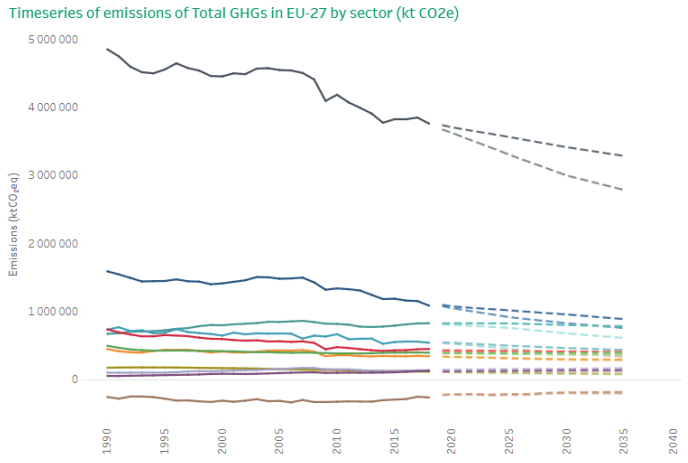
Version 5.0 - 15/02/2023

Guidance for reporting on GHG projections under Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action



Authors:

Carmen Schmid, Georg Wartecker (EAA), Tom Dauwe, Kelsey van Maris (VITO), Rosie Brook, Justine Raoult (AETHER), Hannah Förster, Sabine Gores (Öko-Institut) Evert Bouman, (NILU), Javier Esparrago, Magdalena Jóźwicka-Olsen (EEA)

ETC/CME consortium partners: *AETHER*, Interprofessional Technical Centre for Studies on Air Pollution (*CITEPA*), Czech Hydrometeorological Institute (*CHMI*), Energy and Environmental Studies and Software Development (*EMISIA)*, Institute for Applied Ecology (*ÖKO-INSTITUT*), *ÖKO-RECHERCHE*, Norwegian Institute for Air Research (*NILU*), Netherlands Environmental Assessment Agency (*PBL*), National Institute for Public Health and the Environment (*RIVM*), Environment Agency Austria (EAA), Flemish Institute for Technological Research (*VITO*)

Version 5.0 - 15/02/2023

Cover photo: Snapshot of EEA GHG projections viewer: https://www.eea.europa.eu/data-and-maps/data/data-viewers/eea-greenhouse-gas-projections-data-viewer

Legal notice

The contents of this publication do not necessarily reflect the official opinions of the European Commission or other institutions of the European Union. Neither the European Environment Agency, the European Topic Centre on Climate change mitigation and energy nor any person or company acting on behalf of the Agency or the Topic Centre is responsible for the use that may be made of the information contained in this report.

Copyright notice

© European Topic Centre on Climate change mitigation and energy (2023)

Reproduction is authorized provided the source is acknowledged.

More information on the European Union is available on the Internet (http://europa.eu).

European Topic Centre on Climate
change mitigation and energy

Boeretang 200

B-2400 Mol, Belgium

Tel.: +32 14 33 59 77

Web: https://www.eionet.europa.eu/etcs/etc-cme

Email: etccme@vito.be

For help on please contact: govreg@eea.europa.eu

Table of Contents

Abbreviations 6

1. What is new on version 4.1 of the guidance? 8

2. Introduction 8

2.1. Legal background 8

2.2. Overview of main changes in reporting compared to the MMR 10

2.3. Purpose of this guidance and overview of content 11

2.4. Specific guidance for reporting on the year 2020 in 2021 12

2.5. Supporting information and contact points for reporters 13

3. Reportnet 3.0 14

3.1. Organizing the reporting network 14

3.2. Logging in 14

3.3. Dataflow for greenhouse gas projections 15

3.4. Uploading data 16

3.5. Validating data 18

4. Instructions for the reporting tables on National projections of anthropogenic greenhouse gas emissions 20

4.1. Table 1a - Greenhouse gas projections by gases and categories 27

4.2. Table 1b - Projections of reported greenhouse gas emissions and removals in the LULUCF sector 32

4.3. Table 2 - Indicators to monitor and evaluate projected progress of policies and measures 37

4.4. Table 3 - Reporting on parameters / variables for projections 39

4.5. Table 4 - Model Factsheet 45

4.6. Table 5a - Projections of reported emissions and removals from the LULUCF sector by gases and accounting categories 48

4.7. Table 5b - Projections of accounted emissions and removals from the LULUCF sector in accordance with Regulation (EU) 2018/841 and the Effort Sharing sector in accordance with Regulation (EU) 2018/842 51

4.8. Table 6 - Results of the sensitivity analysis 54

4.9. Table 7 - Key parameters that were varied in the sensitivity analysis 56

4.10. Technical report 58

4.10.1. Requirements and guidance for the report 58

4.10.2. Reporting on interlinkages between PaMs and projections 61

5. Guidance for calculating ETS and ESD/ESR projections 67

5.1. Determining a base year/reference year for projections 67

5.2. Identifying historical stationary ETS and ESD emissions in GHG inventory source categories 68

5.3. Calculating ESD/ESR emissions and the share of ETS emissions 70

5.4. Comparing calculated and reviewed ESD emissions 72

5.5. Projecting stationary ETS emissions 72

5.6. Domestic and international aviation 73

Annex 1 – Table templates for reporting interlinkages 74

Annex 2 – Updates to templates since version 1.1 77

Abbreviations

CDR	Central Data Repository
CRF	Common Reporting Format
DG CLIMA	Directorate-General for Climate Action
EC	European Commission
EEA	European Environment Agency
ES/ESD/ESR	Effort Sharing (Decision/Regulation)
ETC/CME	European Topic Centre for Climate change Mitigation and Energy
ETS	Emission Trading System
EU	European Union
Gov. Reg.	Regulation on the Governance of the Energy Union and Climate Action (EU) 2018/1999
FRL	Forest Reference Level
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
LULUCF	Land Use, Land-Use Change and Forestry
MMR	Monitoring Mechanism Regulation
MS	Member State
NECP	National Energy and Climate Plan
NIR	National Inventory Report
PaMs	Policies and Measures
QA	Quality Assurance
QC	Quality Control

RY	Reference Year
SWD	Commission Staff Working Document
TCCCA	Transparency, Consistency, Completeness, Comparability, Accuracy
UNFCCC	United Nations Framework Convention on Climate Change
WAM	With Additional Measures
WEM	With Existing Measures
WOM	Without Measures

1. What is new in version 5.0 of the guidance?

Main changes compared to version 4.1

The guidance has been adapted to reflect changes in reporting for 2023. The main changes affecting reporters are:

- Reporting for years 2045 and 2050 is now mandatory. Intermediate years (2041-2044 and 2046-2049) are optional.
- The Global Warming Potential of greenhouse gases should now follow IPCC Fifth Assessment Report (AR5).

2. Introduction

From 1 January 2021 onwards, the EU Monitoring Mechanism Regulation (EU) No 525/2013 will be repealed. As of March 15 2021, the biennial reporting obligation on GHG projections will change to the "Integrated reporting on greenhouse gas policies and measures and on projections" under the Regulation on the Governance of the Energy Union and Climate Action (EU) 2018/1999 and because the new electronic reporting Reportnet 3.0 has been introduced to replace the CDR, the European Environment Agency (EEA) and the European Topic Centre for Climate change Mitigation and Energy (ETC/CME) have prepared this document to provide guidance and support to the Member States for this transition to the new reporting obligation and reporting tools.

2.1. Legal background

From 15 March 2021 onwards, Member States have to report every two years their GHG projections in accordance with Article 18 (1) (b) of the Governance of the Energy Union and Climate Action Regulation (EU) 2018/1999 (Gov. Reg.) and Article 38 of the related Implementing Regulation (EU) 2020/1208. The Gov. Reg. repeals the Monitoring Mechanism Regulation (EU) No 525/2013 (MMR) and introduces some new reporting tables and requirements and updates of existing reporting tables.

Governance Regulation of the Energy Union and Climate Action (EU) 2018/1999

- "Art 18 (1) (b): MS shall report their national projections of anthropogenic greenhouse gas emissions by sources and removals by sinks, organised by gas or group of gases (Hydrofluorocarbons and Perfluorocarbons) listed in Part 2 of Annex V. National projections shall take into consideration any policies and measures adopted at Union level and shall include the information set out in Annex VII.
- Art 18 (2): Member States shall report the most up-to-date projections available. Where a Member State does not submit complete projection estimates by 15 March every second year, and the Commission has established that gaps in the estimates cannot be filled by that Member State once identified through the Commission's quality assurance or quality control procedures, the Commission may prepare estimates as required to compile Union projections, in consultation with the Member State concerned.

- Art 18 (3): A Member State shall communicate to the Commission any substantial changes to the information reported pursuant to paragraph 1 during the first year of the reporting period, by 15 March of the year following the previous report.
- Art 18 (4): Member States shall make available to the public, in electronic form, their national projections pursuant to paragraph 1 and any relevant assessment of the costs and effects of national policies and measures on the implementation of Union policies relevant for limiting greenhouse gas emissions along with any relevant underpinning technical reports. Those projections and assessments should include descriptions of the models and methodological approaches used, definitions and underlying assumptions."

In Annex VII of the Gov. Reg. the information to be reported for the GHG projections is further specified. Information included in brackets beginning with an arrow have been added to refer to the common abbreviations/expressions that were later used in the document:

- Annex VII - Information to be included in the reports referred to in Article 18:
    - (a) projections without measures (=> WOM) where available, projections with measures (=> WEM), and, where available, projections with additional measures (=> WAM);
    - (b) total GHG projections and separate estimates for the projected GHG emissions for the emission sources covered by Directive 2003/87/EC (=> ETS) and by Regulation (EU) 2018/842 (=> ESR) and the projected emissions by sources and removals by sinks under the Regulation (EU) 2018/841 (=> accounted LULUCF);
    - (c) the impact of policies and measures identified pursuant to point (a) of Article 18(1). Where such policies and measures are not included, this shall be clearly stated and explained;
    - (d) results of the sensitivity analysis performed for the projections and information on the models and parameters used;
    - (e) all relevant references to the assessment and the technical reports that underpin the projections referred to in Article 18(4)

It should be noted that Art. 18 (1) (a) is referring to the reporting of policies and measures (PaMs). For this reporting obligation, a separate guidance document is available under this link: https://www.eionet.europa.eu/reportnet/docs/govreg/policies-and-measures

The related Implementing Regulation (EU) 2020/1208 defines on the one hand further reporting requirements in Article 38 and in Annex XXV the Regulation provides the layout of the reporting tables which have to be used by the Member States.

- Art 38 (1): Member States shall report the information on their national projections of anthropogenic greenhouse gas emissions by sources and removals by sinks, organised by gas or group of gases, referred to in Article 18(1)(b) and point (a) of Annex VII of Regulation (EU) 2018/1999 in the format set out in Annex XXV to this Regulation.

- Art 38 (2): Member States shall provide the additional information on their national projections of anthropogenic greenhouse gas emissions by sources and removals by sinks referred to in Annex VII to Regulation (EU) 2018/1999 in a textual format, specifying:
    - (a) the projection results for total greenhouse gas emissions, emissions covered by Regulation (EU) 2018/842 and Directive 2003/87/EC respectively, and the projected emissions by sources and removals by sinks under Regulation (EU) 2018/841, pursuant to point (b) of Annex VII of Regulation (EU) 2018/1999;
    - (b) the results of the sensitivity analysis performed pursuant to point (d) of Annex VII of Regulation (EU) 2018/1999;
        - (1) for the total reported greenhouse gas emissions, together with a brief explanation of which parameters were varied and how;
        - (2) split on total emissions covered by Directive 2003/87/EC and by Regulation (EU) 2018/842 respectively and the projected emissions by sources and removals by sinks under the Regulation (EU) 2018/841, where such information is available;
    - (c) the year of the inventory data (base year) and the year of the inventory report used as a starting point for the projections;
    - (d) the methodologies used for the projections, including a brief description of the models used and their sectoral, geographical and temporal coverage, references to further information on the models and information on data sources, key exogenous assumptions and on the parameters used; pursuant to point (e) of Annex VII of Regulation (EU) 2018/1999.
- Art 38 (3): In the reports on projections to be provided pursuant to Article 18(1) of Regulation (EU) 2018/1999, Member States shall take into account the harmonised values for key parameters for projections – at least for oil, gas, and coal import prices as well as for carbon prices under the European Emission Trading System pursuant to Directive 2003/87/EC – which the Commission has recommended, in consultation with the Member States, 12 months before the deadline for submission of the reports

As mentioned before, the EEA and the ETC/CME has prepared reporting templates to be used by the Member States which are in line with the tables provided in Annex XXV of the implementing regulation. In addition to what is provided in the Annex XXV, these templates include color shading to highlight mandatory and non-mandatory fields, equations to linked tables and integrated basic quality checks to facilitate the reporting for Member States.

The reporting tables are available in the *Dataflow help* section of Reportnet 3.0 and on https://www.eionet.europa.eu/reportnet/docs/govreg/

2.2. Overview of main changes in reporting compared to the MMR

The main changes in reporting under the Gov. Reg. are highlighted below. A complete description of all changes is provided in the respective chapters for each reporting table.

- New reporting platform Reportnet 3.0 (see chapter 3)
- New reporting tables for reporting GHG projections and related information (see chapter 4) including integrated voluntary tabs to perform basic quality checks before submission

- Detailed projections of emissions and removals from LULUCF, according to inventory and land accounting categories (see chapters 4.2 and 4.6)
- Possibility to report projections for the unspecified mix of HCFs and PFCs, and changes to the Memo Items (see chapter 4.1)
- Some key indicators already suggested in the regulation (see chapter 4.3)
- Energy related parameters / variables used for projections aligned with the regulation (see chapter 4.4)
- Sensitivity analysis results and their parameters has to be reported in tabular format in addition to textual report (see chapters 4.8 and 4.9)
- Report on information relevant for the accounting towards the ESR targets and the LULUCF Regulation (see chapter 4.7)

Note on the Global Warming Potentials (GWP) to convert the units for gases into CO2 equivalents:

The global warming potentials from the IPCC Fifth Assessment Report (AR5) must be used from 2023. In order to ensure consistency between GHG projections and inventories, both at EU and MS level, **the GWP of AR5 shall be used for projections and PaMs reporting in the submission year 2023 and beyond**. This also ensures that the reported data is consistent with the international reporting obligations under the UNFCCC. The GWP of AR5 are summarized in the following table for the main gases[1]:

Table 1 Overview of Global Warming Potentials (GWP) of AR5 for the main gases

Gas	GWP
CO2	1
CH4	28
N2O	265
SF6	23500
NF3	16100

2.3. Purpose of this guidance and overview of content

The purpose of this document is to provide guidance for reporting GHG projections and instructions on how to complete the reporting templates provided by EEA/ETC. This document does not contain any methodological guidance despite some basic information on how to calculate the ETS/ESR split for the projections (see Chapter 5). The recommendations made in this report do not refer to any

[1] The complete list for all gases can be found here: https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf

legally binding obligations (as this is done e.g. in the UNFCCC reviews), but should be read here as suggestions and advice to improve the reporting.

- The first section of this report includes some general information and guidance for the use of Reportnet 3.0, including information on the login, description of the different roles (lead reporters and supporting reporters).
- In Chapter 4 guidance is provided for the new reporting tables and recommendations for the related report. For each table a dedicated chapter is provided, explaining the reporting obligation and providing an overview any changes compared to the reporting under Art. 14 of the MMR. Some of the tables are interlinked and it is explained what needs to be considered for these specific tables. In addition, the chapters provide instructions for the voluntary use of the integrated QA/QC checks which are included for some of the reporting tables.
- Chapter 4 provides basic methodological guidance for calculating the ETS and ESR projections.

2.4. Specific guidance for reporting on the year 2020 in 2021

2020 is a mandatory reporting year under the Gov. Reg. However, for the reporting in 2021 it is acknowledged that the reporting for this year is exceptionally challenging. The development of emissions is very different from the years before and expectedly after due to the Covid-19 pandemic. Data availability to cover this change might be rather limited and uncertain due to the yet unforeseeable impacts on the economy and thus on emissions. Therefore, it is very crucial to report transparently on the assumptions for this year in order to understand the projected development in further years.

In the written report a specific paragraph should be included to address the treatment of the effects of the pandemic to projections, and it is recommended to provide information on the following questions:

(1) How have the effects of the Covid-19 pandemic been taken into account for the year 2020 and for the further development of emissions? For instance, the GDP development used for the projections may include a dip in the year 2020 (and potentially in 2021) which may influence projected emissions due to lower industrial production.
(2) Which numbers have been used to quantify emissions for the mandatory projected year 2020?
For example, numbers may be based on proxy estimates without further breakdown e.g. of the energy balance. They may also consider recalculations from the most recent inventory in comparison to the inventory used for the projections and may thus deviate due to changes in methodology and/or data inputs.
(3) What is the data source used for these numbers or how have these numbers been estimated?
(4) Eventually include a note below tables or mark these numbers in tables by shading or report 2020 emissions separately from other reported years to indicate their different origin and content.

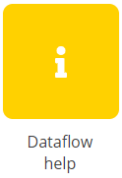
For the GHG projection template table 1a, the year 2020 has to be filled with quantified emission information. However, it is noted by the ETC/CME and the EEA that this is a special year and it is understood that the information reported for 2020 is related to quite some uncertainty.

2.5. Supporting information and contact points for reporters

This section provides some useful links and addresses to which reporters can reach out in case there are any further questions.

There are two video-tutorials on GHG Projections available at the EEA Reportnet 3 YouTube playlist (https://www.youtube.com/playlist?list=PL1_QSyumTz7BDCar7q2ZmvKvc-15Q5RVr). The video *GHG Projections – Part 1: Introduction and Templates* gives an overview of the different Excel templates. The second part called *GHG Projections – Part 2: Reportnet* guides you through the most important functionalities of Reportnet for projections, as well as the necessary steps for uploading, validating and submitting data.

You will always find the most updated templates and practical information in the *Dataflow help* section of Reportnet. You can access this section after logging in and accessing the relevant dataflow.



The old Eionet Help folder includes valuable information to the reporting under the MMR that, in many cases, can still be useful for reporters: http://cdr.eionet.europa.eu/help/mmr

In case direct support is needed, please do not hesitate to contact the EEA team:

- For questions related to the reporting obligation on GHG projections and the Governance Regulation: govreg@eea.europa.eu
- For technical questions related to Reportnet 3, contact the Helpdesk: helpdesk@reportnet.europa.eu

3. Reportnet 3.0

Reportnet 3.0 (https://reportnet.europa.eu/) is the next generation of platform for reporting environmental data to the European Environment Agency (EEA), and also host several reporting tasks of DG for Environment and DG for Climate Action. Reportnet 3.0 is a centralized e-Reporting platform, aiming at simplifying and streamlining the data flow steps across all environmental domains. The system acts as a one-stop-shop for all involved stakeholders.

