

Final Review Report

2021 annual review of national greenhouse gas inventory data

pursuant to Article 19(2) of Regulation (EU) No 525/2013

Bulgaria
30 June 2021



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Conclusions from the 2021 annual ESD review

This Draft Review Report presents the findings from the 2021 annual review of the greenhouse gas (GHG) emission inventory of Bulgaria, pursuant to Article 19(2) of Regulation (EU) No 525/2013, with a view to monitoring Bulgaria's achievement of its GHG emission reduction or limitation target pursuant to Article 3 of Decision No 406/2009/EC (the 'Effort Sharing Decision', ESD) in 2019.

The reviewers carried out checks to verify the transparency, accuracy, consistency, comparability and completeness of the national GHG inventory for the year 2019 submitted in 2021 by Bulgaria pursuant to Articles 7(1) and 7(3) of Regulation (EU) No 525/2013.

The review consisted of two steps:

1. The EU inventory team (European Environment Agency (EEA), European Topic Centre on Climate Change Mitigation and Energy (ETC/CME), Joint Research Centre (JRC) and Eurostat) performed the initial checks under Step 1.
2. A Technical Expert Review Team (TERT) performed Step 2 of the 2021 annual ESD review.

More information on the ESD legislation and the procedures for the 2021 annual ESD review is presented in the annexes to this review report.

Step 1 conclusions

The EU inventory team identified 11 significant issues through the checks performed in Step 1. Therefore, Bulgaria was subject to a second step of the 2021 annual ESD review. Only significant issues were subject to the second step review checks.

Step 2 conclusions

1. The reviewers raised 45 issues with Bulgaria during the first and the second step of the 2021 annual ESD review (see Table 1). The TERT provided a recommendation for 7 of these issues. Other issues raised during the annual review were clarified and are considered resolved.
2. The TERT identified cases where inventory data were prepared in a manner which is inconsistent with UNFCCC guidance documentation or Union rules. In particular, the TERT identified a number of underestimates or overestimates exceeding the threshold of significance pursuant to Article 31 of Commission Implementing Regulation (EU) No 749/2014.
3. Bulgaria provided 1 revised estimate. The TERT agreed with the revised estimate. Table 2 below summarises the revised estimate and further information is provided at the end of this report.
4. The TERT also deemed necessary technical corrections in the meaning of Article 19(3)(c) of Regulation (EU) No 525/2013 and calculated such technical corrections in consultation with Bulgaria. The technical corrections are presented in Table 2 and are accompanied by evidence-based justification. At the time of preparing the draft review report, there was no agreement on the draft technical corrections between Bulgaria and the TERT yet.
5. The TERT identified non-binding recommendations in order to improve the national inventory data of Bulgaria (see Table 4).
6. The TERT considers that it received a response from Bulgaria that was sufficient in order to undertake the review appropriately.

Table 1: Overview of issues raised with Bulgaria during the first and the second step

	Issues raised ¹	Recommendations ²	Revised estimates ³	Technical corrections ⁴
Total	45	7	1	2
Energy	16	-	-	-
IPPU	17	3	1	2
Agriculture	7	2	-	-
Waste	5	2	-	-
Cross-cutting	-	-	-	-

¹ Excluding findings related to Land use, land-use change and forestry (LULUCF) and Kyoto Protocol (KP) LULUCF.

² The total number of recommendations includes revised estimates and technical corrections.

³ Revised estimates: changes in inventory estimates triggered by the review and provided by the Member State.

⁴ Technical corrections: changes in inventory estimates triggered by the review and provided by the TERT.

