFC-23 and HFC-152a emissions from refrigeration and air-conditioning equipment. | Not resolved. Poland informed the ERT that analysis of the existing F-gas market with respect to HFC-23 and HFC-152a was carried out using a database of F-gas users and importers (see also ID# I.4 above). The Party clarified that it will include the relevant analysis and an explanation for the lack of F-gases in its next submission. |
| I.6 | 2.F.1 Refrigeration and air conditioning – HFCs (I.12, 2016) (I.12, 2015) (49 and 52, 2014) Transparency | Include the information provided to the ERT during the review on the data QC checks for the subcategory transport refrigeration (to justify the use of only HFC-134a). | Resolved. The original issue relates to the reporting of only one F-gas (HFC-134a) under transport refrigeration, which was deemed unusual by the ERT. The ERT noted that in the 2018 submission the Party reported HFC-32, HFC-125, HFC-134a and HFC-143a under transport refrigeration in CRF table 2(II)B-Hs2 and relevant assumptions are included in the NIR (pp.151–153), indicating improved data QC checks for the subcategory. |
| I.7 | 2.F.1 Refrigeration and air conditioning – HFCs (I.13, 2016) (I.13, 2015) (49 and 53, 2014) (63(c), 2013) Transparency | Justify in the NIR the 15-year lifetime used for transport refrigeration. | Not resolved. Poland did not include any information in the NIR to justify the country-specific lifetime applied (15 years) for transport refrigeration. During the review, the Party explained that the main reason for introducing country-specific values is that transport equipment in Poland is used for a much longer period of time than in Western Europe for economic reasons. The ERT agreed with Poland as statistical data from the United Nations Economic Commission for Europe demonstrate that the lorry fleet in Poland is older than 10 years. |
| Agriculture | | | |
| A.1 | 3. General (agriculture) (A.1, 2016) (A.1, 2015) (63, 2014) (73, 2013) Transparency | Document the main findings of the sector-specific QA/QC activities, particularly the reasons for any discrepancies between EFs applied in Poland and those applied in other countries and international literature, in the category-specific subchapters of the NIR. | Addressing. Poland included some qualitative information in the NIR (section 5.2.2, pp.168–169) on the tier 2 approach applied for cattle under category 3.A (for other livestock, tier 1 was applied (p.167)). The Party explained that the parameters required to estimate gross energy intake are from national statistics, whereas digestible energy values are provided by a national research institute. The Party also explained that the country-specific EF is higher than the IPCC default but is in the lower range of EFs applied for other European countries. A similar explanation is provided in the NIR (section 5.3.2.1, pp.174–175) for category 3.B. However, no reasons are given for the discrepancies between the EFs applied by Poland and those applied by other countries |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | | | and in international literature, as alluded to in the NIR (section 5.2.4, p.171) (source-specific QA/QC and verification). Moreover, the Party did not provide any cross reference in the QA/QC section to the pages of the NIR containing a qualitative discussion of the comparison of the country-specific EF and methodologies with international literature and other countries' methods and EFs. The ERT noted that inclusion of a table illustrating the comparison with other Parties and international literature could provide the necessary documentation for the QA/QC activities in the sector. |
| A.2 | 3. General (agriculture) (A.2, 2016) (A.2, 2015) (65, 2014) (76, 2013) Transparency | Provide a transparent explanation for the use of specific livestock census statistics, including the additional information provided during the review indicating that reference date population data from the summer census (June–July) are chosen mainly because there are no consistent time series for other census data and that the summer census data also correspond to the data reported to the Food and Agriculture Organization of the United Nations. | Resolved. Poland included the required information in the NIR (section 5.5.2, pp.165–166). |
| A.3 | 3.A Enteric fermentation – $CH_4$ (A.3, 2016 ) (A.3, 2015) (66, 2014) (79, 2013) Transparency | Include additional information on the methods and assumptions used to derive the gross energy intake values by livestock subcategory. | Not resolved. Poland did not add any further information to the NIR (section 5.2.2). CRF table 3.As2 presents additional information on enteric fermentation; however, there is not enough information on the parameters used to estimate gross energy intake, such as parameters per animal type and fat content. During the review, Poland provided the ERT with information on all parameters. |
| A.4 | 3.A Enteric fermentation – $CH_4$ (A.4, 2016) (A.4, 2015) (67, 2014) (79, 2013) Transparency | Provide data justifying the lower body weight of dairy cattle used in the inventory. | Resolved. Poland added text to the NIR (section 5.2.2, p.169) justifying the lower body weight of dairy cattle applied. |
| A.5 | 3.A Enteric fermentation – $CH_4$ (A.15, 2016) (A.15, 2015) Transparency | Ensure consistency between the NIR and the CRF tables when reporting the methods used for the emission estimates. | Resolved. Poland updated the information in CRF table Summary 3s2 to reflect the correct method applied and reported accordingly in the NIR (section 5.2.2, pp.167–168). |
| A.6 | 3.B Manure management – $CH_4$ and $N_2O$ (A.6, 2016) (A.6, 2015) (69, 2014) (81, | Provide additional information that justifies the distribution of animal waste management systems used (including, for example, information on general | Addressing. Poland provided additional information in the NIR (p.174) on the source of data used to identify livestock populations and their animal waste management systems. However, it did not provide a detailed explanation of the methods used to estimate |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | 2013) (90, 2012) Transparency | agricultural structures and policies). | manure allocation per animal waste management system. |
| A.7 | 3.B Manure management – $CH_4$ (A.8, 2016) (A.8, 2015) (71, 2014) (82, 2013) Transparency | Separately report $CH_4$ emissions from anaerobic digesters. | Addressing. During the review, the Party informed the ERT that specific data on manure applied in agricultural biogas plants are being collected. |
| A.8 | 3.B Manure management – $CH_4$ (A.16, 2016) (A.16, 2015) Transparency | Correctly label the method as a tier 1 method for the estimation of $CH_4$ emissions from manure management for swine. | Resolved. Poland reported the use of a tier 1 method for swine in the NIR (section 5.3.2.1, p.174). |
| A.9 | 3.B Manure management – $CH_4$ (A.17, 2016) (A.17, 2015) Transparency | Correct the errors in the $CH_4$ EFs for manure management for cattle and swine presented in table 5.9 of the NIR. | Resolved. Poland updated the values in NIR table 5.9 (p.175). The ERT verified that these are in accordance with CRF table 3.B(a)s1. |
| A.10 | 3.B Manure management – $CH_4$ (A.18, 2016) (A.18, 2015) Transparency | Improve the transparency of the reporting on $CH_4$ emissions from manure management by including information on the manure management system for poultry provided to the ERT during the review. | Resolved. Poland corrected NIR section 5.3.2 (p.173) to reflect that animal waste management systems for poultry are 11 per cent litter-free and 89 per cent solid storage. In table 5.11 (p.177) the EF for $N_2O$ emissions is separated by poultry manure with and without litter. |
| A.11 | 3.B Manure management – $CH_4$ and $N_2O$ (A.22, 2016) (A.22, 2015) Transparency | Improve the transparency of the characterization of fur-bearing animals by reporting the population trend for rabbits, foxes, minks and polecats in the NIR and ensure consistency of reporting between the NIR and the CRF tables for rabbits and other fur-bearing animals. | Addressing. Poland improved the information in the NIR by including in table 5.2 (p.166) livestock population trends for rabbits and fur-bearing animals separately (in the section on enteric fermentation, category 3.A). However, it did not provide any clarification on the characterization of fur-bearing animals; for example, by explaining that fur-bearing animals in Poland consist of rabbits, foxes, minks and polecats, and that the emissions in CRF table 3.B(a)s1 are reported separately for rabbits and other fur-bearing animals. In addition, the Party did not clarify in NIR table 5.7 (on trends in $CH_4$ emissions) which kind of fur-bearing animals are considered (if rabbits are included or not). |
| A.12 | 3.D Direct and indirect $N_2O$ emissions from agricultural soils – $N_2O$ (A.11, 2016) (A.11, 2015) (64, 2014) (71, 2013) Adherence to the UNFCCC Annex I inventory reporting guidelines | Report the assumptions and methods used to estimate uncertainty, and apply methods provided in the IPCC good practice guidance to combine uncertainties. | Not resolved. The uncertainty assessment in chapter 5.2.3 is only a general summary and the NIR does not contain information on the uncertainties of AD and EFs to estimate the combined uncertainty for the category. |
| A.13 | 3.D.a Direct $N_2O$ emissions from | Consider explaining in the NIR how the trend in the | Resolved. Poland corrected the information in the NIR (section 5.4.2.1, pp.183–184) to explain that AD for |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | managed soils – $N_2O$ (A.24, 2016) (A.24, 2015) Consistency | annual mean changes in AD for 2003–2009 has been used to estimate the amount of sewage sludge application for 1988–2002. | 1988–2002 were estimated on the basis of annual mean changes of the AD for 2003−2009 (where AD increase over that period) and no longer in 2003–2012 (as noted by the previous ERT). The Party also explained that the decreasing trend back to 1988 corresponds to the number of people using sewage treatment plants, which has climbed from 11 million in 1988 to 28 million in 2016. |
| A.14 | 3.D.a Direct $N_2O$ emissions from managed soils – $N_2O$ (A.25, 2016) (A.25, 2015) Transparency | Improve QA/QC to ensure that the reference to the table containing AD for crop production is correct and that table 5.23 is included in the NIR. | Not resolved. The NIR (p.185) still refers to a missing table 5.23 to demonstrate the data coming from the country studies (e.g. data on N content of above-ground residues, ratio of above-ground residues in dry matter to harvested yield for crops, fraction of crops burned); and to table 5.12 for AD concerning crop production. During the review, Poland informed the ERT that the errors will be amended in its next submission. |
| A.15 | 3.D.a.2 Organic N fertilizers – $N_2O$ (A.23, 2016) (A.23, 2015) Completeness | Account for the additional N from bedding material as part of the managed manure N applied to soils in accordance with the 2006 IPCC Guidelines. | Resolved. Poland reported in the NIR (section 5.4.2.1, p.183) that N in bedding material had been included in the estimates. Recalculations were explained in the previous NIR. The estimated $N_2O$ emissions increased from 4.35 to 4.77 kt $N_2O$ for 2014 in the 2017 submission. In response to the list of potential problems raised by the ERT (see ID# A.18 in table 5), $N_2O$ emissions for this category increased to 5.32 kt $N_2O$ (for 2014) in the 2018 submission. For 2016 the emissions are 5.36 kt $N_2O$. |
| A.16 | 3.G Liming – $CO_2$ (A.26, 2016) (A.26, 2015) Transparency | Provide more information on the different types of lime applied to soils as well as the rationale for the assumptions used to derive the amounts of each applied. | Resolved. Poland included more information on lime applied to soils in the NIR (section 5.6.2, p.193). |
| LULUCF | | | |
| L.1 | 4. General (LULUCF) (L.1, 2016) (L.1, 2015) (78, 2014) (94, 2013) (98, 2012) Transparency | Provide detailed information on the rationale for and impact of the recalculations for the LULUCF sector. | Addressing. Poland included information in the NIR (section 6.6.7, p.230) on the impacts of the recalculations between the 2017 and 2018 submissions for the entire time series. In terms of rationale, the ERT noted that further explanatory information is needed in accordance with paragraphs 44–45 of the UNFCCC Annex I inventory reporting guidelines. For example, although the Party indicated in its NIR (section 6.6.7, p.231) that recalculations were performed for category 4.A on the adjustment of the carbon stocks calculation, the ERT could not find a detailed explanation of that recalculation in the NIR, whether in section 6.4.7 (p.223) or elsewhere. |
| L.2 | 4. General (LULUCF) (L.2, 2016) (L.2, 2015) (table 3 and para. 79, 2014) (table 3 and paras. 105– | Estimate and report the carbon stock changes from all mandatory categories. | Addressing. Poland informed the ERT during the review that it had provided relevant estimates for carbon stock changes in CRF tables 4.B and 4.E for land converted to cropland (category 4.B.2) and land converted to settlements (category 4.E.2) and that it had identified no further categories for which the reporting of carbon stock changes was mandatory. However, the ERT noted that for the categories raised |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | 108, 2013) Completeness | | in the original recommendation, the Party reported values for living biomass under categories 4.B.2.2 (for 1990, 2005, 2007 and 2008) and 4.E.2.2 (for the entire time series); for organic soils under categories 4.B.2.2 and 4.C.2.2 the notation key "NO" is still reported in CRF tables 4.B and 4.C for the entire time series; for category 4.E.2.4, the notation key "NO" is reported for carbon stock changes in living biomass and organic soils; and the notation key "NO" is reported for $N_2O$ emissions from land converted to cropland (category 4.B.2 in CRF table 4(III)). To resolve this issue, the Party should estimate and report the carbon stock change for all these categories or provide justification for the exclusion of these emissions from the inventory. |
| L.3 | 4. General (LULUCF) (L.4, 2016) (L.4, 2015) (82, 2014) Adherence to the UNFCCC Annex I inventory reporting guidelines | Provide in the NIR the data sources used for the uncertainty assumptions of the AD and EFs for each category or carbon pool. | Resolved. Poland provided information on the data sources for the uncertainty assumptions of the AD and EFs in the NIR (annex 8, p.420). |
| L.4 | 4. General (LULUCF) (L.26, 2016) (L.26, 2015) Accuracy | Apply different $F_{LU}$ or $F_{MG}$ values for different land-use or management categories in accordance with the 2006 IPCC Guidelines. | Not resolved. For organic carbon stocks in mineral soils, Poland continued to use the same reference carbon stock values ($F_{LU}$, $F_{MG}$ and $F_I$) for time "T" and time "T-20" (from the 2006 IPCC Guidelines, volume 4, equation 2.25). |
| L.5 | 4. General (LULUCF) (L.27, 2016) (L.27, 2015) Transparency | Include in the NIR sufficient information on the rationale, the impacts and the change from the gain–loss to the stock-change method for estimating $CO_2$ emissions and removals from forest land remaining forest land for all years. | Not resolved. Poland did not include in the NIR a rationale with qualitative analysis to explain the reasons for the large changes in emissions and removals, including an evaluation of which factors and parameters had an impact on the increase in emissions and removals (for each subcategory) when the method changed from gain–loss to carbon stock change. The ERT notes that it is good practice to verify estimates of emissions and removals by comparing the results of the gain–loss and stock-change method to ensure that emissions are neither over- nor underestimated. |
| L.6 | Land representation (L.5, 2016) (L.5, 2015) (80, 2014) (105, 2012) Consistency | Include the land-use transition matrices (approach 2) in the NIR and revise the time series of the land-use change data to ensure that the total territorial area is consistent for the entire inventory period since 1988. | Resolved. Land-use transition matrices are provided in annex 6.1 to the NIR (p.411) and in CRF table 4.1. The Party explained in the NIR (p.198) that inconsistencies in the land-use matrix (approach 2) were addressed as far as possible with the available data sets, but that, owing to the combination of several different data sources, it was not possible to reduce all inconsistencies to zero and, in some years, small discrepancies remain (less than 0.00000015 per cent) in the total area of the national territory. In the NIR (section 6.1.3, p.199), the Party explained that a significant part of the Polish border runs along major rivers, large sections of which are unregulated, resulting in frequent changes in the location of mainstreams. These country area fluctuations were reflected in the changes in the area of "other land". |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| L.7 | 4.A.1 Forest land remaining forest land – $CO_2$ (L.6, 2016) (L.6, 2015) (87, 2014) Transparency | Provide more detailed information on how the national forest inventory data were factored into the calculation to estimate the growing stock volume since 2009. | Not resolved. Poland did not provide any qualitative information in the NIR (section 6.2.4.3) to explain how the national forest inventory data were factored into the calculation to estimate the growing stock volume since 2009. The previous ERT had asked the Party to explain its assertion that important changes related to the volume stock of merchantable timber as well as the average volume between 2008 and 2009 were a consequence of the introduction of the national forest inventory system in 2005, with the earliest results of the national forest inventory available since 2009; and to show the consistency of the carbon stock changes in above-ground biomass for 2009 by using the mean of the difference in the annual average growing stock volume per ha compared with the previous year between 2008 (2007–2008) and 2010 (2009–2010) by interpolation. During the review, the Party provided the ERT with a spreadsheet showing how the growing stock volume had been factored in for 2009–2016 (see also ID#s L.8 below and L.33 in table 5). |
| L.8 | 4.A.1 Forest land remaining forest land – $CO_2$ (L.7, 2016) (L.7, 2015) (87, 2014) Consistency | Seek to resolve the issue regarding time-series consistency between 2008 and 2009 for the gross timber resources using IPCC approaches. | Not resolved. Poland reported the same information in the NIR (section 6.2.4.3, p.205) as in the 2016 NIR, namely that the linear calibration of previous data (i.e. data for before 2009) was applied, but without providing the calibrated results and information on the impact of the calibration. During the review, the Party explained that it had applied a surrogate data method exclusively for 2008. However, the ERT noted that Poland did not include any information in the NIR on the use of this new approach or explained how the use of a surrogate data method has improved the time-series consistency between 2008 and 2009 for the AD for gross timber resources (as shown in table 7.5 of the 2014 NIR), given that there is no significant increase in the carbon stock in living biomass between 2008 (8,542.95 kt C) and 2009 (8,070.84 kt C). In addition, the Party did not include in its 2018 NIR similar information to that in table 7.5 of the 2014 NIR showing the AD for gross timber resources (see also ID#s L.7 above and L.33 in table 5). |
| L.9 | 4.A.1 Forest land remaining forest land – $CO_2$ (L.8, 2016) (L.8, 2015) (88, 2014) Accuracy | Explore the possibility of using country-specific values for the BEF and the root-to-shoot ratio, and indicate the results of such an attempt and its limitations in the NIR. | Addressing. Poland indicated in the NIR (sections 6.2.4.5, p.206, and 6.2.4.6, p.207) that "recent process related to the possibility of using country-specific values for BEF and root-to-shoot ratio is carried out as an independent activity in parallel to subsequent improvements introduced into the inventory preparation". During the review, Poland informed the ERT that it is planning to implement the Carbon Budget Model of the Canadian Forest Sector, and that a relevant description of the approaches and methods used will be provided in the next submission. |
| L.10 | 4.A.1 Forest land remaining forest land – $CO_2$ (L.10, 2016) (L.2, | Use consistent regions when selecting the default values among the categories, or derive a country-specific adjustment factor reflecting | Resolved. Poland is correctly using the default values (temperate, dry) for soil organic carbon stocks in forest land and the relative stock change factors for cropland and grassland, in accordance with tables 2.3, 5.5 and 6.2 of the 2006 IPCC Guidelines (volume 4). Further |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | 2015) (90, 2014) Consistency | the effect of the change from the previous forest type to the new one, using, as an interim measure, the results from the available literature. | information can be found in the NIR (sections 6.2.4.9 (table 6.11, p.210), 6.3.4.4 (p.218) and 6.4.4.3 (p.222)). |
| L.11 | 4.A.1 Forest land remaining forest land – $CO_2$, $CH_4$ and $N_2O$ (L.28, 2016) (L.2, 2015) Accuracy | Use a tier 2 or higher IPCC approach to estimate emissions from both the litter and deadwood carbon pools. | Not resolved. Poland still uses a tier 1 approach to estimate emissions from both the litter and deadwood carbon pools in forest land remaining forest land. During the review, Poland explained that it is exploring the application of a higher-tier approach but noted that, without proper sampling and data, it will not be possible to develop estimates of emissions and removals from deadwood and litter on a statistical basis (see also ID# L.19 below). |
| L.12 | 4.A.1 Forest land remaining forest land – $CO_2$, $CH_4$ and $N_2O$ (L.29, 2016) (L.2, 2015) Accuracy | Apply the correct EFs for estimating emissions from biomass burning. | Resolved. Poland corrected the values of the EFs applied (EFs for extra-tropical forest as in table 2.5 of volume 2 of the 2006 IPCC Guidelines) for estimating emissions from biomass burning on forest land (NIR section 6.2.4.11, table 6.14, p.211). |
| L.13 | 4.A.2 Land converted to forest land – $CO_2$ (L.11, 2016) (L.2, 2015) (92, 2014) Accuracy | Revise the default biomass increment value for living biomass. | Resolved. Poland has revised the default biomass increment unit from $m^3$/ha/year to t dry matter/ha/year (NIR section 6.2.5.3, table 6.15, p.213). |
| L.14 | 4.A.2 Land converted to forest land – $CO_2$ (L.12, 2016) (L.12, 2015) (93, 2014), (104, 2013) Accuracy | Further analyse the national forest inventory data and use data exclusively from age class I (1–20 years) for the estimation of the carbon stock changes in living biomass and deadwood for land converted to forest land. | Not resolved. Poland indicated in the NIR (section 6.2.5.3, p.213) that the national forest inventory did not provide annual increment data exclusively from age class I (1-20 years) and that application of the default values results in a consistent time series of both area and GHG estimates. However, it is exploring the possibility of estimating carbon stock changes in the biomass pool of newly established forests with an empirical model of growing stock over age on a unit area of afforestation. During the review, Poland informed the ERT that this will be addressed through the implementation of the Carbon Budget Model of the Canadian Forest Sector (see also ID# L.18 below). |
| L.15 | 4.A.2 Land converted to forest land – $CO_2$ (L.13, 2016) (L.13, 2015) (94, 2014) Accuracy | Apply the gain–loss method (tier 2), which follows a more disaggregated approach and allows for more precise estimates of the carbon stock changes in biomass. | Not resolved. Poland stated in the NIR (p.213) that it is exploring the possibility of estimating carbon stock changes in the biomass pool of newly established forests with an empirical model of growing stock over age on a unit area of afforestation (see also ID# L.18 below). |
| L.16 | 4.A.2 Land converted to forest land – $CO_2$ (L.14, 2016) (L.14, 2015) (94, 2014) Accuracy | Disaggregate the area converted by species and clarify in the NIR why the conversion occurs only for extensively managed forests and not intensively managed | Not resolved. Poland indicated in the NIR (p.213) that it is analysing available species-specific simplified models for young forests, using a sample of young stands of varying ages. |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | | forests, as would be the case for plantations. | |
| L.17 | 4.A.2 Land converted to forest land – $CO_2$ (L.15, 2016) (L.15, 2015) (95, 2014) Transparency | Provide in the NIR more detailed information on the estimation methods used for the carbon stock changes in the dead organic matter and soil pools. | Addressing. Poland included information in the NIR (section 6.2.5.4, p.213) on carbon stock changes in dead organic matter. Information on the estimation methods for carbon stock changes in soils is not provided in the NIR. |
| L.18 | 4.A.2 Land converted to forest land – $CO_2$ (L.30, 2016) (L.30, 2015) Accuracy | Use a higher-tier method (e.g. using national forest inventory data exclusively from age class I (1–20 years)) to estimate a country-specific biomass increment value to increase the accuracy of the estimate for the land converted to forest land category, and provide the results and the limitations encountered in the next NIR. | Not resolved. See ID#s L.14 and L.15 above. The Party also did not provide the results and the limitations encountered to estimate a country-specific biomass increment value. |
| L.19 | 4.A.2 Land converted to forest land – $CO_2$ (L.31, 2016) (L.31, 2015) Accuracy | Account for emissions and removals from deadwood and litter following the 2006 IPCC Guidelines (volume 4, chapter 2.3.2) with the highest possible tier approach. | Not resolved. Poland still used a tier 1 approach to estimate emissions from both the litter and deadwood carbon pools. During the review, the Party explained that without proper sampling and data it is not possible to develop estimates of emissions and removals from deadwood and litter on a statistical basis. Since conversion of non-forest land to forest land almost certainly results in net removals in the dead organic matter and litter pools, reporting "NO" (application of "a not a source provisions") for these pools is considered by the Party the most acceptable approach for land converted to forest land until a more advanced estimation is possible. |
| L.20 | 4.A.2 Land converted to forest land – $CO_2$ (L.32, 2016) (L.32, 2015) Transparency | Correct the default biomass increment unit used for estimating $CO_2$ emissions and removals from land converted to forest land. | Resolved. Poland has revised the biomass increment unit from $m^3$/ha/year to t dry matter/ha/year (see also ID# L.13 above). |
| L.21 | 4.A.2.1 Cropland converted to forest land – $CO_2$ (L.16, 2016) (L.16, 2015) (86, 2014) Transparency | Provide evidence that no orchards have been converted to forest land. | Resolved. Poland provided additional information in the NIR (section 6.2.5.1, p.212) on some ordinances and laws limiting the conversion of orchards to forest land. |
| L.22 | 4.B.1 Cropland remaining cropland – $CO_2$ (L.17, 2016) (L.17, 2015) (96, 2014) Transparency | Provide the interpolated and extrapolated results for the area of cropland under different soil types. | Resolved. Interpolated and extrapolated results for the area of cropland under different soil types are provided in NIR table 6.17 (p.217). |
| L.23 | 4.B.2.2 Grassland converted to | Explain why a gain in carbon stock in living | Resolved. Poland revised the estimates for the entire time series. Grassland was converted to cropland in |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | cropland – $CO_2$ (L.19, 2016) (L.19, 2015) (98, 2014) Transparency | biomass occurred only in 2003 and clarify why the loss of living biomass occurred in 2004 (one year after the conversion). | 1990, 2005, 2007 and 2008 and losses are properly accounted for in the inventory. Gains are reported as "NO". |
| L.24 | 4.C.1 Grassland remaining grassland – $CO_2$ (L.20, 2016) (L.20, 2015) (99, 2014) Transparency | Provide details in the NIR regarding the calculation of carbon stock changes in soils. | Resolved. The relevant information is provided in the NIR (section 6.4.4.3, p.222). |
| L.25 | 4.C.2 Land converted to grassland – $CO_2$ (L.21, 2016) (L.21, 2015) (100, 2014) Accuracy | Include information on the extrapolated results from 2000 for the area of grassland under different soil types. | Resolved. The relevant information is provided in the NIR (section 6.4.4.3, table 6.21, p.221). |
| L.26 | 4.C.2 Land converted to grassland – $CO_2$ (L.22, 2016) (L.22, 2015) (100, 2014) Accuracy | Use the relative stock change factors from the IPCC good practice guidance. | Resolved. Poland is using the correct value for the relative stock change factors (NIR section 6.4.4.3, p.222) in accordance with table 6.2 of the 2006 IPCC Guidelines (volume 4, p.6.16). |
| L.27 | 4.E.2.2 Cropland converted to settlements – $CO_2$ (L.24, 2016) (L.24, 2015) (84, 2014) (98, 2013) Transparency | Clearly explain the allocation of the emissions and removals from all carbon pools in the category cropland converted to settlements. | Not resolved. Poland reported in the 2018 submission the notation key "IE" only for gains in carbon stock change in living biomass in CRF table 4.E. However, it did not insert any comments to the cell or include any information in the documentation box indicating the allocation. During the review, the Party indicated that relevant information was provided in the NIR (section 6.6.4.2, p.228), but the ERT could not find any information related to cropland converted to settlements. |
| L.28 | 4(V) Biomass burning – $CO_2$ (L.25, 2016) (L.25, 2015) (101, 2014) Transparency | Provide more information on the values used for mass of available fuel, fraction of biomass combusted and EFs to estimate non-$CO_2$ emissions from wildfires. | Addressing. Poland provided information on the EFs and on the mass of grassland biomass fuel in the NIR for estimates of non-$CO_2$ emissions from wildfires (sections 6.2.4.11, p.206, and 6.4.4.5, p.222). However, it did not provide any information on mass of forest biomass fuel and fraction of biomass combusted. |
| Waste | | | |
| W.1 | 5.D.1 Domestic wastewater – $N_2O$ (W.5, 2016) (W.5, 2015) (112, 2014) Accuracy | Update the values of protein consumption to the latest available data in FAOSTAT. | Resolved. Poland updated the amount of animal and vegetal protein consumption per capita per year in accordance with FAOSTAT (NIR section 7.5.2.1, pp.263–264). |
| W.2 | 5.C.1 Waste incineration – $CO_2$ (W.6, 2016) (W.6, 2015) Consistency | Report the corrected estimates for municipal solid waste incineration. | Resolved. Poland updated the estimates for municipal solid waste incineration (see NIR section 7.4.2.1, p.255, and tables 7.18, 7.19, 7.20 and 7.21). See also ID# W.3 below. |
| W.3 | 5.C.1 Waste incineration – $CO_2$ (W.6, 2016) (W.6, | Appropriately describe the recalculation in the NIR when reporting the corrected | Not resolved. Poland corrected the estimates for municipal solid waste incineration (see ID# W.2 above). The Party reported in the NIR that recalculations were performed to reflect changes in the amount of |