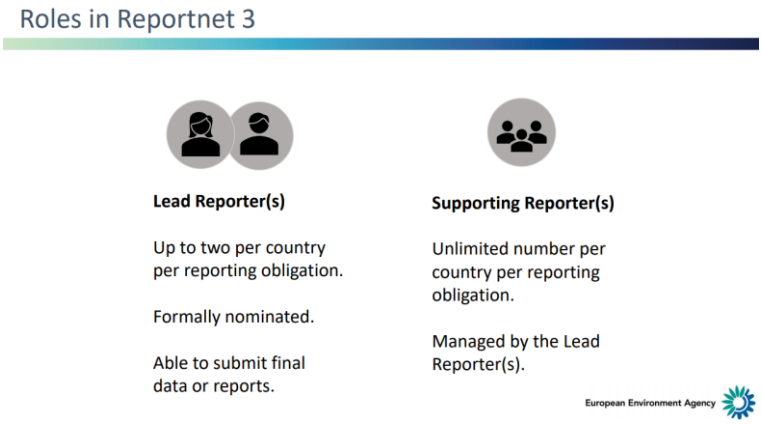
The vision of Reportnet 3.0 is designed to deliver the ambition and the strategic goals as set out by the European Commission's Digital Strategy. It is the EEA's contribution to deliver on this long-term strategy.

This section provides an overview of the most important functionalities of Reportnet for reporting of GHG projections, as well as the necessary steps for reporting data. This is also covered in the **video-tutorial** *GHG Projections – Part 2: Reportnet*, located in the EEA's Reportnet 3 Tutorial YouTube playlist (https://www.youtube.com/playlist?list=PL1_QSyumTz7BDCar7q2ZmvKvc-15Q5RVr). You are encouraged to watch this tutorial if you have not attended one of the training sessions.

3.1. Organizing the reporting network

Lead reporters are officially nominated and are the ones that can submit data. They are also responsible for adding and managing supporting reporters.

Supporting reporters can upload and modify data in the system but cannot add other reporters or officially submit data.



3.2. Logging in

Access the platform Reportnet 3 at the website: https://reportnet.europa.eu/. To the right of the page you will find supporting documents about the general functioning of the platform.

Click on **Login** on the top-right corner.

User authentication is carried out on the EU login platform, hence you need to have an EU login account before you can be authenticated for Reportnet 3 access.

For more information on how to log in and how to create an EU login account please see: https://www.eionet.europa.eu/reportnet/docs/prod/howto_login_reportnet3.0

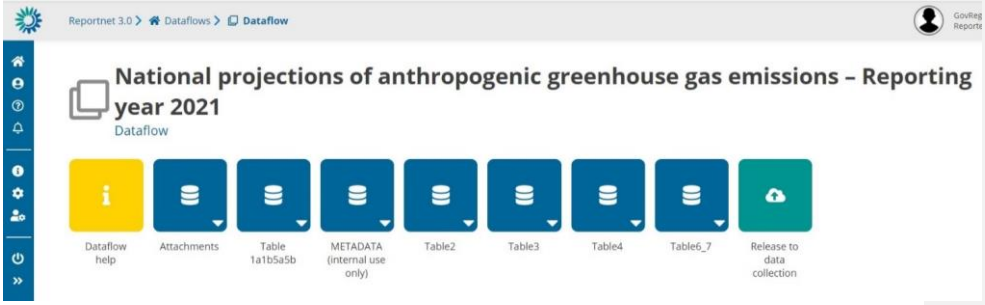
Once you are successfully logged-in in Reportnet 3.0 you will see the dataflows assigned to you.

If you need support contact the EEA:

- Governance Regulation: govreg@eea.europa.eu
- Helpdesk: helpdesk@reportnet.europa.eu

3.3. Dataflow for greenhouse gas projections

Once logged in you will be able to access the GHG Projections dataflow (named *National projections of anthropogenic greenhouse gas emissions – Reporting year 20XX*)



There are four main elements on this window:

The **vertical menu** on the left. This menu includes a series of icons to support reporters. Of particular importance are the *Help* , which guides you through the elements of the page, and *Manage reporters* , which allows lead reporters to add supporting reporters.

Dataflow help, represented by a yellow square. This section contains relevant documents such as this guidance document, the Excel templates and other supporting information. It also includes a list of useful links

Reporting datasets, represented by blue squares. The datasets called *Table1a1b5a5b, Table2, Table3, Table4* and *Table6_7* are correspond with each of the template Excel files. These datasets are where you should report the data.

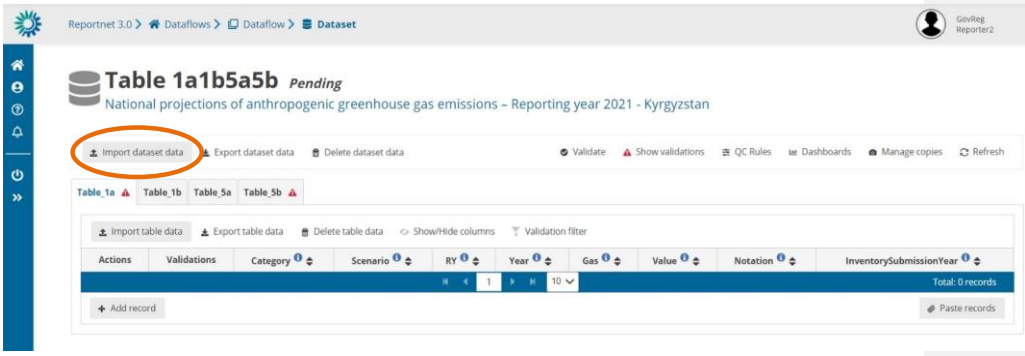
The dataset *Attachments* is used for uploading supporting files, importantly the projections technical report (See section 4.10), but also any other (non-data) files you want us to receive, such as diagrams describing models, analysis, supporting information, etc. The dataset called *METADATA* is for internal use only and reporters can ignore it.

Release to data collection, represented by a green square. This button is used to submit the data. Once the data has been submitted you will see a *Confirmation receipt* next to it.

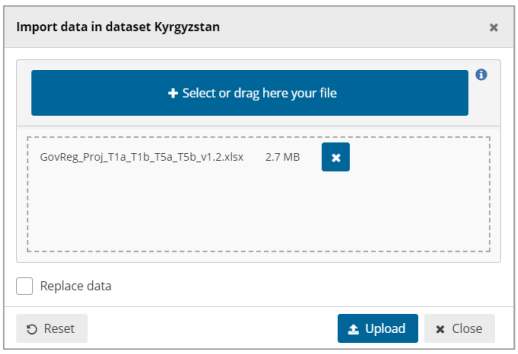
3.4. Uploading data

Access the relevant reporting dataset (the image below corresponds to the dataset *Table1a1b5a5b).* Here you will see a tab for each of the tables within the dataset, corresponding to each of the reporting tabs on the Excel file.

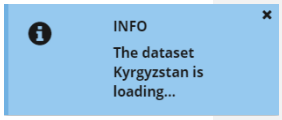
To upload your data, click on **Import dataset data** (do not confuse with *Import table data)*. If you are re-uploading an Excel file it is recommended to click before on *Delete dataset data* to remove the old data and avoid duplication of records.



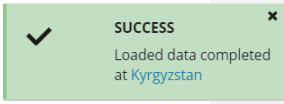
Select or drag the filled Excel file corresponding to this dataset (for this example it would be template *GovReg_Proj_T1a_T1b_T5a_T5b_v1.2.xlsx*) and click Upload. If you have not deleted the existing data and want to replace it, tick the box for *Replace data*. Click the button *Upload*.



The file will upload and you will see an info notification on the top-right corner informing you the dataset is loading. Now the system will take the data from the Excel templates and manipulate it so it fits the structure of Reportnet.



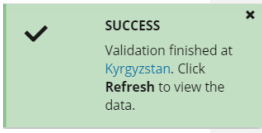
Once the dataset has been loaded, you will see a success notification. The time it takes for datasets to load varies depending on the dataset structure, the amount of information contained in the Excel files and the number of simultaneous users. Time ranges from 1 or 2 minutes for the small tables (e.g. Table 4) to up to 20 min for a fully loaded file for *Table1a1b5a5b.*



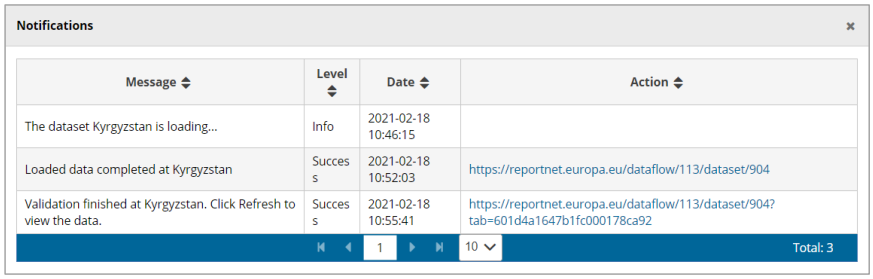
Please do not upload old versions of the Excel template. The version for reporting in 2023 is v2.0. Any template with version 1.x will not work. You can see the version of the template at the bottom of the sheet *Introduction*.

Commented [JE1]: Update every year

After uploading the data, you can validate it by clicking the Validate button. This process uses in-built QC rules to check for errors or inconsistencies in your data. Once the validation is finished, you will receive a notification. The time it takes to validate is also very variable and depends on the dataset, the number of errors and total number records. It ranges from 1-2 min for small simple tables to up to 10-15 min for large complex ones.



This means that the whole process (upload + validation) can vary from a couple of minutes to nearly half an hour. Of course, you can do other things with your computer while the data is loading and validating, including navigating to other parts of Reportnet. The bell icon on the left of the screen (**Notifications**) is very useful to track the progress of your upload and validation.

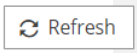


Notifications

Message	Level	Date	Action
The dataset Kyrgyzstan is loading...	Info	2021-02-18 10:46:15	
Loaded data completed at Kyrgyzstan	Success	2021-02-18 10:52:03	https://reportnet.europa.eu/dataflow/113/dataset/904
Validation finished at Kyrgyzstan. Click Refresh to view the data.	Success	2021-02-18 10:55:41	https://reportnet.europa.eu/dataflow/113/dataset/904?tab=601d4a1647b1fc000178ca92

1 10 Total: 3

Once the data has been loaded and validated click the button **Refresh** on the top-right corner to display your data. The data should be loaded and validated for all the tables within the dataset. You can also refresh your browser but this will clear the information on the notifications window.



3.5. Validating data

There are four type of errors in Reportnet 3:

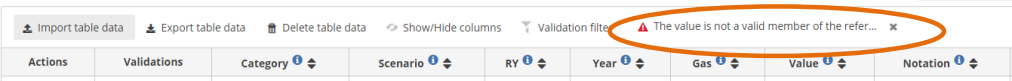
- Blocker – serious issues, the data cannot be submitted
- Error - the data may be released but some explanation is required. Please note, errors should be avoided. You should submit a dataset with errors only under exceptional circumstances.
- Warning – less serious issues, does not prevent the data release.
- Information – minor issues or simple notifications.

No blockers have been implemented in 2021 for GHG projections, only errors and warnings, although blockers might be added in the future if deemed necessary. This means that in 2021 your submission will not be stopped by the issues detected during the validation.

Once the validation has finished and you hit the Refresh button, the column 'Validations' shows for the level of error for each record.

Click on the **Show validations** button (dataset menu) to view the list of all errors in the dataset. These errors are displayed in a summary table, grouped by a particular error type. Here you can see useful information about the errors such as the table and fields affected, the level of error (Error or Warning), a message describing the error and the number of records affected.

Click on an error in the list to go to the affected record in the table and it will be highlighted. When clicking on a grouping, it filters the main table with all those records that triggered the error. Click on the x to the right of the error name to remove the group filter. Alternatively, you can use the *Validation filter* button in the table.



The most common errors found during the validation are listed below:

Table 2 Common validation errors

Level of error	Message	Common causes	Solution
Error	Mandatory table has no records	A table marked as mandatory remains empty.	Ensure that mandatory tables are filled on the Excel template before uploading data.
Error	The record should contain a value or notation key	The user did not type a value nor a notation key. Usually when adding the record manually.	Add a value or a notation key for this record.
Error	The value is not a valid member of the referenced list.	Some fields only accept certain values (e.g. a pre-determined list of values, or a 0 or 1 for binary fields). This error often occurs when an invalid text is typed into a cell that should contain only numerical values or a notation key (e.g. values for emission projections, indicators, parameters). Any text typed on those cells will go to the column *Notation* and, if not a valid notation key, it will display this error. Multiple notation keys in a single cell will display this error. Please use NK to represent multiple notation keys instead.	Make sure that the cells for numerical values contain only numbers or valid notation keys. Do not use commas to mark decimal points, or add any text symbols. Do not add comments on the value cell, please provide comments in the relevant Comments column (for tables 2,3 and 7) or in the technical report.
Error	Duplicated record	This usually occurs when data is re-uploaded to Reportnet without deleting the existing data It also occurs when user fills data for the base year and then fills it again for the same year on the column to the right	Click on *Delete dataset data* before uploading or select the *Replace data* box in the upload menu. Fill the base year and the years afterwards, without duplicating the base year.

4. Instructions for the reporting tables on National projections of anthropogenic greenhouse gas emissions

There is a **video-tutorial** titled *GHG Projections – Part 1: Introduction and Templates*, located in the EEA's Reportnet 3 Tutorial YouTube playlist (https://www.youtube.com/playlist?list=PL1_QSyumTz7BDCar7q2ZmvKvc-15Q5RVr). This tutorial gives an overview of the different Excel templates.

The following subchapters provide detailed guidance and instructions for all reporting tables in line with Annex XXV of the Implementing Regulation (EU) 2020/1208. With this new reporting obligation, several changes and updates have been implemented to the reporting tables. New tables have been introduced for the LULUCF sector, as well as the tables to report on the sensitivity analysis and some of the tables are interlinked.

- Table 1a provides the information on GHG projections per sector, gas and scenario and was subject to only minor changes compared to the previous tables. Further instructions for this table are available in **chapter 4.1.**
- Table 1b (new) includes the GHG projections for the LULUCF sector for the CRF and accounting categories. In addition, this table includes two summary tables below:
  - ⇒ Part 2 to summarise the LULUCF projections in line with the CRF categories. This is linked to the table 1a.
  - ⇒ Part 3 to summarise the LULUCF projections for the land accounting categories.
  - ⇒ Note: If a MS only reports 5a then the information for the LULUCF categories in Table 1b Part II has to be filled out manually. In addition, the row for unaccounted has to be filled in. On the other hand, if 1b is reported completely than 5a does not need to be filled out, because all other tables are filled automatically

  Further instructions for these tables are available in **chapter 4.2.**

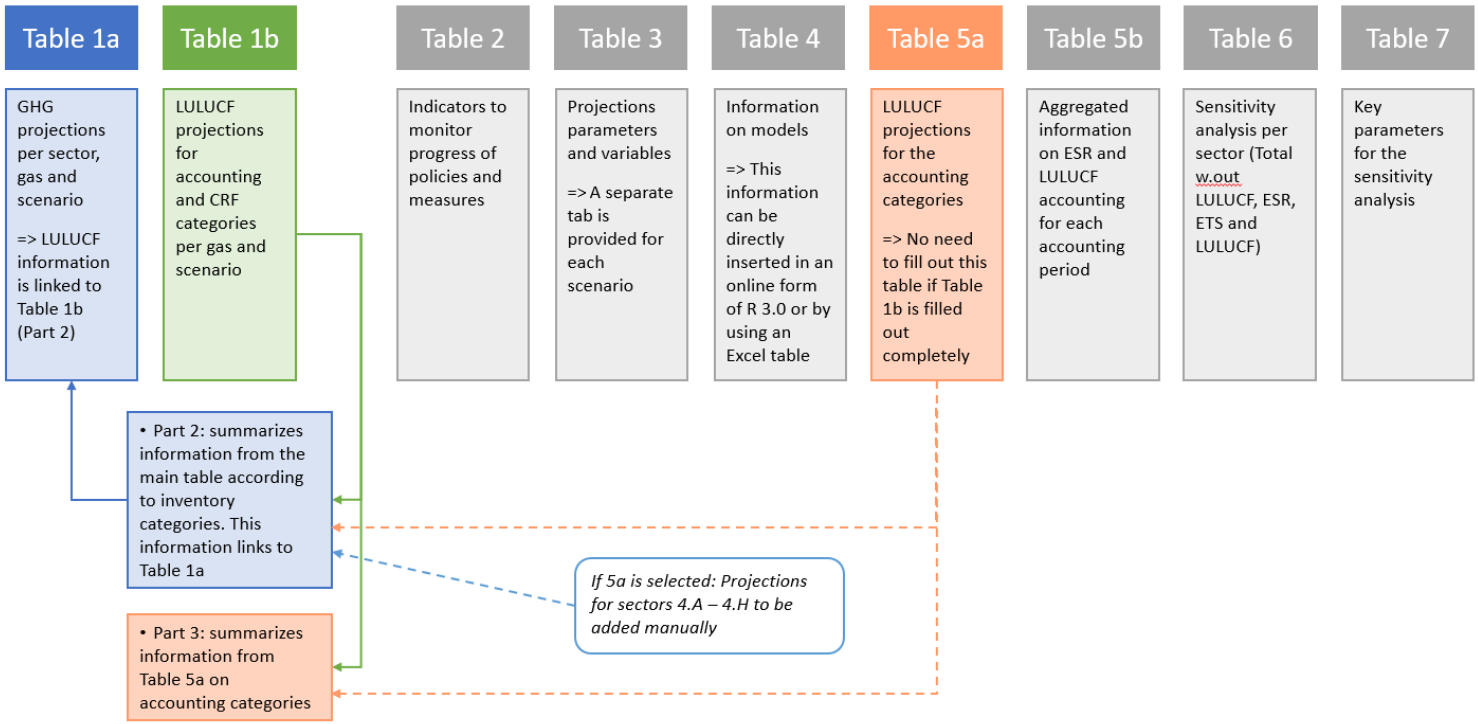
- Table 2 includes the information on indicators to monitor and evaluate the projected progress of policies and measures. Further instructions for this table are available in **chapter 4.3.**
- Table 3 includes the parameters and variables used for the projections scenarios. There exist now separate tabs for the WEM, WAM and WOM scenario and some additional parameters are now available. Further instructions for this table are available in **chapter 4.4**.
- Table 4 includes the model factsheets. Further instructions are available in **chapter 4.5**
- Table 5a (new) includes the information for the LULUCF projections per accounting category according to the LULUCF Regulation (EU) 2018/841. Further instructions are available in **chapter 4.6**.
- Table 5b (new) is a summary table in which projections of accounted emissions and removals from the LULUCF sector in accordance with Regulation (EU) 2018/841 and the

effort sharing sector in accordance with Regulation (EU) 2018/842 have to be reported. Further instructions are available in **chapter 4.7**.

- Table 6 (new) provides information on sensitivity analysis per sector (Total excl. LULUCF, ESR, ETS and LULUCF). Further instructions are available in **chapter 4.8**.
- Table 7 (new) provides information on the key parameters used for the sensitivity analysis. Further instructions are available in **chapter 4.9**.

