

# Final Review Report

## 2020 Comprehensive Review of National Greenhouse Gas Inventory Data

pursuant to Article 4(3) of Regulation (EU) No 2018/842 and to  
Article 3 of Decision No 406/2009/EC

Denmark

30 August 2020



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## Conclusions from the 2020 comprehensive review

This Final Review Report presents the findings from the 2020 review of the greenhouse gas (GHG) emission inventory of Denmark, pursuant to:

- Article 4(3) of Regulation (EU) No 2018/842 (the 'Effort Sharing Regulation', ESR), for the purpose of setting out Denmark's annual emission allocations (AEAs) for the years from 2021 to 2030 in terms of tonnes of CO<sub>2</sub> equivalent, and
- Article 3 of Decision No 406/2009/EC (the 'Effort Sharing Decision', ESD), for the purpose of verifying Denmark's GHG emissions and achievement of its GHG emission limitation target in the year 2018

The review was carried out as a comprehensive review in line with Article 19(1) of Regulation (EU) No 525/2013 (the 'Monitoring Mechanism Regulation', MMR). The global warming potentials applied are those from the IPCC Assessment Report 4.

The reviewers carried out checks to verify the transparency, accuracy, consistency, comparability and completeness of the national GHG inventory for the years 2005, 2016, 2017 and 2018 submitted in 2020 by Denmark pursuant to Article 7 of the MMR.

The review consisted of two steps. The initial checks in step 1 were performed by 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). Step 2 was performed by a Technical Expert Review Team (TERT).

More information on the Effort Sharing legislation and the procedures for the 2020 comprehensive review is presented in the annexes of this review report.

Denmark provided a resubmission to the Commission on 08/05/2020. The TERT considered this resubmission as the basis for the comprehensive review.

### Step 1 and 2 conclusions

1. The reviewers raised 20 issues with Denmark during the first and the second step of the 2020 comprehensive ESD review (see Table 1). The TERT provided a recommendation for 1 of these issues. Other issues raised during the comprehensive review were clarified and are considered non-issues for the ESD review 2020.
2. The TERT identified a case where inventory data were prepared in a manner which is inconsistent with UNFCCC guidance documentation or Union rules. However, the TERT did not identify any under- or over-estimates exceeding the threshold of significance pursuant to Article 31 of Commission Implementing Regulation (EU) No 749/2014.
3. Denmark provided no revised estimates.
4. The TERT did not deem necessary any technical corrections in the meaning of Article 19(3)(c) of Regulation (EU) No 525/2013.
5. The TERT identified a non-binding recommendation in order to improve the national inventory data of Denmark (see Table 6).
6. The TERT considers that it received a response from Denmark that was sufficient in order to undertake the comprehensive review appropriately.

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

	Issues raised step 1 <sup>1</sup>	Issues raised step 2	Recommendations	Revised estimates <sup>2</sup>	Technical corrections <sup>3</sup>
<b>Total</b>	<b>8</b>	<b>12</b>	<b>1</b>	<b>-</b>	<b>-</b>
Energy	2	3	-	-	-
IPPU	2	4	-	-	-
Agriculture	3	4	1	-	-
Waste	1	1	-	-	-
Cross-cutting	-	-	-	-	-

<sup>1</sup> Excluding findings related to Land Use, Land Use Change and Forestry (LULUCF) and Kyoto Protocol (KP) LULUCF.

<sup>2</sup> Revised estimates: changes in inventory estimates triggered by the review, which were provided by the country and accepted by the TERT.

<sup>3</sup> 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**

Emission source category	Reference	Emission estimates (kt CO <sub>2</sub> equivalent) <sup>1</sup> 2018
Total greenhouse gas emissions, including indirect CO <sub>2</sub> , without Land Use, Land Use Change and Forestry, without international aviation, as reported by Denmark pursuant to Article 7(4) of Regulation (EU) No 525/2013, taking into account any resubmission to the Commission	DNM_2020_5_27042020	48 223.790
Total greenhouse gas emissions		48 223.790
CO <sub>2</sub> emissions from 1A3a Domestic Aviation <sup>2</sup>	DNM_2020_5_27042020	133.201
NF <sub>3</sub> emissions <sup>2</sup>	DNM_2020_5_27042020	-

<sup>1</sup> 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 are taken into account.