| *ID#* | *Issue and/or problem classification*[a,b] | *Recommendation made in previous review report* | *ERT assessment and rationale* |
|---|---|---|---|
| | 2015)<br>Transparency | estimates for municipal solid waste incineration. | incinerated municipal waste in 2015 only (see NIR, section 7.4.5). However, the ERT noted that changes were also made to the composition of incinerated municipal waste (table 7.21) and the fraction of biogenic and non-biogenic waste (table 7.18). The ERT notes that, according to paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines, recalculations should be reported with explanatory information and justification, including an indication of changes in the methods, EFs and AD used. |
| KP-LULUCF | | | |
| KL.1 | General (KP-LULUCF) – $CO_2$ (KL.1, 2016) (KL.1, 2015) (121, 2014)<br>Transparency | Provide more detailed information in the NIR on the methodologies and assumptions applied for each pool. | Addressing. Detailed information on the methodologies, EFs and assumptions is still lacking for several pools, such as biomass burning, for which the mass of forest biomass fuel and the fraction of biomass combusted were not provided; and carbon stock change in soils on land converted to forest land (see also ID#s L.28 and L.17 above). |
| KL.2 | General (KP-LULUCF) – $CO_2$ (KL.4, 2016) (KL.4, 2015)<br>Accuracy | Provide consistent values for land area for the entire time series and correct the rounding errors in order to ensure compliance with decision 2/CMP.8, annex II, paragraph 2(d), noting also footnote 7 to CRF table NIR-2, which states that "the total land area should be the same for the current inventory year and the previous inventory year". | Resolved. Land-use transition matrices are provided in annex 6 to the NIR and in CRF table 4.1. During the review, Poland explained that, according to the statistical office, country total area variations were driven mainly by geodesic remeasurements at subsequent surveys. The instability of the country's borders was considered the main cause of relative area changes. For instance, Poland's coastline is constantly changing as a result of water erosion, and due to land border movement. A significant part of the Polish border runs along major rivers, large sections of which are unregulated, resulting in frequent changes in the location of mainstreams. Country area fluctuations were reflected in the changes in the area of other land. Differences equate to less than 0.00000015 per cent (see also ID# L.6 above). |
| KL.3 | General (KP-LULUCF) – $CO_2$, $CH_4$ and $N_2O$ (KL.5, 2016) (KL.5, 2015)<br>Accuracy | Provide a list in the NIR summarizing any methodological inconsistencies that may trigger a technical correction. | Not resolved. Poland informed the ERT during the review that since the systematic implementation of ERT recommendations in its LULUCF GHG inventory has triggered methodological changes for some estimations, it intends to submit a technical correction together with a list of any methodological inconsistencies between the FMRL and the GHG inventory at a later stage to implement any potential changes resulting from the evaluation of the GHG inventory. |
| KL.4 | FM – $CO_2$ (KL.6, 2016) (KL.6, 2015)<br>Transparency | Provide a more detailed explanation to demonstrate that the deadwood and litter pools under FM are not a net source of $CO_2$ emissions. | Resolved. Poland provided additional information in the NIR (section 6.2.4.8, p.208, and section 11.3.1.1, p.307) to demonstrate that the deadwood and litter pools are not a net source of $CO_2$ emissions. |