National totals for the purpose of Article 3 of Decision No 406/2009/EC (ESD)

Table 2: National totals for the purpose of Article 3 of Decision No 406/2009/EC

Data / Source category	Reference	Emission estimates (kt CO ₂ equivalent) ¹ 2019
Total greenhouse gas emissions, including indirect CO ₂ , without land use, land-use change and forestry as reported by Bulgaria pursuant to Article 7(4) of Regulation (EU) No 525/2013, taking into account any resubmission to the Commission	BGR_2021_1_10032021	55 955.277
Difference between original estimate and revised estimate provided by Bulgaria and accepted by the TERT²		
2B2 Nitric acid production, N ₂ O	BG-2B2-2021-0001	-693.635
Difference between original estimates and technical corrections deemed necessary by the TERT²		
2F1 Refrigeration and air conditioning, HFCs	BG-2F1-2021-0004	-164.123
2F1 Refrigeration and air conditioning, HFCs	BG-2F1-2021-0007	-68.171
Total greenhouse gas emissions including revised estimates and technical corrections		55 029.348
CO ₂ emissions from 1A3a Domestic aviation ³	BGR_2021_1_10032021	20.682
NF ₃ emissions ³	BGR_2021_1_10032021	-

¹ The tables presented in this report show numbers rounded to three decimal places, although most numbers are available with greater precision. For all calculations (in particular of total GHG emissions and total ESD emissions), all available decimal places were used. Therefore, the totals shown may slightly differ from calculation results where only three decimals would be taken into account.

² A positive difference indicates an increase compared to reported emissions. A negative difference indicates a decrease compared to reported emissions.

³ NF₃ emissions and emissions from 1A3a Domestic Aviation will be deducted from the national total as they are not included within the scope of total ESD emissions.

Greenhouse gas emissions covered by Decision 406/2009/EC

Table 3: Greenhouse gas emissions covered by Decision 406/2009/EC

Data	Reference	Emissions (kt CO ₂ equivalent) ¹ 2019
Total greenhouse gas emissions including accepted revised estimate provided by Bulgaria and technical corrections deemed necessary by the TERT	<i>See Table 2 above</i>	55 029.348
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 12 April 2021 ²	29 194.151
CO ₂ emissions from 1A3a Domestic aviation ³	<i>See Table 2 above</i>	20.682
NF ₃ emissions ³	<i>See Table 2 above</i>	-
Total ESD emissions		25 814.515

¹ The tables presented in this report show numbers rounded to three decimal places, although most numbers are available with greater precision. For all calculations (in particular of total GHG emissions and total ESD emissions), all available decimal places were used. Therefore, the totals shown may slightly differ from calculation results where only three decimals would be taken into account.

² The emissions of ETS stationary installations were independently verified and recorded in the EU Transaction Log (EUTL). These emissions do not derive from the national greenhouse gas emission inventory data and therefore the TERT was not tasked to review them.

³ NF₃ emissions and emissions from 1A3a Domestic Aviation will be deducted from the national total as they are not included within the scope of total ESD emissions.

Statement from Bulgaria on the conclusions presented by the TERT

Bulgaria agrees with the aggregated GHG emission inventory estimates presented in Table 3. Thank you for the fruitful discussions and useful recommendations during the review.

Recommendations from the TERT including revised estimates and technical corrections deemed necessary by the TERT.

Table 4: Recommendations from the TERT (RE = Revised estimate¹; TC = Technical correction²)