<sup>2</sup> Included in the totals. NF<sub>3</sub> was included in the comprehensive review (see Table A-1) for the purpose of the ESR, but has to be deducted for the purpose of ESD.

## National totals for the purpose of Article 4(3) of Regulation (EU) No 2018/842 (ESR)

**Table 3: National totals for the purpose of Article 4(3) of Regulation (EU) No 2018/842**

Emission source category	Reference	Emission estimates (kt CO <sub>2</sub> equivalent) <sup>1</sup>			
		2005	2016	2017	2018
Total greenhouse gas emissions, including indirect CO <sub>2</sub> , without Land Use, Land Use Change and Forestry, without international aviation, as reported by Denmark pursuant to Article 7(4) of Regulation (EU) No 525/2013, taking into account any resubmission to the Commission	DNM_2020_5_27042020	66 692.709	50 664.455	48 353.712	48 223.790
<b>Total greenhouse gas emissions</b>		<b>66 692.709</b>	<b>50 664.455</b>	<b>48 353.712</b>	<b>48 223.790</b>
CO <sub>2</sub> emissions from 1A3a Domestic Aviation <sup>2</sup>	DNM_2020_5_27042020	140.257	135.268	137.185	133.201

<sup>1</sup> 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 ESR emissions), all available decimal places were used. Therefore, the totals shown may slightly differ from calculation results where only three decimals are taken into account.

<sup>2</sup> Included in the totals

## Statement from Denmark on the conclusions presented by the TERT

Denmark agrees with the aggregated GHG emission inventory estimates presented in Table 2 and Table 3.

## Greenhouse gas emissions covered by Decision 406/2009/EC (ESD)

**Table 4: Greenhouse gas emissions for the purpose of Article 3 of Decision No 406/2009/EC**

Emission source category	Reference	Emission estimates (kt CO <sub>2</sub> equivalent) <sup>1</sup> 2018
Total greenhouse gas emissions including any accepted revised estimates provided by Denmark and any technical corrections deemed necessary by the TERT	See Table 2 above	48 223.790
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 9 March 2020 (as agreed at the Working Group I of the Climate Change Committee on 18 May 2015) <sup>2</sup>	14 948.146
CO <sub>2</sub> emissions from 1A3a Domestic Aviation	See Table 2 above	133.201
NF <sub>3</sub> emissions	See Table 2 above	-
<b>Total ESD emissions</b>		<b>33 142.443</b>

<sup>1</sup> 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 are taken into account.

<sup>2</sup> 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.



## Greenhouse gas emissions covered by Regulation (EU) No 2018/842 (ESR)

**Table 5: Greenhouse gas emissions for the purpose of Article 4(3) of Regulation (EU) No 2018/842 (ESR)**

Emission source category	Reference	Emission estimates (kt CO <sub>2</sub> equivalent) <sup>1</sup>			
		2005 <sup>3</sup>	2016	2017	2018
Total greenhouse gas emissions including any accepted revised estimates provided by Denmark and any technical corrections deemed necessary by the TERT	See Table 3 above	66 692.709	50 664.455	48 353.712	48 223.790
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 9 March 2020 (as agreed at the Working Group I of the Climate Change Committee on 18 May 2015) <sup>2</sup>	26 475.718	17 220.334	15 062.601	14 948.146
CO <sub>2</sub> emissions from 1A3a Domestic Aviation	See Table 3 above	140.257	135.268	137.185	133.201
<b>Total ESR emissions</b>		-	<b>33 308.853</b>	<b>33 153.926</b>	<b>33 142.443</b>

<sup>1</sup> 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 ESR emissions), all available decimal places were used. Therefore, the totals shown may slightly differ from calculation results where only three decimals are taken into account.