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue and/or problem was raised. Issues are identified in accordance with paragraphs 80–83 of the UNFCCC review guidelines and classified as per paragraph 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with paragraph 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

[b] The review of the 2017 annual submission of Poland did not take place in 2017 and, as such, the 2017 annual review report was not available at the time of this review. Therefore, the recommendations reflected in table 3 are taken from the 2016 annual review report. For the same reason, the year 2017 is excluded from the list of years in which the issue has been identified.

# IV. Issues identified in three successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues included in table 4 have been identified in three successive reviews, including the review of the 2018 annual submission of Poland, and have not been addressed by the Party.

Table 4
**Issues identified in three successive reviews and not addressed by Poland**

| *ID#* | *Previous recommendation for the issue identified* | *Number of successive reviews issue not addressed*[a] |
|---|---|---|
| General | | |
| | No such general issues were identified | |
| Energy | | |
| E.1 | Elaborate on the description of how the Party maintains time-series consistency while using different sources of AD | 5 (2012–2018) |
| E.2 | Improve the reporting of the details of the annual QA/QC measures implemented in the energy sector and provide information on the cross-checks made among the national statistics data, the Eurostat data and the EU ETS data, as well as information on any validation of EFs by comparison with the EU ETS data | 5 (2012–2018) |
| E.8 | Complete and report on the planned development of country-specific $CO_2$ EFs for the significant fuels in the energy sector, and consider applying the country-specific $CO_2$ EF for gasoline used in road transportation to stationary combustion | 5 (2012–2018) |
| E.9 | Apply a tier 2 method to estimate $CH_4$ emissions from stationary combustion (solid fuels and biomass) | 4 (2013–2018) |
| IPPU | | |
| I.3 | Implement the new data from the Polish Geological Institute and ensure the consistent reporting of $SF_6$ arising from magnesium production across the time series | 3 (2014–2018) |
| I.5 | Include in the NIR a relevant analysis of the national F-gas market and an explanation for the lack of HFC-23 and HFC-152a emissions from refrigeration and air-conditioning equipment | 5 (2012–2018) |
| 1.7 | Justify in the NIR the 15-year lifetime used for transport refrigeration | 4 (2013–2018) |
| Agriculture | | |
| A.1 | Document the main findings of the sector-specific QA/QC activities, particularly the reasons for any discrepancies between EFs applied in Poland and those applied in other countries and international literature, in the category-specific subchapters of the NIR | 4 (2013–2018) |

| *ID#* | *Previous recommendation for the issue identified* | *Number of successive reviews issue not addressed*[a] |
|---|---|---|
| A.3 | Include additional information on the methods and assumptions used to derive the gross energy intake values by livestock subcategory | 4 (2013–2018) |
| A.6 | Provide additional information that justifies the distribution of animal waste management systems used (including, for example, information on general agricultural structures and policies) | 5 (2012–2018) |
| A.7 | Separately report $CH_4$ emissions from anaerobic digesters | 4 (2013–2018) |
| A.12 | Report the assumptions and methods used to estimate uncertainty, and apply methods provided in the IPCC good practice guidance to combine uncertainties | 4 (2013–2018) |
| LULUCF | | |
| L.1 | Provide detailed information on the rationale for and impact of the recalculations for the LULUCF sector | 5 (2012–2018) |
| L.2 | Estimate and report the carbon stock changes from all mandatory categories | 4 (2013–2018) |
| L.7 | Provide more detailed information on how the national forest inventory data were factored into the calculation to estimate the growing stock volume since 2009 | 3 (2014–2018) |
| L.8 | Seek to resolve the issue regarding time-series consistency between 2008 and 2009 for the gross timber resources using IPCC approaches | 3 (2014–2018) |
| L.9 | Explore the possibility of using country-specific values for the BEF and the root-to-shoot ratio, and indicate the results of such an attempt and its limitations in the NIR | 3 (2014–2018) |
| L.14 | Further analyse the national forest inventory data and use data exclusively from age class I (1–20 years) for the estimation of the carbon stock changes in living biomass and deadwood for land converted to forest land | 4 (2013–2018) |
| L.15 | Apply the gain–loss method (tier 2), which follows a more disaggregated approach and allows for more precise estimates of the carbon stock changes in biomass | 3 (2014–2018) |
| L.16 | Disaggregate the area converted by species and clarify in the NIR why the conversion occurs only for extensively managed forests and not intensively managed forests, as would be the case for plantations | 3 (2014–2018) |
| L.17 | Provide in the NIR more detailed information on the estimation methods used for the carbon stock changes in the dead organic matter and soil pools | 3 (2014–2018) |
| L.27 | Clearly explain the allocation of the emissions and removals from all carbon pools in the category cropland converted to settlements | 4 (2013–2018) |
| L.28 | Provide more information on the values used for mass of available fuel, fraction of biomass combusted and EFs to estimate non-$CO_2$ emissions from wildfires | 3 (2014–2018) |
| Waste | | |
| | No such issues for the waste sector were identified | |

| *ID#* | *Previous recommendation for the issue identified* | *Number of successive reviews issue not addressed*[a] |
|---|---|---|
| KP-LULUCF | | |
| KL.1 | Provide more detailed information in the NIR on the methodologies and assumptions applied for each pool | 3 (2014–2018) |

[a] The review of the 2017 annual submission of Poland did not take place in 2017. Therefore, the year 2017 is not taken into account when counting the number of successive years in table 4. In addition, as the reviews of the 2015 and 2016 annual submissions were held in conjunction with each other, they are not considered "successive" years and 2015/2016 is considered as one year.

# V. Additional findings made during the individual review of the 2018 annual submission

10. Table 5 contains findings made by the ERT during the individual review of the 2018 annual submission of Poland that are additional to those identified in table 3.

Table 5
**Additional findings made during the individual review of the 2018 annual submission of Poland**