EMRT - ID	Key category	Category, gas, year	Recommendation	RE or TC in 2021
BG-2B2-2021-0001	Yes	2B2 Nitric acid production, 2019, N ₂ O	For 2B2 Nitric Acid Production, N ₂ O, 2019 the TERT noted that emissions increased by 574% between 2018 and 2019 and were approximately 9 times larger than ETS data for that category as reported in Bulgaria's 2021 Annex V on Reporting on consistency of reported emissions with data from the emissions trading system. In response to a question raised during the review, Bulgaria explained that combustion emissions had incorrectly been included in the IPPU sector as well as the Energy sector. This double count resulted in an over-estimate of emissions. Bulgaria provided a revised estimate for the year 2019. The TERT agreed with the revised estimate provided by Bulgaria and attached to the annex of the review report. The TERT recommends that Bulgaria include the revised estimate in its next submission.	RE
BG-2F1-2021-0007	Yes	2F1 Refrigeration and air conditioning, 2019, HFCs	For 2F1f Stationary Air Conditioning, HFCs in 2019 the TERT noted that Bulgaria's response to the TERT did not include a transparent explanation of its emission estimates provided and so it was not possible for the TERT to review them. The TERT therefore decided to calculate a technical correction for the year 2019 which [was/was not] accepted by Bulgaria. The estimates demonstrate that the issue is above the threshold of significance. The TERT recommends that Bulgaria include a revised estimate in its next submission.	TC
BG-2F1-2021-0004	Yes	2F1 Refrigeration and air conditioning, 2019, HFCs	For 2F1a Commercial Refrigeration, HFCs in 2019 the TERT noted that Bulgaria's response to the TERT did not include a transparent explanation of its emission estimates provided and so it was not possible for the TERT to review them. The TERT therefore decided to calculate a technical correction for the year 2019 which [was/was not] accepted by Bulgaria. The estimates demonstrate that the issue is above the threshold of significance. The TERT recommends that Bulgaria include a revised estimate in its next submission.	TC
BG-3A-2021-0001	Yes	3A Enteric fermentation, 1990-2019, CH ₄	For CH ₄ emissions from category 3A1 Enteric Fermentation Dairy Cattle, the TERT noted that the milk yield increases across the time series, while the digestibility of feed remains constant across the time series. The TERT considers that these trends could be inconsistent, but are not able to assess the extent to which this may result in an over or under-estimate of emissions but considers any change likely to be below the threshold of significance. In response to a question raised during the review, Bulgaria explained that they plan to obtain data that would allow a significant improvement in the assessment of the digestibility of feed. The TERT strongly recommends that Bulgaria use year-specific values for the digestibility of feed in its emissions calculations for 3A1 Enteric Fermentation Dairy Cattle or provide clear justification for the use of a constant value across the time series. Where this data is not currently available, the TERT strongly recommends that Bulgaria undertake work that will deliver the required data and that annual progress be reported on this improvement activity in the NIR until it is completed.	No

EMRT - ID	Key category	Category, gas, year	Recommendation	RE or TC in 2021
BG-3B-2021-0001	Yes	3B Manure management, 1990-2019, N ₂ O	For N ₂ O emissions from category 3B1 Manure Management, Dairy Cattle, the TERT noted that the milk yield increases across the time series, while the nitrogen excretion rate remains constant across the time series. The TERT considers that these trends could be inconsistent, but are not able to assess the extent to which this may result in an over or under-estimate of emissions but considers any change likely to be below the threshold of significance. In response to a question raised during the review, Bulgaria explained that they plan to obtain data that would allow a significant improvement in the assessment of the nitrogen excretion rate. The TERT strongly recommends that Bulgaria use year-specific values for the nitrogen excretion rate in its emissions calculations for 3B1 Manure Management, Dairy Cattle, or provide clear justification for the use of a constant value across the time series. Where this data is not currently available, the TERT strongly recommends that Bulgaria undertake work that will deliver the required data, and that annual progress be reported on this improvement activity in the NIR until it is completed.	No
BG-5D-2021-0001	Yes	5D Wastewater treatment and discharge, 2018, CH ₄	For CH ₄ emissions from domestic wastewater treatment and discharge category 5D1 Domestic Wastewater Handling, the TERT noted that Bulgaria initially submitted emissions in January 2021 that were not in line with those expected following the 2020 ESD revised estimate (observation BG-5D-2020-0003). Bulgaria then resubmitted its March 2021 CRF tables applying the correct approach agreed during the 2020 ESD review. The methodology applies the MCF value (0.03) for centralized wastewater treatment plants (WWTP) from the 2019 IPCC Refinement (Table 6.3 updated) across the time series, replacing Bulgaria's previous methodology that adopted the 2006 IPCC default MCF for WWTP that are poorly managed / overloaded (0.3). This change was made to better account for information on implementation of the Urban Waste Water Directive (UWWTD) showing that the majority of WWTP in Bulgaria are in compliance with the legislation on remaining BOD in effluent and can therefore be considered as well managed / not overloaded. Despite this, the TERT noted that Section 7.5.3.2.1 of Bulgaria's NIR submission in 2021 has not been updated to reflect this change in methodology, also showing CH ₄ emissions from 5D1 Domestic Wastewater Handling that match the old methodology rather than matching the approach reported in Bulgaria's CRF. In a file shared by Bulgaria during the review (5D1 Domestic Wastewater HandlingDWW-Calculation_28.02.2021), the TERT noted that the tab 'TERT' shows the corrected methodology and emissions totals, whereas the tab 'CH ₄ emission_domestic (2)plant' was updated for the whole time series (up to 2019) using the old methodology. It appeared to the TERT that this old methodology and output matches that included in the NIR section 7.5.3.2.1. In addition, no information on recalculations for this category was reported in the NIR (section 7.5.6, p. 420). The TERT notes that this issue does not relate to an over or under-estimate of emissions but considers this to be a transparency issue. In response to a question raised during the review (and subsequent discussion), Bulgaria agreed and understood the findings of the TERT. The TERT recommends that Bulgaria update its future NIR section 7.5.3.2.1 and recalculations 7.5.6 to explain and fully justify its revised approach, particularly in reference to the use of the 2019 IPCC Refinement MCF of 0.03 for its domestic centralized WWTP.	No