<sup>2</sup> 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.

<sup>3</sup> Due to changes in ETS scope and country coverage between 2005 and 2013, 'Total ESR emissions' cannot be calculated for 2005 by deducting 'Total verified emissions from stationary installations under Directive 2003/87/EC' and 'CO<sub>2</sub> emissions from 1A3a Domestic Aviation' from 'Total GHG emissions including any revised estimates and any technical corrections'.

Recommendations from the TERT, considering revised estimates and technical corrections deemed necessary by the TERT

**Table 6: Recommendations from TERT (RE = Revised estimate; TC = Technical correction)**

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
DK-3B-2020-0001	Yes	3B Manure Management, CH <sub>4</sub> , 1990-2018	For category 3B Manure Management, CH <sub>4</sub> and all years 1990-2018, the TERT notes that Denmark carried out a significant recalculation in the 2020 submission (impact of 310 kt CO <sub>2</sub> eq in 1990 and of 373 kt CO <sub>2</sub> eq in 2017). The TERT notes that the rationale for the recalculation is not transparently described in the NIR. On page 425 of the NIR Denmark identifies the factor "LnA" and temperature values as the main factors contributing to the recalculated MCF values in cattle housing, while for swine VS shares have been updated. However, the TERT is unable to find sufficient information regarding the parameter "LnA" and how this affects the information contained in the national model to derive MCF values. In response to a question raised during the review, Denmark provided a detailed response including the central equation for calculating the methane production rate, the factor "LnA", amongst others. The TERT agreed with the explanation provided by Denmark. The TERT recommends that Denmark include in the NIR of its next submission further information with respect to the central equation for calculating the methane production rate, the factor "LnA" and other important factors in the calculation methodology.	No

## Annex I: Legal background and procedures of the 2020 comprehensive 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 countries 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 Regulation (EU) No 749/2014.

The Effort Sharing Regulation (EU) 2018/842 (ESR) sets national emission limits for greenhouse gas emissions in the sectors outside the EU's ETS for the period 2021-2030. In Article 4(3) of the ESR, the Commission is required to adopt implementing acts setting out annual emission allocations (AEAs) for the period 2021-2030 in terms of CO<sub>2</sub> equivalents, for which it shall carry out a comprehensive review.

The 2020 Union review was thus held as a comprehensive review in line with MMR Article 19 (1) in concert with the Union review required by the ESR.

### Objectives

The objectives of the comprehensive review of countries' GHG emission inventories in 2020 are:

- a) to support the European Commission by ensuring it has accurate, reliable and verified information on annual GHG emissions for
  - o determining compliance with ESD targets for the years 2018 in a credible, consistent, transparent and timely manner, and for
  - o setting out countries' annual emission allocations (AEAs) for the years from 2021 to 2030 in terms of tonnes of CO<sub>2</sub> equivalent, according to Article 4(3) of the ESR.
- b) to assist countries in improving the quality of their GHG inventories.

### Procedures

The scope of the 2020 comprehensive review is presented in Table A-1. The checks carried out during the 2020 comprehensive review are presented in Annex II. The review consisted of two steps.

The Step 1 was combined with the 'EU QA/QC procedures' (i.e. initial checks) and was carried out by the EU inventory team (ETC/CME, JRC, Eurostat). All findings from the initial checks that were partly resolved or not resolved within the initial check phase were followed up in the second step of the review.