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| General | | | |
| G.4 | Inventory management | The ERT noted that Poland provided in the NIR (section 10.4.1, p.276) a list of recommendations from the previous review, for some of which implementation is ongoing and will be delivered for future submissions. The ERT also noted that the Party reported source-specific planned improvements in the sectoral chapters of the NIR but did not compile a consolidated, prioritized plan or list and did not describe the process for prioritizing and assessing improvement activities. During the review, Poland explained that the Party's inventory team had elaborated a 'living' list, which is systematically updated and covers recommendations from international reviews as well as those resulting from self-assessment. Internal meetings are organized throughout the year for inventory compilers to discuss progress and possibilities to improve methodologies for estimating emissions using country-specific data.<br><br>The ERT encourages Poland to include in the NIR a description of how planned improvements are consolidated and prioritized. The ERT also encourages the Party to include in the NIR a list of the key categories prioritized in the improvement plan, highlighting the status of any improvements. | Not an issue/problem |
| G.5 | Article 3, paragraph 14, of the Kyoto Protocol | Poland reported in the NIR (chapter 15) on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. The changes concern the amount of climate aid donated in 2016, the beneficiary countries and the proportion of aid provided for adaptation, emission reduction and horizontal projects. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent. | Not an issue/problem |
| Energy | | | |
| E.15 | Feedstocks, reductants and other NEU of fuels – solid fuels – $CO_2$ | The ERT noted that, in CRF table 1.A(d), Poland reported $CO_2$ emissions from other bituminous coal as "NO" (in cell I30), although AD of 3,660 TJ were reported. During the review, Poland explained that $CO_2$ emissions from other bituminous coal are included in the IPPU sector under categories 2.C.1 and 2.C.2 and that the notation key "IE" should have been reported. However, the ERT is of the view that Poland should report in the CRF table the $CO_2$ emissions associated with the use of bituminous coal as NEU instead of reporting the notation key "IE".<br><br>The ERT recommends that Poland report in CRF table 1.A(d) the $CO_2$ emissions associated with the use of other bituminous coal as NEU (cell I30), and report under column J (cell J30) in which categories the $CO_2$ emissions are reported in the IPPU sector in accordance with footnote 3 to the CRF table. | Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines |
| E.16 | 1.A.3.b Road transportation – liquid fuels – $CO_2$, $CH_4$ and $N_2O$ | Poland uses the COPERT IV model to calculate emissions under category 1.A.3.b (road transport). The ERT noted that it was unclear from the information in the NIR how emissions from combustion of lubricants are considered in the inventory. During the review, Poland clarified that rough estimates indicated insignificant emissions of $CO_2$ from this activity and that setting up the COPERT model to include emissions from lubricant combustion was | Yes. Transparency |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| | | difficult. The ERT understands that the source may be insignificant but considers that such information should be included in the NIR for transparency purposes.<br><br>The ERT recommends that Poland include in the NIR information on how combustion of lubricants is considered in the inventory and, if it is insignificant, provide a justification based on the likely level of emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. | |
| E.17 | 1.A.4 Other sectors – liquid fuels – $CO_2$, $CH_4$ and $N_2O$ | Poland reported in its NIR (annex 2, tables 11 and 12, pp.370–375) the consumption of motor gasoline as "zero" for categories 1.A.4.a and 1.A.4.b. The ERT noted that motor gasoline is used under these categories for off-road vehicles and machinery (subcategories 1.A.4.a(ii) and 1.A.4.b(ii)); however, upon checking CRF table 1.A(a)s4, the ERT also noted that the Party had reported the notation key "IE" and added the comment "included in 1.A.3". It was unclear to the ERT whether or not motor gasoline was consumed in the country (in the residential and commercial sectors) and why the notation key "IE" had been reported. The ERT further noted that the notation key is reported for all fuels under subcategories 1.A.4.a(ii) and 1.A.4.b(ii). During the review, Poland explained that statistics for AD for off-road vehicles and machinery are provided together with those for fuel use in road transport (category 1.A.3.b) and that separating those data would not be possible.<br><br>The ERT recommends that Poland explain in the NIR (e.g. in a footnote to tables 11 and 12 in annex 2) whether or not consumption of motor gasoline occurs under subcategories 1.A.4.a(ii) and 1.A.4.b(ii), and that it use the documentation box in CRF table 1.A(a)s4 and CRF table 9 to explain the inclusion of emissions (related to all fuels) from off-road vehicles and machinery in the road transport emissions. | Yes. Transparency |
| IPPU | | | |
| I.8 | 2.B.2 Nitric acid production – $CO_2$ | The ERT noted that Poland reported in the NIR (section 4.3.2.2, p.127) that country-specific EFs are obtained from all nitric acid producers (from five installations run by four enterprises); and that AD were taken from Statistics Poland for the entire 1988–2016 period. It was unclear to the ERT whether the AD reported by the Party covers all nitric acid produced, including production integrated into larger production processes that do not enter into commerce and may not be included in national statistics. During the review, Poland explained that, to ensure the AD covered all nitric acid production, it compared the data provided by Statistics Poland with those reported by the installations, that owing to national obligations have to report their annual production and volume of emissions to the national database (data available for 2005 onward). A comparison of the statistical data from the two data sets, provided by the Party in Excel format, showed only slight variations for certain years (from –1.3 to +2.6 per cent), indicating that all production was covered by the statistical data.<br><br>The ERT recommends that Poland include in the NIR information on how the Party ensures that the AD cover all nitric acid production in the country, for example by including an explanation of the performed comparison between the statistical data and data from installations using nitric acid for larger production processes and the results obtained. | Yes. Transparency |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| I.9 | 2.F Product uses as substitutes for ozone-depleting substances – HFCs | During the review, the ERT noted that some information in the NIR was incorrectly reported. In section 4.7.1 (p.150) Poland reported that the data used to estimate emissions for the GHG inventory are based on aggregate data collected by operators under Article 3, paragraph 6, of EU regulation 842/2006; however, this legislation has been repealed by EU regulation 517/2014. Moreover, the share of gases and mixes for commercial refrigerators reported in NIR table 4.7.2 (p.152) differ from those given in table 7.8 of the 2006 IPCC Guidelines (volume 3, chapter 7, p.7.44). The Party acknowledged the errors and explained that the difference in composition is a result of the editorial error in NIR table 4.7.2 and that the emissions are calculated correctly.<br><br>The ERT recommends that Poland include in the NIR (section 4.7.1) the correct reference to EU regulation 517/2014 and correct the data on the share of gases and mixes for commercial refrigerators in NIR table 4.7.2 to ensure consistency with the 2006 IPCC Guidelines (volume 3, chapter 7, table 7.8). | Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines |
| I.10 | 2.F Product uses as substitutes for ozone-depleting substances – $SF_6$ and $NF_3$ | The ERT noted that Poland reported the notation key "IE" in CRF table Summary 3s1 for category 2.F under "method applied" and "emission factor" for both $SF_6$ (cells L24 and M24) and $NF_3$ (cells P24 and Q24). The ERT considers the use of "IE" for reporting these gases to be inappropriate considering that the NIR (section 4.7.2, p.151) states that no activity resulting in $NF_3$ emissions was identified, and that the NIR (p.157) (referring to the reporting of $SF_6$) does not mention category 2.F because no methodology is provided in the 2006 IPCC Guidelines and no such emissions occur in the country. During the review, Poland acknowledged that the correct notation key should be "NO" and informed the ERT that it will update the CRF table accordingly in its next submission.<br><br>The ERT recommends that Poland change the notation key used in CRF table Summary 3s1 to "NO" for $SF_6$ and $NF_3$ under "method applied" and "emission factor" for this category. | Yes. Comparability |
| I.11 | 2.F.1 Refrigeration and air conditioning – HFCs | Poland reported in NIR tables 4.7.4–4.7.7 (pp.152–153) the final assumptions on the percentage of refrigerant equipment in which HFC-32, 125, 134a and 143a were used. From the information provided in the NIR, it was unclear to the ERT where the assumptions came from. The ERT was also unable to find any information on the QA/QC carried out on market providers, which would allow the ERT to validate the assumptions regarding the per cent of refrigeration equipment where F-gases are used. During the review, Poland explained that the basis of the assumptions and the QA/QC steps taken included analysis of the available national data from the questionnaire sent by installations and operators, working knowledge, direct contact with F-gas operators, analysis of the parameters applied by other countries with comparable national circumstances (Eastern European EU member States), and analysis of the phasing-out effect and conversion of equipment not containing F-gases. The ERT, while welcoming this explanation, does not consider that the information provided in the NIR (section 4.7.2, under "2.F.1 refrigeration and air conditioning equipment", pp.151–154) contains sufficient descriptions, references and information regarding assumptions, EFs and AD and the rationale for their selection, given the importance of this key category.<br><br>The ERT recommends that Poland explain in the NIR how it arrived at the assumptions on the percentage of refrigerant equipment in which HFC-32, 125, 134a and 143a are used, and provide the sources of information for the estimation of emissions for this category as well as the rationale for their selection. | Yes. Transparency |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| I.12 | 2.F.1 Refrigeration and air conditioning – HFCs | The ERT noted significant inter-annual changes for "HFC remaining in products at decommissioning" for category 2.F.1.e mobile air conditioning (216.5 per cent between 2014 and 2015); and category 2.F.1.f stationary air conditioning (HFC-125: 1,282.6 per cent between 2013 and 2014 and 162 per cent between 2015 and 2016; HFC-134a: 1,276.0 per cent between 2013 and 2014; and HFC-32: 1,278.0 per cent between 2013 and 2014). The ERT is of the view that one of the reasons for the inter-annual changes is related to the assumed lifetime of 15 years for mobile air-conditioning equipment (see ID# I.7 in table 3) and 10 years for stationary equipment such as small split systems and medium split systems as explained by the Party during the review.<br><br>The Party explained that the outlier values for mobile air conditioning (category 2.F.1.e) had increased for 2014–2015 because the passenger car fleet had grown from 291,551 in 1999 to 537,060 in 2000 as a result of a change in legislation opening up the national market to import used cars from Western Europe, containing F-gases, and phasing out older cars without air conditioning. Taking into account that the assumed lifetime of mobile air-conditioning equipment is 15 years, then this import is reflected in a significant relative emission increase for 2014–2015, when the oldest equipment is reaching the end of its lifetime. Outlier values for stationary equipment (category 2.F.1.f) were a result of intensive efforts to decommission the oldest stationary air-conditioning units available on the market (such as small split systems and medium split systems), whose lifetime is 10 years. The emissions generated by the decommissioning of the equipment in 2013 and 2014 had been estimated on the basis of the volume of HFCs in operating equipment (stock) in 2003 and 2004. The Party noted that the number of stationary equipment containing HFCs had increased significantly in 2004 as a result of economic and technological transformation and the phasing-out of older air-conditioning technologies. For instance, the estimated number of small and medium split systems was 83,657 in 2003 and 322,845 in 2004, and this is reflected in the amount of equipment decommissioning after 10 years (in 2013–2014). The ERT, while recognizing the value of the explanation, considers that the information reported in the NIR is not sufficiently detailed to explain the trends and the Party should include the information provided above in the NIR.<br><br>The ERT recommends that Poland include in the NIR sufficient information to explain the trends and significant inter-annual changes observed for HFCs remaining in products at decommissioning for categories 2.F.1.e and 2.F.1.f, including information on the assumed lifetime for different types of equipment in line with the information provided to the ERT during the review. | Yes. Transparency |
| I.13 | 2.F.2 Foam blowing agents – HFCs | The ERT noted that the HFC-152a product manufacturing factor for closed cell foams (95 per cent for all reported years) was the highest value of all reporting Parties (which ranged between 10 and 95 per cent) for 2011–2015. In response to a question raised by the ERT, Poland clarified that, according to the F-gas data provider, the HFC-152a product manufacturing factor for closed cell foams was too high, given that the EU average stood at around 41 per cent in 2016. Poland informed the ERT that it will revise this factor to a level comparable with the EU average.<br><br>The ERT recommends that Poland obtain the correct value for the HFC-152a product manufacturing factor for closed cell foams and revise the emission estimates accordingly. The ERT also recommends that the Party include a | Yes. Accuracy |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| | | clear explanation in the NIR of the recalculation performed, in accordance with paragraph 44 of the UNFCCC Annex I inventory reporting guidelines. | |
| I.14 | 2.F.2 Foam blowing agents – HFCs | The ERT noted that the HFC-227ea product manufacturing factor for closed cell foams (1 per cent for all reported years) was the lowest value of all reporting Parties (which ranged between 1 and 60 per cent) for 2015. Poland stated in the assessment report that it was investigating the issue to ensure that the reported values were consistent. In response to a question raised by the ERT, the Party explained that, following investigation, it considered the value to be accurate given that, in 2015, five Parties had reported values between 1 and 1.5 per cent (Belgium, EU, France, Monaco and Romania). However, the ERT checked the values reported by those Parties and noted that two had reported "NO", one "confidential" and the others between 14.35 and 15 per cent for the HFC-227ea product manufacturing factor. The default EF in table 7.5 of the 2006 IPCC Guidelines is 10 per cent (volume 3, chapter 7, p.7.35). The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions for this category.<br><br>The ERT recommends that Poland either justify the use of the HFC-227ea product manufacturing factor for closed cell foams (1 per cent for all reported years) or apply the 2006 IPCC Guidelines default factor (volume 3, table 7.5, p.7.35). The ERT also recommends that the Party include a clear explanation in the NIR of the recalculation performed, in accordance with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines. | Yes. Accuracy |
| Agriculture | | | |
| A.17 | 3.B Manure management – $N_2O$ | During the review, the ERT noted that some country-specific Nex values were lower than expected for the current milk productivity level in Poland. For example, for an average milk production of 5,730 l/year for dairy cattle (NIR table 5.4, p.169), the Nex value given was 83 kg N/head/year (NIR table 5.10, p.177) for 2016. The ERT asked Poland to provide in a spreadsheet background data for replicating the estimation of its Nex values for the different cattle subcategories (e.g. feed intake, protein content of feed, N retention in meat and milk). In response, Poland provided data on total Nex values for all animal groups. The auxiliary tables (Fotyma and Kopiński, 2012) provided by the Party indicate higher Nex values than those reported in its 2018 submission (86.8 kg/N/head/year for dairy cattle with milk production over 4,000 l/year). The ERT is of the view that, given the annual milk production figures provided by the Party in the inventory (5,730 l/head/year), the Nex value used in the inventory for dairy cattle (83 kg N/head/year) is an underestimate. Furthermore, the supporting documentation provided by Poland indicates that the Nex for non-dairy cattle and poultry and the associated $N_2O$ emissions were incorrectly estimated. This issue was included in the list of potential problems and further questions raised by the ERT during the review.<br><br>In response, Poland acknowledged that the Nex values for dairy and non-dairy cattle had not been updated for the most recent years reported in the GHG inventory, when the cows were producing a lot of milk (exceeding 5,000 l/year), and it provided revised estimates of (1) country-specific gross energy intake; (2) Nex and N intake (using equations 10.31 and 10.32 from the 2006 IPCC Guidelines, volume 4, chapter 10, respectively) for the entire time series since 1988; (3) N retention rate (0.2 for dairy cows and 0.07 for other cattle, from the 2006 IPCC Guidelines, volume 4, chapter 10, table 10.20); and (4) protein content of feed, as recommended by the ERT, from Bittman et al. | Yes. Transparency |

| ID# | Finding classification | Description of the finding with recommendation or encouragement | Is finding an issue and/or a problem?[a] If yes, classify by type |
|---|---|---|---|
| | | (2014). Poland explained that, since some cattle subcategories in Bittman et al. (2014) did not correspond to those used in the Polish inventory (and national statistics), the following assumptions were used for crude protein percentages: (1) 15.5 per cent for dairy cattle producing above 4,000 l/year (according to the National Research Institute of Animal Production, this value relates to dairy cattle producing approximately 6,000 l/year); (2) 14.5 per cent for dairy cattle producing below 4,000 l/year; (3) 18 per cent for young cattle (< 1 year); and (4) 14 per cent for young cattle (aged 1–2 years) and heifers and bulls (> 2 years). Poland informed the ERT that selected values of crude protein percentages could be considered conservative and that further analysis will be undertaken to establish country-specific percentages for cattle in the future. For poultry, Poland explained that it was not possible to establish new Nex values owing to the lack of country-specific gross energy intake values. Therefore, default Nex values for Eastern Europe were applied for poultry based on the 2006 IPCC Guidelines (volume 4, chapter 10, table 10.19, p.10.59).<br><br>As a result of the revised estimates, the estimated $N_2O$ emissions for 2016 increased from 2.21 to 2.80 kt (by 26.7 per cent) for dairy and non-dairy cattle (category 3.B(b).1) and from 0.13 to 0.15 kt $N_2O$ (by 15.4 per cent) for poultry (category 3.B(b).4). The ERT agrees with the revised estimates and recommends that Poland explain in the NIR the recalculation performed, including the method and parameters used to calculate Nex and $N_2O$ emissions for categories 3.B(b).1 and 3.B(b).4, in accordance with paragraph 44 of the UNFCCC Annex I inventory reporting guidelines. | |
| A.18 | 3.B Manure management<br>3.D Direct and indirect $N_2O$ emissions from agricultural soils – $N_2O$ | The revised Nex values referred to in ID# A.17 above also affected the estimates of indirect $N_2O$ emissions from volatilized N and leached N from manure stores (category 3.B(b).5) and the subsequent direct and indirect $N_2O$ emissions reported in CRF table 3.D for animal manure applied to soils (category 3.D.a.2.a), urine and dung deposited by grazing animals (category 3.D.a.3), atmospheric deposition (category 3.D.b.1) and N leaching and run-off (category 3.D.b.2). Accordingly, the list of potential problems and further questions raised by the ERT included a request for Poland to submit new estimates for all categories indirectly affected by the revision of Nex values. In response, Poland provided revised estimates as follows: for category 3.B(b).5 emissions increased from 4.57 to 5.30 kt $N_2O$; for category 3.D.a.2.a emissions increased from 2.99 to 3.51 kt $N_2O$ (atmospheric deposition) and from 0.43 to 0.50 kt $N_2O$ (N leaching and run-off); for category 3.D.a.3 emissions increased from 1.14 to 1.44 kt $N_2O$; for category 3.D.b.1 emissions increased from 2.69 to 2.86 kt $N_2O$; and for category 3.D.b.2 emissions increased from 5.93 to 6.12 kt $N_2O$.<br><br>The ERT agrees with the revised estimates and recommends that Poland explain in the NIR the recalculation performed, including the method and parameters used for categories 3.B(b).5, 3.D.a.2.a, 3.D.a.3, 3.D.b.1 and 3.D.b.2. | Yes. Transparency |
| A.19 | 3.D.a.6 Cultivation of organic soils (i.e. histosols) – $N_2O$ | Poland reported that the total area of cultivated organic soils was 882.6 kha in the mid-1970s, 769 kha in the mid-1990s and 679 kha in 2016 (NIR, pp.186 and 218). According to the Party, the area of cultivated histosols could only be estimated on the basis of a case study undertaken for the national inventory. Based on information collected from the computer database on peatlands in Poland, entitled "TORF", and from the System of Spatial Information on Wetlands, the area of histosols was assessed for the mid-1970s and mid-1990s. For 2016, the area was assessed | Yes. Transparency |