EMRT - ID	Key category	Category, gas, year	Recommendation	RE or TC in 2021
BG-5D-2021-0002	Yes	5D Wastewater treatment and discharge, 2019, CH ₄	For CH ₄ emissions from 5D2 Industrial Wastewater Handling - Industrial Waste Water Handling the TERT noted that the emissions reported by Bulgaria in its CRF are 21% lower in 2019 than in 2018. In response to a question raised during the review, Bulgaria provided a file that justifies this trend due to a decrease in activity data (organic load of industrial wastewater) from a number of its key industries in 2019. In reviewing the provided file and methodology, the TERT noted that Bulgaria is mostly implementing a Tier 1 methodology and parameters for this key category. Specifically, the TERT noted that: 1. Bulgaria estimates that 59% of its industrial wastewater is treated on-site in 2019, of which approximately 60% is directly discharged into sea, river, lake. 39% is treated in centralized WWTP for which the 2006 IPCC classification 'aerobic, not well managed' (MCF=0.3) is applied. 2. The remaining 41% of industrial wastewater output that is not treated on-site equates to over 122 kt DC from industrial wastewater facilities in 2019. According to Bulgaria's CRF, the total organic load entering the domestic sewers in 2019 is 190.3 kt DC. Based on the assumption that this volume of organic component is co-discharged into domestic sewers it represents 65% of the total organic load entering the domestic sewer system. The TERT notes that this issue does not relate to an over or under-estimate of emissions but is an issue of transparency. The TERT recommends that Bulgaria i) review and justify the appropriateness of its MCF selection for centralized industrial WWTP as 'aerobic, not well managed' (MCF=0.3) given that it has already revised its MCF for domestic WWTP to better reflect that the majority of WWTP in Bulgaria are in compliance with the Urban Waste Water Directive (UWWTD) legislation; and ii) that Bulgaria develop a Tier 2 methodology to estimate CH ₄ emissions from industrial wastewater where possible, giving specific consideration to industrial wastewater that is co-discharged into the domestic sewer system. In such a case, Bulgaria should also reassess its use of the co-discharge factor 'I' (1.25) for additional industrial BOD discharged into domestic sewers in its calculations for category 5D1 Domestic Wastewater Handling.	No

¹ Revised estimates: changes in inventory estimates triggered by the review and provided by the Member State.

² Technical corrections: changes in inventory estimates triggered by the review and provided by the TERT.

