Assessment of Member States'

GHG projections 2015

Submitted under Art. 14 of the EU Monitoring Mechanism Regulation

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European Topic Centre
on Air Pollution and
Climate Change Mitigation

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1 Introduction

This report provides a summary of the assessment of the EU Member States' (MS) submission under Article 14 of the Monitoring Mechanism Regulation (MMR) in 2015. The underlying quality assurance (QA) procedure (ETC Technical Paper 2015/11) has been updated to be in line with the new provisions under the MMR and to improve the effectiveness of the checks and the procedure itself.

The report is structured according to the quality criteria defined by the Intergovernmental Panel on Climate Change (IPCC) (see chapter 3). The first part includes a brief overview of general QA results such as findings per sector, followed by a general assessment of completeness and timeliness. In the chapter on consistency and comparability a deeper insight on the quality of the data is provided, such as unit consistency, consistency with historic data, or split of ETS (Emission trading scheme) and ESD (Effort sharing decision) emissions. The assessment of accuracy and transparency cannot be provided on an aggregated level and therefore specific illustrative cases are provided for some Member States. A separate chapter covers a brief assessment of the reported parameters and the most common issues the European Topic Centre for air pollution and climate change mitigation (ETC/ACM) detected during the quality assurance / quality control (QA/QC) process.

Only greenhouse gas (GHG) projections that have been reported before end of July have been considered in this assessment and the results of the assessment refer to the draft final data-set as of 31 August 2015.

2 Reporting requirements

In July 2013 the Monitoring Mechanism Decision (MMD) was replaced by the MMR. Article 14 of the MMR and Article 23 and Annex XII of its Implementing Regulation set out the details for Member States to provide information on national GHG projections. Every two years starting from 2015 MS have to report GHG projections and accompanying information to the European Union.

The main mandatory elements of this reporting obligation are:

- GHG projections reported by gas (CO_2, CH_4, N_2O, HFC, PFC, SF_6, NF_3)
- For the reference year, 2015, 2020, 2025, 2030 and 2035
- Split by sectors in line with common reporting format (CRF) format
- Sectoral split into ETS and ESD emissions
- Report a with existing measures scenario (WEM)
- Provision of a model factsheet
- Provision of a sensitivity analysis
- Provision of a description of methodologies, models and underlying assumptions
- Provision of input and/or output parameters

Voluntary reporting items are:

- WAM (with additional measures) scenario
- WOM (without measures) scenario
- Intermediate years

3 Scope of the QA/QC

The European Commission (DG CLIMA) is responsible for coordinating QA/QC activities on GHG projections at EU level and ensures that the objectives of the newly developed QA/QC programme are fulfilled. The European Environment Agency (EEA) is responsible for the annual implementation of the QA/QC procedures and is assisted by the ETC/ACM.
The data quality objectives pursued by this QA/QC procedure are based on the core principles of data quality: transparency, completeness, consistency, comparability and accuracy. These quality principles have been initially defined by the IPCC to characterise the quality of historic emission inventories. They have a slightly different scope in the context of emission projections.

Transparency

…means to ensure that transparent information is provided on underlying assumptions, methodologies used and sensitivity analysis performed in MS' national projections to enable further assessment by users of the reported information and for the purpose of the compilation of Union GHG projections.

Completeness

…means to ensure that projections are reported by MS for all years, sources and sinks, gases and sectors as required under the MMR so that projections are available for the entire EU area to enable further assessment by users of the reported information and for the purpose of the Union GHG projections compilation.

Consistency

…means to ensure internal time series consistency in all elements of national and Union GHG projections over a period of historic and future years as well as to ensure that key input parameters and assumptions are aligned across different sectors for national GHG projections and across different MS for Union GHG projections

Comparability

…means to ensure that national estimates of projected emissions and removals reported by MS are comparable across MS. The allocation of different sources and sink categories by gas follows the split in accordance with the MMR and recommendations by the Commission with regard to projections horizon, reference year (starting year), ETS/ESD spilt, EU policies and measures to be taken into account and harmonised key assumptions are followed as appropriate.

Accuracy

…means that projected estimates are accurate in the sense that they are plausible and neither systematically over- nor underestimated as far as can be judged and that uncertainties inherent to the methodology and input data are reduced as far as practicable. In addition it should be ensured that an accurate aggregation of sectors for national GHG projections and an accurate aggregation of MS for the Union GHG projections is provided.

An additional quality principle used in this context is **timeliness** and it means that national GHG projections are submitted by 15 March of a reporting year in accordance with the MMR.
Further details on the QA procedure are provided in the ETC Technical Paper 2015/11

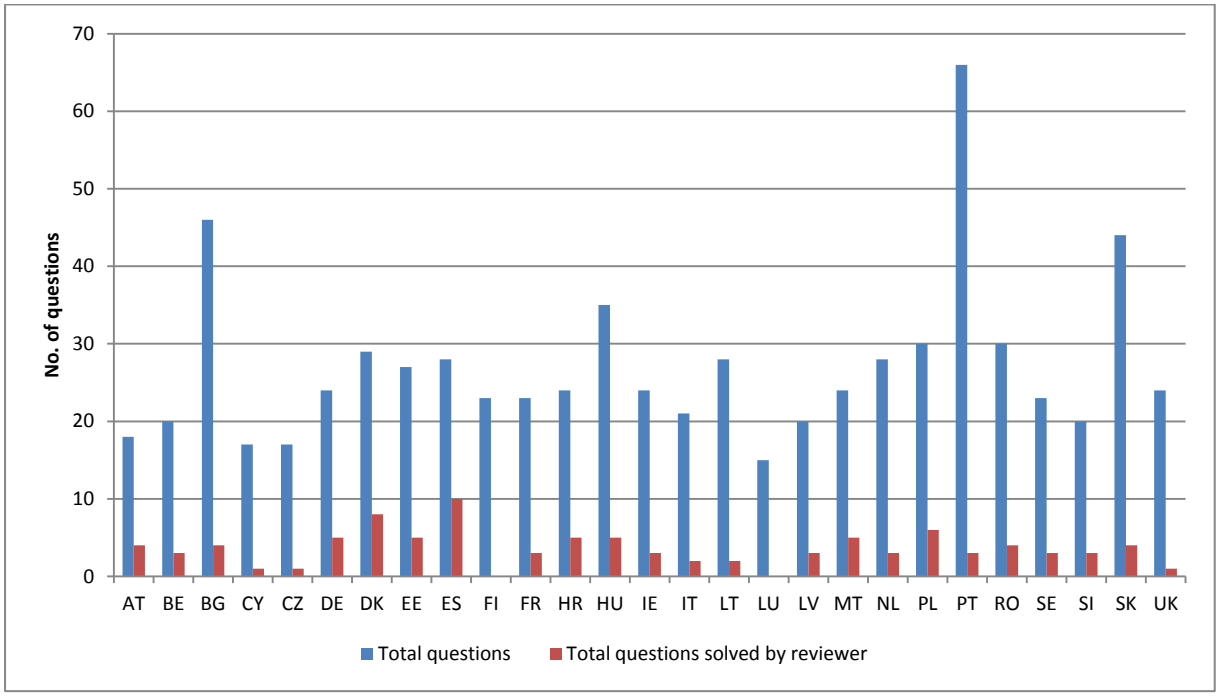
4 General results

In the reporting year 2015, 27 Member States, except Greece[1], submitted projections in accordance with Art. 14 of the MMR.
During the QA/QC procedure, the ETC/ACM sector experts posed in total 728 questions to the Member States' experts. 75% of these questions could be solved directly with the Member States' experts in the communication process. The remaining 25% could not be solved either due to insufficient, unclear responses from Member States or a lack of time to follow up. In cases where an issue was deemed insignificant by the sector expert, the finding was translated into a recommendation for future submissions. Some issues were solved by the ETC/ACM sector experts and MS experts were informed in the communication log file.

Figure 4-1 presents the number of questions per Member State and the number of questions solved by ETC/ACM sector experts without an input from the MS experts (e.g. explanation was found in the report, correction of simple sum errors). On average the ETC/ACM asked 27 questions per Member State. Portugal, Bulgaria's and Slovakia's submissions were subject to a high amount of sum errors and outliers in trends not sufficiently or not described in a report (see chapter 5.3.1).The questions were grouped as much as possible in order to reduce the number of similar questions, for instance if the issue applied to more than one scenario, when the same issue was observed in different related (sub)sectors and gases or when several issues were found for the same sector, gas, scenario combination.

[1] Greece reported GHG projections on 16 September 2016 and was therefore not quality checked by the ETC/ACM.

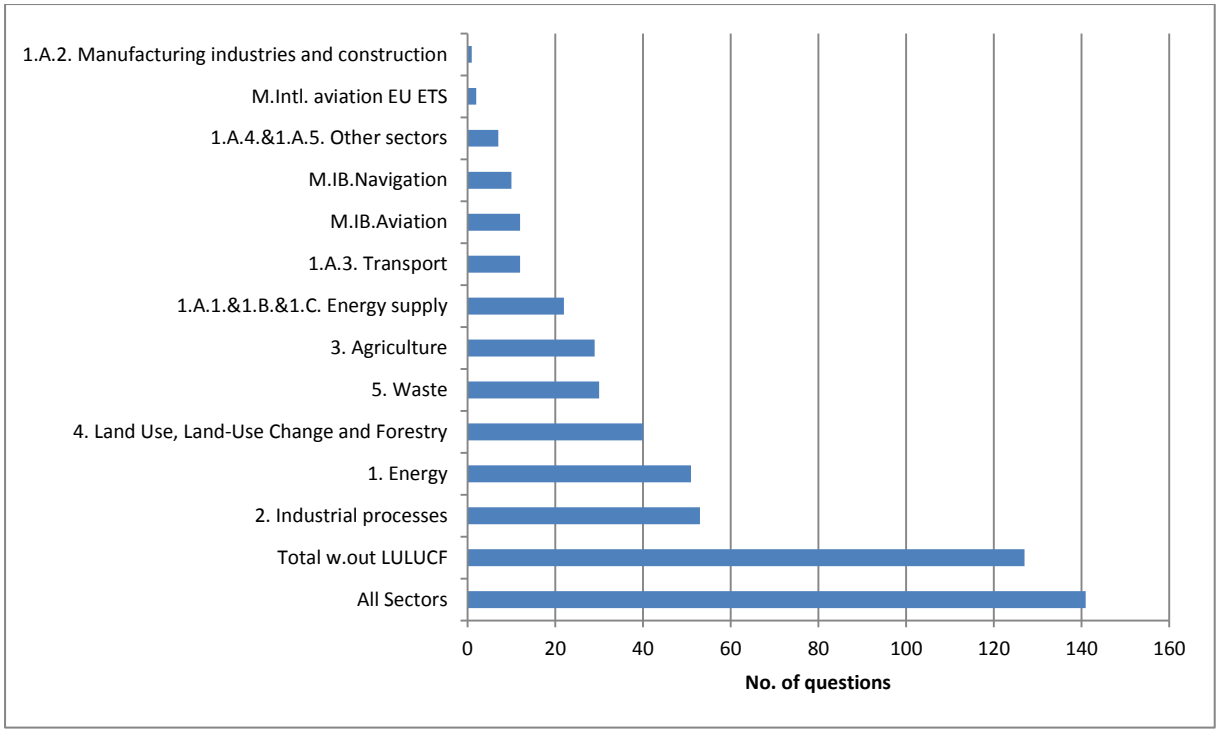
Figure 4-1 Number of questions per Member State and questions solved by ETC/ACM sector expert



Note: Greece not included

Most questions concerned cross-cutting issues or the national total emissions without LULUCF. Apart from that, Sector 2 Industrial processes, 1 Energy and 4 LULUCF are the sectors most questions were related to (Figure 4-2).