| ID# | Finding classification | Description of the finding with recommendation or encouragement | Is finding an issue and/or a problem?[a] If yes, classify by type |
|---|---|---|---|
| | | for the purpose of projecting GHG emissions and amounted to 679 kha. Interpolation was applied for 1976–1994 and 1995–2015 and further up to 2020 (NIR, p.186).<br><br>The ERT noted that the reported area of cultivated organic soils decreases over the time series. In the base year (1988), the reported area is 808.76 kha and, in 2016, 679 kha, equating to a total decrease of 129.76 kha (–14 per cent). Under the LULUCF sector, Poland split the area between cropland (78 per cent) and grassland (22 per cent) for the entire time series. A minor part (18.42 kha) was attributed to an increase in organic soils in forest land for 2016 (CRF tables 4.A and 4(KP-I)A.1). The ERT also noted that in its submitted information on the FMRL (see https://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/poland_150911.pdf) the Party reported that the area of cultivated histosols was calculated as 680 kha for 2015 and that interpolation was applied for 1995–2015. Therefore, it seems that the area reported for 2016 was estimated by extrapolation.<br><br>It was unclear to the ERT the reasons for the decrease in the area of cultivated soils. The ERT therefore asked the Party for more detailed information on how the area of cultivated organic soils was estimated, including if any methodological changes had been made to the estimation methods between the three different inventory periods (mid-1970s, mid-1990s and 2015).<br><br>In response, Poland explained that the main reason for the decrease in the area of histosols was the mineralization of organic matter such as peat, silt or gyttja occurring as a result of the progressive desiccation of habitats. The Party added that, to a lesser extent, the disappearance of peat bogs was attributable to the exploitation of peat, with a reference to a study from Oświecimska–Piasko (2008) (in Polish). However, no clarification of the methodologies used to estimate the area was provided by the Party. The ERT therefore considered the reduction in the area of cultivated organic soils to be undocumented, including the reduction in the reported area for 2016, which was estimated by extrapolation. This issue was included in the list of potential problems and further questions raised by the ERT, whereby the Party was asked (1) to provide justification and solid documentation demonstrating that the methodology used for estimating the area of cultivated organic soils was consistent between the three time periods; if digital maps of organic soils are available, to provide an overlay between agricultural fields reported in the EU Land Parcel Information System with a view to estimating the area of cultivated organic soils, and (2) in case it is not possible, use the estimated area of cultivated organic soils reported for 1988 (base year) for all years of the time series (until 2016) minus the reported area converted to other land uses (e.g. afforestation) to estimate the $N_2O$ emissions from cultivated organic soils.<br><br>In response, Poland provided revised estimates, in which the base-year area of organic soils used for agricultural purposes, including grassland, was retained for the entire 1988–2016 period and adjusted for the areas of organic soils dedicated to afforestation and wetlands flooding. The final area for 2016 is now reported as 786 kha (previously 679 kha), thus increasing the estimated emissions for this category from 8.356 to 9.881 kt $N_2O$. Poland explained that this is a temporary approach and that it will make efforts to improve its estimates by exploring additional methods, such as: | |

| ID# | Finding classification | Description of the finding with recommendation or encouragement | Is finding an issue and/or a problem?[a] If yes, classify by type |
|---|---|---|---|
| | | (a) Assessing the area of organic soils used as arable land from geographical information systems, and amalgamating existing data by overlaying land-use and organic soils shape files for the whole country. In order to delineate agricultural land (cropland and grassland), the Party could use either the Land Parcel Identification Scheme data created by the Agency for Restructuring and Modernisation of Agriculture, assuming they are accessible to the GHG inventory team, or CORINE land cover data sets; | |
| | | (b) Using 1:100,000 maps of wetlands in Poland to identify organic (peat) soils. The maps delineate particular soil habitat types and known associations between certain habitats and subsoils, land cover, altitude and altitude-related features. They also integrate features from the computer database on peatlands in Poland, entitled "TORF". Since the Land Parcel Identification Scheme data are deemed reliable for delineating agricultural activity, and specifically arable cropping, and national data regarding the location of organic soils (peat) are less robust and lack information on uncertainty, the focus of the accuracy assessment will be on the soil type – organic (peat) or mineral – in fields under cultivation for arable crops. | |
| | | The Party informed the ERT that, since the GHG inventory team's ability to quickly and easily access relevant Land Parcel Identification Scheme data is limited by the number of institutional interconnections, it will focus temporarily on using CORINE land cover assessments. | |
| | | The ERT agrees with the revised estimates and with the future efforts Poland is planning to do to improve the accuracy of estimates relating to the area of cultivated organic soils. The ERT recommends that the Party update the NIR to reflect the revised estimates of $N_2O$ emissions and provide an explanation of the recalculations performed, including methods applied, as well as a description of the planned improvements to the estimation of the area of cultivated organic soils. | |
| A.20 | 3.B.5 Indirect $N_2O$ emissions – $N_2O$ | The primary source of the Party's indirect $N_2O$ emissions is ammonia volatilization. However, the ammonia emissions reported by Poland under CLRTAP and to the UNFCCC differ, despite referring to the same compound. Submissions under CLRTAP follow the EMEP/EEA air pollutant emission inventory guidebooks, while those under the UNFCCC follow the 2006 IPCC Guidelines. During the review, Poland explained that the discrepancy could be attributable to the use of different EFs from the GHG inventory and EMEP/EEA guidelines in the submissions. Moreover, the Party's reporting using the EMEP/EEA guidebooks is based on a tier 2 method, while for its inventory it used a tier 1 method from the 2006 IPCC Guidelines (volume 4, chapter 10, equation 10.26, p.10.54). The Party informed the ERT that it will make efforts to coordinate the reporting on N release from manure management in both Polish inventories. | Not an issue/problem |
| | | The ERT encourages Poland to coordinate its reporting on ammonia volatilization under CLRTAP and to the UNFCCC using the most appropriate estimation methodology. | |

LULUCF

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| L.29 | 4.A Forest land – $CO_2$ | The ERT noted that, according to NIR table 6.4 (p.200), a large increase in forest area occurred between 2015 (9,395,171 ha) and 2016 (9,513,245 ha). However, in CRF tables 4.A and 4.1, the area reported for 2016 was 9,381,979 ha. During the review, Poland acknowledged that the values reported for 2016 in NIR table 6.4 had mistakenly included woody and bushland areas.<br><br>The ERT recommends that Poland correct the forest land area reported in NIR table 6.4 for 2016. | Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines |
| L.30 | 4.A.1 Forest land remaining forest land – $CO_2$ | The ERT noted that the title of NIR table 6.7 (p.206), "Basic wood density by major tree species", was at odds with the name of the second column, "Air-dry wood density". During the review, Poland acknowledged that this was an editorial error and that "Air-dry wood density" should be replaced with "Basic wood density".<br><br>The ERT recommends that Poland change the title of the second column of NIR table 6.7 to "Basic wood density". | Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines |
| L.31 | 4.A.1 Forest land remaining forest land – $CO_2$ | Poland reported in the NIR (section 6.2.4.5, p.206) that the IPCC default values for $BEF_2$ were used (in accordance with table 3A1.10 of the IPCC good practice guidance for LULUCF). The ERT noted that the values reported in the column "$BEF_2$ (overbark)" in NIR table 6.8 actually referred to the values of "$BEF_1$ (overbark)". During the review, Poland indicated that it had applied the IPCC default values for $BEF_2$ in its calculations but that, instead of using the median values, it had used the lower range of the values indicated for $BEF_2$ in table 3A1.10 of the IPCC good practice guidance for LULUCF to limit the positive impact on overall carbon stock change reported for forest land remaining forest land and for FM activities (conservative approach). It explained that this conservative approach allowed for selective accounting of carbon pools and helped to reduce monitoring costs. However, the ERT found that the lower rage of the $BEF_2$ values given in table 3A1.10 of the IPCC good practice guidance for LULUCF for pines (1.2) and broadleaf (2.0) do not match the values provided in NIR table 6.8 (pine: 1.05; broadleaf: 1.20). The ERT understands that Poland adopted a conservative approach for the biomass conversion and expansion factor; however, the Party should provide a clearer explanation in the NIR of the values applied for $BEF_2$ and of the assumptions made for this choice.<br><br>The ERT recommends that Poland verify the $BEF_2$ values used for pines and broadleaf and clarify in the NIR (perhaps in a footnote to table 6.8) that the $BEF_2$ values applied in the inventory are at the lower end of the range of default values in table 3A1.10 of the IPCC good practice guidance for LULUCF. In addition, the ERT recommends that the Party explain in the NIR the assumptions made in applying those values and the results from this choice. | Yes. Transparency |
| L.32 | 4.A.1 Forest land remaining forest land – $CO_2$ | The ERT noted that in NIR table 6.9 (p.207) the default value used for "Oak under AGB < 50 tonnes/ha" was 0.30. Referring to table 4.4 in volume 4 of the 2006 IPCC Guidelines, the ERT could only find the default value of 0.30 for the temperate climate domain for "Quercus spp. AGB > 70 tonnes/ha" and could not understand why Poland had applied it to "Oak AGB < 50 tonnes/ha". During the review, Poland explained that it had applied the default value of 0.30 in NIR table 6.9 to "Oak AGB < 50 tonnes/ha" and "Oak AGB 50–70 tonnes/ha" for lack of an appropriate alternative in the 2006 IPCC Guidelines. The Party also explained that the values applied should be understood in the context of its conservative approach, limiting the positive effect of young oak forest on overall carbon stock change. | Yes. Transparency |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| | | The ERT recommends that Poland clarify in the NIR (perhaps in a footnote to table 6.9) that the default values applied in the inventory for "Oak AGB < 50 tonnes/ha" and "Oak AGB 50–70 tonnes/ha" are the same as the IPCC default for "Quercus spp. AGB >70 tonnes/ha" in accordance with table 4.4 of the 2006 IPCC Guidelines, and explain the assumptions made in applying those values and the results from this choice. | |
| L.33 | 4.A.1 Forest land remaining forest land – $CO_2$ | During the review, the ERT followed up on a previous issue (see ID#s L.7 and L.8 in table 3) and asked the Party for more detailed information on how the data surrogate process exclusively for 2008 was implemented and what the resulting time-series average growing stock data were for 1988–2016. In response, Poland provided an Excel spreadsheet containing the relevant calibrated data for the growing carbon stock change in living biomass. | Yes. Transparency |
| | | The ERT checked the data in the spreadsheet and calculated the annual stock differences for 2008–2016 on the basis of the calibrated data for the average growing stock. For example, the "average growing stock" in 2008 and 2009 is 252.51 and 253.50 $m^3$/ha, respectively (as an Excel spreadsheet provided to the Party during the review). Subtracting the average growing stock for 2008 (252.51 $m^3$/ha) from that for 2009 (253.50 $m^3$/ha) gives an annual stock difference of 0.99. Following the same logic, the annual stock difference between 2015 and 2016 is 6.26 $m^3$/ha. Since Poland has applied the stock-change method, the implied carbon stock change factors for living biomass for forest land remaining forest land (0.99 t C/ha in 2008–2009 and 0.97 t C/ha in 2015–2016, as per CRF table 4.A) should be proportionate to the annual stock differences. But this is not the case: while the annual stock difference increased for 2008–2009 and 2015–2016 (by 0.99 $m^3$/ha and 6.26 $m^3$/ha, respectively), the implied carbon stock change factors (as per CRF table 4.A) remained almost the same over the time series. In addition, the ratios between the annual stock differences and the implied carbon stock change factors vary from 1.00 for 2008 to 6.44 for 2016. In response to this observation, Poland explained that the fluctuation in the ratio of implied carbon stock change factors in living biomass was triggered by the changes in the species and age-structure distribution of the timber resources. This explanation is supported by the preliminary results of the Carbon Budget Model of the Canadian Forest Sector, which was expected to be officially implemented by the end of 2018. However, the ERT notes that the annual stock differences, (which are the differences of average growing stocks of two consecutive years), also reflect the changes in the species and age-structure distribution of the timber resources. In addition, the ERT is of the view that the changes in the species and age-structure distribution of the timber resources alone could not explain the fluctuation in the ratio of the implied carbon stock change factors in living biomass, since the effects of these changes on the weighted mean wood density, weighted mean BEF and weighted mean root-to-shoot ratio are rather small. | |
| | | The ERT recommends that Poland provide information in the NIR (e.g. a table) showing the average growing stock volume ($m^3$/ha) and the stock difference ($m^3$/ha/year) and provide a detailed explanation of why the implied carbon stock change factors for forest land remaining forest land are not in line with the annual stock differences. | |
| L.34 | 4.B.1 Cropland remaining cropland – $CO_2$ | Poland reported in the NIR (section 6.3.4.5, p.218) that a default EF for a cold temperate climate of 5 t C/ha/year had been used to estimate $CO_2$ emissions from cultivated organic soils. However, the ERT noted that the IEFs reported in CRF table 4.B ranged from 1.00 t C/ha/year for 1988 to 1.18 t C/ha/year for 2016. In response to this observation, Poland acknowledged that the NIR (section 6.3.4.5, p.218) contained an editorial error and will be | Yes. Adherence to the UNFCCC Annex |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| | | corrected in the next submission. The Party further explained that the IEF values in CRF table 4.B are correct, citing as justification a study by Turbiak and Miatkowski (2010), which states that the average EF for organic soils in cropland is lower than 1.00 t C/ha/year. Therefore, Poland applied the annual EF for cultivated organic soils for a cold temperate climate (from table 3.3.5 of the IPCC good practice guidance for LULUCF). In addition, the Party clarified that an apparent inconsistency in CRF table 4.B had been caused by a script error in CRF Reporter, as the values for net carbon stock change in organic soils had been calculated as constant (–631.3 kt C) for the entire time series despite variable AD and a constant EF. The Party had expected the CRF table to show a constant EF (1.00 t C/ha) and a range of net carbon stock change in organic soils in accordance with the area (in ha) reported for cropland remaining cropland.<br><br>The ERT recommends that Poland report in the NIR the correct annual EF for cultivated organic soils applied in the inventory. The ERT also recommends that the Party verify the values reported in the inventory for net carbon stock change in organic soils in CRF table 4.B for the entire time series. | I inventory reporting guidelines |
| L.35 | 4.B.2 Land converted to cropland<br>4.C.2 Land converted to grassland – $CO_2$ | The ERT noted that Poland used different default biomass values for living organic matter for grassland in different sections of the NIR. For example, section 6.3.4.3 (p.216) states that a default biomass value for warm temperate dry eco-regions (6.1 t dry matter/ha) was used for initial carbon stock for grassland converted to cropland; however, the ERT noted that according to the NIR (section 6.4.4.2, p.221) a default value for a cold temperate dry eco-region (6.5 t dry matter/ha, after conversion) was used for grassland. The Party referred to table 6.4 of the 2006 IPCC Guidelines to justify both values. The ERT also noted that Poland used a default value for a tropical dry eco-region (1.8 t C/ha) for annual crops (from table 5.9 of the 2006 IPCC Guidelines) for grassland converted to cropland (NIR section 6.4.4.2, p.221). The ERT could not understand why different climate zones had been used to calculate carbon stock change in biomass due to the conversion of land between grassland and cropland. In response, Poland explained that the descriptions in the NIR were incorrect, and that since 2016, in line with a recommendation made by the previous ERT, it has been using the default factors for a cold temperate wet climate zone such as 13.6 dry matter/ha for biomass carbon stock present in grassland after conversion from other land uses (from the 2006 IPCC Guidelines, volume 4, table 6.4) and 5.0 t C/ha (annual crops) for carbon stock present on land converted to cropland in the year following conversion (from the 2006 IPCC Guidelines, volume 4, table 5.9), to facilitate the implementation of tier 2 methods and meet its obligation to report all compulsory categories.<br><br>The ERT recommends that Poland update the relevant parts of the NIR to reflect the correct climate zones used for the default biomass carbon stock present in grassland after conversion from other land uses (13.6 dry matter/ha) and for carbon stock present on annual crops for land converted to cropland after one year following conversion (5.0 t C/ha). | Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines |
| L.36 | 4.C.2 Land converted to grassland – $CO_2$ | In response to a question raised by the ERT (see ID# L.35 above), Poland provided an Excel spreadsheet of the values used in the inventory to calculate carbon stock change, using the default factors for the cold temperate wet climate zone, as mentioned under ID# L.35 above. From the spreadsheet, the ERT identified that, for annual crops converted to grassland, Poland applied a default value for biomass before conversion of 5 t C/ha, after conversion of 0 t C/ha and $\Delta C_{conversion}$ of –4.7 t C/ha, which was not equal to biomass after conversion minus biomass before | Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines |

