

Final Review Report

2021 annual review of national greenhouse gas inventory data

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

Luxembourg
30 June 2021

European Environment Agency



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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 Luxembourg, pursuant to Article 19(2) of Regulation (EU) No 525/2013, with a view to monitoring Luxembourg'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 Luxembourg 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 2 significant issues through the checks performed in Step 1. Therefore, Luxembourg 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 14 issues with Luxembourg during the first and the second step of the 2021 annual ESD review (see Table 1). The TERT provided a recommendation for 2 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 an underestimate or overestimate exceeding the threshold of significance pursuant to Article 31 of Commission Implementing Regulation (EU) No 749/2014.
3. Luxembourg provided 1 revised estimate. The TERT agreed to the revised estimate. Table 2 below summarises the revised estimate and further information is provided at the end of this report.
4. On that basis, the TERT did not deem necessary any technical corrections within the meaning of Article 19(3)(c) of Regulation (EU) No 525/2013 in consultation with Luxembourg.
5. The TERT identified non-binding recommendations in order to improve the national inventory data of Luxembourg (see Table 4).
6. The TERT considers that it received a response from Luxembourg that was sufficient in order to undertake the review appropriately.

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

	Issues raised ¹	Recommendations ²	Revised estimates ³	Technical corrections ⁴
Total	14	2	1	-
Energy	4	1	1	-
IPPU	8	-	-	-
Agriculture	1	1	-	-
Waste	1	-	-	-
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 Luxembourg pursuant to Article 7(4) of Regulation (EU) No 525/2013, taking into account any resubmission to the Commission	LUX_2021_1_12032021	10 742.797
Difference between original estimate and revised estimate provided by Luxembourg and accepted by the TERT²		
1 Energy, CO ₂	LU-1-2021-0001	-7.011
Total greenhouse gas emissions including revised estimates		10 735.786
CO ₂ emissions from 1A3a Domestic aviation ³	LUX_2021_1_12032021	0.507
NF ₃ emissions ³	LUX_2021_1_12032021	-

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 Luxembourg	<i>See Table 2 above</i>	10 735.786
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 12 April 2021 ²	1 496.236
CO ₂ emissions from 1A3a Domestic aviation ³	<i>See Table 2 above</i>	0.507
NF ₃ emissions ³	<i>See Table 2 above</i>	-
Total ESD emissions		9 239.043

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 Luxembourg on the conclusions presented by the TERT

Luxembourg agrees with the aggregated GHG emission inventory estimates presented in Table 3.

Recommendations from the TERT including revised estimates

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
LU-1-2021-0001	Yes	1 Energy, 2019, CO ₂	For category 1A Fuel Combustion – gaseous fuels, CO ₂ and year 2019, the TERT noted that Luxembourg accounts biogas which is injected into the natural gas network as fossil CO ₂ emissions from natural gas, which leads to an over-estimate above the threshold of significance. In response to a question raised during the review, Luxembourg provided a revised estimate for the year 2019 and stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Luxembourg and attached to the annex of the review report. The TERT recommends that Luxembourg include the revised estimate in its next submission.	RE
LU-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 is not able to assess the extent to which this may result in an over or under-estimate of emissions. In response to a question raised during the review, Luxembourg provided a substantial amount of detailed information that summarised their progress to date on this issue, their future plans, and suggested that it should be possible to include updated information on the digestibility of feed in the emissions inventory calculations within the next few years. Whilst recognising that Luxembourg has an improvement plan in place, the TERT strongly recommends that Luxembourg uses year-specific values for the digestibility of feed in its emissions calculations for 3A1 Enteric Fermentation Dairy Cattle, or provides clear justification for the use of a constant value across the time series. Until this data is available, the TERT strongly recommends that annual progress is reported on this improvement activity in the NIR until it is completed.	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 Luxembourg and accepted by the TERT

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ESD Review Tool ID:	LU-1-2021-0001
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2021/LU-1-2021-0001
Country:	Luxembourg
Sector:	1 Energy
Gases:	CO ₂
Fuel	Gaseous fuels
Completed by Sector Expert:	Stephan Poupa
Reviewed by Counterpart:	Julien Vincent
Reviewed by Lead Reviewer:	Ioannis Sempos
Reviewed by Quality Controller:	Bernd Guele

The underlying problem:	The TERT notes with reference to 1A Fuel Combustion – gaseous fuels – CO ₂ and year 2019 that there is an overestimation of emissions above the level of significance, because biogas fed into the natural gas network is accounted as fossil natural gas in the national energy balance, and Luxembourg calculated fossil CO ₂ emissions from total natural gas consumption including biogas (over-estimate).
Summarise the methodology used:	Biogas has been subtracted from natural gas activity data and CO ₂ emissions have been recalculated by means of the national emission factor.

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	Original estimate (Gg CO ₂ e)							Notes
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	
2019	1 607.998							1 Energy, natural gas

	Revised Estimate received from country (Gg CO ₂ e)							Notes
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Mixed GHG	
2019	1 600.987							1 Energy, natural gas

	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	-7.011						

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.