Figure 4-2 Number of questions per sector



5 Results per quality criterion

5.1 Completeness and Timeliness

5.1.1 Date of submission and re-submissions

Only 12 Member States submitted their projections before the official deadline of 15 March (Austria, Croatia, Estonia, Finland, Germany, Ireland, Netherlands, Poland, Portugal, Romania, Slovakia and Spain). This is a slight improvement compared to 2013, when 11 Member States had reported their projections before 15 March. Eight more Member States (Belgium, Bulgaria, Czech Republic, Denmark, France, Lithuania, Sweden and United Kingdom) submitted within six weeks after the deadline. Eventually, submissions from 27 Member States (all except Greece[2]) were received by the end of July. This is a substantial deterioration compared to 2013, when all Member States reported until June 18th.

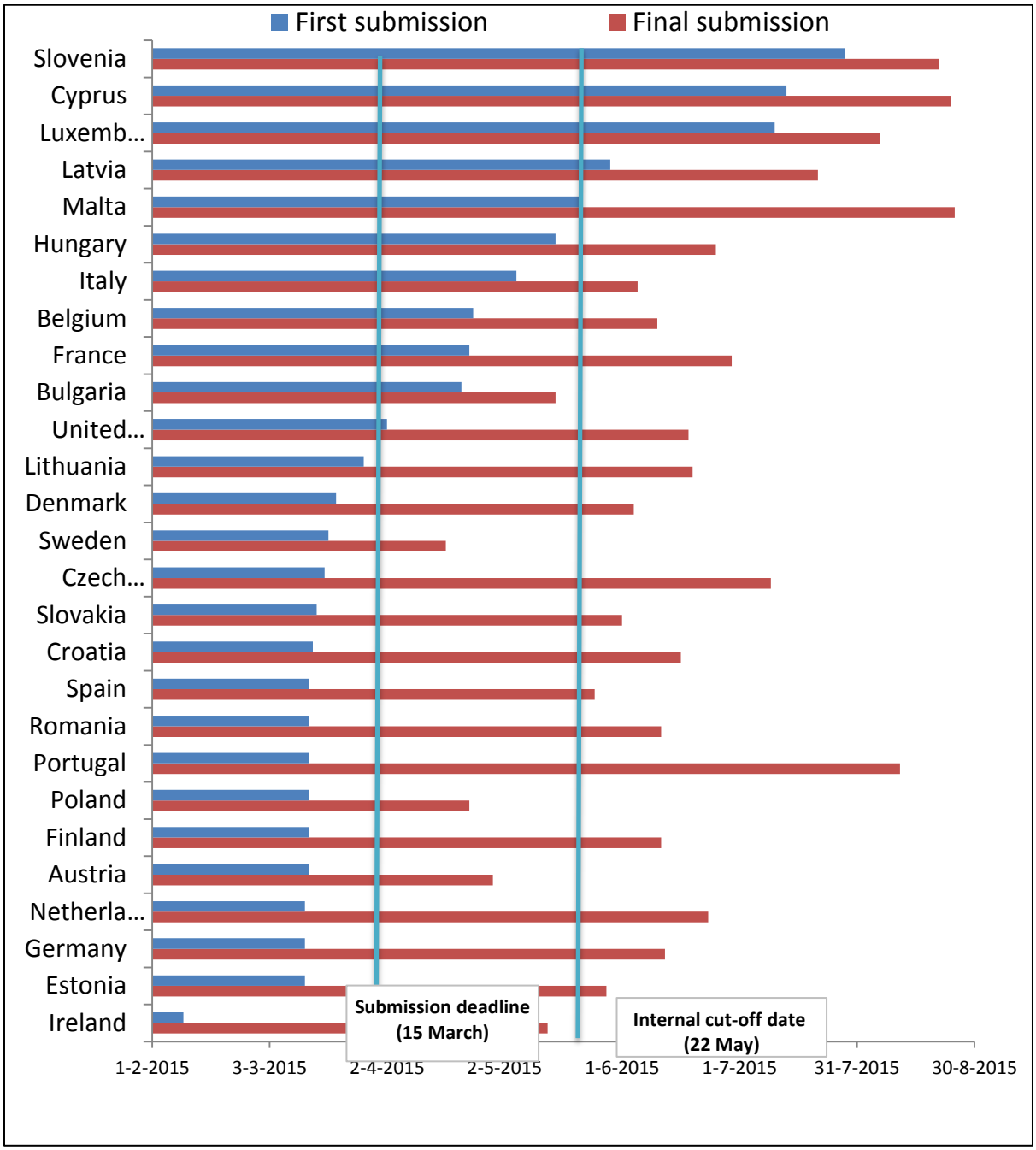
Further improvement of the timeliness of MS' submissions and the responsiveness of MS experts would allow for a more efficient QA/QC procedure with only one communication loop which would help minimising the administrative burden for all parties involved i.e. MS, EEA, ETC/ACM and Commission. Several countries have resubmitted in the period 17 April to 25 August, with the majority (13 Member States) submitting their revised datasets in June. Figure 5-1 summarises the dates of initial submission and final resubmission.

The time between the first and the final submission of Member States varies from a minimum of 24 days for Bulgaria and Slovenia up to a maximum of 151 days for Portugal, the average being about 69 days.

Further improvement of the timeliness of MS' submissions and the responsiveness of MS experts would allow for a more efficient QA/QC procedure with only one communication loop which would help minimising the administrative burden for all parties involved i.e. MS, EEA, ETC/ACM and Commission.

[2] Greece reported GHG projections on 16 September 2016 and was therefore not quality checked by the ETC/ACM.

Figure 5-1 Timeliness of submissions by EU-28 Member State



Note: Greece has not submitted projections

Introducing or increasing quality control checks as a routine activity by MS experts before submitting the dataset to Reportnet would significantly reduce the number of questions and re-submissions necessary.

5.1.2 General completeness of submissions

Figure 5-2 illustrates the completeness of mandatory emissions data submitted at a two-digit IPCC sector level. The data are shown for the WEM scenario and for all EU Member States. A 100% completeness rate means that all EU-28 have reported emissions figures for all GHGs, all mandatory years, and the split by ETS and ESD for a given sector (at two-digit level).

From the countries that submitted their projections before end of July (i.e. all EU-28 except Greece), only Luxembourg has not submitted emissions data at two-digit level.

The Industrial processes (2) sector was the most complete in terms of emissions data reported, followed by the Energy (1) and Waste (5) sectors, whereas the Agriculture (3) and LULUCF (4) sectors were less complete. Most Member States (except Denmark and Portugal) have reported emissions for memo items.

Figure 5-2 Completeness of emissions data reported at a two-digit IPCC sector level for the WEM scenario

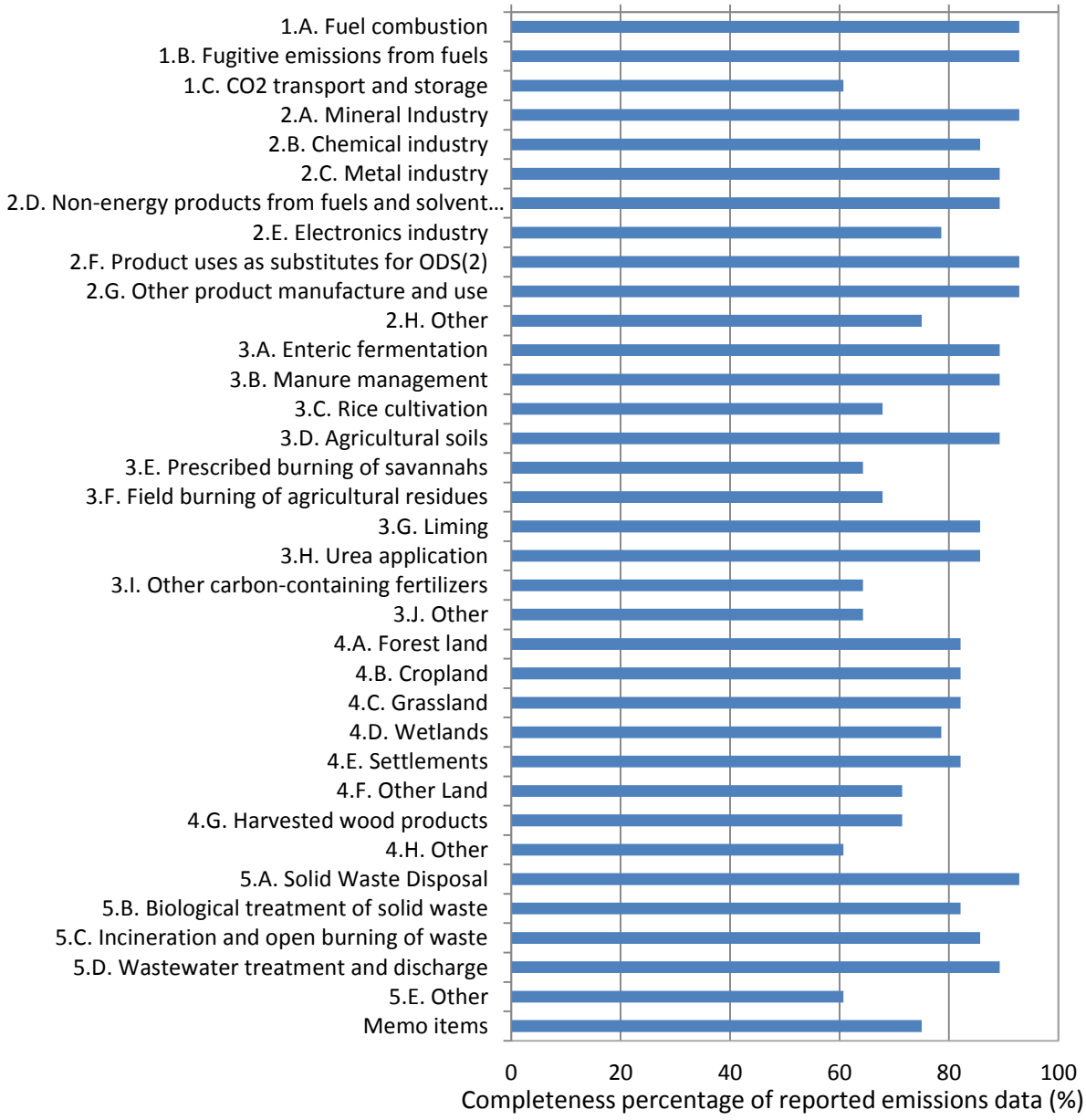


Figure 5-3 Completeness of reported mandatory and voluntary information by EU Member State