Revised estimate provided by Bulgaria and accepted by the TERT

1	ESD Review Tool ID:	BG-2B2-2021-0001							
	ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2021/BG-2B2-2021-0001							
	Country:	Bulgaria							
	Sector:	2B2 Nitric acid production							
	Gases:	N ₂ O							
	Fuel								
	Completed by Sector Expert:	Emma Salisbury							
	Reviewed by Counterpart:	Maria Purzner							
	Reviewed by Lead Reviewer:	Ralph Harthan							
	Reviewed by Quality Controller:	Bernd Guele							
2	The underlying problem:	N ₂ O emissions for 2B2 Nitric acid increased by 574% between 2018 and 2019 and were approximately 9 times larger than ETS data for that category as reported in Bulgaria's 2021 Annex V on Reporting on consistency of reported emissions with data from the emissions trading system.							
	Summarise the methodology used:	Bulgaria provided revised estimate consistent with data from the emissions trading system.							
	Original estimate (Gg CO ₂ e)								
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	Notes
	2019			779.622					
2	Revised Estimate received from country (Gg CO ₂ e)								
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	Notes
	2019			85.987					
	Difference between RE and original estimate (Gg CO ₂ e)								
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	
2019			-693.635						

Technical corrections deemed necessary by the TERT

1

ESD Review Tool ID:	BG-2F1-2021-0004
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2021/BG-2F1-2021-0004
Country:	Bulgaria
Sector:	2F1 Refrigeration and air conditioning
Gases:	HFCs
Fuel	N/A
Completed by Sector Expert:	Emma Salisbury
Reviewed by Counterpart:	Maria Purzner
Reviewed by Lead Reviewer:	Ralph Harthan
Reviewed by Quality Controller:	Justin Goodwin
The underlying problem:	For 2F1a Commercial refrigeration, the product life factor changes from 10% (for years up to 2018) to 15% (for the year 2019) whilst the TERT would expect this value to be 15% for the whole time series; stock emissions for HFC-23 in 2019 (11.4482535075 t) are reported in the wrong units (factor of 1000 too big); manufacturing activity data are missing for some gases; disposal emissions are not reported.
Summarise the methodology used:	The product life factor was updated to 15% for the whole time series (so that the factor is the same for all years) and stock emissions were recalculated. "Filled into new equipment" activity data for 2019 were provided by Bulgaria in their response to the TERT on 14 May 2021. Manufacturing emissions were recalculated accordingly. Furthermore, the average IPCC default parameters for commercial refrigeration (stand-alone commercial applications and medium & large commercial refrigeration) were used to estimate disposal emissions resulting in a lifetime of 12 years and initial charge remaining of 58%. These corrected estimates affect the whole time series.

2

	Original estimate (Gg CO ₂ e)							Notes
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	
2019				333.234				
	Technical Correction calculated by TERT (Gg CO ₂ e)							Notes
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	
2019				169.111				
	Difference between TC and original estimate (Gg CO ₂ e)							
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	
2019				-164.123				

1	ESD Review Tool ID:	BG-2F1-2021-0007							
	ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2021/BG-2F1-2021-0007							
	Country:	Bulgaria							
	Sector:	2F1 Refrigeration and air conditioning							
	Gases:	HFCs							
	Fuel	N/A							
	Completed by Sector Expert:	Emma Salisbury							
	Reviewed by Counterpart:	Maria Purzner							
	Reviewed by Lead Reviewer:	Ralph Harthan							
Reviewed by Quality Controller:	Justin Goodwin								
1	The underlying problem:	The TERT noted that disposal from commercial air conditioning was not included in the 2F1f estimates. In addition, the TERT noted a possible overestimate in the existing calculated disposal emissions in the CRF compared to a calculation applying disposal EFs to the "Filled into new manufactured products". It is likely that the current CRF calculates this using the total bank rather than gas in equipment at end of life. In addition the TERT noted that the 2F1f stationary air conditioning, HFCs, disposal emissions in 2019 are significantly lower than in 2018 (e.g. 488.72 kt CO ₂ e reduction for HFC-125) because of the significant drop in new equipment between 2008 and 2009, which are now being decommissioned.							
	Summarise the methodology used:	The TERT calculated disposal emissions from domestic, industrial and commercial AC using "filled into new manufactured products" from CRF Table2(II)B-Hs2 as the activity data and using the parameters provided in the NIR for domestic AC: "The calculation of emissions from domestic systems was made after the following assumptions: EF [product life factor] of 5 % ... Emission lifetime is set to 10 years."							
2	Original estimate (Gg CO ₂ e)								
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	Notes
	2019				438.775				
	Technical Correction calculated by TERT (Gg CO ₂ e)								
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	Notes
	2019				370.604				
	Difference between TC and original estimate (Gg CO ₂ e)								
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	
2019				-68.171					