In Figure 1 an overview of all reporting tables relevant for the reporting obligation in Art 18 (1) (b) is provided. The tables highlighted in grey are standalone tables without any direct link to another table, although it should be noted that they are all thematically connected. Tables 1a, 1b and 5a are shaded in color to illustrate how they are connected. Table 1b consists of three tables, the actual table 1b and the summary tables Part 2 and Part 3 below Table 1b. The summary table Part 2 summarises the LULUCF projections in line with the CRF categories and is linked to table 1a to fill out the information on LULUCF projections. The summary table Part 3 contains the summary information of the LULUCF projections for the land accounting categories in accordance with the LULUCF Regulation. If table 1b is filled out completely, both summary tables (Part 2 and Part 3) are filled out automatically with the given equations in the reporting templates. Member States can choose to either report the LULUCF information in table 1b (recommended option) or in table 5a, but it is mandatory to report on either table 1b or table 5a. If table 5a is chosen, additional information for the unaccounted categories has to be provided by the Member State in table 1b Part 2, whereas the Part 3 table is filled automatically with the information provided in table 5a.

Figure 1 Overview of reporting tables and linkages between them



The **reporting templates** for tables 1a, 1b, 5a and 5b are included in one Excel workbook containing different tabs for each table, because some of these tables are interlinked by the use of Excel equations. Tables 2, 3 and 4 are available in separate Excel workbooks each. The reporting templates for tables 6 and 7 are jointly available in one Excel workbook, because they relate thematically to the sensitivity analysis.

At the moment of writing this guidance, the most updated template package is version 1.2.1. It is distributed in the file GHG_Projections_templates_v1.2.1.zip and contains the following files:

- GovReg_Proj_T1a_T1b_T5a_T5b_v1.2.1
- GovReg_Proj _T2_v1.1
- GovReg_Proj_T4_v1.1
- GovReg_Proj_T3_v1.1
- GovReg_Proj_T6_T7_v1.1

See Annex 2 – for a list of changes from previous versions and how to update the templates.

Guidance for the technical report is available in **chapter 4.10**, including a suggested outline, a checklist to increase transparency of interlinkages between PaMs and projections, etc.

Tables 1a, 1b and 5a include shaded cells to facilitate the reporting. The interpretation of the different colors is explained in the following table. Note that for Table 1b (LULUCF) the colors in rows C and D are applied to highlight how the CRF and land accounting categories match.

Table 3 Color coding for Tables 1a, 1b and 5a used in the reporting templates

	Grey cells indicate sectors and gases combinations for which no information is expected to be filled in. These cells do not need to be filled out by the MS and can be left blank. However, the cells are not blocked, so if a MS prefers to fill in information (e.g. a notation key) this is possible.
	Light grey cells indicate that for this category only very small numbers are expected and it is up to the Member State to report projections for this sector/gas combination (e.g. non-CO2 emissions 1.A.3.a domestic aviation for Total ESR emissions)
	Yellow cells indicate mandatory years for which projections have to be reported.
	White cells represent intermediate years. It is good practice to provide data also for these years. Note that if a MS does not report intermediate years, they will be automatically gap-filled by the ETC/CME during the QA/QC.
	Green cells include equations that either link to another table or calculate a sum of sub-categories. The equations can be overwritten or deleted by the MS, however this is not recommended.

For tables 1a, 1b and 5a the reporting template includes integrated QA/QC checks in separate tabs as basic check for MS before the submission. It is not mandatory, but it is recommended to carry out these checks to avoid basic discrepancies (e.g. sum errors) in the dataset that usually lead to a high number of questions during the QA/QC procedure. Each of the check is described in the chapters for the related tales in more detail.

- T1a_QAQC(1): This tab includes an automated sum check across the gases for each sector (e.g. CO2+CH4+N2O+NF3+SF6+HFCs+PFCs+unspecified mix of HFC/PFC = Total GHGs)
- T1a_QAQC(2): This tab includes an automated sum check across the sectors (e.g. 2.A+2.B+2.C+2.D+2.E+2.F+2.G+2.H = 2)
- T1a_QAQC(3): This tab includes an automated consistency check to check if WAM scenario ≤ WEM scenario ≤ WOM scenario.
- T1a_QAQC(4): This tab includes an automated completeness check that highlights any blank cells or cells containing real zeros.

Where information is not available for a specific sub-category, gas, parameter, etc. it is good practice to use **notation keys** as defined in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Chapter 8: Reporting guidance and tables). The notation keys of IE (included elsewhere), NO (not occurring), C (confidential) and NA (not applicable) may be used. The use of the notation key NE (Not Estimated) shall be restricted to the situation where a disproportionate amount of effort would be required to collect data for a category or a gas from a specific category that would be insignificant in terms of the overall level and trend in national emissions. It is also good practice to provide an explanation for the use of any notation keys in the accompanying projections report. **If multiple notation keys are used to report on a sector or gas (e.g. IE/NA), it is recommended to use the generic notation key of Reportnet 3 "NK", because the use of multiple notation keys combinations can trigger errors in the data validation process.** The generic notation "NK" stands for notation key. This notation key is also applied automatically on the templates to refer to a mix of notations (e.g. when summing cells that contain several notation keys).

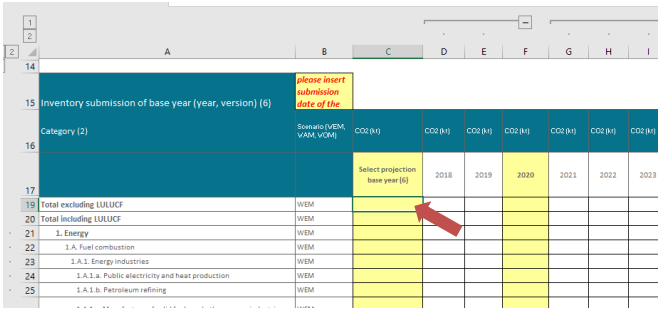
IMPORTANT: Templates are fragile

Do not insert/delete/paste full rows or columns. Stick to the area reserved for reporting. There are some hidden rows and columns that are used by the software to move data from the templates to Reportnet. They might be modified accidentally by manipulating full rows or columns, resulting in malfunctions when importing to Reportnet.

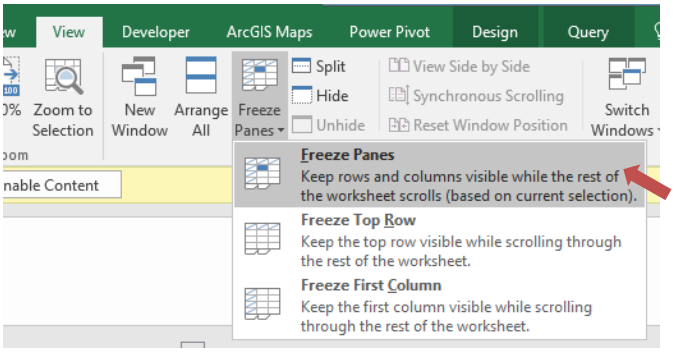
It is ok to use the empty space under the tables and footnotes for your own calculations.

Tips and tricks for the Excel templates:

- **Freeze panes to fix the view**:
  As some of the tables in the templates are very large it can be useful to fix the view for certain rows and columns so that certain rows (e.g. the years/gases) and certain columns (e.g. the sectors) are always displayed, even when you scroll down very far or move very far to the right of the table. To do so, (1) you need to click on the cell below the row and on the right of the column you want to fix (in this example cell C19 was clicked).

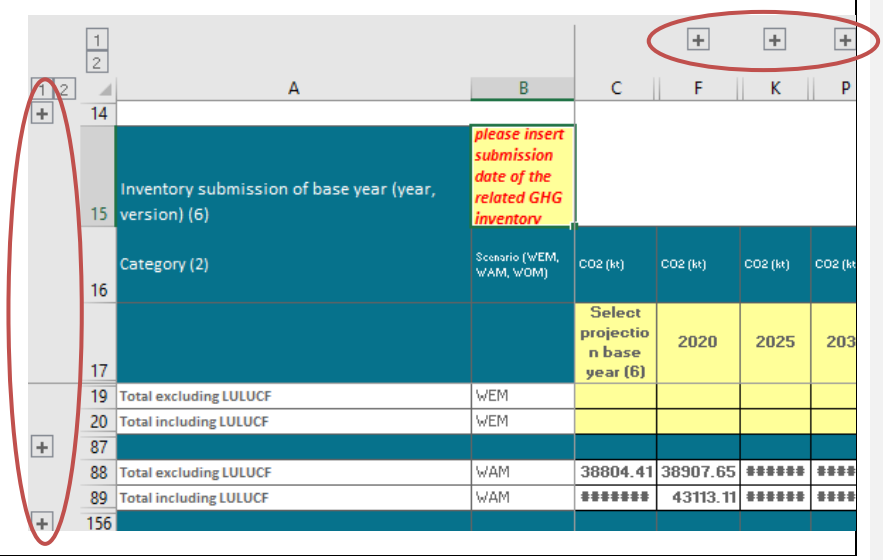


  (2) Then click on the ribbon on top called "View", and click on "Freeze Panes". Now the view is fixed and you can always see the gases/years on top and the sectors/scenarios on the left. To redo it go back to the ribbon "View", then "Freeze Panes" and click on "Unfreeze Panes".



- **Group and ungroup rows and columns (collapse and expand the rows/columns):**
  Some of the bigger tables in the reporting templates include grouped rows and columns to reduce the size of the table and better fit it to the window. The grouping/ungrouping function allows to expand and collapse columns and rows, to hide or display certain information (e.g. the scenarios or sub-categories or intermediate years). If on the top or on the left of an Excel worksheet little grey boxes with pluses or minuses are shown, this indicates that the rows and columns were grouped and some rows and columns are not displayed at the moment. To fully view all columns or rows you can either click on each of the pluses or you click on the numbers in the left corner. If you click on the number 2 on the top, all columns of table fully expand and you can see all columns. If you click on the number 2 on the left, all rows will be displayed. On the other hand, if you want to hide the columns again, you can either click on the minuses or on the number 1 in the left corner.

Note: When you insert data by using links to external data and you drag and drop the link to other cells, note that the link will be also copied into the hidden cells. It is therefore recommended to double check that all cells have been filled out properly in the expanded view (seeing all cells and columns), before uploading the submission.



	A	B	C	F	K	P
14						
15	Inventory submission of base year (year, version) (6)	please insert submission date of the related GHG inventory				
16	Category (2)	Scenario (WEM, WAM, WOM)	CO2 (kt)	CO2 (kt)	CO2 (kt)	CO2 (kt
17			Select projection base year (6)	2020	2025	203
19	Total excluding LULUCF	WEM				
20	Total including LULUCF	WEM				
87						
88	Total excluding LULUCF	WAM	38804.41	38907.65	######	####
89	Total including LULUCF	WAM	#######	43113.11	######	####
156						

4.1. Table 1a - Greenhouse gas projections by gases and categories

Table 1a is the main table in which the GHG projections have to be reported by gases, categories and scenarios (in line with Annex XXV, Table 1a) for the whole time series of the mandatory years.

What is different compared to the MMR table:

Table 1a replaces Table 1 as reported under the MMR. This table remains largely unchanged from the previous reporting table, however there are a few important changes:

- **Inventory submission of base year:** MS have to report to which GHG inventory submission the base year is referring to.
- **Years:** The years to be reported has been updated to the base year, 2018, 2019, 2020 – 2040 and 2050. As in the previous template, only the base year and years ending in 0 or 5 i.e. 2020, 2025, 2030, 2035, 2040, 2045 and 2050 are mandatory and are highlighted in yellow.
- **Gases:**
  - "Total ESD" has been renamed "ESR emissions"
  - Unit change: The gases NF3 and SF6 are now reported in kt
  - The gas "Unspecified mix of HFCs and PFCs" has been added and is to be reported only if emissions are projected, for which it is not possible to report them under HFCs or under PFCs.
- **Sectors:**
  - The subsectors under 2A and 2C have been updated. There is only one subsector under these categories (2.A.1. Cement production and 2.C.1. Iron and steel production)
  - The Memo Item Long-term storage of C in waste disposal sites has been removed.
  - The Memo Item International Aviation in the EU ETS has been removed.
  - The Memo Item Indirect N2O has been removed
  - Indirect CO2 has been added as a new Memo Item.
  - LULUCF is now linked to the new Table 1b and is automatically filled in Table 1a. The linked cells are coloured green. If no data is included in Table 1b Part 2, the MS expert has to manually fill the table 1b Part 2.
- **Scenarios:** no changes, the WEM scenario is mandatory but WAM is strongly encouraged and WOM should be reported where available.
- **Colour coding:** The colour coding has been updated (see Table 1 above). Greyed out cells indicate sector and gas combinations where no emissions are expected. MS can leave these cells blank.

Guidance for filling out the template:

Figure 2 Screenshot of reporting template for Table 1a

3	**Instructions** (click the '+' in the left):							
14								
15	Inventory submission of base year (year, version) (6)	*please insert submission date of the*					t-5 (see footnote 7)	
17	Category (2)	Scenario (WEM, WAM, WOM)	CO2 (kt)	CO2 (kt)	CO2 (kt)	CO2 (kt)	CO2 (kt)	C
18			Select base year	2018	2019	2020	2021	
19	**Total excluding LULUCF**	WEM	38804.41	38542.75	40027.47	38907.65	38804.41	
20	**Total including LULUCF**	WEM	42248.80	42196.94	42603.42	43113.11	42248.80	
21	**1. Energy**	WEM	35960.73	36072.30	37385.03	36239.30	35960.73	
22	1.A. Fuel combustion	WEM	35960.44	36071.85	37383.58	36234.46	35960.44	
23	1.A.1. Energy industries	WEM	10398.45	11746.68	12442.31	11670.32	10398.45	
24	1.A.1.a. Public electricity and heat production	WEM	9957.65	11272.92	12003.25	11230.52	9957.65	
25	1.A.1.b. Petroleum refining	WEM	321.85	25.00	313.25	310.86	321.85	

- Review the instructions contained in rows 3:13
- Enter the submission year[2] of the GHG inventory to which the base year is referring to in cell B15 in the format YYYY (e.g. 2021).
- Enter the base year of the projections in cell C18 using the dropdown. This cell is linked to the base years of the other gases to automatically fill them with the same base year. If a different base year has been used for other gases, this should be explained in the report. If a different base year is used for a certain sector, this should also be clearly explained in the report. For practical reasons provide in the reporting template the data corresponding to the year selected in cell C18, even though this is not the real base year and base year data for that specific sector.
- Enter the historical and projected WEM emission estimates. The mandatory cells are highlighted in yellow; it is also recommended that the non-mandatory white cells are completed where possible. Note that the ETC/CME will automatically gap-fill the intermediate years by applying linear interpolation.
- Cells that have been greyed out can be left blank, but if appropriate, these cells can be filled with data or notation keys. Enter data in line with the units, note that some gases should be reported in kt and others in kt CO2e (see row 16 in the template).
- Footnote 4 of the Implementing Regulations defines the scope of the ETS emissions to be reported. In accordance with Directive 2003/87/EC, the scope (specified in ANNEX I) excludes emissions from sector 1.A.3.a domestic aviation. Therefore, these emissions should

[2] EU MS should refer to the inventory submission year to the EEA. For non-EU countries, it can be referred to the UNFCCC submission as well.

not be reported for the columns HT:IR. However, it is possible to report the small amount of domestic aviation (non-CO2) emissions under the ESR (therefore shaded in light grey), if applicable. Further guidance on the ETS/ESR split is provided in chapter 5.

- Where emissions are not available for a specific sub-category or gas, it is good practice to use notation keys as defined in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Chapter 8: Reporting guidance and tables), the notation keys of IE (included elsewhere), NO (not occurring), C (confidential) and NA (not applicable) may be used, as appropriate when projections do not yield data on a specific reporting level (see 2006 IPCC Guidelines). The use of the notation key NE (Not Estimated) shall be restricted to the situation where a disproportionate amount of effort would be required to collect data for a category or a gas from a specific category that would be insignificant in terms of the overall level and trend in national emissions. It is good practice to provide an explanation for the use of any notation keys in the accompanying projections report. **If multiple notation keys are used to report on a sector or gas (e.g. IE/NA), it is recommended to use the generic notation key of Reportnet 3 and insert "NK" instead,** because the use of multiple notation keys can trigger errors in the validation process.
- If estimates are available, follow the same process to enter data for the WAM and WOM tables which are provided below the WEM table.
- It is important to note that:
    - Indirect CO2, if available, should be included in the Total with and without LULUCF (for Total GHGs, CO2 and ESR emissions) (rows 18 and 19 in the WEM scenario)
    - Indirect N2O should be included in the LULUCF (in the respective subcategories if available)

Do not report historical values when no projections are available, as this causes issues in the EU aggregated dataset and has to be corrected manually by the ETC. It is recommended to either fill out the whole time series with a notation key or leave it blank.

- Once Table 1a has been filled, it is recommended to review the Table 1a QC sheets: T1a_QAQC(1), T1a_QAQC(2), T1a_QAQC(3), T1a_QAQC(4). Additional information on the QC checks is provided below.
- Member States are strongly encouraged by the EEA to report WAM. If the WAM scenario is not provided, note that the ETC/CME will gap-fill it with the data from the WEM scenario in order to complete the EU dataset.

Links to other tables: This table contains equations for the LULUCF sector and its sub-categories linking to table 1b (Part 2), so the MS do not have to fill out the projections for LULUCF manually if Part 2 in table 1b is reported completely. If empty, fill out table 1b.

Checklist for table 1a:

1) Check that the inventory submission date has been filled in cell B15.
2) Check that the correct base year value has been selected in cell C18.
3) Check that all yellow mandatory cells are filled with either numeric values or notation keys. Any zero values should be replaced with notation keys.
4) Check that were available, estimates have also been provided for the non-mandatory cells.
5) Check that were estimates are available, values for the WAM and WOM scenarios have been provided.
6) Check for LULUCF that the gases are reported in the correct units (kt per gas and not in CO2 equivalents)
7) Check that the gases NF3 and SF6 are reported in the correct units (kt per gas and not in CO2 equivalents)
8) Check that HFCs and PFCs emissions have been reported for the relevant categories, or that where it is not possible to disaggregate HFC and PFC emissions they have been reported under the gas "Unspecified mix of HFCs and PFCs".
9) Check that historical values (base year values) are **not** reported for a sector and gas, when there are no projections available. It is recommended to use a notation key for the whole time series instead.

Integrated QC checks in the template:

Four sheets are provided within the reporting template which include QC checks for Table 1a. These sheets are linked to the data entered in Table 1a and can be used to check for potential errors before submitting the file through Reportnet. All QC sheets contain an overview of the check and a summary of the check results at the top of the sheet.

Potential errors are highlighted in pink

An overview of the QC checks for Table 1a is provided below.

T1a_QAQC(1): Sum check

This check includes two components:

- Comparing the aggregate GHGs in CO2e (CO2, N2O, CH4, SF6, NF3, HFC, PFC, Unspecified mix of HFCs and PFCs) with the gas "Total GHGs" for all sectors in the WEM scenario.
- Comparing the estimates reported under the gas "Total GHGs" with ETS and ESR emissions e.g. for the sector Total with LULUCF, do Total GHGs = (ETS + non-ETS + CO2 Domestic aviation + LULUCF)? Notes on the data selected data for ETS split sum check are provided in column CB.