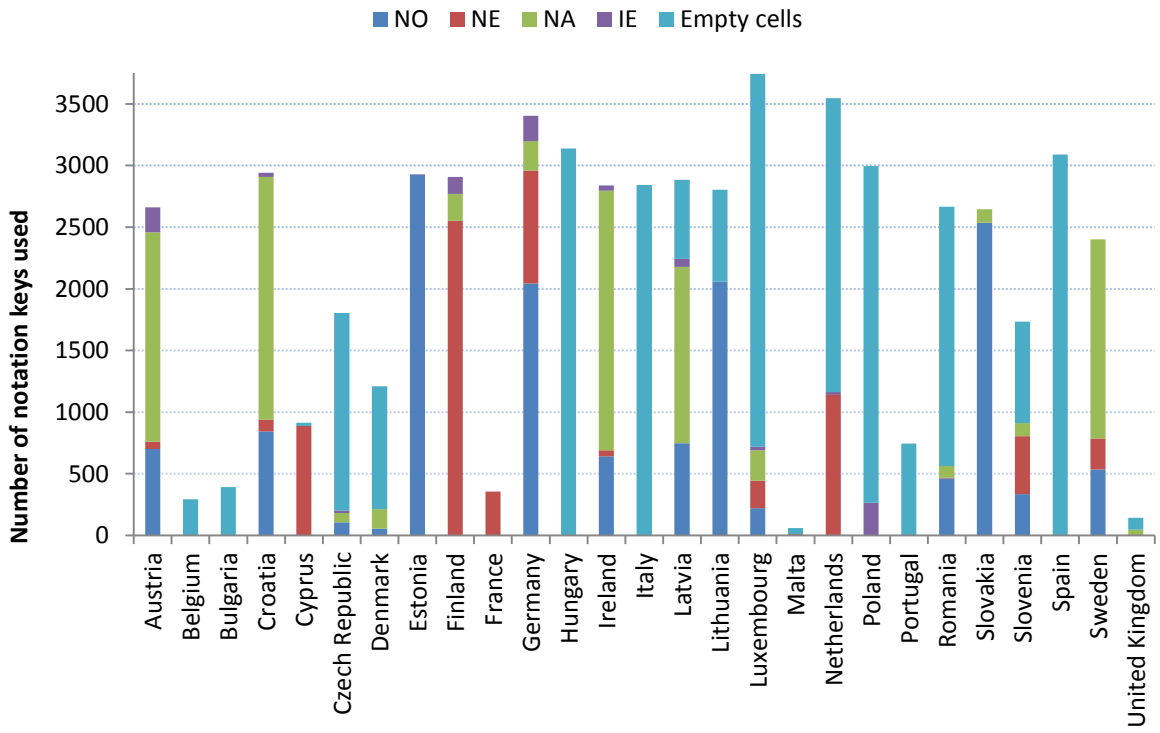
In general, the completeness rate of mandatory information was high in most Member States. 16 countries have reported all mandatory information, whereas 9 more countries achieved a rate higher than 75 %. Only in Luxembourg the completeness rate was very poor.

Increasing further the completeness of mandatory information such as detailed underpinning explanatory data would facilitate more in-depths cross-comparison of reported projections and thus enhance the quality of the aggregated EU projections.

The completeness rate of voluntary information was substantially lower, typically 50% or lower. No Member State has reported all voluntary information, with three of them not reporting any (Germany, Luxembourg and Sweden).

Figure 5-4 illustrates the use of the standard IPCC notation keys (not occurring (NO), not estimated (NE), not applicable (NA), included elsewhere (IE)) in the different Member States. Notation keys were extensively used by 9 Member States (Croatia, Estonia, Finland, Germany, Austria, Croatia, Estonia, Finland, Germany, Ireland, Latvia, Slovakia and Sweden), whereas they were not used at all by 6 Member States (Belgium, Hungary, Italy, Portugal, Spain and Bulgaria).

Figure 5-4 Use of notation keys per Member State (WEM scenario and mandatory reporting years)



Increasing further the completeness of voluntary information such as notation keys would give additional information on the scope and completeness of estimated emission sources in a MS and would help identifying typical errors such as transcript or sum errors. The voluntary reporting of a WAM and WOM scenario is especially valuable since they should complement the interpretation of the projected progress to target assessment of a WEM scenario as different scenarios shed light on the sum of policy effects of either implemented measures (WEM-WOM) or additional measures (WAM-WEM) (EEA, 2015)

5.1.3 Completeness of time series

Most of the Member States reported all mandatory years for most sectors, whereas the voluntary information of intermediate years was often not reported. Missing intermediate reporting years are gap-filled by the ETC/ACM by linear interpolation. Missing years until 2035 are gap-filled by a linear trend extrapolation. Table 5-1 shows the number of Member States for which interpolation or extrapolation has been carried out and to which years it applied. For all Member States which reported projections the years between the reference year and the first mandatory projected year (2015) was gap-filled because the reporting template does not provide extra cells for these years. Extrapolation of the projected trend was necessary for Spain, Hungary and Malta.

Table 5-1 Interpolated and extrapolated years of MS projections

	Interpolation 2011-2014	Interpolation 2016-2019	Interpolation 2021-2024	Interpolation 2026-2029	Interpolation 2031-2034	Extrapolation 2031-2035
AT						
BE						
BG						
CY						
CZ						
DE						
DK						
EE						
EL						
ES						All sectors starting with 2030
FI						
FR						
HR						
HU						All sectors starting with 2025
IE						
IT						
LT						
LU						
LV						
MT						Sector 1A1, 1A2 1A3, 1A4&1A5, 2, 3 starting with 2030
NL						
PL						
RO						
SE						
SI						
SK						
UK						
Total	**27**	**13**	**13**	**12**	**12**	**3**

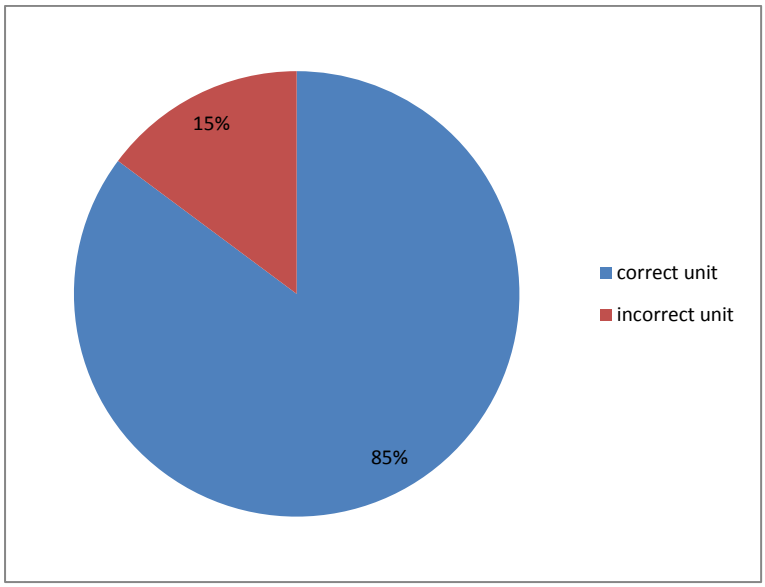
… gap-filled/extrapolated

5.2 Consistency and Comparability

5.2.1 Units and GWPs

Four out of 27 Member States did not report projections in the correct unit or in the new Global Warming Potential (GWP) [3]. In the cases of Croatia, Hungary and Portugal old GWPs were applied and the MS were encouraged to re-submit the data in the correct unit. Hungary and Cyprus made a general unit error which also was corrected in a re-submission. All in all, there are less unit errors than in previous years.

Figure 5-5 Reporting of correct units and application of the new Global Warming Potential



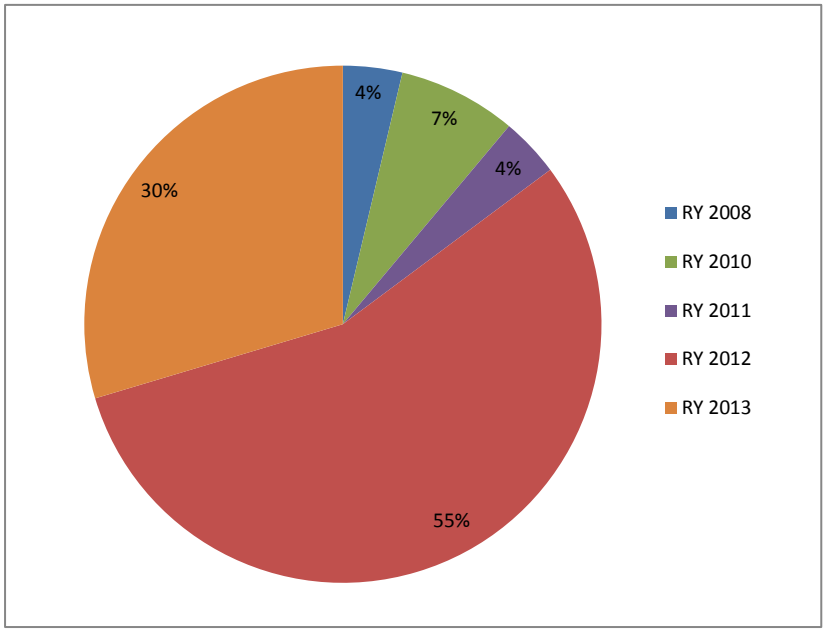
Type of error	MS
GWP error	HR, PT
Unit error	CY
Unit and GWP error	HU

5.2.2 Reference year

The majority of Member States reported the reference years (RY) in line with the latest available inventories, namely 2012 or 2013. The 15 Member States which reported 2012 as reference year recalculated the values with the new GWP but without changing to the 2006 IPCC methodology. Eight countries already used the new inventory data as reference year. Older reference years were reported by Portugal and Sweden (2011), France (2010) and Hungary (2008). During the QA procedure the ETC/ACM ensured that these Member States applied the new GWP to the reported data.