| ID# | Finding classification | Description of the finding with recommendation or encouragement | Is finding an issue and/or a problem?[a] If yes, classify by type |
|---|---|---|---|
| | | conversion (equal to –5 t C/ha and not –4.7 t C/ha). During the review, Poland provided a new spreadsheet in which $\Delta C_{conversion}$ was reported as –5 t C/ha. However, according to the 2006 IPCC Guidelines, a default value of 4.7 t C/ha should be used for cropland containing annual crops. Therefore, Poland should use $\Delta C_{conversion}$ equal to –4.7 t C/ha, as previously, but correct the value applied for biomass before conversion (equal to –4.7 t C/ha instead of –5 t C/ha).<br><br>The ERT recommends that Poland use the correct values for $\Delta C_{conversion}$ (–4.7 t C/ha) and biomass before conversion (4.7 t C/ha) for annual crops converted to grassland. | |
| L.37 | 4.D.2 Land converted to wetlands – $CO_2$ | Poland reported in the NIR (section 6.5.4.1, p.226) that it applied the default EF (2.8 t dry matter/ha) for living biomass on land immediately before conversion to flooded land (in accordance with the 2006 IPCC Guidelines, volume 4, p.6.8). The ERT checked the 2006 IPCC Guidelines and noted that the value used by the Party (2.8 t dry matter/ha) refers to the ratio of below-ground biomass to above-ground biomass for dry climate zones (cold, warm and tropical). During the review, Poland explained that recent inventory estimates had been based on biomass stock present on grassland (peak above-ground biomass for herbal species) to implement tier 2 estimates, and that the factors needed for tier 2 estimation were above-ground biomass stocks at multiple points in time and expansion factors for below-ground biomass. The Party also clarified that the resultant emissions had been estimated using the appropriate methodology from the 2006 IPCC Guidelines (appendix 2, volume 4). The Party informed the ERT that it will update the NIR accordingly.<br><br>The ERT recommends that Poland update the NIR to reflect the correct methodology applied for estimating the change in carbon stock for land converted to wetlands, including information on the correct climate zones used. | Yes. Transparency |
| L.38 | 4.D Wetlands – $CO_2$ | The ERT noted that Poland did not use the Wetlands Supplement to estimate emissions from organic soils. During the review, Poland explained that it follows the EU position, namely to further discuss the use of the Wetlands Supplement with a focus on the implementation of the guidance for coastal wetlands (chapter 4) and inland wetland mineral soils (chapter 5). The Party also explained that implementing guidance from these chapters can be challenging owing to the difficulties encountered in collecting the specific AD required to calculate relevant estimates. Owing to the diversity of wetlands, more time is needed to assess the suitability of the default EFs and develop national EFs.<br><br>The ERT encourages the Party to use the Wetlands Supplement in preparing its future annual inventories for estimating emissions from organic soils under the wetlands category. | Not an issue/problem |
| L.39 | 4.D.1 Wetlands remaining wetlands – $CO_2$ | Poland reported in CRF table 4.D the losses of carbon stock change in living biomass (–2.38 t C/ha and –3.85 kt C) for category 4.D.1.1 (peat extraction remaining peat extraction); however, the ERT noted that no losses of organic matter (from extracted peat) were reported under organic soils (cell Q12). The ERT also noted that Poland reported a large amount of losses from organic soils (–3.58 t C/ha and –966.96 kt C) under category 4.D.1.2 (flooded land remaining flooded land); however, since the 2006 IPCC Guidelines provide no guidance on estimating carbon stock change in soils due to land conversion to flooded land, reported emissions from soils under category 4.D.1.2 should be zero unless national circumstances are available. In addition, the ERT also noted that Poland used EFs for drained | Yes. Accuracy |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| | | agricultural land and used these as proxies for flooded land; however, this is not correct. During the review, Poland explained that a reporting error had occurred and that the net carbon stock change in soils (both mineral and organic soils) reported under flooded land (category 4.D.1.2) should have been reported under peat extraction (category 4.D.1.1), and that the notation key "NO" should have been reported for net carbon stock change in soils under flooded land (category 4.D.1.2). However, the ERT is of the view that the notation key "NE" should be reported for net carbon stock change in soils under flooded land because although no relevant estimation methodology is provided in the 2006 IPCC Guidelines, $N_2O$ emissions may occur.<br><br>The ERT recommends that Poland verify the methodology applied for category 4.D.1.1 to estimate net carbon stock change in soils (both mineral and organic soils) and report the values correctly in CRF table 4.D under the appropriate category. The ERT also recommends that the Party report the notation key "NE" for net carbon stock change in soils under flooded land (category 4.D.1.2). The ERT further recommends that Poland update the NIR to reflect the correct methodologies applied. | |
| L.40 | 4.D.1 Wetlands remaining wetlands<br>4.D.2 Land converted to wetlands<br>– $CO_2$, $CH_4$ and $N_2O$ | In addition to ID# L.39 above, the ERT noted that according to CRF table 4.D the total area of organic soils managed for peat extraction in 2016 was 1,617 ha and the value of losses reported for living biomass was –3.85 kt C. However, the method used to calculate those losses was not clear, given the lack of clarity on the type of land reported as organic soils (1,617 ha) under category 4.D.1.1 (e.g. whether that land had been converted since the previous year or already been used for peat extraction). During the review, Poland explained that the reported losses in living biomass for peat extraction areas (category 4.D.1.1) were above-ground biomass losses from the opening of new peat bog for harvesting (where peat has reached its useful maturity). The Party also explained that, since no surveys have been conducted in Poland to determine the horticulture grade of sphagnum, it applied the default factor for cold temperate wet regions (biomass before conversion of 2.4 t dry matter/ha) for grassland (from the 2006 IPCC Guidelines, volume 4, p.6.27, table 6.4).<br><br>From the Party's explanation, the ERT understands that the 1,617 ha land reported under category 4.D.1.1 is then subject to land conversion since the last year, in preparation for peat extraction, and that the biomass before conversion available for grassland (2.4 t dry matter/ha) was the amount of standing living above-ground biomass which is removed. However, under category 4.D.1.1, Poland should report the area already open and subject to peat extraction for the past 20 years (transition time). For such areas, no living biomass would usually be available and the Party should account for only $CO_2$, $CH_4$ and $N_2O$ emissions from on-site degradation of peat combined with mined loss of organic matter (which degrades and generates emissions elsewhere). If the 1,617 ha land reported represents newly opened peat extraction areas (land conversion), these should be reported under category 4.D.2.1 (land converted to peat extraction). This should include loss of living biomass and on-site degradation and the amount of peat extracted.<br><br>In response to this observation, Poland explained that for peat extraction (category 4.D.1.1) it is also assumed that, when peat is removed in a new milling, in a given extraction season, any potential living biomass should also be removed to provide access to the available peat layers. In this particular case, the emissions reported in the CRF table (–2.38 t C/ha for 2016) are any potential emissions linked to the carbon stock change in living biomass. It is | Yes. Completeness |

| ID# | Finding classification | Description of the finding with recommendation or encouragement | Is finding an issue and/or a problem?[a] If yes, classify by type |
|---|---|---|---|
| | | therefore assumed that any peat extracted from existing peatlands is preceded by biomass removal. Hence, the amount of biomass removed was also assigned to the IPCC default factor available for grassland (biomass before conversion of 2.4 t dry matter/ha). The principle of conservativeness is also taken into account in this regard. The Party acknowledged that $CO_2$-C off-site emissions, $CO_2$-C on-site emissions and $N_2O$ emissions managed for peatland extraction were not estimated and will make efforts to provide relevant estimates in its next submission. The Party also explained that emissions associated with the conversion of land for peat extraction were reported under category 4.D.2.2 (land converted to flooded land) instead of category 4.D.2.1 (land converted to peat extraction).<br><br>The ERT noted that Poland referred to equation 7.6 (tier 3) on page 7.9 of the 2006 IPCC Guidelines (volume 4), whereas page 7.9 actually contains equation 7.3 (tier 1). Moreover, in CRF table Summary 3s2, the method and EF used are not reported.<br><br>The ERT recommends that Poland improve the description in the NIR in line with the information provided by the Party above by explaining what type of land is reported under organic soils and how losses in living biomass are calculated under category 4.D.1.1, why land converted for peat extraction is reported under category 4.D.2.2 (land converted to flooded land), how land converted for peat extraction and land under peat extraction are reported in the inventory, and what methods and assumptions are used to estimate the emissions under categories 4.D.1 and 4.D.2. The ERT also recommends that the Party make efforts to estimate $CO_2$-C off-site emissions, $CO_2$-C on-site emissions and $N_2O$ emissions managed for peatland extraction (category 4.D.1.1). | |
| L.41 | 4.D.1 Wetlands remaining wetlands | In response to a question raised by the ERT in relation to ID# L.40 above, Poland provided a table containing data on the open drained areas used for peat extraction (3,485 ha in 2016). The ERT evaluated the data and noted that Poland had assumed a large new clearance area compared with the mined areas already open (1,617 ha of mined areas compared to 3,485 ha in 2016). Normally, only 5–15 cm can be exploited per year on new extraction sites and open sites can be excavated for over 10 years. The ERT is of the view that the Party should take this into account when it provides new estimates for category 4.D.1.1.<br><br>The ERT encourages Poland to take into account, when providing new estimates for category 4.D.1.1 (as recommended in ID# L.40 above), that only 5–15 cm can be exploited per year on new extraction sites and open sites can be excavated for over 10 years. | Not an issue/problem |
| L.42 | 4.E.2 Land converted to settlements – $CO_2$ | The ERT noted that Poland applied instant oxidation for soil organic matter (which means that t = 1 year) to estimate carbon stock change in combination with land-use conversion (NIR section 6.6.4.2, p.229). However, in such cases, the default transition time of 20 years is often used because soil organic matter is generally not very degradable. It is acceptable to assume instant oxidation for living biomass and minor sources. During the review, Poland explained that, given the significant impact of changes in land use and land cover on total soil organic carbon, its fractions and its overall soil carbon content, it had decided to adopt a conservative approach whereby all soil organic matter is assumed to be instantly oxidized. This approach avoids any negative consequences in terms of | Yes. Transparency |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| | | accounting implications related to deforestation under the Kyoto Protocol, bearing in mind that all potential emissions are reported and accounted for.<br><br>The ERT recommends that Poland explain in the NIR its decision to apply instant oxidation instead of transition time for estimating carbon stock change in soil organic matter. | |
| L.43 | 4.E.2 Land converted to settlements – $CO_2$ | The ERT noted that CRF table 4.E showed a large increase in deforested area in 2016 under forest land converted to settlements (category 4.E.2.1) when compared with other years. Deforested areas, according to CRF table 4.1 and the related emissions reported in CRF tables 4.E and KP.A.2, were larger for 2016 alone than they were for 1990–2015. For example, between 2015 (11.38 kha) and 2016 (24.61 kha) there is an increase of 116 per cent. During the review, Poland explained that the large increase in deforested area under category 4.E.2.1 in 2016 was attributable to operationalization programmes set up to assess the complementarity of development interventions implemented in 2014–2020.<br><br>The ERT recommends that Poland clearly explain in the NIR the reasons for the large increase in deforested area in 2016 under forest land converted to settlements when compared with other years. | Yes. Transparency |
| Waste | | | |
| W.4 | 5.A Solid waste disposal on land – $CH_4$ | The ERT noted that according to NIR table 7.12 (p.247) the amount of landfilled industrial waste reduced significantly over the time series. There was also a shift in the composition of industrial waste (NIR table 7.13, p.249). For example, in 1997, food represented 87.8 per cent of waste and, in 2015, 31.98 per cent. During the review, the Party explained that data on industrial waste mass and composition were provided by Statistics Poland and published in annuals by industry, and that, since 1975, landfilled food waste volumes have decreased by 99.1 per cent, contributing to a significant decline in industrial waste mass and composition. Other factors identified by Poland as important drivers of this shift include the entry into force of legislation between 1999 and 2001 regulating waste disposal and promoting a reduction in the landfilling of biodegradable waste. In addition, reduction in waste mass and composition was also associated with the transition of the economic system in the 1980s and early 1990s.<br><br>The ERT encourages Poland to explain in the NIR the decreasing trend in the amount of landfilled industrial waste. | Not an issue/problem |
| W.5 | 5.A Solid waste disposal on land – $CH_4$ | Poland reported in the NIR (section 7.2.2.1, p.241) that all unmanaged landfills are categorized as deep on the basis of expert judgment and that historical and current statistical data on the share of shallow and deep landfills was lacking. The ERT notes that the decision to categorize all unmanaged landfills as deep could have a significant impact on emission trends, particularly given that the EU landfill directive (1999/31/EC) induced a shift towards phasing out unmanaged landfills. During the review, Poland explained that, in the absence of any data to determine whether unmanaged landfills are deep or shallow, the decision was made to adopt a more conservative approach, which could lead to an overestimation of the emissions. The Party indicated its intention to revise these assumptions by 2020, depending on the availability of a new waste database. | Yes. Accuracy |