T1a_QAQC(2): Sector sum check

Comparing the sector totals with sum of the subsectors for all gases, years and scenarios e.g. do the emissions reported under 1.A. = 1.A.1. + 1.A.2. + 1.A.3. + 1.A.4. + 1.A.5.? Any differences between sectors and the sum of their corresponding subsectors are highlighted in red.

T1a_QAQC(3): WEM vs WAM check

Are the emissions reported under the WAM scenario ≤ WEM scenario? This check is performed for all gases, years and sectors except for LULUCF. The check returns the difference of the WEM scenario – WAM scenario. Where no WAM scenario is available, the check will return "No WAM" and where notation keys are provided in the WAM scenario the check will return "NK". A positive result in the check denotes the emissions saving the WAM scenario and cells are highlighted in green. Negative results, where the emissions in the WAM scenario are greater than the WEM are highlighted in red to flag potential errors.

T1a_QAQC(4): Completeness check

Does Table 1a contain any zero of blank values? This check contains a duplicate of Table 1a, with all cells filled with a formula to check whether a value (numerical or notation key) has been provided. Where cells are either blank or contain a 0 value an error is flagged. Where no emission/removal estimates can be provided, notation keys should be used (see instructions above for more information on notation keys).

4.2. Table 1b - Projections of reported greenhouse gas emissions and removals in the LULUCF sector

The Gov. Reg. requires MS to report on accounted LULUCF projections in line with the LULUCF Regulation (2018/841). In order to match the CRF categories with the land accounting category as defined in the LULUCF Regulation, it is necessary that MS report also LULUCF projections for sub-categories (i.e. remaining land and land use changes between sub-categories). The following table shows how the CRF categories match with the respective land accounting category. In addition to these categories, net emissions/removals from harvested wood products have to be reported in table 1b.

Table 4 Crosswalk between CRF categories and land accounting categories for the LULUCF sector

		Land use to					
	Land use categories	Forest land	Cropland	Grassland	Wetlands	Settlements	Other land
Land use from	Forest land	Managed Forest Land	Deforested Land	Deforested Land	Deforested Land	Deforested Land	Deforested Land
	Cropland	Afforested Land	Managed Cropland	Managed Grassland	Managed Cropland	Managed Cropland	Managed Cropland
	Grassland	Afforested Land	Managed Cropland	Managed Grassland	Managed Grassland	Managed Grassland	Managed Grassland
	Wetlands	Afforested Land	Managed Cropland	Managed Grassland	Managed Wetland	Managed Wetland	Managed Wetland
	Settlements	Afforested Land	Managed Cropland	Managed Grassland	Managed Wetland	Not accounted	Not accounted
	Other land	Afforested Land	Managed Cropland	Managed Grassland	Managed Wetland	Not accounted	Not accounted

To fulfill this reporting obligation, the Implementing Regulation provided two different tables for MS to report on the LULUCF sector (Table 1b and Table 5a), of which at least one of them is mandatory.

In Table 1b, MS have to report on detailed LULUCF projections, per sub-category, gases and scenarios. Below the main table, Table 1b includes two summary tables to summarise the “reported” and “accounted” LULUCF categories. It should be noted that these summary tables are mandatory to be filled out regardless of which LULUCF table (1b or 5a) was selected for the reporting.

What is different compared to the MMR:

- This table is completely new and includes all LULUCF categories by gases and scenario in the IPCC logic, but also the related land accounting category in accordance with the LULUCF Regulation

- A more refined disaggregation of categories has to be reported, including land use change categories between main categories and remaining land.

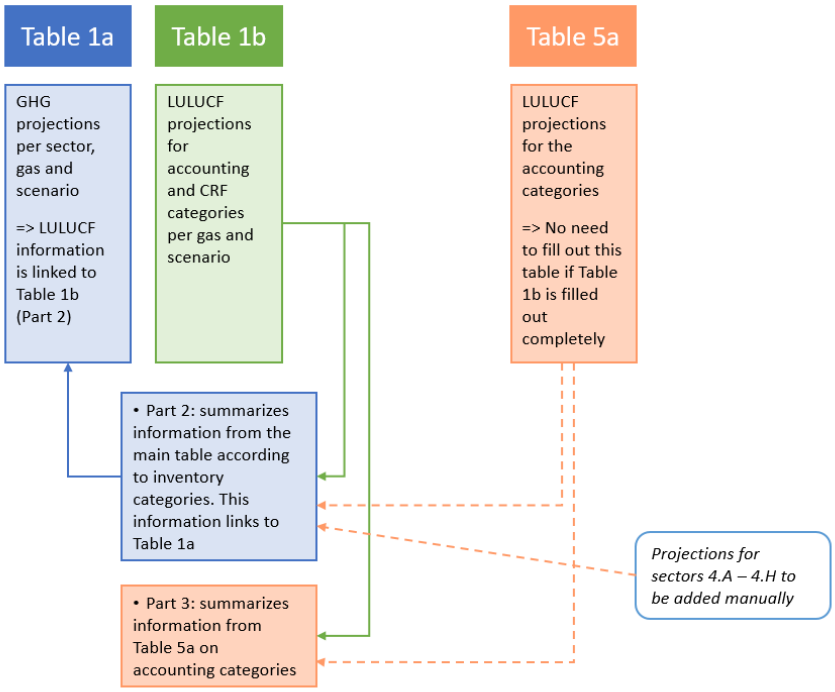
On the bottom of the table, there are two summary tables which summarise the normal LULUCF projections in line with the CRF categories of the GHG inventory (Part 2) and a table which summarised the projections for the land accounting categories in line with the LULUCF Regulation (EU) 2018/841 (Part 3)

Figure 3 provides an overview how the LULUCF tables 1b and 5a are linked with Table 1a. MS can choose to either report their LULUCF information in table 1b or 5a. To facilitate the reporting, it is recommended to completely fill out table 1b, because the template is designed in a way that all other LULUCF related tables will be filled out automatically if the information is complete. Note that also include information on the unaccounted categories needs to be provided to ensure the information for the LULUCF sector is complete!

- Option 1 (recommended): Fill out Table 1b only
    - If table 1b is filled out completely, both summary tables (Part 2 and Part 3) are filled out automatically with the given equations in the reporting templates.

- Option 2: Fill out Table 5a and additional information in Table 1b Part 2
    - If table 5a is chosen, additional information for the unaccounted categories has to be provided by the Member State in table 1b Part 2, whereas the Part 3 table is filled automatically with the information provided in table 5a. More information on Table 5a is provided in chapter 4.6.

Figure 3 Links between LULUCF tables 1b and 5a and table 1a



Guidance for filling out the template:

Figure 4 Screenshot of reporting template for Table 1b

Annex XXV - Table 1b: Projections of reported greenhouse gas emissions and removals in the LULUCF sector as reported in the national greenhouse gas inventory (to be reported only if Table 5a is not completed in full) [(1)(2)]

Instructions:
Unfold the template by clicking the framed '+' icons.

t-10 (see fi t-5 (see footnote 3)

Part 1: LULUCF GHG emissions and removals on inventory and accounting category matching level				Scenario (WEM, WAM, WOM)	CO2 (MtCO2e)	CO2 (MtCO2e)	CO2 (MtCO2e)	CO2 (MtCO2e)	CO2 (MtCO2e)	CO2 (MtCO2e)	CO2 (MtCO2e)	CO2 (MtCO2e)
Greenhouse gas source and sink categories	Category as used in Table 1a	LULUCF Regulation Accounting subcategory (as Table 5a)	LULUCF Regulation Accounting category		Select base year	2015	2020	2025	2030	2035	2040	2050
4.A.1. Forest land remaining forest land	4.A Forest land	Forest land remaining forest land	Managed forest land	WEM								
4.A.2.1 Cropland converted to forest land	4.A Forest land	Cropland converted to forest land	Afforested land	WEM								
4.A.2.2 Grassland converted to forest land	4.A Forest land	Grassland converted to forest land	Afforested land	WEM								
4.A.2.3 Wetlands converted to forest land	4.A Forest land	Wetland converted to forest land	Afforested land	WEM								
4.A.2.4 Settlements converted to forest land	4.A Forest land	Settlements converted to forest land	Afforested land	WEM								
4.A.2.5 Other land converted to forest land	4.A Forest land	Other land converted to forest land	Afforested land	WEM								
4.B.1. Cropland remaining cropland	4.B. Cropland	Cropland remaining cropland	Managed cropland	WEM								
4.B.2.1 Forest land converted to cropland	4.B. Cropland	Forest land converted to cropland	Deforested land	WEM								
4.B.2.2 Grassland converted to cropland	4.B. Cropland	Grassland converted to cropland	Managed cropland	WEM								
4.B.2.3 Wetlands converted to cropland	4.B. Cropland	Wetland converted to cropland	Managed cropland	WEM								

- In Cell F18 choose the base year of the scenario from the dropdown menu.
- Color coding of the table: The color coding is explained in Table 3. Greyed out cells indicate sector and gas combinations where no emissions are expected. MS can leave these cells

blank. Yellow cells highlight mandatory years and have to be filled out. White cells can be filled out on a voluntary basis. Green cells include equations that facilitate the reporting by automatically calculating sums or show warnings if data is incomplete. These equations can be overwritten by the MS, if needed.

- Insert the following data:
    a. Years: The time series has to cover the projections base year, 2020, 2025, 2030, 2035, 2040, 2045 and 2050 (mandatory). The cells for mandatory years are highlighted in yellow. All other years are voluntary. Note that the ETC/CME will automatically gap-fill the intermediate years by applying linear interpolation. The time series should be consistent with the other sectors reported in table 1a. However, for LULUCF in addition it is possible to report the year t-10. For this reason, it is possible to provide the time series already from 2015 onwards. Important note: Do not report historical values when no projections are available for a certain category or gas! It is recommended to either fill out the whole time series with a notation key or leave it blank.
    b. Gases: For the LULUCF sector the gases CO2, CH4, N2O as well as the Total GHGs have to be reported. The unit for all gases in table 1b is kt CO2 equivalents.
    c. Sectors: Projected emissions and removals from all land use changes between main categories and remaining land have to be reported. This also should include emissions from CH4 and N2O (direct and indirect) in the respective category. Projections on harvested wood products have to be split into HWP from managed forest land, from afforested land, from deforested land and from other land, if applicable. Note that according to Annex V of the LULUCF Regulation it is allowed to jointly report HWP from managed and afforested land under HWP from managed land if it is not possible to differentiate between the two. It is important that also data is provided for the unaccounted categories, if available.
    d. Scenarios: It is possible to provide projections for the WEM, WAM and WOM scenario. The WEM scenario is mandatory.

It should be noted that MS should report in table 1b for the category Managed Forest Land their WEM/WAM/WOM scenario and not the Forest Reference Level.

It is recommended to report the emissions from CRF tables 4(I) to 4(V) split per sub-category/land accounting category as it is outlined in Table 4 in order to be able to assign the emissions to the respective land accounting category. The CRF tables unfortunately do not provide this sectoral disaggregation for all the emissions to be reported in tables 4(I) to 4(V), but to consistently report on projections by land accounting category it is necessary to provide such a split for the GHG projections. If this information is not available, an expert judgment can be applied to assess the likelihood of the emissions per sub-category based on the knowledge of the landscape, management practices and type of natural disturbances in the country and to split the projections emissions accordingly. Otherwise, the sum checks might flag errors and trigger questions during the QA/QC as cross-sectoral sums are not matching. For example, the indirect N2O emissions from mineral soils (CRF category 4(IV)) should be reported separately for all land use change categories, instead of just the Total number for the whole LULUCF sector as it is done in the CRF table (IV).

- Table 1b Part 2 and Part 3 (rows 174-229)
    a. These tables contain equations (green cells) which automatically extract the information from the main table 1b.
    b. Note that the tables Part 2 and Part 3 are filled out automatically if the main table 1b is filled out completely.
    c. The data from table Part 2 feeds into table 1a.
    d. If a MS chooses to fill only table 5a, the table Part 2 has to be filled out manually. In addition, the MS has to provide the sum of unaccounted categories in rows 211, 220 and 229.
    e. If information is missing or incomplete, the MS has to fill in the information manually by overwriting the equations.
    f. If only notation keys are provided in the underlying data, the cells show the text "NK".

Links with other tables: The part 2 of this table links to table 1a.

Checklist for table 1b:

1) Insert base year of the projections in cell F18
2) Insert data for all mandatory years (base year and projected years until 2050) for the WEM scenario and all gases (CO_2, CH_4, N_2O and Total GHGs)
3) Insert data for all categories (remaining land and land use changes), if projections are not available, use the appropriate notation key
4) Insert data for the intermediate years and the WAM scenario, if available.
5) Ensure that CH_4, N_2O is provided in kt CO_2eq and not in kt per gas (use GWP from AR5)
6) Ensure that data is included for Part 2 in rows 174 to 201 (mandatory for WEM).
    a. If data is completely provided in rows 19 to 173 (big table), then Part 2 table is filled automatically.
    b. If the data is not complete in the big table, insert the data manually and overwrite the formulas.
    c. Check that data is provided for all mandatory years and all gases.
7) When Part 2 is completed, go to table 1a and ensure that rows 65 to 73 for WEM (and row 134 to 142 for WAM if reported) are completed with information from Part 2.
    a) Check that all main sectors and gases are provided for LULUCF in table 1a.
    b) Double check the units in table 1a (CH_4 and N_2O have to be reported in kt in tables 1a, but in table 1b CH_4 and N_2O are reported in CO_2eq)
8) Ensure that data is included for Part 3 in rows 202 to 229 for the land accounting categories (mandatory for WEM).
    a. If data is completely provided in rows 19 to 173 (big table), then Part 3 table is filled automatically. This also applied if table 5a is filled out completely.
    b. If the data is not complete in the big table, insert the data manually and overwrite the formulas.
    c. Check that data is provided for all mandatory years and all gases.

Integrated QC checks in the template:

Two sheets are provided within the reporting template which include QC checks for Table 1b. These sheets are linked to the data entered in Table 1b and can be used to check for potential errors before submitting the file through Reportnet. All QC sheets contain an overview of the check and a summary of the check results at the top of the sheet.

Potential errors are highlighted in pink

An overview of the QC checks for Table 1b is provided below.

T1b_QAQC(1): Sum check

This check compares the aggregate GHGs in CO2e (CO2, N2O, CH4) with the gas "Total GHGs" for all sectors in Table 1b the WEM scenario.

T1b_QAQC(4): Completeness check

Does Table 1b contain any zero of blank values? This check contains a duplicate of Table 1b, with all cells filled with a formula to check whether a value (numerical or notation key) has been provided. Where cells are either blank or contain a 0 value an error is flagged. Where no emission/removal estimates can be provided, notation keys should be used.

4.3. Table 2 - Indicators to monitor and evaluate projected progress of policies and measures

In Table 2, MS have to report on indicators to monitor and evaluate projected progress of policies and measures, if they were used by the MS.

What is different compared to the MMR:

- A column "indicator used (Yes / No)" has been added.
- A column "Comments" has been added. This allows MS to add other relevant information that was not covered in the predefined fields.
- Columns with the optional reporting years have been added, that can be extended or folded. Mandatory reporting years are not highlighted anymore (compared to the previous template). Rather, all reporting years not labelled optional are mandatory,
- A column for 2050 values has been added under WEM and WAM scenarios.
- Eight indicators have been filled out already, with the respective default units. However it is possible to add additional indicators in the free rows.

Figure 5 Screenshot of the indicator table (Table 2)

Submission year	2021																
Member State	Select country																
						With existing measures (WEM)						With additional measures (WAM)					
Indicator/ numerator/denominator	Unit	Guidance / definition	Guidance / source	Indicator used (Yes / No)	Base / Reference year (value)	2025	2030	2035	2040	2050 (option al)	Base / Reference year (value)	2025	2030	2035	2040	2050 (option al)	Comments
Carbon intensity of the overall economy	tCO2eq/GDP	EUR (2016); Carbon intensity to be calculated with GDP as defined by Eurostat															
GHG intensity of domestic power and heat gener	tCO2/MWh	MWh of gross electricity and heat generation as defined by Eurostat															
GHG intensity of final energy consumption by sector																	
Industry	tCO2eq/toe																
Residential	tCO2eq/toe																
Tertiary	tCO2eq/toe																
Transport	tCO2eq/toe																
Passenger transport (when available)	tCO2eq/toe																
Freight transport (when available)	tCO2eq/toe																
Use lines below for each additional indicator																	

Guidance for filling out template:

An indicator is a quantitative factor or variable that contributes to better understanding progress of implementing policies and measures. Indicators are also a reporting requirement under the reporting of policies and measures. Make sure reporting is consistent.

- Select the base year in cell G14
- It is recommended to report indicator(s) when available from the projections. The template already includes eight indicators, but additional indicators can be added in separate rows if necessary. Do not insert rows or columns. Add new indicators using the blank rows at the end of the table.
- Pay attention to filling out the unit column and filling it out correctly and transparently. Reporting indicator data in this default unit facilitates QA/QC and avoids ambiguities. Should a MS need to report indicators in another unit than the default unit, it is deemed important to indicate the unit used in column 'Comments'. Like this, conversion during the QA/QC process can happen without ambiguities and feedback-loops. If the indicator is a share or is dimensionless, write "%" or "dimensionless".
- The Guidance/definition column should be used to describe the indicator.
- The Guidance/source section can be used to link the source document, in case this is relevant.
- Indicator used: Select "yes" if the indicator was used or "no" if the indicator was not used.
- Indicate the base year for each indicator.
- Fill out the indicator value for the base year.
- Fill out the values for the indicators for the mandatory reporting years. In case possible, also indicate values for the optional years. It is suggested to also report on any year in between mandatory reporting years to facilitate better QA/QC and aggregation to EU-wide projections.
- Reporting columns are available to report data for the WEM and WAM scenario.

Links with other tables:

Although Table 2 looks similar to "Table 3: Reporting on parameters / variables for projections, if used", it is important to note that they serve different purposes. Table 2 is linked to the output of the modelling, assessing the impact of the policies and measures, and how their impact is projected to progress over the years per scenario. Table 3 on the other hand is input to the modelling,

comprises the parameters which have been used when preparing the projections (input parameters).

Checklist for table 2:

1) Only report those indicators that are used. Fill out column J “indicator used (Yes/No)”.
2) Select the base year
3) Units are reported according to the default units as indicated in the reporting template. If this is not possible, indicate the applied unit in the column *Comments;*
4) For indicators used, insert data for all mandatory years and the WEM scenario
5) For indicators used, insert data for the intermediate years and the WAM scenario, if available
6) For indicators not used, leave blank the respective cells.