[3] In accordance with the MMR the new GWP from the 4th Assessment report of the IPCC shall be used.

Figure 5-6 Reference year reported by Member States



MS	RY
AT	2013
BE	2012
BG	2013
CY	2012
CZ	2012
DE	2012
DK	2012
EE	2013
EL*	2010
ES	2012
FI	2012
FR	2010
HR	2012
HU	2008
IE	2013
IT	2013
LT	2012
LU	2012
LV	2012
MT	2012
NL	2012
PL	2013
RO	2013
SE	2011
SI	2012
SK	2013
UK	2012

*Greece: 2010 as starting year selected

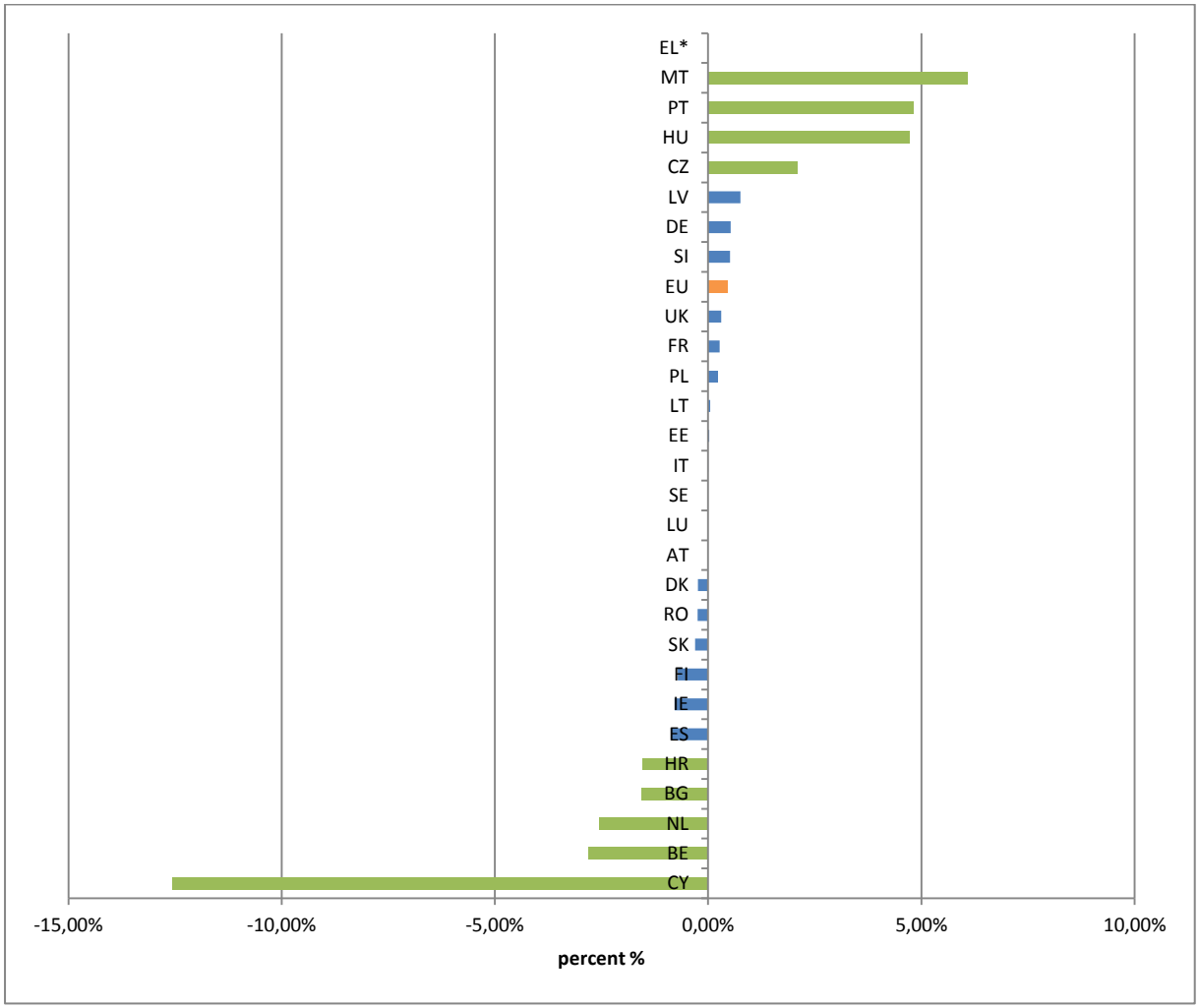
An important quality criterion is the time series consistency between projections and historic data (inventories). The reference year for the Union GHG projections is 2013, as this is the latest inventory year available when projections were prepared. Figure 5-7 presents the percentage differences between reference year and the respective year reported in the 2015 inventory [(4)] for each Member State. The green bars show the nine Member States whose projections were calibrated against the inventory. Greece was gap-filled with the Reference scenario of the latest available Commission projection prepared and consulted with Member States experts in the framework of the EUCLIMIT project GR was also calibrated with the current inventory (year 2013).

The implicit lower and upper boundaries of the "tolerable" deviation of the reported reference year for Total excl. LULUCF from the national inventory lie between -0.87% (Spain) and +0.76% (Latvia), all other MS have lower deviations.

It has to be noted that the ETC/ACM could not always perform the reference year check with the reported data because of obvious errors (e.g. unit error, sum error), in such cases, the dataset was first corrected and the check was performed with the corrected dataset. The graph below compares data which were already corrected and gap-filled or re-submitted.

[(4)] National GHG emission inventory submission to EU: June 2015

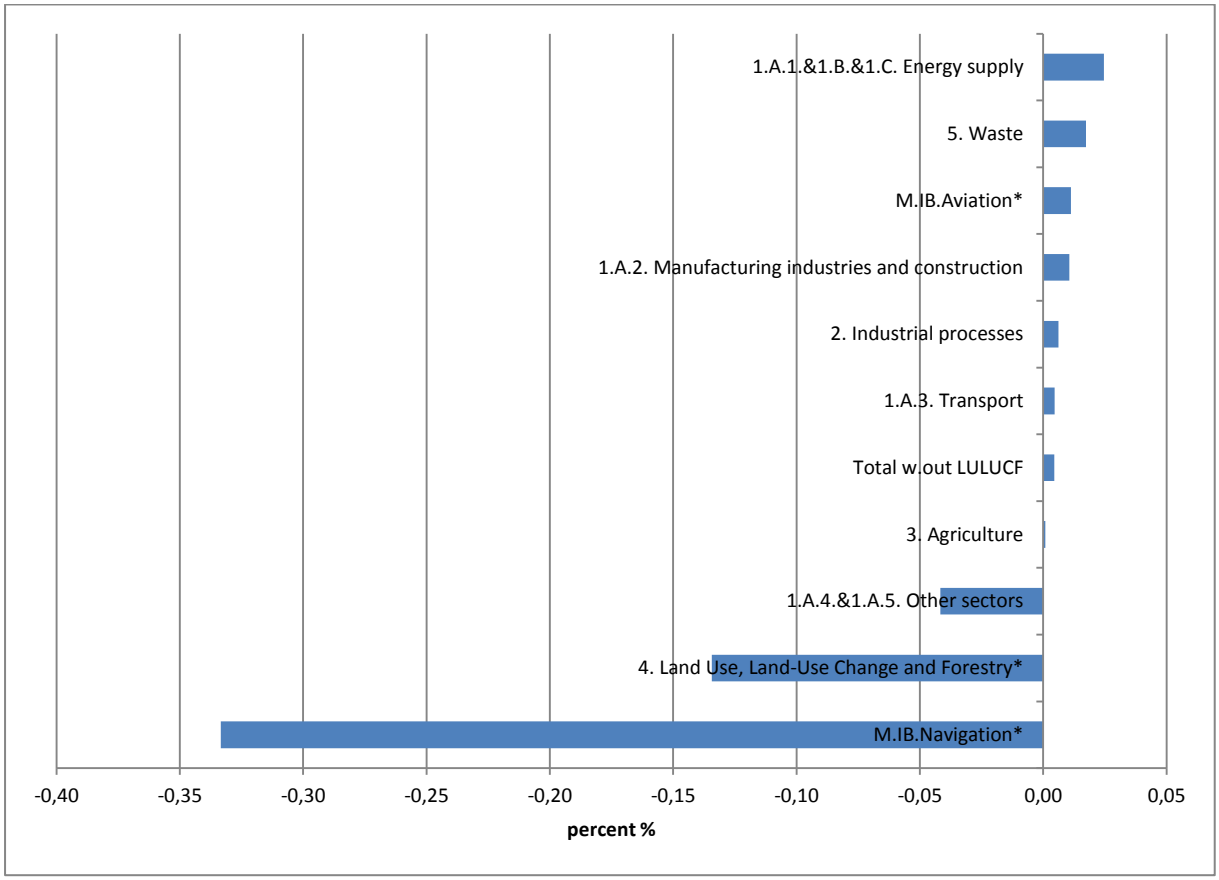
Figure 5-7 Percentage difference of the reference year reported by Member State compared to the 2015 inventory (for year 2013)



Note: *EL: Greece did not report projections

In the following figure (Figure 5-8) the percentage difference of the reference year for the Union GHG projections (2013) and the 2015 inventory is shown per sector. The highest deviations occur in sector M.IB Navigation and LULUCF, but these sectors are not subject to reference year calibration as LULUCF and international bunkers are not accounted to the national Total. The reasons why these sectors show these high differences are often related to a lack of data/non-reporting (International bunkers) or methodological issues such as the application of models for which the reference year cannot be easily updated (LULUCF).
Apart from this, the energy aggregates 1A4&1A5 and 1A1&1B&1C are the sectors with the highest deviation. Reasons for these differences need to be further investigated in the future. One reason might be that small sectors such as 1A5, 1B and 1C are not projected separately.