| ID# | Finding classification | Description of the finding with recommendation or encouragement | Is finding an issue and/or a problem?[a] If yes, classify by type |
|---|---|---|---|
| | | The ERT commends Poland for its efforts to plan for the refinement of country-specific AD and recommends that the Party improve the accuracy of the estimates using the new waste database. | |
| W.6 | 5.D Wastewater treatment and discharge – $CH_4$ | The ERT noted the lack of any clear information on annual sludge removals in domestic and industrial wastewater treatment. NIR table 7.10 (p.246) presents the amount of sewage sludge landfilled (325 kt in 2016), and while NIR table 7.27 (p.263) presents the AD for sludge removed from domestic wastewater (category 5.D.1), no indication is given of the final use of that sludge, for example application to agricultural soils, incineration or disposal in landfill. In addition, for category 5.D.2 (industrial wastewater), although the Party indicates the use of the tier 1 approach based on a domestic case study (NIR section 7.5.2.2, p.264) , no confirmation is provided that the default value applied for sludge removal was zero in accordance with the 2006 IPCC Guidelines (volume 5, p.6.9).<br><br>During the review, Poland explained that the amount of sludge disposed in landfill (table 7.10) consists of municipal and industrial waste and is considering 70 per cent wet matter. The Party clarified that it had applied the tier 1 IPCC default value for sludge removal under industrial wastewater (category 5.D.2) for lack of data on sludge removal split by industry. The Party provided a table with the amount of domestic sludge removed, disaggregated by final use (incinerated, landfilled, applied in agriculture, applied in cultivation for compost production and applied in land reclamation), which allowed the ERT to verify whether sludge removal from wastewater was consistent with the estimates for sludge applied to other uses as in footnote 1 to CRF table 5.D. The ERT noted that in the table provided by the Party during the review, the amount of domestic sludge removed and landfilled (20.67 kt) is different from the amount reported in table 7.10 (325 kt).<br><br>The ERT recommends that Poland improve the transparency of the reporting on sludge removed in domestic and industrial wastewater by including in the NIR the amount of domestic sludge removed under category 5.D.1, disaggregated by final use; and an explanation that the amount of sludge removed under industrial wastewater (category 5.D.2) is zero in accordance with the IPCC default tier 1 value, given the lack of any data on sludge split by industry. The ERT also recommends that the Party verify the values reported in NIR table 7.10 with the amount of sludge removed and landfilled (20.67 kt in 2016) in the table provided during the review (and used for the calculation of emissions), and, in case values are really different, justify and explain the reasons for any significant differences. | Yes. Transparency |
| W.7 | 5.D.2 Industrial wastewater – $CH_4$ | The ERT noted that in the NIR (section 7.5.2.2, p.264) Poland did not provide clarification on how industrial liquid effluents were managed and how this activity was reflected in the inventory. During the review, Poland referred to NIR section 7.5.2.2 for the description of the methodology and made reference to table 7.31 on the amount of industrial wastewater by industry (pp.266–267). However, it was unclear to the ERT from the information contained in the NIR how industrial liquid effluent management had evolved over the time series.<br><br>The ERT recommends that Poland include a description in the NIR of how wastewater management has evolved over time with regard to the management of industrial liquid effluents. | Yes. Transparency |
| KP-LULUCF | | | |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| KL.5 | General (KP-LULUCF) – $CO_2$ | Poland uses the default transition time (t=20 years) for land converted to other land uses. Consequently, reporting for 2016 should concern only changes from 1997 to 2016 under the Convention and from 1990 to 2016 under the Kyoto Protocol. However, the reported emission figures are the same under the Convention and the Kyoto Protocol.<br>The ERT recommends that Poland explain in the NIR how it manages the land-use matrix when reporting under the Convention and the Kyoto Protocol and the differences between the two. | Yes. Transparency |
| KL.6 | Deforestation – $CO_2$ | The ERT noted from the NIR (annex 6.1, p.411) an increase in the area of deforested land in 2016 (13.64 kha) under forest land converted to settlements compared with the previous year (see also ID# L.43 above). It also noted that $CO_2$ emissions were high in 2016 compared with other years, and asked the Party whether instant oxidation was assumed for mineral soils where land-use conversion occurred. Poland confirmed that it was and explained that for carbon stock change in biomass and soils, under the conservativeness principle, all potential emissions associated with the conversion of forest land to settlements were assigned to the year the conversion actually occurred. This approach results in an overestimation of emissions but avoids the creation of potential net credits and any negative accounting implications with respect to deforestation under the Kyoto Protocol, bearing in mind that all potential emissions are reported and accounted for. Therefore, when reporting carbon stock reductions, it is a prerequisite to assume full liability for the carbon stocks not only in the commitment period during which the credits are issued, but also in future commitment periods and for all the lands that were monitored and accounted for from the outset. Assigning the emission (area) estimates associated with the conversion of forest land to settlements to the year in which they actually occurred eliminates potential reporting burdens and simplifies and facilitates understanding of the reporting tables under the two different regimes.<br>The ERT recommends that Poland explain in the NIR the reasons for the high $CO_2$ emissions observed for deforestation activities in 2016 compared with previous years of the time series, in accordance with the answer provided to the ERT during the review. | Yes. Transparency |
| KL.7 | AR – $CO_2$ | The reported afforestation area (18.42 kha) and emissions (–12.52 kt C) for organic soils in CRF table (KP-I)A.1 are the same as in the reporting under the Convention (CRF table 4.A), despite the fact that only the previous 20 years (1997–2016) should be reported under the Convention. In response to a question raised by the ERT in this regard, Poland explained that it had used the same values for organic soils for afforestation and for category 4.A.2 (land converted to forest land) to eliminate potential reporting burdens and simplify and facilitate understanding of the reporting tables under the two different reporting regimes. Applying the same EF and AD used for AR to estimate emissions for land converted to forest land will result in an overestimation of emissions under the Convention, which should be viewed in the context of the conservativeness principle.<br>The ERT recommends that Poland provide a detailed explanation in the NIR as to why the reported afforestation area and emissions for organic soils are the same in the reporting under the Convention and the Kyoto Protocol. | Yes. Transparency |
| KL.8 | FM – $CO_2$ | The total sink for forest land remaining forest land (category 4.A.1) reported under the Convention stands at –34,000.05 kt $CO_2$ (CRF table 4.A). This value should be the sum for 1997–2016, according to Convention reporting (as Poland applies the default transition time t = 20 years). The estimated total value reported under the | Yes. Transparency |

| *ID#* | *Finding classification* | *Description of the finding with recommendation or encouragement* | *Is finding an issue and/or a problem?[a] If yes, classify by type* |
|---|---|---|---|
| | | Kyoto Protocol (in CRF table 4(KP)B.1) is a little lower at –33,634.46 kt $CO_2$. In CRF table 4(KP) B.1, all years 1990–2016 are reported as a net sink, such that the net sink reported under the Kyoto Protocol should be greater than under the Convention. The ERT also noted that the area reported for category 4.A.1 forest land remaining forest land (8,754.09 kha) is a little higher than that reported in CRF table 4(KP-I)B.1 (8,646.88 kha).<br><br>The ERT recommends that Poland include a detailed explanation in the NIR as to why the net sink and the area reported under the Kyoto Protocol for FM (CRF table 4(KP)B.1) are smaller than under the Convention for forest land remaining forest land (CRF table 4.A). | |
| KL.9 | AR – $CO_2$ | The general approach to estimating changes in living biomass where land-use change occurs is firstly to estimate the standing stock of living biomass in terms of carbon, then to remove the carbon mass and include this value as a loss in the CRF table for the type of land conversion concerned. For example, if afforestation is occurring on cropland, the amount of carbon in living biomass on that cropland should be reported as a loss for cropland converted to forest land in CRF table 4.A; and the annual carbon stock in the new forest should be reported as a "gain" in the same CRF table. If deforestation is occurring on forest land and that land is converted to cropland, the reduction in living biomass should be reported as a loss in CRF table 4.B; and the carbon stock in living biomass on that land should be reported as a "gain" in the same CRF table. This approach ensures the visible reporting of both gains and losses.<br><br>In its reporting of afforestation in CRF table 4(KP-I)A.1, Poland referred to losses from land converted to forest land as "NO". This is not in line with the *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* or the 2006 IPCC Guidelines.<br><br>The ERT recommends that the Party provide justification or documentation to confirm that no living biomass is removed when afforestation occurs. If this is not possible, the ERT recommends that the Party include estimates for losses of living biomass from afforestation for 2013–2016 under category 4(KP-I)A.1. If national derived values cannot be obtained, default values for carbon stock of cropland can be found in table 5.9, and of grassland in table 6.4, of the 2006 IPCC Guidelines (volume 4). The ERT notes that the figures in table 6.4 are given in dry matter and not in carbon and the figures in the column which includes both above- and below-ground biomass should be used. | Yes. Accuracy |

[a] Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

# VI. Application of adjustments

11. The ERT has not identified the need to apply any adjustments to the 2018 annual submission of Poland.

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

12. Poland has elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF activities is not applicable to the 2018 review.

# VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2018 annual submission.

# Annex I

## Overview of greenhouse gas emissions and removals for Poland for submission year 2018 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by Poland in its 2018 annual submission

1. Tables 6–9 provide an overview of total GHG emissions and removals as submitted by Poland.

Table 6
**Total greenhouse gas emissions for Poland, base year[a]–2016**
(kt $CO_2$ eq)

| | *Total GHG emissions excluding indirect $CO_2$ emissions* | | *Total GHG emissions including indirect $CO_2$ emissions[b]* | | *Land-use change Article 3.7 bis as contained in the Doha Amendment)[c]* | *KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)[d]* | *KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)* | |
|---|---|---|---|---|---|---|---|---|
| | *Total including LULUCF* | *Total excluding LULUCF* | *Total including LULUCF* | *Total excluding LULUCF* | | | *CM, GM, RV, WDR* | *FM* |
| FMRL | | | | | | | | –27 133.00 |
| Base year | 555 488.30 | 571 415.33 | NA | NA | NA | | NA | |
| 1990 | 441 038.99 | 468 642.60 | NA | NA | | | | |
| 1995 | 423 330.67 | 439 176.91 | NA | NA | | | | |
| 2000 | 357 535.52 | 390 444.67 | NA | NA | | | | |
| 2010 | 376 443.95 | 406 839.29 | NA | NA | | | | |
| 2011 | 369 016.21 | 406 223.42 | NA | NA | | | | |
| 2012 | 362 372.96 | 399 004.67 | NA | NA | | | | |
| 2013 | 356 887.96 | 395 634.65 | NA | NA | | –2 638.31 | NA | –42 741.15 |
| 2014 | 352 705.72 | 382 852.43 | NA | NA | | –2 499.16 | NA | –35 692.06 |
| 2015 | 359 053.42 | 386 282.65 | NA | NA | | –2 547.98 | NA | –31 734.20 |
| 2016 | 369 043.99 | 396 995.79 | NA | NA | | 2 689.57 | NA | –37 830.88 |

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

[a] "Base year" refers to the base year under the Kyoto Protocol, which is 1988 for $CO_2$, $CH_4$ and $N_2O$, 1995 for HFCs and PFCs, and 2000 for $NF_3$. Poland has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The Party did not report indirect $CO_2$ emissions in CRF table 6.

[c] The value reported in this column refers to 1990.