4.4. Table 3 - Reporting on parameters / variables for projections

The Governance Regulation of the Energy Union and Climate Action (EU) 2018/1999 calls for Member States to report, along with their greenhouse gas projections, the parameters used for preparing these projections (see Article 18 and Annex VII-d). The Commission Implementing Regulation (EU) No 2020/1208 provides the tabular format for this purpose in Annex XXV “Reporting on national projections pursuant to Article 38”, among which “**Table 3: Reporting on parameters / variables for projections, if used**”.

What is different compared to the MMR:

The Implementing Regulation Article 38(3) states that:

- "In the reports on projections to be provided pursuant to Article 18(1) of Regulation (EU) 2018/1999, Member States **shall take into account the harmonised values for key parameters for projections – at least for oil, gas, and coal import prices as well as for carbon prices** under the European Emission Trading System pursuant to Directive 2003/87/EC – which the Commission has recommended, in consultation with the Member States,.." (emphasis by ETC/CME).
- The default list of parameters has expanded compared to previous template in line with Annex XXV Table 3 as specified in the Implementing Regulation. New parameters are, for example, LULUCF related parameters and data on final energy consumption split by sector by fuel.
- The recommended parameters are available in the *Dataflow help* section of Reportnet 3 and here: https://www.eionet.europa.eu/reportnet/docs/govreg/
- The default units for monetary values are now more clearly described in the Excel reporting template (column D).
- The WEM, WAM and WOM scenarios are now reported on separate sheets in the excel template.
- The parameters are now grouped by these topics:
    a. General parameters and variables
    b. Energy balances and indicators
    c. Non-CO2 emission related parameters
    d. LULUCF
    e. Other parameters and variables

  Each of these topics is structured further by "subsections" to provide better overview.

Figure 6 Screenshot of Table 3 showing the topics 3 - Non-CO2 emission related parameters and 4- LULUCF with respective subsections.

	A	B	C	D	E	F	G	H	I	J
161		**3. Non-CO2 emission related parameters**								
162		**3.1. Agriculture**								
163		Livestock								
164		Dairy cattle		1000 heads						
165		Non-dairy cattle		1000 heads						
166		Sheep		1000 heads						
167		Pig		1000 heads						
168		Poultry		1000 heads						
169		Nitrogen input from application of synthetic fertilizers		kt nitrogen						
170		Nitrogen input from application of manure		kt nitrogen						
171		Nitrogen fixed by N- fixing crops		kt nitrogen						
172		Nitrogen in crop residues returned to soils		kt nitrogen						
173		Area of cultivated organic soils		1000 hectares						
174		**3.2. Waste**								
175		Municipal solid waste (MSW) generation		t						
176		Municipal solid waste (MSW) going to landfills		t						
177		Share of CH4 recovery in total CH4 generation from landfills		%						
178		**4. LULUCF**								
179		**4.1. Managed forest land**								
180		Forest harvest removals for energy use		1000 cubic meters						
181		Forest harvest removals for non- energy use		1000 cubic meters						
182		Forest increment		1000 cubic meters						
183		Forest disturbances included in modelling		Yes / No						
184		Forest land remaining forest land		1000 hectares						
185		**4.2. Afforested land**								
186		Forest harvest removals for energy use		1000 cubic meters						

Guidance for filling out the template:

Scope: Those parameters and variables shall be reported that are part of the projections, either as input or as output. Thus, table 3 may include elements which may be outputs for certain models or sectors and are reported alongside the greenhouse gas projections. If such an element is listed, the corresponding cells should be filled.

All other parameters and variables that are not used in the model do not need to be filled. However, the use of notation keys is recommended since it informs clearly about each parameters status and avoids empty cells that may produce ambiguities.

Use the following notation keys:

- C - confidential
- IE – included elsewhere
- NA – not applicable
- NO – not occurring
- NE – not estimated/not used. The use of the notation key NE (Not estimated) is for cases where the suggested parameter is neither used as a driver nor reported along with the Member States Projections.
- NK – To designate a combination of notation keys. It is recommended not to list several notation keys in a single cell, but to use NK instead.

Default units: The reporting template indicates, for each parameter, a default unit in column *H*. It is recommended to report parameter data by using the default units. This ensures consistency, facilitates QA/QC and avoids ambiguities. If parameters are reported in another unit than the default unit, then the unit used should be indicated in column *I – Additional unit information*.

> **Example:** If the energy prices are reported in *USD (2015) / boe* instead of the default unit *EUR (2016) / GJ*, then the term *USD (2015) / boe* has to be entered in the column *Additional unit information*, see **Error! Reference source not found.**. This will support the unit c onversion and checking procedure during the initial checks of the QA/QC process.

Figure 7 Screenshot of Table 3 showing default units and an example on how to report if these were not used.

Parameter used [3] ('with existing measures' scenario)		Default unit	Parameter / variable part of projections (Yes/No)	Additional unit information (if applicable)
1. General parameters and variables				
International (wholesale) fuel import prices -	Coal	**either** EUR(2016) /GJ	Yes	(USD 2015)/boe
		or EUR(2016)/toe	No	
	Crude Oil	***either*** EUR(2016)/GJ	Yes	(USD 2015)/boe
		or EUR (2016)/toe	No	
	Natural gas	***either*** EUR(2016)/GJ	Yes	(USD 2015)/boe
		or EUR(2016)/toe	No	

- **Default units for monetary parameters:** To report on monetary parameters, a suggested default unit is provided: EUR (2016), as monetary values used in the projection for the National Energy and Climate plans are required to be expressed in this unit in accordance with the Gov. Reg. Annex I part 2. Ambiguities due to the selection of different units for currencies are more complicated to solve than for other parameters as different assumed exchange rates and used data sources may produce different results. It is therefore **recommended to report all monetary parameters in this default unit**. If parameters cannot be reported in the default unit, it is important to indicate the unit used in column *I – Additional unit information (see example given below)*. Price parameters include monetary units AND energy units and are thus more prone to ambiguities if the unit used is not provided than single unit parameters.

Unit conversion: Note that if MS do not report in default units and do not indicate in column "Additional unit information" which unit has been used, this also causes challenges in the QA/QC conducted by the ETC/CME, because the checks are conducted for in the default units and the unit information provides the basis for any conversion. Below is a short method for unit conversion is described for a hypothetical example, if unit conversion to default units is required for the reporting.

The parameter "Net imports Electricity" is available in TWh instead of the default unit ktoe. This value can be converted by using the appropriate conversion factor (CF). The CF to convert TWh to

ktoe ($CF^{TWh=>kto}$) is 85.9845 ktoe per TWh. A conversion of 10 TWh to ktoe therefore requires multiplication with the CF as shown in the formula below, with units in square brackets. A correct unit conversion can be checked by ensuring that the units on the left and right hand side of the equation are equal. In the example below it can be seen that TWh on the left hand side is cancelled out, leaving ktoe on both left and right hand side.

$$10\ [TWh] * CF^{TWh \rightarrow ktoe} \frac{[ktoe]}{[TWh]} = 859.845[ktoe]$$

This concept can be expanded further. If the "Net imports Electricity" is available in GWh instead, and considering that the $CF^{GWh=>TWh}$ is 0.001 TWh per GWh, a combination of conversion factors can be used to convert it to ktoe. It can be seen that both GWh and TWh cancel out on the left hand side of the equation leaving ktoe as a unit on both sides:

$$10\ [GWh] * CF^{TWh \rightarrow ktoe} \frac{[ktoe]}{[TWh]} * CF^{GWh \rightarrow TWh} \frac{[TWh]}{[GWh]} = 116.3\ [ktoe]$$

As mentioned above, special attention is needed for monetary. Monetary values have to be reported in constant prices, with a default unit of EUR(2016). The Eurostat table nama_10_gdp ([3]) provides the price index (implicit deflator) for individual Member States as well as the EU-27, that form the basis for monetary conversion factors ([4]).

In the following example the German GDP in EUR(2016) is converted to EUR(2010) values (by using the CF = 0.912, this CF is specific to Germany):

$$GDP_{DE}\ [EUR(2016)] * 0.912 \frac{[EUR(2010)]}{[EUR(2016)]} = GDP_{DE}\ [EUR(2010)]$$

Another examples is to convert fuel prices from EUR(2016)/GJ to EUR(2010)/GJ for the EU-27. The conversion factor i used is CF=0.938, this CF is based on an EU-27 average):

$$Fuel\ Price\ \frac{[EUR(2016)]}{[GJ]} * 0.938 \frac{[EUR(2010)]}{[EUR(2016)]} = Fuel\ Price\ \frac{[EUR(2010)]}{[GJ]}$$

[3] https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en

[4] Conversion factors follow from the price index by dividing the value for the target year (2010 in the example above) with the value for the source year (2016 in the example above).

When both currency, base year, and energy unit are different (such as in the example of USD(2015)/boe above) a series of unit conversions is required to convert the unit into default units which may trigger additional findings and questions in the QA/QC procedure.

Summarizing, unit conversion can be done the following steps:

- Step 1: Find proper conversion factors that relate source unit to target unit, being especially aware of base year and currency in monetary units.
- Step 2: Set up the conversion equation such that units on left and right hand side are equal and all "unwanted" units cancel out in the nominator and denominator.
- Step 3: Convert parameter in source unit to target unit multiplying the parameter value with all conversion factors.

Harmonised values for energy and carbon prices: Under the Gov. Reg. Member States shall take into account the energy and carbon price values provided by the Commission. These recommendations are provided in the default monetary units and are shared with MS 12 months before the deadline for submission of the reports. The recommended parameters include **oil, gas, and coal import prices as well as for carbon prices** (See IR Article 38 (3)[5]) The recommended parameters are available here: https://www.eionet.europa.eu/reportnet/docs/govreg/.

Parameters shall be reported (if used) for mandatory years as well as the reference (= base) year (column *G*) and reference year value (column *H*). Column *G* asks for reporting on the reference year of the projection. Provide in this column the historical year, which serves as a reference year to the parameter used (this is often the same as the reference year for the projections, but may differ). Reporting is mandatory for all years that are not labelled 'optional'. It is recommended to also report on any year in between mandatory years.

Parameter / variable part of projections (Yes/No) (Column F): This column indicates if a parameter / variable is part of the projection. Choose *Yes* if the parameter / variable is part of the projection. In this case, report on the parameter in the respective fields. It is also possible to report notation keys for parameters (e.g. C, IE, NA, NO, NE – see list above). Choose *No* if the parameter / variable is neither used as input, nor is it output of the projections.

Other parameter and variables not specified in the template can be added in the empty rows at the bottom of the sheet as needed from line 220 onwards.

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R1208&from=EN page 15/132

Data source: In these cells further information explaining the parameter has to be provided. Describe the data source as detailed as possible – e.g. Author (year): Title. URL.

Sectoral projections for which the parameter is used (Yes/No) => Use these fields to select sectors for which the parameters / variables were used / are outputs. Choose "Yes" or "No" according to whether this parameter / variable was part of the projection for the given sector.

Links with other tables:

Although Table 3 looks similar to Table 7 and Table 2, it is important to note that they serve different purposes. **Table 7** is linked to **key parameters** that were **varied in the sensitivity analysis. Table 2** on the other hand is **linked to the policies and measures**, and how their impact is projected to progress over the years per scenario.

Checklist for table 3:

1) Only report those parameters that are used as input to the modelling of scenarios or are outputs of the modelling exercise.
2) Units are reported according to the default units as indicated in the reporting template. If this is not possible, indicate the applied unit in the column *Additional unit information;*
3) Ensure that the reference year and reference year value for the parameters is reported.
4) In case output parameters are reported, indicate which these are in the report that is submitted alongside the reporting templates.
5) For parameters not used, use a notation key.

4.5. Table 4 - Model Factsheet

Article 18 (4) of the Governance Regulation of the Energy Union and Climate Action (EU) 2018/1999 stipulates that "Member States shall make available to the public, in electronic form, their national projections pursuant to paragraph 1 and any relevant assessment of the costs and effects of national policies and measures on the implementation of Union policies relevant for limiting greenhouse gas emissions along with any relevant underpinning technical reports. **Those projections and assessments should include descriptions of the models and methodological approaches used**, definitions and underlying assumptions".

Consequently, Article 38(2)(d) of the Implementing Regulation 2020/1208 stipulates that the following shall be provided: "the methodologies used for the projections, **including a brief description of the models used and their sectoral, geographical and temporal coverage, references to further information on the models and information on data sources**, key exogenous assumptions and on the parameters used; pursuant to point (e) of Annex VII of Regulation (EU) 2018/1999".

Annex XXV provides a template for this information through "Table 4: Model Factsheet".

What is different compared to the MMR:

It is very similar to reporting table 4, Annex XXII, of 749/2012. The only addition is the comment field in the table of newer implementing regulation 2020/1208. This allows MS to add other relevant information that was not covered in the predefined fields.

Figure 8 Screenshot of model factsheet

Model 1	
Model name (abbreviation)	
Full model name	
Model version and status	
Latest date of revision	
URL to model description	
Model type	
Summary	
Intended field of application	
Description of main input data categories and data sources	
Validation and evaluation	
Output quantities	
GHG covered	
Sectoral coverage	
Geographical coverage	
Temporal coverage (e.g. time steps, time span)	
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output	
Input from other models	
References to the assessment and the technical reports that underpin the projections and the models used	
Model structure (if diagram please attach to your submission in Reportnet)	
Comments or other relevant information	

Guidance for filling out the template/reporting table:

- Complete the table for each individual model which has been used for the GHG projections.
- Model name: Report here the most commonly used name of the model. This can be an abbreviation.
- Full model name: Report here the complete and full name of the model.
- Model version and status: Where applicable, provide the version of the model that was used to make the projections.
- Latest date of revision: Provide here the latest date of changes to the model structure and to the input data.
- URL to model description: Where available include a link to technical documentation describing the model.
- Model type: A distinction could be made between bottom-up, top-down, econometric and other models.
- Summary: Provide a short summary description of the model. Example:

  Projection of the production of electricity and district heating has been calculated using the Ramses-model based on the demand for electricity and district heating as calculated in the projection of the consumer sectors. In the projection, the production of electricity and heating is broken down into existing and possibly new production facilities based on the facilities' technical specifications, price of fuel and CO2

emissions trading prices. The model also determines electricity prices on the market and the scope of electricity exchange with neighboring countries and takes account of the limits to the trading capacity. The production of electricity has been liberalised and therefore there is no close link to national demand, rather, it is based on the characteristics of the individual facility and the market prices. Industrial and local mini combined heat and power production are not projected in the Ramses model, therefore a separate (bottom-up) projection of this production has been prepared.

- Intended field of application: Report what the original application of the model is.
- Description of main input data categories and data sources: Describe here the main input data categories and data sources that are used in the model.
- Validation and evaluation: Describe here the validation and evaluation processes that are applied to quality check the model outputs.
- Output quantities: Describe the main output of the model. This could be related to energy, emissions, or other activity data.
- GHG coverage: Differentiate between CO2, N2O, CH4, and F-gases. Also specify if a distinction is made between emissions under ETS, ESR and/or LULUCF.
- Sectoral coverage: Include sectors covered by the model. Use the same sectoral split as in Table 1. Also report the level of detail of the sectoral coverage (i.e. which subsectors are covered).
- Geographical coverage: Make distinction between scope of the model and the geographical area the model covers, usually this will be national emissions. Also report the geographical detail of the model, e.g. if differentiation is made in regional/local level.
- Temporal coverage: Make distinction between temporal coverage (time period that model covers) and temporal resolution (time intervals between two consecutive data points). For example, the model covers the period 2025-2050, in 5-year intervals.
- Other models which interact with this model: Include here all other models that have an effect on the results and outcome of the model described.
- Input from other models: If applicable, report here all models where results are directly used as input data for the model described.
- References: Include a reference to technical documents that support the projections and to descriptions of the model.
- Model structure: Provide a textual or schematic representation of the model structure.
- Comments: In case MS would like to add other relevant information that was not covered in the predefined fields, they can use this column.

Checklist for table 4:

Provide information about the methodologies used for the projections. At a minimum:

1) Brief description of the models used;
2) Their sectoral, geographical and temporal coverage;
3) References to further information on the models.

4.6. Table 5a - Projections of reported emissions and removals from the LULUCF sector by gases and accounting categories

The Gov. Reg. requires MS to report on accounted LULUCF projections in line with the LULUCF Regulation (2018/841). For this reason, it is necessary that MS report also LULUCF projections for sub-categories (i.e. remaining land and land use changes between sub-categories). To fulfill this reporting obligation, the Implementing Regulation provided two different tables for MS to report on the LULUCF sector (1b and 5a), of which at least one is mandatory.

In Table 5a, MS have to report on detailed LULUCF projections, per land accounting sub-category, gases and scenarios. It should be noted that this table does not include "unaccounted categories", this information can be only filled out in Table 1b. If table 5a is selected for the LULUCF reporting, Part 3 in Table 1b is filled out automatically, except for the unaccounted categories that must be filled manually. In addition, the Part 2 table has to be filled out manually, because these summary tables are mandatory regardless of which LULUCF table (1b or 5a) was selected for the reporting.

What is different compared to the MMR:

- This table is completely new and includes all LULUCF categories by gases and scenario in the logic of the land accounting categories following the LULUCF Regulation
- A more refined disaggregation of categories has to be reported, including land use change categories between main categories and remaining land.
- This table has to be reported if table 1b is not been fully reported.
- If this table is chosen to be filled out instead of table 1b, additional information for the unaccounted categories has to be provided by the Member State in table 1b Part 2, whereas the Part 3 table is filled automatically with the information provided in table 5a.

Guidance for filling out the template:

- In cell C18 choose the base year of the scenario from the dropdown menu.
- Color coding of the table: The color coding is explained in Table 3 and under the instructions in the spreadsheet. Greyed out cells indicate sector and gas combinations where no emissions are expected. MS can leave these cells blank. Yellow cells highlight mandatory years and have to be filled out. White cells can be filled out on a voluntary basis. Green cells include equations that facilitate the reporting by automatically calculating the sum of the sub-categories or show warnings for mandatory years if data is incomplete. These equations can be overwritten by the MS, if needed. If only notation keys are reported in the subcategories, the green cells will show "NK" and can be overwritten by the MS to include the correct notation keys manually.
- Insert the following data:
    a. Years: The time series has to cover the projections base year, 2020, 2025, 2030, 2035, 2040, 2045 and 2050. The cells for mandatory years are highlighted in yellow. All other years are mandatory. Note that the ETC/CME will automatically gap-fill the intermediate years by applying linear interpolation. The time series should be consistent with the other sectors reported in table 1a. However, for LULUCF in

addition it is possible to report the years t-10. For this reason, it is possible to provide the time series already from 2015 onwards.
Important note: Do not report historical values when no projections are available for a certain category or gas! It is recommended to either fill out the whole time series with a notation key or leave it blank.

b. Gases: In table 5a for the LULUCF sector the gases CO2, CH4, N2O as well as the Total GHGs have to be reported. Important note: CH4 and N2O have to be reported in kilotonnes per gas (and not in CO2 equivalents).
c. Sectors: Projected emissions and removals from land use changes between main categories and remaining land have to be reported for all land accounting categories in this table. This also should include emissions from CH4 and N2O (direct and indirect) in the respective category. Projections on harvested wood products have to be split into HWP from managed forest land, from afforested land, from deforested land and from other land, if applicable. Note that according to Annex V of the LULUCF Regulation it is allowed to jointly report HWP from managed and afforested land under HWP from managed land if it is not possible to differentiate between the two. It is important that in this table information for the unaccounted categories cannot be reported.
d. Scenarios: It is possible to provide projections for the WEM, WAM and WOM scenario. The WEM scenario is mandatory.