Figure 5-8 Percentage difference of the reference year reported by MS compared to the 2015 inventory by sector (for year 2013)

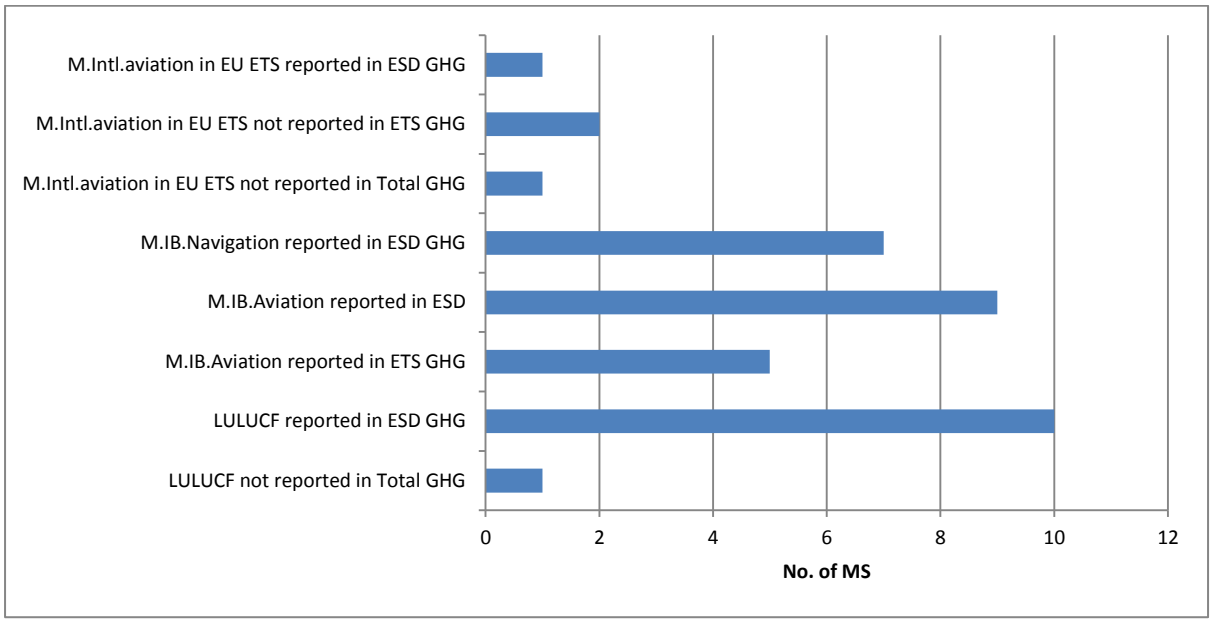


5.2.3 Sector allocation

It turned out during the QA procedure 2015 that the correct sector allocation and the ETS/ESD split of the sectors International bunkers (aviation and navigation), International aviation in the EU ETS and LULUCF is challenging for many Member States. Figure 5-9 presents common misallocations of the sectors mentioned. LULUCF which should be reported only for the GHGs and Total GHGs was allocated to ESD emissions by 10 Member States. Another frequent error is the reporting of International bunkers aviation/navigation under ETS or ESD emissions which should be reported only under Total GHGs.

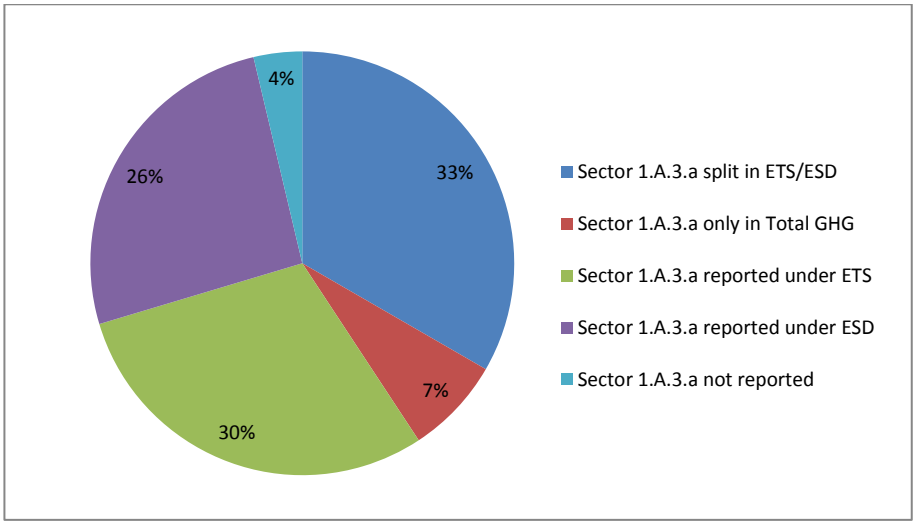
Further improvement of the internal consistency of MS' submissions could be facilitated by providing additional guidance on sector allocation (e.g. ETS/ESD split, LULUCF, aviation) and would significantly reduce the effort of re-allocating sectors by the ETC/ACM.

Figure 5-9 Sector misallocation of International Bunkers and LULUCF



Another inconsistency with regard to sector allocation was identified in the reporting of sector 1A3a domestic aviation. This sector usually consists partly of ETS emissions and partly of ESD emissions. Only nine Member States correctly reported these emissions in the foreseen split. Sixteen Member States completely reported 1A3a either under Total GHG, ETS or ESD.

Figure 5-10 Reporting of sector 1A3a domestic aviation

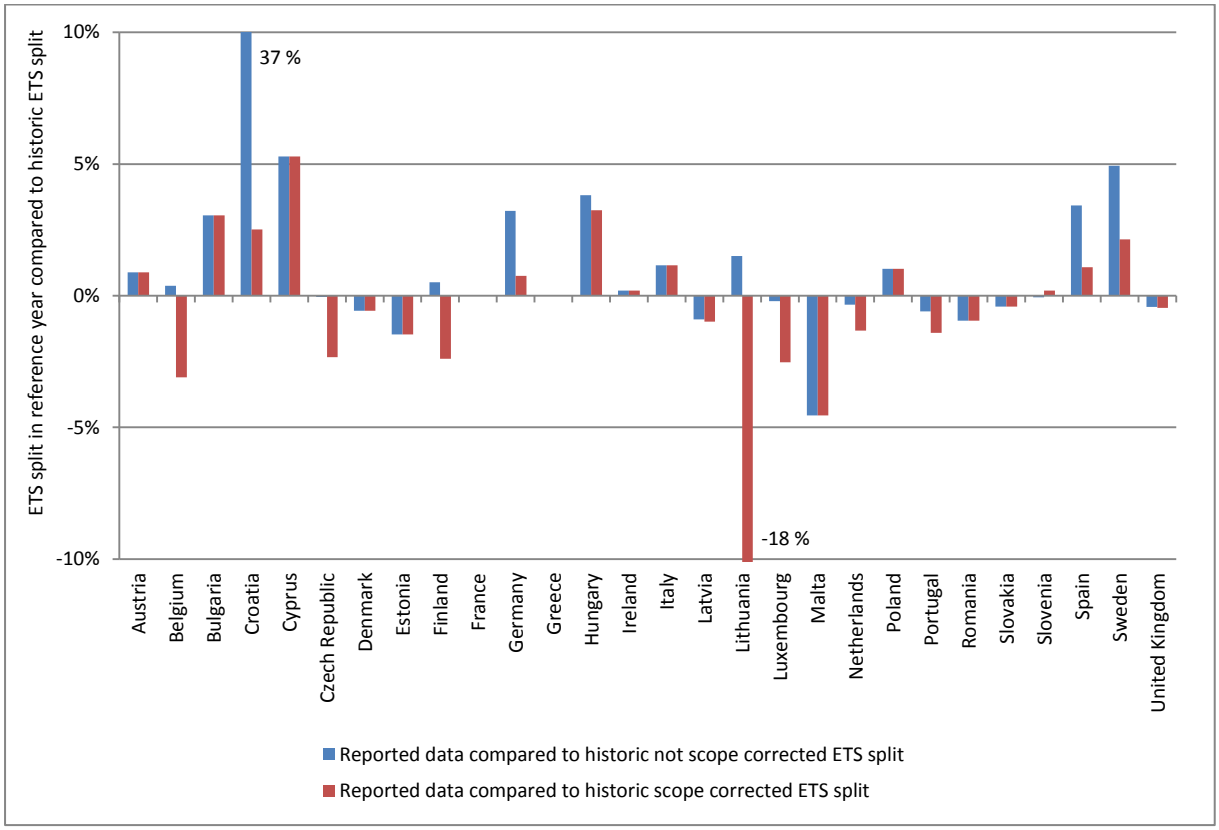


5.2.4 ESD/ETS split

In 2015, projected emissions had to be reported separately for ETS and ESD emissions for each source category. ETS splits reflecting the share of ETS emissions of total emissions in percent are calculated as ETS emissions divided by total emissions per category The ETS split should be consistent between inventory data and projections and should change only in small, plausible steps along the timeline.

All MS reported the ETS and ESD emissions of the total projected emissions and could therefore be compared with historic ETS splits from the inventory submission 2014 and ETS data (from EEA EU ETS data viewer[5]).

Figure 5-11 ETS split for the reference years of total GHG projections compared to historic ETS splits (2014 inventory)



Note: No ETS data for reference year has been provided by France.