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

Table 7
**Greenhouse gas emissions by gas for Poland, excluding land use, land-use change and forestry, 1988–2016**
(kt $CO_2$ eq)

| | *$CO_2$*[a] | *$CH_4$* | *$N_2O$* | *HFCs* | *PFCs* | *Unspecified mix of HFCs and PFCs* | *$SF_6$* | *$NF_3$* |
|---|---|---|---|---|---|---|---|---|
| 1988 | 470 650.56 | 69 721.30 | 30 707.70 | NA, NO | 147.26 | NA, NO | NA, NO | NA, NO |
| 1990 | 375 810.95 | 64 015.00 | 28 674.78 | NA, NO | 141.87 | NA, NO | NA, NO | NA, NO |
| 1995 | 361 072.03 | 53 636.36 | 24 132.74 | 134.69 | 171.97 | NA, NO | 29.12 | NA, NO |
| 2000 | 316 828.09 | 48 677.75 | 23 372.58 | 1 366.50 | 176.68 | NA, NO | 23.07 | NA, NO |
| 2010 | 331 709.98 | 47 496.15 | 20 574.36 | 7 006.36 | 17.07 | NA, NO | 35.37 | NA, NO |
| 2011 | 331 268.30 | 46 396.20 | 20 881.07 | 7 622.60 | 16.22 | NA, NO | 39.02 | NA, NO |
| 2012 | 323 823.35 | 46 172.15 | 20 991.93 | 7 959.91 | 15.41 | NA, NO | 41.92 | NA, NO |
| 2013 | 319 608.07 | 46 452.80 | 21 155.52 | 8 356.09 | 14.64 | NA, NO | 47.54 | NA, NO |
| 2014 | 307 044.69 | 45 986.77 | 20 776.28 | 8 978.00 | 13.90 | NA, NO | 52.79 | NA, NO |
| 2015 | 310 526.32 | 46 658.80 | 20 037.63 | 8 969.67 | 13.21 | NA, NO | 77.03 | NA, NO |
| 2016 | 321 182.01 | 46 109.36 | 20 656.15 | 8 957.35 | 12.55 | NO, NA | 78.38 | NO, NA |
| **Per cent change 1988–2016** | **–31.8** | **–33.9** | **–32.7** | **NA** | **–91.5** | **NA** | **NA** | **NA** |

*Note*: Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions.
[a] Poland did not report indirect $CO_2$ emissions in CRF table 6.

Table 8
**Greenhouse gas emissions by sector for Poland, 1988–2016**
(kt $CO_2$ eq)

| | *Energy* | *IPPU* | *Agriculture* | *LULUCF* | *Waste* | *Other* |
|---|---|---|---|---|---|---|
| 1988 | 474 732.14 | 31 198.21 | 49 221.38 | –15 927.04 | 16 075.08 | NO |
| 1990 | 381 749.15 | 22 693.33 | 48 517.75 | –27 603.61 | 15 682.37 | NO |
| 1995 | 366 339.86 | 22 691.59 | 35 744.31 | –15 846.24 | 14 401.15 | NO |
| 2000 | 320 680.90 | 23 790.48 | 31 844.96 | –32 909.15 | 14 128.33 | NO |
| 2010 | 338 662.69 | 25 002.33 | 30 584.35 | –30 395.35 | 12 589.93 | NO |
| 2011 | 335 337.76 | 27 847.36 | 30 930.12 | –37 207.21 | 12 108.19 | NO |
| 2012 | 329 473.70 | 26 824.62 | 30 831.45 | –36 631.70 | 11 874.90 | NO |
| 2013 | 325 795.75 | 26 572.14 | 31 451.25 | –38 746.70 | 11 815.52 | NO |
| 2014 | 311 898.16 | 28 177.62 | 31 419.33 | –30 146.70 | 11 357.33 | NO |

| | *Energy* | *IPPU* | *Agriculture* | *LULUCF* | *Waste* | *Other* |
|---|---|---|---|---|---|---|
| 2015 | 316 135.92 | 28 535.19 | 30 658.85 | –27 229.23 | 10 952.68 | NO |
| 2016 | 326 536.84 | 28 666.35 | 31 235.15 | –27 951.80 | 10 557.45 | NO |
| **Per cent change 1988–2016** | **–31.2** | **–8.1** | **–36.5** | **75.5** | **–34.3** | **NA** |

*Notes*: (1) Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions. (2) Poland did not report indirect $CO_2$ emissions in CRF table 6.

Table 9

**Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year[a]–2016, for Poland**

(kt $CO_2$ eq)

| | *Article 3.7 bis as contained in the Doha Amendment[b]* | *Article 3.3 of the Kyoto Protocol* | | *FM and elected Article 3.4 activities of the Kyoto Protocol* | | | | |
|---|---|---|---|---|---|---|---|---|
| | *Land-use change* | *AR* | *Deforestation* | *FM* | *CM* | *GM* | *RV* | *WDR* |
| FMRL | | | | –27 133.00 | | | | |
| Technical correction | | | | NA | | | | |
| Base year | NA | | | | NA | NA | NA | NA |
| 2013 | | –2 841.79 | 203.48 | –42 741.15 | NA | NA | NA | NA |
| 2014 | | –2 815.71 | 316.55 | –35 692.06 | NA | NA | NA | NA |
| 2015 | | –2 849.21 | 301.23 | –31 734.20 | NA | NA | NA | NA |
| 2016 | | –2 832.82 | 5 522.39 | –37 830.88 | NA | NA | NA | NA |
| **Per cent change base year–2016** | | | | | NA | NA | NA | NA |

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

[a] Poland has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

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

2. Table 10 provides an overview of key relevant data for Poland's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 10
**Key relevant data for Poland under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the 2018 annual submission**

| *Key parameters* | *Values* |
|---|---|
| Periodicity of accounting | (a) AR: commitment period accounting<br>(b) Deforestation: commitment period accounting<br>(c) FM: commitment period accounting<br>(d) CM: not elected<br>(e) GM: not elected<br>(f) RV: not elected<br>(g) WDR: not elected |
| Election of activities under Article 3, paragraph 4 | None |
| Election of application of provisions for natural disturbances | No |
| 3.5% of total base-year GHG emissions, excluding LULUCF | 20 300.700 kt $CO_2$ eq (162 405.602 kt $CO_2$ eq for the duration of the commitment period) |
| Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for: | |
| 1. AR in 2016 | NA |
| 2. Deforestation in 2016 | NA |
| 3. FM in 2016 | NA |
| 4. CM in 2016 | NA |
| 5. GM in 2016 | NA |
| 6. RV in 2016 | NA |
| 7. WDR in 2016 | NA |

# Annex II

## Information to be included in the compilation and accounting database

Tables 11–14 include the information to be included in the compilation and accounting database for Poland. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table 11
**Information to be included in the compilation and accounting database for 2016, including on the commitment period reserve, for Poland**
(t $CO_2$ eq)

| | *Original submission* | *Revised estimate* | *Adjustment* | *Final* |
|---|---|---|---|---|
| **CPR** | 1 425 544 942 | | | |
| **Annex A emissions for 2016** | | | | |
| $CO_2$[a] | 321 182 010 | | | 321 182 010 |
| $CH_4$ | 46 109 357 | | | 46 109 357 |
| $N_2O$ | 19 483 884 | 20 656 147 | | 20 656 147 |
| HFCs | 8 957 351 | | | 8 957 351 |
| PFCs | 12 548 | | | 12 548 |
| Unspecified mix of HFCs and PFCs | NO, NA | | | NO, NA |
| $SF_6$ | 78 376 | | | 78 376 |
| $NF_3$ | NO, NA | | | NO, NA |
| **Total Annex A sources** | **395 823 526** | | | **396 995 789** |
| **Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2016** | | | | |
| 3.3 AR | –2 832 817 | | | –2 832 817 |
| 3.3 Deforestation | 5 522 390 | | | 5 522 390 |
| **FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2016** | | | | |
| 3.4 FM | –37 830 883 | | | –37 830 883 |

[a] Poland did not report indirect $CO_2$ emissions in CRF table 6.

Table 12
**Information to be included in the compilation and accounting database for 2015 for Poland**
(t $CO_2$ eq)

| | *Original submission* | *Revised estimate* | *Adjustment* | *Final* |
|---|---|---|---|---|
| **Annex A emissions for 2015** | | | | |
| $CO_2$[a] | 310 526 318 | | | 310 526 318 |
| $CH_4$ | 46 658 802 | | | 46 658 802 |
| $N_2O$ | 18 924 864 | 20 037 628 | | 20 037 628 |
| HFCs | 8 969 667 | | | 8 969 667 |
| PFCs | 13 208 | | | 13 208 |
| Unspecified mix of HFCs and PFCs | NA, NO | | | NA, NO |
| $SF_6$ | 77 026 | | | 77 026 |
| $NF_3$ | NA, NO | | | NA, NO |
| **Total Annex A sources** | **385 169 884** | | | **386 282 648** |
| **Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2015** | | | | |
| 3.3 AR | –2 849 209 | | | –2 849 209 |

| | *Original submission* | *Revised estimate* | *Adjustment* | *Final* |
|---|---|---|---|---|
| 3.3 Deforestation | 301 232 | | | 301 232 |
| **FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2015** | | | | |
| 3.4 FM | –31 734 200 | | | –31 734 200 |

[a] Poland did not report indirect $CO_2$ emissions in CRF table 6.

Table 13
**Information to be included in the compilation and accounting database for 2014 for Poland**
(t $CO_2$ eq)

| | *Original submission* | *Revised estimate* | *Adjustment* | *Final* |
|---|---|---|---|---|
| **Annex A emissions for 2014** | | | | |
| $CO_2$[a] | 307 044 692 | | | 307 044 692 |
| $CH_4$ | 45 986 769 | | | 45 986 769 |
| $N_2O$ | 19 754 620 | 20 776 281 | | 20 776 281 |
| HFCs | 8 977 997 | | | 8 977 997 |
| PFCs | 13 903 | | | 13 903 |
| Unspecified mix of HFCs and PFCs | NA, NO | | | NA, NO |
| $SF_6$ | 52 786 | | | 52 786 |
| $NF_3$ | NA, NO | | | NA, NO |
| **Total Annex A sources** | **381 830 768** | | | **382 852 429** |
| **Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014** | | | | |
| 3.3 AR | –2 815 710 | | | –2 815 710 |
| 3.3 Deforestation | 316 554 | | | 316 554 |
| **FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014** | | | | |
| 3.4 FM | –35 692 056 | | | –35 692 056 |

[a] Poland did not report indirect $CO_2$ emissions in CRF table 6.

Table 14
**Information to be included in the compilation and accounting database for 2013 for Poland**
(t $CO_2$ eq)

| | *Original submission* | *Revised estimate* | *Adjustment* | *Final* |
|---|---|---|---|---|
| **Annex A emissions for 2013** | | | | |
| $CO_2$[a] | 319 608 069 | | | 319 608 069 |
| $CH_4$ | 46 452 803 | | | 46 452 803 |
| $N_2O$ | 20 202 152 | 21 155 517 | | 21 155 517 |
| HFCs | 8 356 092 | | | 8 356 092 |
| PFCs | 14 635 | | | 14 635 |
| Unspecified mix of HFCs and PFCs | NA, NO | | | NA, NO |
| $SF_6$ | 47 537 | | | 47 537 |
| $NF_3$ | NA, NO | | | NA, NO |
| **Total Annex A sources** | **394 681 289** | | | **395 634 654** |
| **Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013** | | | | |
| 3.3 AR | –2 841 791 | | | –2 841 791 |
| 3.3 Deforestation | 203 477 | | | 203 477 |
| **FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013** | | | | |
| 3.4 FM | –42 741 152 | | | –42 741 152 |

[a] Poland did not report indirect $CO_2$ emissions in CRF table 6.

# Annex III

## Additional information to support findings in table 2

### Missing categories that may affect completeness

The categories for which methods are included in the 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of reporting in the Party's inventory are the following:

(a) Carbon stock change for all mandatory categories (see ID# L.2 in table 3);

(b) $N_2O$ emissions managed for peatland extraction under category 4.D.1.1 (see ID# L.40 in table 5).

# Annex IV

## Documents and information used during the review

### A. Reference documents

**Reports of the Intergovernmental Panel on Climate Change**

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

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 http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.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 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/kpsg.

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, Switzerland: IPCC. Available at http://www.ipcc-nggip.iges.or.jp/public/wetlands/.

**Annual review reports**

Reports on the individual reviews of the 2013, 2014, 2015, 2016 and 2017 annual submissions of Poland, contained in documents FCCC/ARR/2013/POL, FCCC/ARR/2014/POL, FCCC/ARR/2015/POL, FCCC/ARR/2016/POL and FCCC/ARR/2017/POL, respectively.

**Other**

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at https://unfccc.int/sites/default/files/resource/AGI%20report_2018.pdf.

Annual status report for Poland for 2018. Available at https://unfccc.int/sites/default/files/resource/asr2018_POL.pdf.

### B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Anna Olecka (Polish Institute of Environmental Protection), including additional material on the methodology and assumptions used. The following documents[1] were also provided by Poland:

Fotyma M, Kopiński J. 2012. *Auxiliary tables*. In: *Temporal and Spatial Differences in Emission of Nitrogen and Phosphorus from Polish Territory to the Baltic Sea*. Pastuszak and Igras (eds). National Marine Fisheries Research Institute, Institute of Soil Science and Plan Cultivation – State Research Institute and fertilizer Researcher Institute. Available at https://issuu.com/mirpib/docs/temporal-and-spatial-differences-in.

[1] Reproduced as received from the Party.

Turbiak J, Miatkowski Z. 2010. *CO2 emission from post-bog soils in on water conditions and habitats*, Instytut Technologiczno-Przyrodniczy w Falentach, 2010, Water Environment-Rural Areas, pp 201-210. Available at http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-article-BATC-0004-0002.

Bittman, S., Dedina, M., Howard C.M., Oenema, O., Sutton, M.A., (eds), 2014, *Options for Ammonia Mitigation: Guidance from the UNECE Task Force on Reactive Nitrogen*, Centre for Ecology and Hydrology, Edinburgh, UK, http://www.clrtap-tfrn.org/sites/clrtap-tfrn.org/files/documents/AGD_final_file.pdf; Table ES2 (or AII.5).

Oświecimska–Piasko Z., 2008. *Assessment of area of cultivated histosols in Poland for the purpose of GHG emissions monitoring in Poland* (in Polish). Falenty. 2008.