It should be noted that MS should report in table 5a for the category Managed Forest Land their WEM/WAM/WOM scenario and not the Forest Reference Level.
It is recommended to report the indirect N2O emissions from mineral soils (CRF category 4(IV)) split per sub-category (e.g. for Forest Land converted to Cropland, etc.) in this table, as there is no option to report these emissions for the sectoral Total LULUCF.

Links to other tables:

Table 5a feeds into Table 1b Part 3 (rows 174-229):

- Note that the tables 1b Part 2 and Part 3 are filled out automatically if the main table 1b Part 1 is filled out completely. If Part 1 is empty, Part 3 feeds from table 5a.
- The data from table 1b Part 2 feeds into table 1a.
- If a MS chooses to fill only table 5a, the table 1b Part 2 has to be filled out manually. In addition, the MS has to provide the sum of unaccounted categories in rows 211, 220 and 229.

Checklist for table 5a:

1) Insert base year of the projections in cell C18
2) Insert data for all mandatory years (base year and projected years until 2050) for the WEM scenario and all gases (CO2, CH4, N2O and Total GHGs)
3) Insert data for all categories. If projections are not available, use the appropriate notation key
4) Insert data for the intermediate years and the WAM scenario, if available.
5) Ensure that CH4, N2O is provided in kt CO2eq and not in kt per gas (use GWP from AR5)

Double checks in table 1b:

6) Ensure that data is inserted for Part 2 in rows 174 to 201 (mandatory for WEM).
7) When Part 2 is completed, go to table 1a and ensure that rows 65 to 73 for WEM (and row 134 to 142 for WAM if reported) are completed with information from Part 2.
   a) Check that all main sectors and gases are provided for LULUCF in table 1a.
   b) Double check the units in table 1a (CH4 and N2O have to be reported in kt in tables 1a, but in table 1b CH4 and N2O are reported in CO2eq)
8) Ensure that data is included for Part 3 in rows 202 to 229 for the land accounting categories (mandatory for WEM). Ensure that data is also included for the "unaccounted" categories.

Integrated QC checks in the template:

Two sheets are provided within the reporting template which include QC checks for Table 5a. These sheets are linked to the data entered in Table 5a and can be used to check for potential errors before submitting the file through Reportnet. All QC sheets contain an overview of the check and a summary of the check results at the top of the sheet.

Potential errors are highlighted in pink

An overview of the QC checks for Table 5a is provided below.

T5a_QAQC(1): Sum check

This check compares the aggregate GHGs in CO2e (CO2, N2O, CH4) with the gas "Total GHGs" for all sectors in Table 5a the WEM scenario.

T5a_QAQC(4): Completeness check

Does Table 5a contain any zero of blank values? This check contains a duplicate of Table 5a, with all cells filled with a formula to check whether a value (numerical or notation key) has been provided. Where cells are either blank or contain a 0 value an error is flagged. Where no emission/removal estimates can be provided, notation keys should be used.

4.7. Table 5b - Projections of accounted emissions and removals from the LULUCF sector in accordance with Regulation (EU) 2018/841 and the Effort Sharing sector in accordance with Regulation (EU) 2018/842

This table summarises projected information relevant for the accounting under the Effort Sharing Regulation (EU) 2018/842 and the LULUCF Regulation (EU) 2018/841.

What is different compared to the MMR:

This is a completely new table. The total cumulative emissions/removals for each accounting period (2021-2025 and 2026-2030) have to be provided for the Total ESR sectors, and for the land accounting categories (Managed Forest Land, Afforested Land, Deforested Land, Managed Cropland, Managed Grassland and Managed Wetlands). This information can be provided for all scenarios, for WEM this information is mandatory.

Figure 9 Screenshot of table 5b

Category	Scenario (WEM, WAM, WOM)	Total cumulative emissions/removals (kt CO2-eq)	
		2021-2025	2026-2030
Effort Sharing Sectors [3]	WEM		
LULUCF: Afforested land	WEM		
LULUCF: Deforested land	WEM		
LULUCF: Managed cropland	WEM		
LULUCF: Managed grassland	WEM		
LULUCF: Managed forest land, including harvested wood products [4]	WEM		
LULUCF Managed forest land, including harvested wood products assuming instantaneous oxidation	WEM		
LULUCF: Managed wetland [5]	WEM		

Guidance for filling out the template:

- In row 19 insert the cumulative emission for the Total ESR for each accounting period. This is done by summing up the Total ESR projected values separately for the years 2021 to 2025 and 2026 to2030.
- For LULUCF (rows 20-26), the cumulative accounted emissions/removals have to be calculated for each accounting period. In the following example the calculation is shown for Managed Forest Land (with dummy data)
    - Step 1: calculate the sum of the accounting category for the period 2021-2025

Year	Projected net result of accounting category, e.g. Managed Forest Land as reported in Table 1b Part 3 (in kt CO2eq)
2021	-1000
2022	-1500
2023	-1800
2024	-1100
2025	-1300
Sum	**-6700**

- Step 2: prepare the reference level or base period data against which the result is accounted:
  Assuming that the annual Forest Reference Level (FRL) amounts to -1000000 t per year[6] for the period 2021-2025, this amount has to be converted to kt (division by 1000):
  - Annual FRL: -1000000 t CO2eq / 1000 = -1000 kt CO2eq

  Then multiply this by 5 to obtain the FRL for the whole period:

  - FRL for period 2021-2025: -1000*5 = -5000 kt CO2eq

- Step 3: Subtract the projected net result of the period from the FRL for the period
  - Cumulative emissions/removals for the accounting period:
    -6700 – (-5000) = **- 1700 kt CO2eq**
    This value has to be inserted in the table 5b for Managed Forest for the period 2021-2025

- To calculate the cumulative results for Managed Cropland and Managed Grassland for the accounting periods for these land accounting categories, the following steps need to be followed:
  - Step 1: calculate the base period for the land accounting categories by calculating the average emissions/removals for the period 2005 to 2009 and multiply the average by 5.

[6] This is the unit in which the FRL is provided in line with Section C, Annex IV of the LULUCF Regulation 2018/841

CRF/inventory category	Land accounting category	Emissions/removals kt CO2 eq				
		2005	2006	2007	2008	2009
Cropland remaining cropland	Managed Cropland	5	4	4	2	4
Grassland converted to cropland	Managed Cropland	1	2	1	1	2
Wetlands converted to cropland	Managed Cropland	-1	-1	-2	-3	-1
Settlements converted to cropland	Managed Cropland	NO	NO	NO	NO	NO
Other land converted to cropland	Managed Cropland	NO	NO	NO	NO	NO
Cropland converted to wetland	Managed Cropland	-2	-1	-2	-1	-2
Cropland converted to settlements	Managed Cropland	10	5	8	7	9
Cropland to other land	Managed Cropland	NO	NO	NO	NO	NO
Sum Managed Cropland		**13**	**9**	**9**	**6**	**12**
Average (2005-2009)						**9.8**
Average (2005-2009) multiplied by 5						**49**

- Step 2: calculate the sum of projected emissions/removals for Managed Cropland/Managed Grassland for both periods 2021-2025 and 2026-2030.

Year	Projected net result of accounting category, e.g. Managed Cropland as reported in Table 1b Part 3 (in kt CO2eq)
2021	7
2022	8
2023	9
2024	10
2025	8
Sum	**42**

Year	Projected net result of accounting category, e.g. Managed Cropland as reported in Table 1b Part 3 (in kt CO2eq)
2026	9
2027	8
2028	7
2029	6
2030	5
Sum	**35**

- Step 3: Calculate the cumulative accounted emissions/removals: Result from step 2 minus result from step 1

Cumulative emissions/removals Managed Cropland 2021-2025: 42 - 49 = **-7 kt CO2 eq**

Cumulative emissions/removals Managed Cropland 2026-2030: 35 – 49 = **-14 kt CO2eq**

- Managed Wetlands: As the accounting for this category is only mandatory from 2026 onwards, MS that do not intend to select this category for accounting in the 2021-2025 period shall use according to footnote 5 of Regulation (EU) 2020/1208 the notation key "not selected' for that period. Note that for the period 2026-2030 projected values have to be reported. The methodology to calculate the cumulative emissions/removals for 2026-2030 is the same as for Managed Cropland/Managed Grassland as described above.
- Managed Forest Land: It should be noted that the calculation of the accounted amount for the period 2026 – 2030 is only possible once the final FRL is adopted by the Delegated Act for this accounting period. Until the FRL for 2026-2030 is adopted in a Delegated Act, the reporting for 2026-2030 is not mandatory and it is recommended to fill the field with a notation key (e.g. NA) (see also footnote 2 and 4 in the table).

Checklist for table 5b:

1) Ensure that ESR emissions are provided for both reporting periods 2021-2025 and 2026-2030 for all scenarios in kt CO2eq.
2) Ensure that accounted LULUCF emissions/removals are provided for the period 2021-2025, and where applicable for 2026-2030.
3) If a WAM scenario is available, also provide the numbers for this scenario.

4.8. Table 6 - Results of the sensitivity analysis

In table 6 the results of the sensitivity analysis have to be reported in tabular format and in a more systematic and structured way than under the MMR, under which this information had to be reported in a free format chosen by the MS. Table 7 is related to this information and is including the parameters varied under the sensitivity analysis. Further details on Table 7 are provided in Chapter 4.9.

What is different compared to the MMR:

The Governance Regulation introduces a completely new reporting table for this reporting obligation. Table 6 includes:

- The time series provided for the sensitivity scenario is in a consistent manner with the projections table. The results for the sensitivity analysis should be provided for those years for which information is available. The Excel table can be extended or folded by clicking on the pluses or minuses.
- Several predefined rows for the sectors for each scenario have been provided: Total excluding LULUCF, Total ETS stationary, Total ESR, LULUCF (as reported in the GHG inventory).
- The scenario names have been pre-defined in the template

Guidance for filling out the template:

- Point (d) of Annex VII "Projections information in the area of GHG emissions" to Regulation 2018/1999, states that "**results of the sensitivity analysis performed for the projections and information on the models and parameters used**" are to be included in the reports referred to in article 18.
  Consequently, article 38(2)(b) of the Implementing Regulation 2020/1208 stipulates that the **results of the sensitivity analyses performed pursuant to point (d) of Annex VII of Regulation (EU) 2018/1999 shall be provided**;
- **for the total reported greenhouse gas emissions**, together with a brief explanation of which parameters were varied and how;
- **split on total emissions covered by Directive 2003/87/EC and by Regulation (EU) 2018/842** respectively and the projected emissions by sources and removals by sinks from the **LULUCF sector**, where such information is available.

Figure 10 Screenshot of reporting table for the sensitivity analysis

Submission year	2021						
Member State	Select country						
Category	GHG emissions/removals (kt CO2 -eq)						
	Select base year	2020	2025	2030	2035	2040	2050 (optional)
Sensitivity Scenario 1							
Total excluding LULUCF							
Total ETS stationary							
Total Effort Sharing							
LULUCF (reported)							
Use rows below for other relevant sectors/categories (if available)							

- The table already consists of several prefilled scenarios (scenario 1, scenario 2, etc). If a MS has 3 scenarios, the information related to these scenarios should be filled out for the rows for scenario 1, scenario 2, scenario 3 in the reporting template. The template for table 6 already includes the four main categories (namely, Total excluding LULUCF, total ETS stationary, Total Effort Sharing and LULUCF (reported)), which refer to the predefined categories according to the Gov. Reg. Additional relevant sectors/categories can be added in separate rows if necessary. Do not insert or delete rows or columns. Add new indicators using the blank rows at the end of the table.
- Select the base year of the sensitivity analysis in cell G14 using the dropdown.
- Fill out the values for the categories Total excluding LULUCF, total ETS stationary, Total Effort Sharing and LULUCF (reported) for the base year and the mandatory years (2020, 2025, 2030, 2035, 2040, 2045, 2050). If possible, also indicate values for the optional years. It is recommended to report on any year in between mandatory reporting years to facilitate better QA/QC and aggregation to EU-wide projections.
- Describe also in the technical report the results of sensitivity analysis with information of models and parameters used in textual format. Specify in the technical report also for each scenario of Table 6 whether this is a sensitivity analysis on the WEM or WAM scenario.

Links with other tables: The information in this table is related to Table 7 that focuses on the key parameters that were varied in the sensitivity analysis.

Checklist for table 6:

1) Ensure that the reference year is filled out
2) Ensure that values are provided for each mandatory reporting year

4.9. Table 7 - Key parameters that were varied in the sensitivity analysis

Under the MMR, the sensitivity analysis and the varied parameters were reported in free format. With the Gov. Reg. there is now also a new table provided to report on the key parameters that were varied for the sensitivity analysis scenarios as reported in Table 6.

What is different compared to the MMR:

- Table 7 is a completely new table, which includes:
- A column 'Additional unit information' has been provided. In case MS choose to use a different unit from the default one, this can be reported in this column.
- A column 'Parameter/variable part of projections (Yes / No).
- Columns with the reporting years are included, that can be extended or folded.
- A column for 2050 values has been included (optional).
- A column 'Parameter' has been provided.
- A column 'Sens_scenario' has been added where the number of the sensitivity scenario can be indicated, in case more than 1 have been performed.

Guidance for filling out the template:

Point (d) of Annex VII "Projections information in the area of GHG emissions" to Regulation 2018/1999, states that "results of the sensitivity analysis performed for the projections and information on the models and **parameters used**" are to be included in the reports referred to in article 18.

- Consequently, article 38(2)(b) of the Implementing Regulation 2020/1208 stipulates that the results of the sensitivity analyses performed pursuant to point (d) of Annex VII of Regulation (EU) 2018/1999 shall be provided;
- for the total reported greenhouse gas emissions, **together with a brief explanation of which parameters were varied and how**;

Figure 11 Screenshot of table 7 to report on key parameters used in the sensitivity analysis

Parameter values in sensitivity scenario		Default unit	Additional unit information	Parameter / variable part of projections (Yes/No)	Base / Reference year (year)	Values							Comment for guidance	Parameter	Sens_Scenario
						Base / Reference year (value)	2020	2025	2030	2035	2040	2050 (optional)			
Sensitivity Scenario 1															
Population		Count												Population |	1
Gross domestic product (GDP)	Real growth rate	%											EUR (2016)[1]	Gross domestic product (GDP) | Real growth r	1
	Constant prices	EUR million (2016)											EUR 2016)	Gross domestic product (GDP) | Constant pric	1
Gross value added (GVA)- total	Constant prices	EUR million (2016)											EUR 2016)	Gross value added (GVA)- total | Constant pri	1
Gross value added (GVA) - agriculture	Constant prices	EUR million (2016)											EUR 2016)	Gross value added (GVA) - agriculture | Const	1
Gross value added (GVA)- construction	Constant prices	EUR million (2016)											EUR 2016)	Gross value added (GVA)- construction | Cons	1
Gross value added (GVA) - services	Constant prices	EUR million (2016)											EUR 2016)	Gross value added (GVA) - services | Constant	1
Gross value added (GVA) – energy sector	Constant prices	EUR million (2016)											EUR 2016)	Gross value added (GVA) – energy sector | Co	1
Gross value added (GVA) – industry	Constant prices	EUR million (2016)											EUR 2016)	Gross value added (GVA) – industry | Constan	1
Number of passenger- kilometres [all modes]		million pkm												Number of passenger- kilometres [all modes	1
Freight transport tonnes - kilometres [all modes]		million tkm												Freight transport tonnes - kilometres [all mo	1
International (wholesale) fuel import prices -	Coal	either EUR(2016) /GJ											EUR 2016)	International (wholesale) fuel import prices	1
		or EUR(2016)/toe											EUR 2016)	International (wholesale) fuel import prices	1
	Crude Oil	either EUR(2016)/GJ											EUR 2016)	International (wholesale) fuel import prices	1
		or EUR (2016)/toe											EUR 2016)	International (wholesale) fuel import prices	1
	Natural gas	either EUR(2016)/GJ											EUR 2016)	International (wholesale) fuel import prices	1
		or EUR(2016)/toe											EUR 2016)	International (wholesale) fuel import prices	1
EU ETS carbon price		EUR (2016)/ EUA											EUR 2016)	EU ETS carbon price |	1
Number of heating degree days (HDD)		Count												Number of heating degree days (HDD) |	1
Number of cooling degree days (CDD)		Count												Number of cooling degree days (CDD) |	1
Use rows below for each additional parameters modified														Use rows below for each additional paramet	1
														|	1
														|	1

- The template for table 7 already includes 14 predefined parameters which can be used for the reporting, if applicable. Additional relevant parameters can be inserted in separate rows if necessary. Do not insert additional rows or columns. Add new parameters using the blank rows at the end of the table.
- Default Unit: The reporting template indicates, for each parameter, a default unit. Should MS choose to report parameters in another unit than the default unit, it is important to indicate the unit used in column 'Additional unit information'. If the indicator is a share or is dimensionless, write "%" or "dimensionless".
- Parameter varied: This is an additional column in which it should be confirmed that this parameter has been changed in the sensitivity analysis compared to the parameters used for the WEM projections. Indicate "yes" if the parameter was changed or "no" if the parameter was not changed. Note that the caption in the Implementing Regulation states that "Only those parameters are to be filled in that were varied in a specific scenario.", but in case other (unchanged) parameters are also reported on a voluntary basis in this table, it is important to highlight this in in this column.
- Fill out the base year, i.e. the reference year or the historical year, which serves as a reference year to the greenhouse gas emission projection.
- Fill out the values for the parameters for the mandatory years (2020, 2025, 2030, 2035, 2040, 2045, 2050). In case possible, also indicate values for the optional years.
- Comments: In this column MS can provide additional information on the parameter, if applicable.

Links with other tables: Table 6 comprises the sensitivity scenarios in which the parameters from table 7 have been varied. Although Table 7 looks similar to Table 3 and Table 2, it is important to note that they serve different purposes. Table 3 is linked to Reporting on parameters / variables which have been used in the projections. Table 2 is linked to the policies and measures, and how their impact is projected to progress over the years per scenario.

Checklist for table 7:

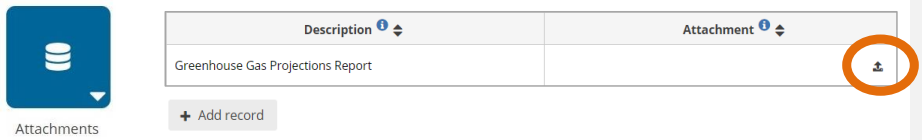
- Ensure that the values been reported in the default unit. If not, ensure that the alternative unit is indicated in the column 'additional unit information'.
- indicate whether the parameter has varied in column E
- Ensure that the reference year been filled out (year and value provided)
- Ensure that values been provided for each mandatory year
-

4.10. Technical report

4.10.1. Requirements and guidance for the report

In relation to Article 18 (1) (b), Annex VII of the Governance Regulation of the Energy Union and Climate Action (EU) 2018/1999 and its Implementing Regulation 2020/1208 Article 38 and Annex XXV, there are several reporting elements that cannot be reported in the tables as outlined in Annex XXV of the Implementing Regulation and should therefore be provided in textual format. The Regulations allow for MS to provide the report in their national language. However, to increase transparency it is recommended to provide a summary in English, covering the mandatory elements described below.