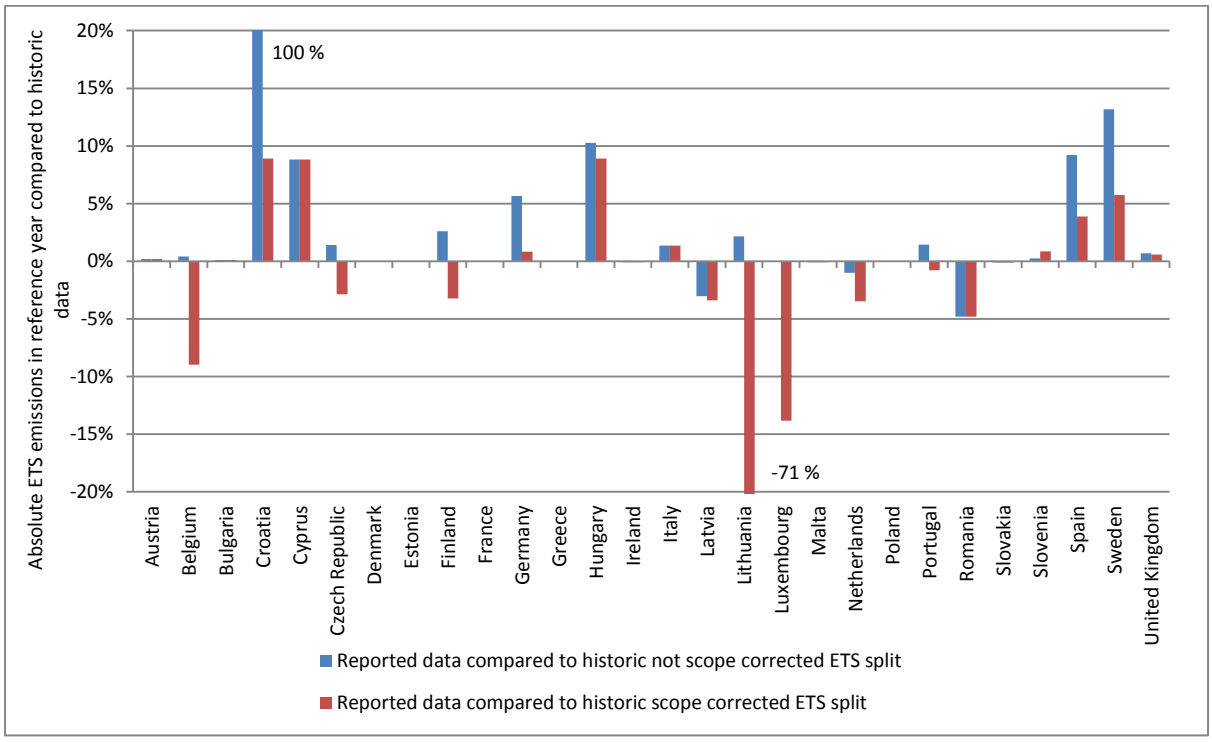
The calculation of historic ETS splits has been done twice: One time for ETS numbers as in EUTL database and one time scope corrected, applying the scope projections provided from the EEA EU ETS data viewer. This scope correction makes ETS data comparable between the different scopes of the second and the third trading period. MS could choose to either report scope corrected or not scope corrected ETS numbers. The difference of at least one ETS split to historic ETS split (either scope corrected or not) is below 5% for all reporting Member States but Cyprus and in most cases considerably lower. Differences to historic numbers might occur due to different assumptions on the change of ETS scopes but also due to different GWP or inventory numbers used. This is especially the case for Croatia: As the reference year was chosen to be 2012, the definition of ETS emissions in the scope of the second trading period in this year is a mere estimate as Croatia did not take part in the EU ETS in 2012. With this, not only the scope change had to be quantified but also the absolute amount of ETS emissions. This explains very well, why the difference to scope corrected

[5] http://www.eea.europa.eu/data-and-maps/data/data-viewers/emissions-trading-viewer

numbers is much lower. For Lithuania, the change in ETS scope lead to a considerable increase in ETS emissions. This explains the high difference between the shares of non-scope corrected historic ETS emissions and the calculated share from its projections. Obviously Lithuania used not scope corrected ETS emissions for the reporting of ETS emissions in the reference year (this has also been stated by Lithuania).

During the process it became evident, that the consideration of the absolute amount of ETS emissions in MS projections is more relevant than the split. See Figure 5-12 on the comparison of absolute ETS emissions.

Figure 5-12 Absolute ETS emissions for reference years compared to historic splits



Note: No ETS data for reference year has been provided by France.

Differences in reference years are considerably higher for some MS if absolute ETS emissions are considered. Assuming that reference year ETS emissions define the starting point of ETS emissions in projected years, a higher level of ETS emissions in reference year might induce a higher level of ETS emissions in projections. The projected level of ETS emissions is important on the one hand for the estimate of the amount of certificates which are needed in the ETS for the third trading period. On the other hand the level of ETS emissions defines the level of ESD emissions (as they nearly add up to total GHG emissions). Similar to the situation in the ETS, a calculation of the availability of annual emission allocation (AEA) certificates is important to estimate the future dynamics under the ESD. The amount of ESD emissions is in addition relevant for political discussions on the possibility of Member States to reduce emissions after 2020.
ETS splits have also been calculated along the timeline of projections and checked for time series consistency. Results are displayed in Table 5-2.

Table 5-2 Changes in ETS splits from reference year to 2035 in WEM scenario[6]

Member State	2015-reference year	2020-2015	2025-2020	2030-2025	2035-2030
Austria	-2,2%	0,2%	0,2%	1,0%	1,3%
Belgium	1,9%	0,1%	2,5%	2,4%	0,02%
Bulgaria	1,6%	1,5%	-2,2%	-1,0%	-0,8%
Croatia	-2,4%	2,7%	1,0%	0,7%	0,0%
Cyprus	-2,6%	-13,7%	2,4%	1,6%	1,2%
Czech Republic	-1,1%	-1,7%	-0,5%	0,2%	-2,6%
Denmark	2,8%	-8,1%	0,1%	-1,7%	0,9%
Estonia	0,3%	0,4%	-3,0%	-1,7%	-0,2%
Finland	6,2%	0,4%	-3,1%	-4,4%	5,2%
France	-	1,3%	1,5%	1,6%	0,9%
Germany	-0,8%	-1,3%	0,2%	-1,8%	-2,4%
Greece	-	-	-	-	-
Hungary	-5,4%	-2,6%	-0,9%	-	-
Ireland	2,5%	-1,6%	0,8%	0,8%	1,5%
Italy	0,2%	-1,1%	1,9%	1,2%	0,6%
Latvia	1,2%	2,5%	0,2%	1,7%	0,5%
Lithuania	12,7%	1,6%	1,1%	1,1%	0,2%
Luxembourg	-1,1%	-1,2%	-0,6%	-0,6%	-0,6%
Malta	1,9%	-19,4%	-3,1%	-2,3%	59,1%
Netherlands	5%	1,1%	-0,4%	-2,0%	-1,8%
Poland	0,3%	-1,3%	-0,6%	-1,8%	0%
Portugal	3,8%	-3,5%	-0,9%	-0,6%	-
Romania	2,8%	-0,6%	-1,4%	-1,8%	-1,1%
Slovakia	-0,7%	-0,3%	-0,1%	0,2%	0,3%
Slovenia	-5,1%	4,3%	-0,9%	-1,6%	-0,8%
Spain	-3,2%	0,9%	1,2%	-0,3%	-
Sweden	1,0%	3,4%	1,4%	0,4%	-1,0%
United Kingdom	-0,1%	-7,6%	-1,9%	2,7%	2,0%

Note: No ETS data for reference year has been provided by France.

Source: MMR MS Projections 2015.

Higher jumps in ETS splits have been highlighted in Table 5-2: Decreases of more than 5% in yellow and increases of more than 3% in red. For nearly all of these high changes explanations have been given by Member States. For smaller countries the closure or start-up of a single plant might affect heavily the share of ETS emissions. With this, projected ETS splits might change considerably from one year to the next. This is e.g. the case for Malta. For Denmark the strong decrease in emissions until 2020 is due to a considerable projected growth in the percentage of renewable energy sources in total energy production.
If the ETS split is constant from one year to the next the cell is highlighted in blue, indicating that either emissions have been kept constant (as it is the case in Poland between 2030 and 2035) or that the split between total GHG and ETS emissions has been constant by intention.

In most Member States domestic aviation has not been subtracted from total GHG emissions to calculate ESD emissions.

[6] This analysis is based on reported numbers, not on QA/QC checked numbers, as can be seen e.g. for Malta

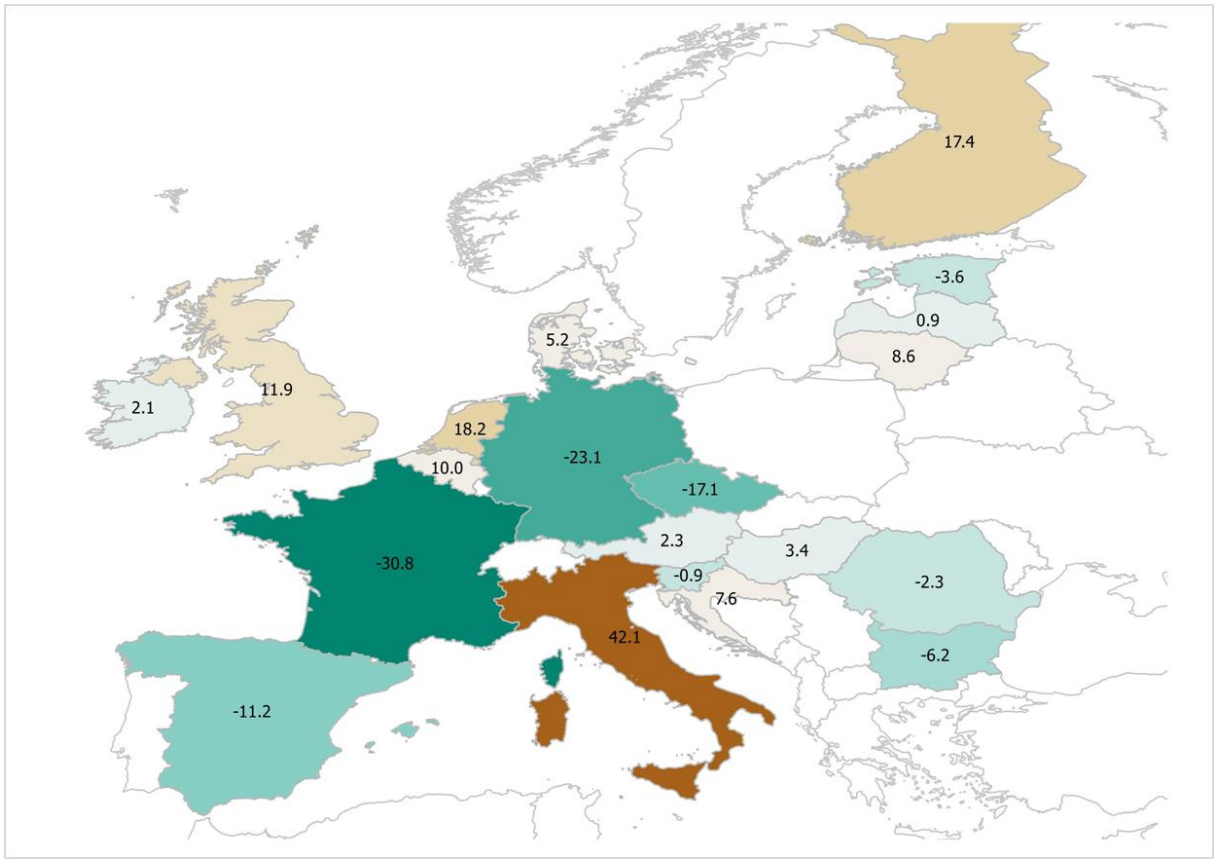
Due to the delay of inventory emissions, a thorough check on ETS emissions on source category level could not be conducted. Only a consistency check by source categories took place.