Annex I: Legal background and procedures of the 2021 annual ESD review

The Effort Sharing Decision No 406/2009/EC (ESD) sets national emission limits for greenhouse gas (GHG) emissions in the sectors outside the EU's Emission Trading System (ETS) for the period 2013-2020. The ESD and the Monitoring Mechanism Regulation (EU) 525/2013 (MMR) lay down annual reporting obligations, compliance checks and a Union review process to ensure that the compliance with annual GHG emission limits is assessed in a credible, consistent, transparent and timely manner. The requirements for the Union review of the national inventory data submitted by Member States are set out in Article 19 of the MMR.

The details concerning the review process, such as the timing and steps of conducting the annual and comprehensive reviews are set out in Chapter III and Annex XVI of the Commission Implementing regulations (EU) No 749/2014.

The objectives of the 2021 annual ESD review of Member States' GHG emission inventories are:

- a) to support the European Commission by ensuring it has accurate, reliable and verified information on annual GHG emissions for determining compliance with ESD targets for the year 2019 in a credible, consistent, transparent and timely manner, according to Article 19 (2) of the MMR;
- b) to assist Member States in improving the quality of their GHG inventories.

The 2021 annual ESD review of national GHG inventory data was carried out for the compliance year 2019 pursuant to Article 19 of the MMR. The EEA review secretariat (consisting of Melanie Sporer, Claire Qoul and Justine Raoult) coordinated the 2021 annual ESD review as foreseen in Article 28 of the Commission Implementing Regulation (EU) No 749/2014.

The scope of the 2021 annual ESD review is presented in Table A.1.1. The checks carried out during the 2021 annual ESD review are presented in Annex II.

The review consisted of 2 steps. Step 1 was combined with the 'EU QA/QC procedures' (i.e. initial checks) and was carried out by the EU inventory team (EEA, ETC/CME, JRC, Eurostat). The EU inventory team consisted of the following experts:

- ETC/CME task manager: Nicole Mandl, Marion Pinterits (ETC/CME)
- Energy: Julien Vincent, Coralie Jeannot, Eva Krtkova, Marion Pinterits, Matina Kastori, Bernd Gugele, Markéta Müllerová (ETC/CME), Michael Goll (Eurostat)
- IPPU: Barbara Gschrey, Kristina Kaar, Lorenz Moosmann, Lukas Emele, Julien Vincent, Coralie Jeannot (ETC/CME)
- Agriculture: Adrian Leip, Simona Bosco, Janka Szemesova, Efisio Solazzo (JRC)
- Waste: Céline Gueguen (ETC/CME)
- LULUCF: Raul Abdas-Vinas (JRC)
- Quality coordinators: Adrian Leip, Giacomo Grassi (JRC), Bernd Gugele, Nicole Mandl, Marion Pinterits, Eva Krtkova, Markéta Müllerová, Risto Saarikivi, Maria Purzner, Julien Vincent, Giorgos Mellios, Ils Moorkens, Kaat Jespers (ETC/CME)
- Cross-cutting: Nicole Mandl (ETC/CME)

All findings from the initial checks that were relevant for the ESD and that were not resolved within the initial check phase were followed up in the second step of the annual review.