The report must be **uploaded** in the Reportnet 3.0 section called *Attachments.* Once there, click on the upload symbol to the right and select your file. You can also provide additional documents or files by clicking on *Add Record*.



Mandatory elements of the Implementing Regulation Art 38 (2):

- **Projection results for total and sectoral GHG emissions** for WEM/WAM/WOM scenarios used. This could include a description of major trends and to highlight drivers of this trends in textual format in each sector and scenario.
- **Results of sensitivity analysis** with information of models and parameters used in textual format. It is good practice to include a textual description of the sensitivity scenarios chosen and the main assumptions made compared to the WEM/WAM scenario and additional information to the information provided in Table 6 and 7. Specify in the technical report for each scenario (Table 6) whether this is a sensitivity analysis of the WEM or WAM scenario.
- **Year of the inventory data** (base year) and the year of the inventory report used as a starting point for projections. Note that this information can be also reported in Table 1a.
- **The methodologies used for the projections**, including a brief description of the models used and their sectoral, geographical and temporal coverage, references to further information on the models and information on data sources, key exogenous assumptions and on the parameters used. The textual information should go beyond the information that is already provided in the reporting tables.

- It is good practice to provide background information e.g. on how the sectoral models are linked and how it is ensured that the projections are consistent across the sectors.
- It is good practice to provide information on any updates in the modelling approach compared to the previous reporting.
- It is good practice that Member States explain and clearly lay out any changes to key parameters, such as GDP, population, vehicle statistics etc. By providing specific information on how key parameters may have changed between reporting years and the provision of reasons why the parameters have changed, this increases the transparency and understanding for why projections might have changed. If a change is due to the impact of a PaM (e.g. change in vehicle statistics due to new vehicle tax) it is important to highlight this in the specific sector in the report.

Other mandatory reporting elements to be provided as textual information in the report following the Governance Regulation:

- **Art 18 (1) (b)** "[…]National projections shall take into consideration any policies and measures adopted at Union level and shall include the information set out in Annex VII."

- **Art 18 (3):** "A Member State shall communicate to the Commission any substantial changes to the information reported pursuant to paragraph 1 during the first year of the reporting period, by 15 March of the year following the previous report."
  - It is good practice that Member States provide specific reasons for **changes in reported projections between submissions**. In order to understand whether changes in projections can be explained by changes in reported PaMs, it is important to know if there are other factors which might affect reported projections, such as a recalculation in the historical inventory. Many Member States already include this information in their technical report by a dedicated section and is therefore good practice.

- **Art 18 (4):** "[…]Those projections and assessments should include descriptions of the models and methodological approaches used, definitions and underlying assumptions. This the same point as mentioned in Art 38 (2) of the Implementing Regulation.

- **Annex VII (b):** "Total GHG projections and separate estimates for the projected GHG emissions for the emission sources covered by Directive 2003/87/EC and by Regulation (EU) 2018/842 and the projected emissions by sources and removals by sinks under the Regulation (EU) 2018/841". This corresponds to the ETS/ESR split and LULUCF projections.

- **Annex VII (c):** "The impact of policies and measures identified pursuant to point (a) of Article 18(1). Where such policies and measures are not included, this shall be clearly stated and explained". This point requires to ensure consistency between the reporting under Art 18 (1) and (2), between PaMs and projections. It is recommended to provide a list of PaMs in the report and highlight which PaMs were considered in the projections and if PaMs were excluded, explain the reasons.

- **Annex VII (d)** "Results of the sensitivity analysis performed for the projections and information on the models and parameters used". This point is also included under the Art 38 (2) of the Implementing Regulation.

- **Annex VII (e)** "All relevant references to the assessment and the technical reports that underpin the projections referred to in Article 18(4)". References should be included in the report for all descriptions of models, methodological approaches, definitions and underlying assumptions

A well-structured report substantially enhances the transparency and helps to support the QA/QC procedure. If trends, outliers, interlinkages with PaMs are well described and easy to find, this can substantially reduce the number of findings. Here are suggestions on how to **structure the technical report** to cover all required information.

GHG PROJECTIONS

1. ENERGY
    a. Overview of the Energy sector
    b. Methodologies and key assumptions/trends
        i. Scenario "with existing measures" (WEM)
        ii. Scenario "with additional measures" (WAM)
        iii. Scenario "without measures" (WOM)
    c. Projections of GHG Emissions
        i. Scenario "with existing measures" (WEM)
        ii. Scenario "with additional measures" (WAM)
        iii. Scenario "without measures" (WOM)
    d. Sensitivity analysis
    e. Difference between previously and currently reported projections

2. IPPU
    a. Overview of the IPPU sector
    b. Methodologies and key assumptions/trends
    (…)
    c. Projections of GHG Emissions
    (…)
    d. Sensitivity analysis
    e. Difference between previously and currently reported projections

(…)

OR

GHG PROJECTIONS

- GENERAL APPROACH
  - General Methodology
  - Key Assumptions/Trends
  - Sensitivity Analysis
  - Uncertainty in projections
- SECTORAL SCENARIO RESULTS
  - Energy (WEM/WAM/WOM)
    - (subsector results)
  - IPPU
    - (subsectors)

  (…)
- SECTORAL METHODOLOGY
  - Energy
    - (subsectors)
  - IPPU
    - (subsectors)

  (…)
- CHANGES WITH RESPECT TO PREVIOUS SUBMISSION
  - Energy
    - (subsectors)
  - IPPU
    - (subsectors)

  (…)

4.10.2. Reporting on interlinkages between PaMs and projections

As reporting on PaMs and Projections should be integrated under the Governance Regulation of the Energy Union and Climate Action (EU) 2018/1999, in the following section recommendations which are broadly categorised into four main themes, together with some tips are provided. If such recommendations are followed within both PaMs and Projections reporting, it will increase transparency and aid reviewers to effectively assess whether reported PaMs are interlinked with reported projections; a requirement which is defined under the Gov. Reg., Annex VI (c).

Recommendation 1: Provide information on key parameter changes between submissions

To make recalculation decisions and emission changes between submissions more transparent, it is recommended that Member States explain and clearly lay out any changes to key parameters, such as GDP, population, vehicle statistics etc. By providing reviewers with specific information on how and why key parameters may have changed between reporting years, this increases the transparency and understanding for differences in projections. If a change is due to the impact of a PaM (e.g. change in vehicle statistics due to new vehicle tax) it is important to highlight this in the report. This information could be provided in several ways, including:

- In a table format with a direct comparison of sector parameters and their new projections compared to previous submissions estimates. An example of this type of table can be found in Annex 1, table 2.
- In text explanations describing major changes in e.g. economic trends and how these changes impact at the parameter level.
- Highlighting specific instances where a change in a key parameter, either how it is modelled or some key assumptions, results in a change in the projected emissions. This can transparently highlight that the projections are linked more to changes in key parameters, rather than reported PaMs.

Recommendation 2: Provide information on how the reporting of PaMs has changed between submissions

It is recommended that Member States provide a dedicated section where they explain how the reporting of PaMs has changed since the last submission, and whether these changes are captured in the reported projected emission trends. This could be a change in the status (e.g. from WAM to WEM/ expiration of a WEM PaM), but it is also possible that a Government updates or extends a PaM (e.g. the funds for a support programme for electric vehicle are increased). It is important to transparently document this in the report and explain what has changed compared to previous submission and if available, whether the impact of the PaM has changed. In addition, it is recommended to provide a clear definition of the scenario(s) and highlight which PaMs are included in each scenario, as well as explaining any exclusion of PaMs from a scenario: e.g. in case it is not possible to include the PaM in the projection because the details of the PaM are not yet clearly defined by the policy makers; or if the scenario definition has been updated and WAM PaMs were moved to the WEM scenario. Additionally, if certain PaMs have now expired or are new to that reporting year, it is good to clearly highlight this in the text, rather than rely on reviewers to compare the different PaM submissions. This information could be provided in a number of ways, including:

- In a table which lists all current WEM and WAM PaMs including a note if the PaMs are new, have changed scenario or no longer included in the projections. Sometimes the PaM names, IDs or other information of the PaM can also change. This important information could also be included in this table. An example of such a table can be found in chapter 4.10.2, table 1.
- A paragraph specifically outlining what PaMs are new to this reporting year and how they have been included within the various projection scenarios.
- An outline of which PaMs have been included under which projection scenario, and clearly stating whether any previously reported PaMs have moved from one projection scenario to another (e.g. from WEM to WAM)

As a next step it is important to highlight the key PaMs, either in each sectoral chapter or in the introduction of the report. It is good practice to list the key PaMs and provide more details on how the PaMs are expected to contribute to emission reductions in the future. Ideally this is underpinned with data on the expected impact of the PaMs (other quantitative parameters are also welcome).

Recommendation 3: Provide specific reasons for changes in reported projections between submissions

It is recommended that Member States provide specific reasons for changes in reported projections between submissions. There are several reasons why Member States' projections change between submission years. The most common, not mutually exclusive, reasons are:

- Adjustments to make projections coherent with the emission inventory data (particularly if there have been recalculations in the historical inventory which has affected the baseline year for projections);
- Changes in GHG PaMs between submission years; and
- Changes to the methodology. This also includes changes to assumptions on the impacts of implemented PaMs.

Therefore, in order to understand whether changes in projections can be explained by changes in reported PaMs, it is important to know if there are other factors which might affect reported projections, such as a recalculation in the historical inventory. Many Member States already include this information in their technical report. There are transparent ways this information can be reported, including:

- A dedicated section or subsection in the report on recalculations, rather than including the information within the results or methodology sections. This could be a short section at the end of each sector chapter, highlighting the most important changes between projection submissions, and its reasons.
- A dedicated chapter on the most important reasons for the differences, which includes all of the sectors. This has been done in some Member States reporting to high success, with bullet points for each specific parameter, PaMs or model assumption which has changed between submission years.

If a Member State chooses to report on recalculations in a dedicated chapter, there is the risk that it is not complete, and important differences in projected emissions for some sectors might not be addressed. To ensure completeness, two elements are relevant to report on:

- The differences in projected emissions between the current and previous reporting cycle for different sectors. A table can be used to provide this information.
- The reasons for these recalculations should be explained. Emphasis should be given to those (sub-) sectors for which the differences are largest and have the biggest impact on total GHG emissions. It should be clear from these explanations if differences were caused by changes in methodology (e.g. new models used); assumptions (e.g. change in fuel prices); and/or PaMs (e.g. new implemented or planned PaMs). Where there have been important changes in assumptions these should be quantified.

Recommendation 4: Provide information and tables which combines both PaMs and Projections

It is recommended that Member States report in such a way which enables reviewers to assess how PaMs and projections and interlinked. This can be done in several ways, including:

- Providing a joint report for PaMs and projections. It is easier to link PaMs and projections if there documented under one combined report, and it means a reviewer does not have to consider two documents when trying to assess the interlinkages.
- A table could be used to report how each individual reported PaM impacts projections, as seen in table 3, Annex 1.

- A sub-heading in each sector chapter which describes clearly what PaMs have been reported in this submission year, and how they impact on the various projection scenarios.

The following **checklist** can be used by Member States when finalizing their technical reports, as a useful and practical guide. The aim of the checklist is to provide a conclusive list of specific actions which when carried out, will result in transparent reporting of the interlinkages between PaMs and Projections. The checklist also identifies the relevant article or implementing act that the check addresses, where appropriate. Example text and references to table templates are provided, where appropriate, in green.

Checklist for transparent reporting between GHG projections and PaMs to better quantify PaMs impact on emission reductions

The guidance tables referred to in green are found in Annex 1

Scope	Check	Check completed?
PaMs and Projections	Report one comprehensive PaMs and Projections technical report by making cross-references between the PaMs and the projections sections to highlight the interlinkages between them.	
	The report is publicly available. If the report is provided in the national language, it is good practice to provide a summary of the main results in English. This may include a summary of the results key messages and most important recalculations in PaMs and projections.	
	Provide information and clear references on which PaMs have been included in the projections scenarios (e.g. provide a list of PaMs for each scenario). Highlight the PaMs that were not included in the projection scenarios. • *This could be done by providing a list of relevant PaMs for each scenario (e.g. WEM, WAM) or presenting this information in table format. See Table 1 for an example of how to present this check. Where a certain PaM is not included in any projection scenarios as there is not enough information yet, then a list of PaMs not used could be provided.*	
	Provide details on how changes in an individual reported PaM has impacted sectoral emission projections. • *'In this year's reporting, PaM X has changed from planned to implemented, meaning its associated savings are included under the WEM projection scenario rather than WAM.'* • *'Ex-ante emission savings on PaM X were calculated to be less than previously reported, which has resulted in a reduction in emission savings in the WAM scenario'.* • *See Table 1 and Table 3*	
	Report on how the National Systems for reporting PaMs and Projections, and how both tasks are interlinked with one another. A description of the information processes should be provided, and how similar the processes are between both tasks.	
PaMs	Key PaMs are listed at the start of each sector chapter together with information on how they are expected to contribute to emission savings. • *See Table 1 for an example of how to present this check*	
	Provide information how the impacts of PaMs have been considered in the projection's scenarios and if possible, provide ex-ante impacts for the PaMs. Also include information on the methodology of this quantification or the reference to a document which provides this information.	

	• *This information would best be presented in table format, listing PaMs and providing ex-ante impact of the PaM if the data is available* • *Added text could be provided to provide information on the assumptions and methodologies used in order to include PaMs in projection scenarios*	
	Provide an overview of how reported PaMs have changed compared to previous submissions (including included/excluded in projections scenario, WEM or WAM scenario, planned/implemented/expired etc.). • *See Table 1 for an example of how to present this check*	
	Provide information where PaMs naming, grouping or descriptions have been modified since previous submission. • *See Table 1 for an example of how to present this check*	
	Ensure that reported PaM IDs and names are consistent within the report	
Projections	Provide an explanation on how key parameters have changed compared to previous submissions. • *Table 2 is useful for presenting this data numerically. Additional explanations would need to be provided to transparently communicate what there is a difference between submission years*	
	Provide an explanation on how model assumptions and methodologies have changed between previous submissions, broken down by sector where possible.	
	Provide information on whether they have been recalculations in the historical inventory which will have affected the baseline projection year and subsequent projection scenarios.	
	Explain any possible discrepancies in projections such as if WEM emissions are less than WAM, or if the WEM-WAM effect does not match the sum of the ex-ante quantification of the PaMs.	
	Ensure that reasons for recalculations in projections are provided, per sector where possible. • *Table 3 is relevant if the recalculation in projections can be explained by changes in reported PaMs* • *Table 2 is relevant if the recalculation in projections can be attributed to changes in parameter data*	

In addition, **several guidance tables** are provided in Annex 1 for Member States to use in their PaMs and Projections reporting. These tables have been identified as tools to increase transparency within reporting and aid reviewers in assessing the interlinkages between PaMs and projections. These templates will aid Member States to fulfil the checklist. These tables are solely a guide on how information can be effectively communicated, and as such are open to alterations and changes.

5. Guidance for calculating ETS and ESD/ESR projections

This chapter presents a guidance for reporting of the projections covered by the EU Emissions Trading System (ETS), the Effort Sharing Regulation(ESR) ([7]) to be reported under the Governance Regulation of the Energy Union and Climate Action (EU) 2018/1999.

Under Article 18(1)(b) and Annex VII (b) of the Gov. Reg. Member State shall report, every two years, total greenhouse gas (GHG) projections as well as separate estimates for emissions covered under the EU ETS and under ESR. The Effort Sharing Regulation (ESR) replaces the ESD (Decision No 406/2009/EC) from 2021 onwards. The Implementing Regulation (EU, 2020/1208) sets out the format for this reporting in Annex XXV, Table 1a.

This section proposes a step-wise approach for the estimation of projected emissions under the ETS and the ESR. To facilitate the reporting of the ETS/ESR emissions in table 1a of the reporting template, cells have been shaded which are not considered to be filled out by the Member States. However, it should be noted that these grey cells are not blocked and it is possible to enter data or notation keys, if required.

5.1. Determining a base year/reference year for projections

Member States should identify the reference year (=base year) used for their projections. This reference year is usually the latest year in the GHG inventory (T-2). The reference year is the starting point of the projections, consequently all tools which are used to calculate projections should be calibrated with the reference year in order to be in line with historical emissions ([8]). It is also necessary to ensure consistency with historical verified emissions under the EU ETS and to compare calculated emissions under Effort Sharing with legally fixed values.

[7] Emission sources covered by Directive 2003/87/EC and by Regulation (EU) 2018/842

[8] For more information about the reference year check see the 'Quality assurance and quality control procedure for national and Union GHG projections 2019' https://www.eionet.europa.eu/etcs/etc-cme/products/etc-cme-reports/quality-assurance-and-quality-control-procedure-for-national-and-union-ghg-projections-2019-used-for-submission-2019

Historical ETS emissions ([9]) for the reference year should be taken from the EUTL (European Union Transaction Log) or from the EEA EU ETS data viewer ([10]).Historical ESD emissions are available from the EEA website ([11]). It has to be understood that in this dataset total ESD emissions are partly fixed by legislative acts, this is indicated by the heading "from ESD review". These numbers might be different from those which are calculated in the next steps due to annual changes in GHG inventories.

It has to be ensured that all tools underpinning reported projections have to be calibrated to the respective sectoral historical numbers for GHG emissions and ETS emissions in the reference year. In addition, it has to be ensured that the sum of sectoral ETS and GHG emissions adds up to historical Total ETS and Total GHG emissions at least in the reference year so that the projection starts with a consistent dataset.

5.2. Identifying historical stationary ETS **and ESD** emissions in GHG inventory source categories

To identify the share of sectoral ETS and ESD/ESR emissions in specific source categories, it is recommended to start from ETS emissions in the stationary sectors. Only afterwards ESD/ESR emissions are calculated as the difference of sectoral GHG emissions minus the ETS emissions.

These stationary ETS emissions mainly consist of **CO_2 emissions** which are located in the following source categories:

- Energy Industries (1.A.1),
- Manufacturing Industries and Construction (1.A.2),
- Transport (1.A.3) ([12])
- Other Sectors (1.A.4)
- Fugitive Emissions from Fuels (1.B.)
- Carbon Dioxide Transport and Storage (1.C)
- Mineral Industry (2.A)
- Chemical Industry (2.B) and

[9] Stationary ETS emissions are all ETS emissions apart from those of the aviation sector.