5.2.5 Net electricity imports

A comparison of projected numbers across Member State projections took place for the projection of net electricity imports. The numbers are shown in Figure 5-13 for reference years and in Figure 5-14 for the year 2020. The reduction of electricity imports or the increase of electricity exports are one of the main reasons for increasing ETS emissions.

10 Member States reported projected net electricity imports, 7 reported net electricity exports in the year 2020. No country changed the direction of exports and imports until 2020 in their projections. For all countries reporting net electricity imports and exports in 2020, the total sum of exchanges added up to about +20 TWh in reference years, whereas the sum for 2020 is -34 TWh. This means in total, considerably more exports are projected in these countries.

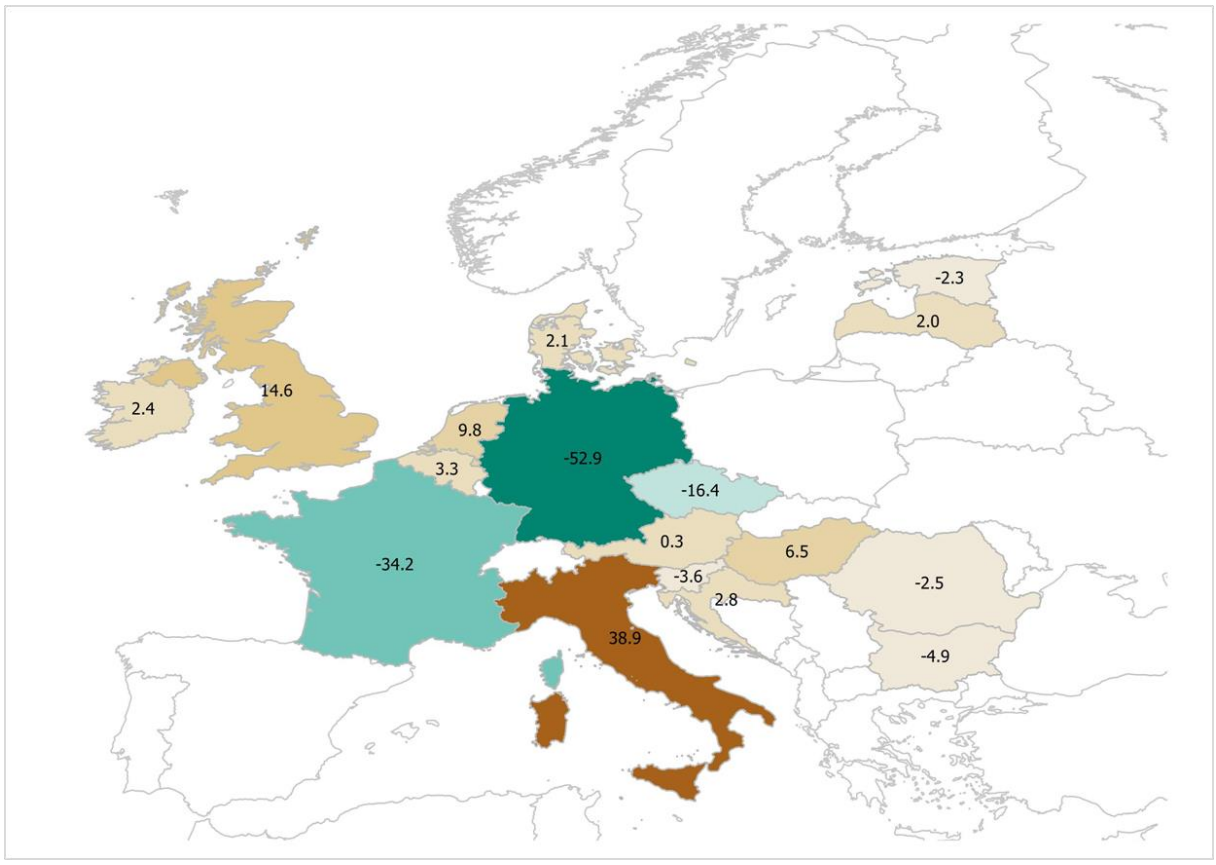
Figure 5-13 Net electricity imports and exports in reference years



Note: Negative numbers show net export, positive numbers net imports.

Source: MMR MS Projections 2015.

Figure 5-14 Net electricity imports and exports in the year 2020 (WEM scenario)



Note: Negative numbers show net export, positive numbers net imports.

Source: MMR MS Projections 2015.

From 10 importing countries, 6 are projecting a decrease of net electricity imports, strongest decrease in terms of percentage has been reported by Austria. From those 7 exporting countries, four are projecting higher exports in 2020. A strong increase of exports in absolute terms has been projected by Germany, in terms of percentage by Slovenia.

5.3 Accuracy and Transparency

To assess the accuracy of projections, a sum check was performed.For following countries the sum check did not reveal any issues: Austria, Belgium, Czech Republic, Germany, Finland, Hungary, Slovenia and the UK. For the other countries the sum check resulted in follow-up questions to MS experts in the QA/QC procedure. The number of questions, 190 in total, are counted split per sector, gas and scenario (in the communication to the MS, sometimes questions were aggregated). It was not split by years, which implies that questions could relate to only one year or to all years.

Although the ETC/ACM sector experts used a clear threshold value for the checks, some MS were informed about a difference that was below the threshold value, but nevertheless much higher than for all other sectors. This was the case for the 8 issues raised with Denmark.

In all cases where the difference was larger than the threshold value, corrective action was taken by the Member State (including a re-submission) or by the ETC/ACM.

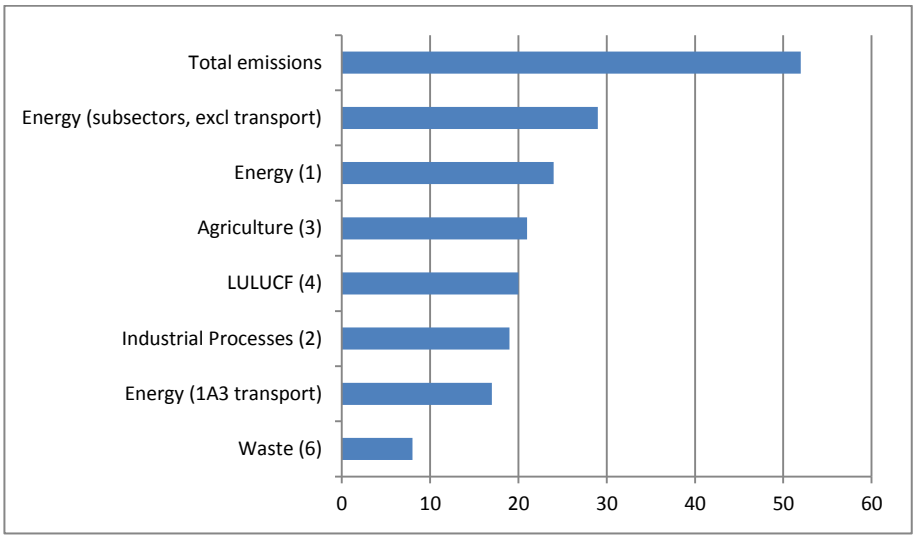
Table 5-3 Number of questions related to the sum check per MS.

Member State	Number of questions
BG	16
CY	2
DK	8*
EE	6
ES	6
FR	2
HR	9
IE	4
IT	11
LT	13
LU	3
LV	1*
MT	1
NL	21
PL	2
PT	49
RO	11
SE	5
SK	20

* For DK and LV the difference was below the threshold value, but because the difference was markedly larger for some sectors we wanted to point this out to make sure this was due to rounding and to exclude that this was an error.

Most of the failed sum checks related to the total emissions, either including or excluding LULUCF (Figure 5-15). In their response Member States experts mentioned two main reasons for failed sum checks: either there was a transcript error and an incorrect value was reported in the template or there was an error in a summation formula in the Excel template. The latter explains why the emissions in the sector total excluding and including LULUCF were most often different from the sum of the relevant subsectors. This can be an indication that the Member State has not implemented an effective internal QC system for the national projections reporting.

Figure 5-15 Number of issues per sector

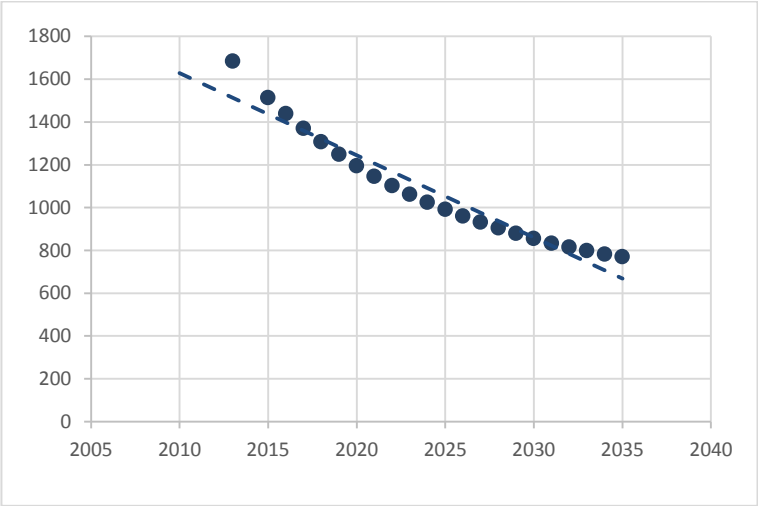


5.3.1 Outliers and trends

The outcome of the assessment of outliers and trends in Member States projections is based on four different checks. These checks are based on the reported projections information in 2015, inventory data and previously reported information on projections. The ETC/ACM's assessment was hampered by the fact that some data was not available at the time the checks were performed and that comparison with previous data sets was in some cases difficult because of changes in GWP values and methodology (change to 2006 IPCC guidelines). Also, assessing trends and outliers is difficult if there are few data points in the time series. This was most problematic in the report of Hungary that only included data for three years (2015, 2020 and 2025).

It is important to highlight that findings based on these checks are not necessarily revealing an error in projections, but rather point out the need for further clarification. The checks assume linear trends and use threshold values to indicate that something could be incorrect.. As an example, see the projection of total GHG emissions in the sector waste of Austria (Figure 5-16), which failed the quality check for outliers. Visual inspection shows however that there is no outlier but that the failed quality check is caused by a non-linear trend in projected emissions. All similar cases have been carefully analysed by the ETC/ACM experts and did not result in a question to the Member State.