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 Krteková, Marion Pinterits, Matina Kastori, Giorgos Mellios, Markéta Müllerová, Bernd Guegle (ETC/CME), Michael Goll (Eurostat)
- IPPU: Barbara Gschrey, Lorenz Moosmann, Kristina Kaar, Lukas Emele, Maria Purzner, Ils Moorkens (ETC/CME)
- Agriculture: Adrian Leip, Janka Szemesová, Alexander De-Meij (JRC)

- Waste: Céline Gueguen (ETC/CME)
- LULUCF: Raúl Abad-Viñas (JRC)
- Quality coordinators: Adrian Leip, Giacomo Grassi (JRC), Bernd Gugele, Nicole Mandl, Marion Pinterits, Maria Purzner, Julien Vincent, Giorgos Mellios, Ils Moorkens, Kaat Jespers (ETC/CME)
- Cross-cutting: Nicole Mandl (ETC/CME)

Step 2 of the comprehensive review 2020 was performed by a Technical Expert Review Team (TERT) under service contract **340201/2019/814628/SER/CLIMA.C.2** of the Directorate General for Climate Action of the European Commission. The lead reviewers and sector review experts did not review emission inventories of countries 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 country whose inventory is concerned, did not take part in the review of that inventory.

The TERT consisted of the following experts:

- CRF categories 1A1, 1A2, 1A4, 1A5 (Stationary Combustion) + Reference Approach: Katrina Young, Julien Vincent and Stephan Poupa;
- CRF categories 1A3 Transport + 1D International Bunkers: Melanie Hobson, Jean-Marc André and Matina Kastori;
- CRF categories 1B Fugitive + 1C CO<sub>2</sub> Transport and Storage: Ioannis Sempos, Marlene Plejdrup and Marion Pinterits;
- CRF categories IPPU Fluorinated Gases: Barbara Gschrey, Jacek Skoskiewicz and Stephanie Barrault;
- CRF categories IPPU Other Gases than Fluorinated Gases: Emma Salisbury, Kristina Kaar and Wolfram Jörß;
- CRF categories 3A Enteric Fermentation and 3B Manure Management: Chris Dore, Steen Gyldenkerne and Bernard Hyde;
- CRF categories 3C-3J: Katalin Lovas, Etienne Mathias and Michael Anderl;
- CRF sector 5 Waste: Céline Gueguen, Elisabeth Kampel and Hans Oonk;
- Lead reviewers: Karin Kindbom, Suvi Monni, Ole-Kenneth Nielsen and Ralph Harthan.
- The following experts supported the team on request of the TERT: Tomas Gustafson (IPPU), Maria Purzner (F-gases), Beatriz Sanchez (Agriculture), Katja Pazdernik (Waste).

The second step of the review was coordinated by Bernd Gugele and Justin Goodwin.

The EEA review secretariat consisting of Melanie Sporer, Claire Qoul, Kirsten May, Justine Raoult and Henry Irvine prepared and coordinated the Union comprehensive review as foreseen in Article 28 of Commission Implementing regulations (EU) No 749/2014 and Article 42 of the Governance Regulation (EU) 2018/1999.

The step 2 of the review was performed on the basis of the 15 April submissions of GHG emission data and the national inventory report (NIR) under the Monitoring Mechanism. Resubmissions reported by countries were taken into account until 8 May 2020.

Where relevant, the TERT calculated technical corrections for over- or under-estimates identified in a mandatory category in the countries' GHG inventories that exceed the threshold of significance. Technical corrections have been calculated only for the years 2005 and 2016-2018. If the technical correction exceeds the threshold of significance for at least one year of the inventory under review (2005, and 2016-2018) but not for all the years the technical correction was calculated for all years under review in order to ensure time series consistency.

**Table A-1: Scope of the comprehensive review 2020**

Element	Scope	Further information
Countries	EU geographical coverage of the Member States, the United Kingdom, Norway and Iceland	
Years	2005, 2016, 2017, 2018	According to MMR Article 27(2); According to MMR Article 19(1); According to ESR Article 4(3)
Gases	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> , NF <sub>3</sub>	
Sectors	All emission source sectors excluding LULUCF	National totals exclude emissions from LULUCF and emissions reported under memo items
Indirect CO <sub>2</sub> emissions	Included in national total	

## Annex II: Checks carried out during the 2020 comprehensive review in line with Art. 29, 32 and 33 of the Commission Implementing Regulation (EU) No 749/2014

### **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 over-estimations or under-estimations 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.