[10] https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1

[11] https://www.eea.europa.eu/data-and-maps/data/esd-2

[12] Only includes emissions from sub-category 1.A.3.e. Note that emissions from 1.A.3.a domestic aviation must be excluded from the ETS emissions

- Metal Industry (2.C) ([13])

In addition, **N_2O** emissions from the Chemical Industry (2.B) and **PFC** emissions from the Metal Industry (2.C) are partly covered under the EU ETS. It should be noted that the ETS also covers aviation emissions, but these need to be treated separately, see section 5.6 below.

Under the Gov. Reg., Member States have to report for the year X-2 in their national GHG inventories and have to allocate stationary ETS emissions to the source categories in the national GHG inventory (See Article 26(3) and Annex V, Part 1 (h) of the Gov. Reg., as well as Article 14 and Annex XII of the Implementing Regulation (EU, 2018/1208)).

Figure 12 Snapshot of the ETS reporting Table for the GHG inventory in Annex XII of the Implementing Regulation (EU) 2020/1208

ANNEX XII

Reporting on consistency of reported emissions with data from the EU Emissions Trading System pursuant to Article 14

Allocation of verified emissions reported by installations and operators under Directive 2003/87/EC to source categories of the national greenhouse gas inventory
Member State
Reporting year:
Basis for data: verified ETS emissions and greenhouse gas emissions as reported in inventory submission for the year X-2

	Total emissions (CO_2-eq)			
	Greenhouse gas inventory emissions [kt CO_2-eq] (1)	Verified emissions under Directive 2003/87/EC [kt CO_2-eq] (1)	Ratio in % (Verified emissions/inventory emissions) (1)	Comment (2)
Greenhouse gas emissions (for GHG inventory: total GHG emissions, including indirect CO_2 emissions if reported, without LULUCF, and excluding emissions from domestic aviation; for Directive 2003/87/EC: GHG emissions from stationary installations under Article 2(1) of Directive 2003/87/EC)				
CO_2 emissions (for GHG inventory: total CO_2 emissions, including indirect CO_2 emissions if reported, without LULUCF, and excluding CO_2 emissions from domestic aviation; for Directive 2003/87/EC: CO_2 emissions from stationary installations under Article 2(1) of Directive 2003/87/EC)				

Category (1)	CO_2 emissions			
	Greenhouse gas inventory emissions [kt] (1)	Verified emissions under Directive 2003/87/EC [kt] (1)	Ratio in % (Verified emissions/inventory emissions) (1)	Comment (2)
1.A **Fuel combustion activities, total**				
1.A **Fuel combustion activities, stationary combustion**				
1.A.1 **Energy industries**				
1.A.1.a Public electricity and heat production				

This reporting table provides the basis on how total ETS emissions are split by the inventory categories and if available, more detailed subcategories; and is therefore a good data source to obtain reference year data for the ETS sectors.

[13] In some countries ETS emissions are allocated also to other source categories like waste incineration (5.C).

5.3. Calculating ESD/ESR emissions and the share of ETS emissions

Before calculating the ESD/ESR emissions, it should be double checked that the sum of the sectoral ETS emissions matches to total ETS emissions and apply corrections if this is not the case. Then the sectoral ESD/ESR emissions can be calculated as follows:

For the calculation of **sectoral** ESD/ESR emissions: (Emissions *E*, for a particular sector *X*)

$$E_X^{ESD/ESR} = E_X^{Tot.GHG\ w.out\ LULUCF} - E_X^{ETS}$$

This calculation needs to be conducted on the lowest sectoral level which is used to calculate national GHG projections.

Be aware for Transport (1.A.3/1.A.3.a): Note that the CO2 emissions in the ETS of sector 1.A.3.a should not be reported under the ETS projections (in accordance with Directive 2003/87/EC which includes only stationary emissions, see also chapter 5.6). This is also indicated in the reporting template by the dark grey shaded cells. On the other hand, it is possible to report the small portion of CH4 and N2O emissions can be reported under the ESD/ESR, if available. The table below shows how ETS/ESR projections should be reported for the sector 1.A.3.

Table 5: Example of emission accounting in sector 1.A.3 for a given year and with dummy data. Note that the sum of lighter shaded cells equals the total in darker shaded cells.

Sector	CO_2 (kt)	CH_4 (kt)	N_2O (kt)	TOTAL GHG (kt CO_2-eq)	ETS (kt CO_2-eq)	ESR (kt CO_2-eq)
1.A.3 Transport	**11887**	**0.48**	**0.43**	**12027**	**13**	**11996.52**
1.A.3.a Domestic aviation	17	0.02	0.00007	17.52	0	0.52
1.A.3.b Road transportation	11395	0.44	0.37	11518	NA	11518
1.A.3.c Railways	115	0.01	0.05	129	NA	129
1.A.3.d Domestic navigation	233	0.02	0.01	235	NA	235
1.A.3.e Other transportation	127	0	0	127	13	114

Be aware for Industrial processes and product use (2) (sector 2 and subsectors): Until 2020 NF3 emissions are excluded from the ESD, but from 2021 NF3 emissions are included in the ESR. Therefore, for the projections of the ESR emissions, NF3 should be included in ESR from 2021 onwards.

The following emissions should neither be allocated to ESD/ESR nor ETS emissions and be only reported for the gases (CO_2, CH_4, N_2O, F-gases where applicable and the Total GHGs):

- CO_2 emissions of domestic aviation,
- LULUCF emissions/removals
- Emissions from Memo Items, such as international bunkers (aviation and navigation)
- NF3 emissions until the year 2020 as NF3 is not included in the ESD. From 2021 NF3 is included in the ESR.

Note that indirect CO2 emissions, if reported, should be also included in the ESR, but not in the ETS (in line with the calculation in Annex XV of the Implementing Regulation (EU) 2020/1208). It is recommended to check after this sectoral allocation of ETS and ESR emissions that the sum of sectoral ETS and ESD/ESR emissions **and those emissions which are neither covered by the ETS/ESR** (listed above) are matching to total GHG emissions in each (sub-) sector.

For some categories it is known that actual ETS emissions (as registered in the EUTL) might be higher than the Total GHGs according to the GHG inventory, due to allocation rules in inventory reporting. This is the case, e.g. for:

- category 2.B.1, due to recovered emissions from ammonia production and
- in category 1.B.2 due to hydrogen production

In these cases, when calculating the sectoral ESD /ESR emissions (by subtracting the ETS emissions from the Total GHG emissions as explained above) this might result in negative ESD/ESR emissions:

Sector	CO2	CH4	N2O	TOTAL GHG	ETS	ESR
2.B.1	80	-	-	60	80	-20

If this happens, it is recommended to try to allocate the sectoral surplus of ETS emissions to another subsector to balance out these ETS emissions on sectoral level.

For example, a surplus in ETS emissions in sector 1.B.2 from hydrogen production can be allocated to ETS emissions of energy industries (1.A.1) as shown in the following Table:

Sector	**CO_2 (kt)**	**CH_4 (kt)**	**N_2O (kt)**	**TOTAL GHG (kt CO_2-eq)**	**ETS (kt CO_2-eq)**	**ESR (kt CO_2-eq)**
1.B.2	80	-	-	60	80	-20
1.A.1	500	-	-	500	475	25
Can be transformed to:						
1.B.2	60	-	-	60	60	0
1.A.1	520	-	-	520	495	25

If no balancing is possible and a difference will persist on sectoral and total level, it to provide some explanations in the projections report.

The calculation of GHG projections is usually done on the level of GHG (sub-) sectors. The differentiation into ETS and ESR emissions is done in a second step. For this, assumptions on the development of ETS and ESR emissions in this (sub-)sector needs to be set. For the first projected years it is important to start from the historical share of ETS emissions which has been identified (see section 5.2). This can be done by the application of the share of ETS emissions on sectoral level (as outlined in section 5.5). This share of ETS emissions is calculated by dividing historic ETS emissions for each sector by Total GHG emissions without LULUCF.

$$share_X^{ETS} = \frac{E_X^{ETS}}{E_X^{Tot.GHG\ w.out\ LULUCF}}$$

These ETS shares are country specific and can range between 0 and 100 %. As an example, the shares from the latest EU projection dataset are shown below. The following EU-wide shares of ETS emissions can be calculated for the year 2019 from the most recent EU projections dataset (version prepared in 2020):

- 88% for Energy Industries (1.A.1),
- 76% for Manufacturing Industries and Construction (1.A.2),
- 65% for Industrial Processes and Product use (2)
- 1% for Transport (1.A.3) and Other Sectors (1.A.4+5)
- 0% for LULUCF (3), Agriculture (4) and Waste (5). => Note: for these sectors usually no ETS emissions are reported so the share should be 0%

5.4. Comparing calculated and reviewed ESD emissions

The sectoral ESD emissions for the reference year are derived by basically subtracting stationary ETS emissions from Total GHG (without LULUCF, in CO_2-eq) from the same year of the latest GHG inventory, as explained above. The sum of these sectoral ESD emissions of the reference year can be compared to the official and reviewed total ESD emissions of the same year, but small differences may occur. Reviewed ESD emissions are fixed values after the review process, and do not change any more, whereas calculated ESD emissions are subject to small annual changes due to recalculations in GHG inventories or small changes in the EUTL data of former years.

As time series consistency of historical inventory and projections is important, it is therefore recommended to use the calculated ESD emissions as the reference year for projections, instead of the reviewed ESD data. This approach ensures consistency with ETS emissions and the inventory data, but one should be aware of the potential differences to the official reviewed ESD emissions.

5.5. Projecting stationary ETS emissions

It is recommended to calculate projections separately for ETS and ESD/ESR emissions in subcategories, starting from the share of ETS emissions identified for each source category in the reference year (as explained 5.2). For the projections, different development of ETS and ESR emissions in specific sectors due to anticipated changes from policies or measures or other assumptions should be considered, such as:

- planned plant closures or openings,
- changes in energy structure like fuel witch, power plant size or ownership;
- increasing efficiencies,
- assumed increasing EU ETS carbon prices (see also the recommended values provided by the European Commission)
- CO_2 prices in non-ETS sectors
- or effects of the application of renewable energies.

If no specific estimate for the different development of projected ETS or ESR emissions by subcategory is available for a certain subcategory, Member States should apply the same ETS share calculated per source category for the reference year to all projected years (i.e. assuming a constant share of ETS emissions).

For example, if the development of ETS and ESD/ESR emissions in sector 1.A.4 is unknown and the ETS share in the reference year is 4%, then in the projections of sector 1.A.4. ETS emissions have a constant share of 4% of the Total w.out LULUCF emissions in projected years). This assumes a stable share of ETS and ESD/ESR emissions at source category level, consistent with the ratio calculated for the reference year.

For the key source category 1.A.1 Energy Industries (power and heat, refineries, other energy industries), for which usually close to 100% of material emissions are covered by the EU ETS, the described approach should however only be used if non-ETS emissions are significant. Otherwise, the full coverage of emissions by the EU ETS and the application of future EU ETS carbon prices to the whole 1.A.1 sector should be assumed.

5.6. Domestic and international aviation

Aviation (domestic and international within the European Economic Area) is included under the EU ETS since 2012. With the tabular reporting formats from the Implementing Regulation (EU, 2020/1208) countries are no longer required to project ETS aviation emissions, because the calculation of ETS aviation projections on Member State level is difficult. ETS aviation emissions are not related to inventory emissions of Member States, neither for domestic nor for international aviation: aviation operators are administered by single Member States irrespective of the flight activities of these operators. This means that e.g. emissions from a domestic flight in Member State A might be reported as ETS emissions in Member State B, because the operating company is registered in Member State B.

A solid estimate for ETS emissions from aviation can only be conducted on the level of all countries taking part in the EU ETS, considering general projected trends in national GHG projections for domestic and international aviation and taking assumptions on the further scope of covered emissions.

Annex 1 – Table templates for reporting interlinkages

Table 1: Reporting on Policies and Measures

This table is a useful tool for highlighting changes in PaMs reporting between submissions. It identifies whether it is a key PaM, what changes has occurred to the PaM since the previous submission, and which projection scenario it is included under. Example data is provided within the table.

PaM ID and name	Projection scenario in which the PaMs is included	Description of changes compared to previous submission	Key PaM (yes/no)
1 Renovation of public buildings	WEM	Moved from WAM to WEM	Yes
2 Promotion of RES in heating and cooling	WEM	No change	No
3 Reduction of fertilizer use on cropland	WEM	Originally the PaM would expire in 2024, but the programme has been extended until 2030	No
4 Installation of solar PV on apartment blocks	WAM	New PaM	Yes
5 Promotion of electric vehicles	WAM	No change	Yes

Table 2: Reporting on parameters and linked projections

This table is a useful means of effectively capturing how parameter projections have changed between submissions years. In addition to this table, it is then useful to provide information on why the parameters have changed between submissions. This could be due to changes in the methodology, the model, or assumptions. This table can be expanded to include further detail on fuel types, for example for energy consumption (e.g. coal, oil, gas etc.). This table could be split between sector parameters or remain as one overarching summary table. Colour-coding could also add value to this table, for example highlighting whether the 2019 projection is higher or lower than the 2017 projection (as seen below).

Submission Year	Parameter	Reference Year	2020	2025	2030	2040
2017		259.04	270.45	281.19	292.35	303.97

2019	Gross Domestic Product ($million)	248.25	264.23	274.01	285.85	296.36
2017	Total Energy Consumption (ktoe)	8525	8518	8756	9120	9210
2019		8521	8310	8623	9112	9326
2017	Total Electricity Generation (TWh)	6.80	6.54	7.20	8.32	8.26
2019		6.28	6.84	7.30	8.87	8.56

Note: 2019 values coloured in green are lower than the 2017 value, values in orange are higher than the 2017 value.

Table 3: Reporting the impact of PaMs on projections

This table provides a useful way of summarising how a particular PaM has changed the projections model compared to previous submission years. It helps to conclusively highlight how a specific PaM is related to projections and can inform reviewers on how the prediction model works. Example data is provided within the table.

PaM ID	Title	Changes in the projections model since previous years
List the PaM ID	*List the individual PaM name*	*Identify here what the impact of the specific PaM will have on various parameters and factors within the prediction model, which is used to calculate the projections*
PaM 1	Toll roads	Tolls on roads will lead to a potential change in demand for certain road transportation, and is based price-demand
PaM 2	Biofuels support	Support for biofuels will result in an increased usage and share of biofuels which will change CO_2 emission factors
…	…	…

Note: This table is inspired by the Czechia and Slovakia's reporting

Table 4: Reporting on WEM and WAM projections for individual PaMs for one year

The table below is a template for reporting the expected impact of individual PaMs on the difference in emission savings between the WEM and WAM projected scenarios. It effectively links PaMs and projections, and visually highlights how an individual PaM affects a scenario. This can be presented either in absolute figures, or as a relative percentage (as seen below). The table below shows the percentage difference in emission savings from the reported WAM scenario to the WEM, in the 2025 projection year. Colour-coding is also useful for highlighting major trends.

PaM	PaM effect for 2025 (WAM-WEM)					
	CO_2	NH_3	N_2O	PFCs	HFCs	Total GHGs
1 ETS	13%	-	-	-	-	12%
2 Biofuel adoption	27%	2%	-24%	-	-	5%
3 Aviation measures	24%	-	12%	-	-	26%
4 Shipping measures	58%	-	-	-	-	58%
5 Electricity generation measures	-2%	-	32%	-	-	30%
6 Fertiliser application measures	2%	-54%	26%	-	-	-26%
7 Industrial solvents measures	10%	-	-	-16%	-8%	-14%

Note: Positive changes, highlighted in green show an increased emission saving in the WAM scenario compared to WEM.

Negative changes highlighted in orange show a decreased emission saving in the WAM scenario compared to WEM.

Table 5: Reporting on WEM and WAM scenarios for individual PaMs across the time series

The table below builds upon table 4. It is an alternative way of presenting emission savings from an individual PaM for both WEM and WAM scenarios. This table is effective at giving a clear overview on how an individual PaM is likely to affect its projection scenario, which is useful when assessing the interlinkages.

PaMs	Reference Year	2020	2025	2030	2035	2040
List the PaM ID and projection scenario						
PaM 1 WEM	*0.6*	*0.8*	*1.2*	*1.6*	*1.7*	*1.5*
PaM 1 WAM	*0.8*	*2.1*	*3.3*	*4.6*	*5.1*	*5.7*
PaM 2 WEM	…	…	…	…	…	…
PaM 2 WAM	…	…	…	…	…	…

Annex 2 – Updates to templates since version 1.1

File	Sheet	Issue	Severity	Updated in version	How to fix it	Comments
GovReg_Proj_T1a _T1b_T5a_T5b	T1a_QAQC(1)	The formula for WAM (BC84:CA94) refers to the domestic aviation from WEM	Low	1.2.1	Select the range BC84:CA94. Press Ctrl+F. Replace 29 for 98. Press “Replace all”	150 replacements should occur
GovReg_Proj_T1a _T1b_T5a_T5b	Table1a	Cells IS86:JQ86 should not be shaded	Low	1.2.1	Unshade the range IS86:JQ86 and fill as appropriate	It only affects if Indirect CO2 is being reported
GovReg_Proj_T1a _T1b_T5a_T5b	Table1a	Mistake in the formula of four cells within row 65	Medium	1.2	Copy cells in the range C203:JQ203 of the same sheet and paste them in C65:JQ65	
GovReg_Proj_T1a _T1b_T5a_T5b	T1a_QAQC(2)	The formulas for "Total excluding LULUCF" and "Total including LULUCF" should include Indirect CO2	Low	1.2	Include the reference to Indirect CO2 manually in the formula or copy the formula from version 1.2 (or later) in rows 17, 18, 30, 31, 43, 44.	It only affects if Indirect CO2 is being reported

Severity key:

- High: The issue prevents uploading data or introduces significant errors. An update is necessary for reporting.
- Medium: The issue has the potential to introduce minor errors that can be easily identified and corrected during QAQC.
- Low: No risk of introducing reporting errors.

Can I use the Draft Testing version for reporting? (GovReg_Proj_T1a_T1b_T5a_T5b_DRAFT.xlsx)

Your data will load to Reportnet and it will reach us. However, it is highly recommended that you do not use this template for reporting. If for any reason you are unable to migrate your data to an updated version of the template, please contact us at govreg@eea.europa.eu and we will give you further instructions on how to adapt it.

To migrate your data to version 1.2. Please make sure that you only copy your input data, from the area reserved for reporting (e.g. for Table 1a this is within the range C19:JQ224 excluding the calculated LULUCF sections in green). Do not copy headers or category columns, or insert full rows or columns. Please paste data as values in the new template to keep formatting integrity. The categories follow the same order in all templates.

Can I use a template from previous years (under the MMR)?

MMR templates will fail to upload to Reportnet and you will not be able to submit your data.

How are the versions numbered?

The first number (e.g. **1**.x.x) refers to a major update, such as those addressing high severity issues. You should not use a template with an old first number.
The second number (e.g. x.**2**.x) refers to updates addressing medium severity issues. Updating is recommended but not required.
The thirds number (e.g. x.x.**1**) refers to a minor update, such as those addressing cosmetic or low severity issues.

The zip file follows the same numbering logic but its version number might differ from the individual excel files.