Step 2 of the 2021 annual ESD review was performed by a Technical Expert Review Team (TERT) under service contract 340201/2020/838280/SER/CLIMA.C.2 of the Directorate General for Climate Action of the European Commission. The TERT consisted of the following experts:

- Lead Reviewers: Ioannis Sempas, Ralph Harthan
- Energy: Stephan Poupa, Julien Vincent

- IPPU: Emma Salisbury, Maria Purzner
- Agriculture: Chris Dore, Katalin Lovas
- Waste: Richard Claxton, Céline Gueguen
- Quality controller: Justin Goodwin
- Co-ordinator: Bernd Gugele

The TERT did not review emission inventories of Member States where these individuals have themselves contributed to the compilation of that inventory, or presently are or have been any part of the decision-making process related to the compilation of that inventory. Reviewers who are nationals of the Member State whose inventory is concerned, did not take part in the review of that inventory.

Step 2 of the review was performed on the basis of GHG emission data and the national inventory report (NIR) officially reported by Member States by 15 March 2021 under the MMR. Where relevant, the TERT calculated technical corrections for over- or underestimates identified in a mandatory category in the Member States' GHG inventories that exceed the threshold of significance. Technical corrections were calculated for the year 2019.

Table A.1.1: Scope of the 2021 annual ESD review

Element	Scope	Further information
Countries	EU geographical coverage of the 27 Member States and the United Kingdom	
Years	2019	
Gases	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆	NF ₃ is not covered by the ESD
Sectors	All emission source sectors excluding LULUCF	National totals exclude emissions from LULUCF and emissions reported under memo items
Indirect CO ₂ emissions	Included in national total	
Inventory Submission	Submissions received by 15 March 2021	

Annex II: Checks carried out during the 2021 annual ESD review in line with Article 29 and 32 of the Commission Implementing Regulation (EU) No 749/2014

As part of the EU's effort to assist Member States in improving the quality of the GHG inventories, the checks to verify the transparency, consistency, comparability and completeness of the greenhouse gas inventory included:

First step review checks:

1. Assessment whether all emission source categories and gases required under Regulation (EU) No 525/2013 are reported;
2. Assessment whether emissions data time series are consistent;
3. Assessment whether implied emission factors across Member States are comparable taking the IPCC default emission factors for different national circumstances into account;
4. Assessment of the use of 'Not Estimated' notation keys where IPCC tier 1 methodologies exist and where the use of the notation key is not justified in accordance with paragraph 37 of the UNFCCC reporting guidelines on annual greenhouse gas inventories as included in Annex I to Decision 24/CP.19;
5. Analysis of recalculations performed for the inventory submission, in particular if the recalculations are based on methodological changes;
6. Comparison of the verified emissions reported under the Union's Emissions Trading System with the greenhouse gas emissions reported pursuant to Article 7 of Regulation (EU) No 525/2013 with a view of identifying areas where the emission data and trends as submitted by the Member State under review deviate considerably from those of other Member States;
7. Comparison of the results of Eurostat's reference approach with the Member States' reference approach;
8. Comparison of the results of Eurostat's sectoral approach with the Member States' sectoral approach;
9. Assessment whether recommendations from earlier Union or UNFCCC reviews, not implemented by the Member State could lead to a technical correction;
10. Assessment whether there are potential overestimations or underestimations relating to a key category in a Member State's inventory.

Second step review checks:

1. Detailed examination of the inventory estimates including methodologies used by the Member State in the preparation of inventories;
2. Detailed analysis of the Member State's implementation of recommendations related to improving inventory estimates as listed in its most recent UNFCCC annual review report made available to that Member State before the submission under review or in the final review report pursuant to Article 35(2) of this Regulation; where recommendations have not been implemented a detailed analysis of the justification provided by the Member State for not implementing them;
3. Detailed assessment of the time series consistency of the greenhouse gas emissions estimates;
4. Detailed assessment whether the recalculations made by a Member State in the given inventory submission as compared to the previous one are transparently reported and made in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories;
5. Follow-up on the results of the checks referred to in Article 29 of the Commission Implementing Regulation (EU) No 749/2014 and on any additional information submitted by the Member State under review in response to questions from the technical experts review team and other relevant checks.