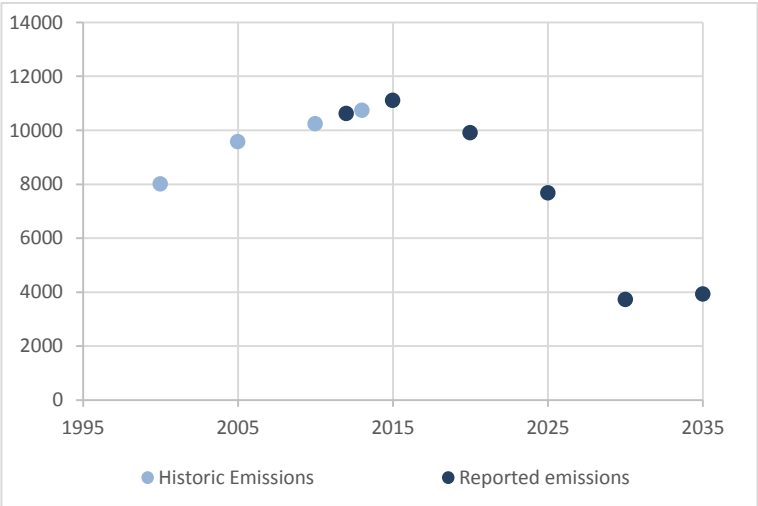
Figure 5-16 Outlier check (for Austria, total GHG emissions sector waste, in kt CO_2-eq)



In the case of Germany for instance, the quality checks revealed several issues. For example the projected HFC emissions from industrial processes show a distinctly different trend from historic emissions and emission in 2035 do not follow the overall trend. Both were however explained in the technical report so this did not result in a follow-up question.

It is important for MS experts to explain sectoral trend changes and outliers in emission trends in the report that accompanies the submission of the national GHG projections dataset in order to increase the efficiency of the QA/QC process.

Figure 5-17 Overall trend check (for Germany, HFC emissions sector industrial processes, in kt CO_2-eq)



In 13 cases Member State experts adjusted the report or the issue was resolved following other corrections (e.g. sum check). The following list provides examples for findings during the QA/QC procedure:

- Bulgaria adjusted reported information on ETS and ESD emissions of respectively the sector energy and the total (excluding LULUCF), following the sector expert's questions. The technical report was not available during the QA/QC process.
- Estonia adjusted GHG emissions in the sector waste after the outlier check revealed an issue with reported emissions for the years 2020-2024.
- Finland adjusted 2035 GHG emissions in the sector industrial processes which were markedly higher than other projected emissions (outlier check).
- France corrected GHG emissions in the sector industrial processes after outlier check revealed that emissions in 2025 were markedly lower.
- In the Hungarian projections the checks revealed that total GHG emissions were markedly lower compared to previous projections. This was partially caused by a summation error.
- Malta corrected CH_4 emissions from waste in the reference year after outlier checks.
- Failed checks for the Netherlands (industrial processes) were resolved by sum error correction.
- Poland corrected CO2 emissions in sector industrial processes (iron and steel production) in 2025 after the outlier check.
- Portugal corrected emissions resolving reference year emissions that deviated from projected total GHG emission trend.

In the cases were Member States did not adjust emissions, an explanation was provided in almost all cases. Most of the issues that were identified that could not be explained by visual inspection of the data related to following aspects:

- The emissions in the reference year deviated from the projected trend or the projected emissions followed a non-linear smooth trend. Member States providing an explanation in these cases referred to planned activities that affect emissions significantly. In the case of the energy sector, this was mostly the foreseen closure of coal-fired power plants (e.g. Ireland, Malta, Portugal, Slovenia, Slovakia and the UK). In some cases the impact on projected emissions is very significant, as is the case for Malta (Figure 5-18). In the case of Cyprus (Figure 5-19), emissions decrease until 2020 and start increasing again afterwards. This was explained by Cyprus as an impact of the economic crisis, which is expected to turn around from 2020 onwards. Nevertheless, projected emission reductions in 2020 seem unrealistically low. The ETC/ACM sought for an explanation and asked Cyprus for further clarification in the QA process. They responded that the trend can be explained due to economic crisis and an expected recovery after 2020.

Figure 5-18 Outlier check (for Malta, total GHG emissions, sector Energy, WEM, in kt CO_2-eq)

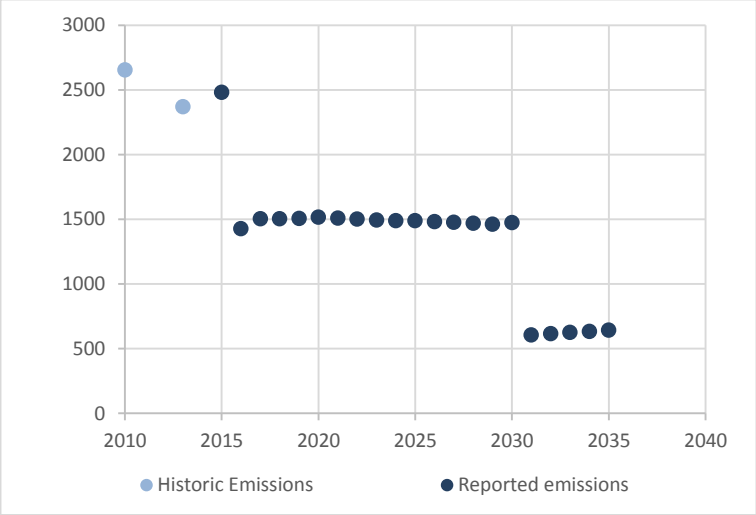
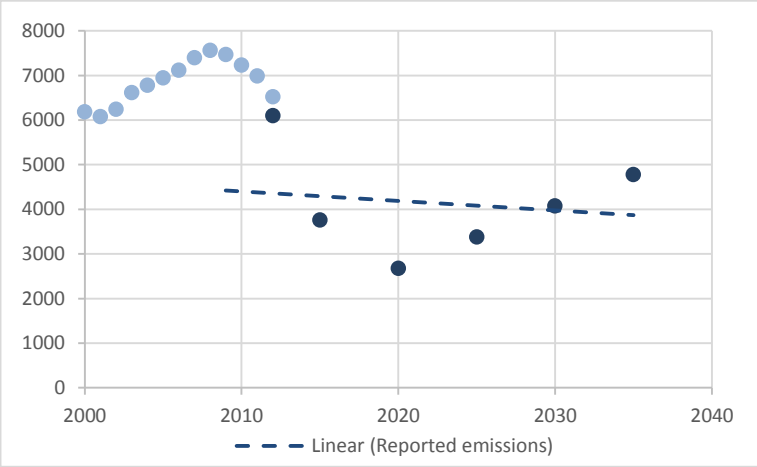
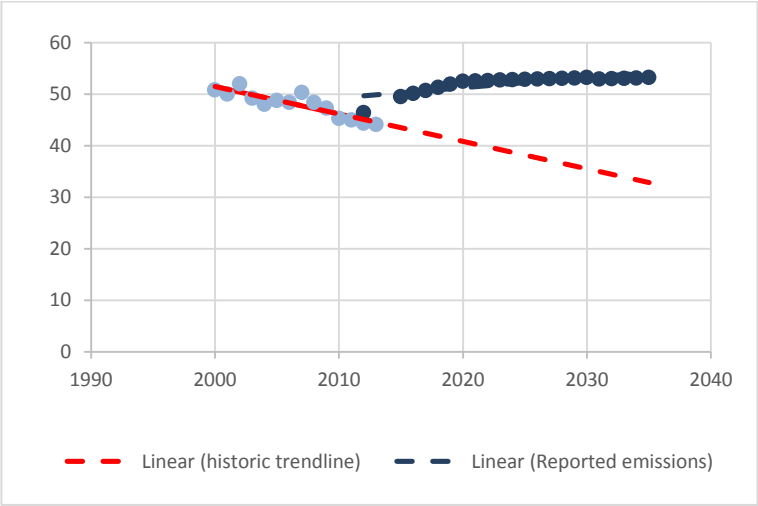


Figure 5-19 Outlier check (for Cyprus, CO_2 emissions sector energy Industries, WEM, in kt CO_2-eq)



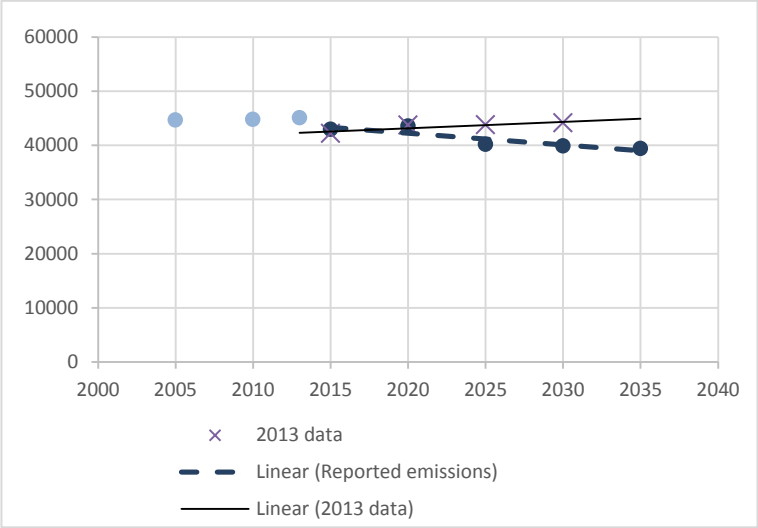
- The trend of historic emissions deviated from the trend of projected emissions. In total 34 questions were directed to the Member States to clarify different trends in projected emissions and inventory data. Because the sector experts did not have inventory data at the time of the quality checks, available summary 2 tables were used. An example of the findings is presented below for Slovenia (Figure 5-20). In their response Member States experts pointed towards the projected changes in underlying activity variables and the implementation and impact of PaMs. For instance in the case of Slovenia, the historic trend is marked by decreases in the number of animals whereas the future trend takes into account the Slovenian strategy of food self-supply, that assumes increasing number of animals.

Figure 5-20 Overall trend check (for Slovenia, CH_4 emissions sector agriculture, in kt CO_2-eq)



- In the case when projected emissions were markedly different from previous projections, a comment was provided to the Member States expert for an explanation and a recommendation to incorporate explanations in the technical reports. As an example, see Figure 5-21 for Bulgaria. In total, 10 questions concerning the recalculation check were asked to 9 different Member States.

Figure 5-21 Recalculation check (for Bulgaria, CO_2 emissions sector energy, in kt CO_2-eq)



5.4 Parameters

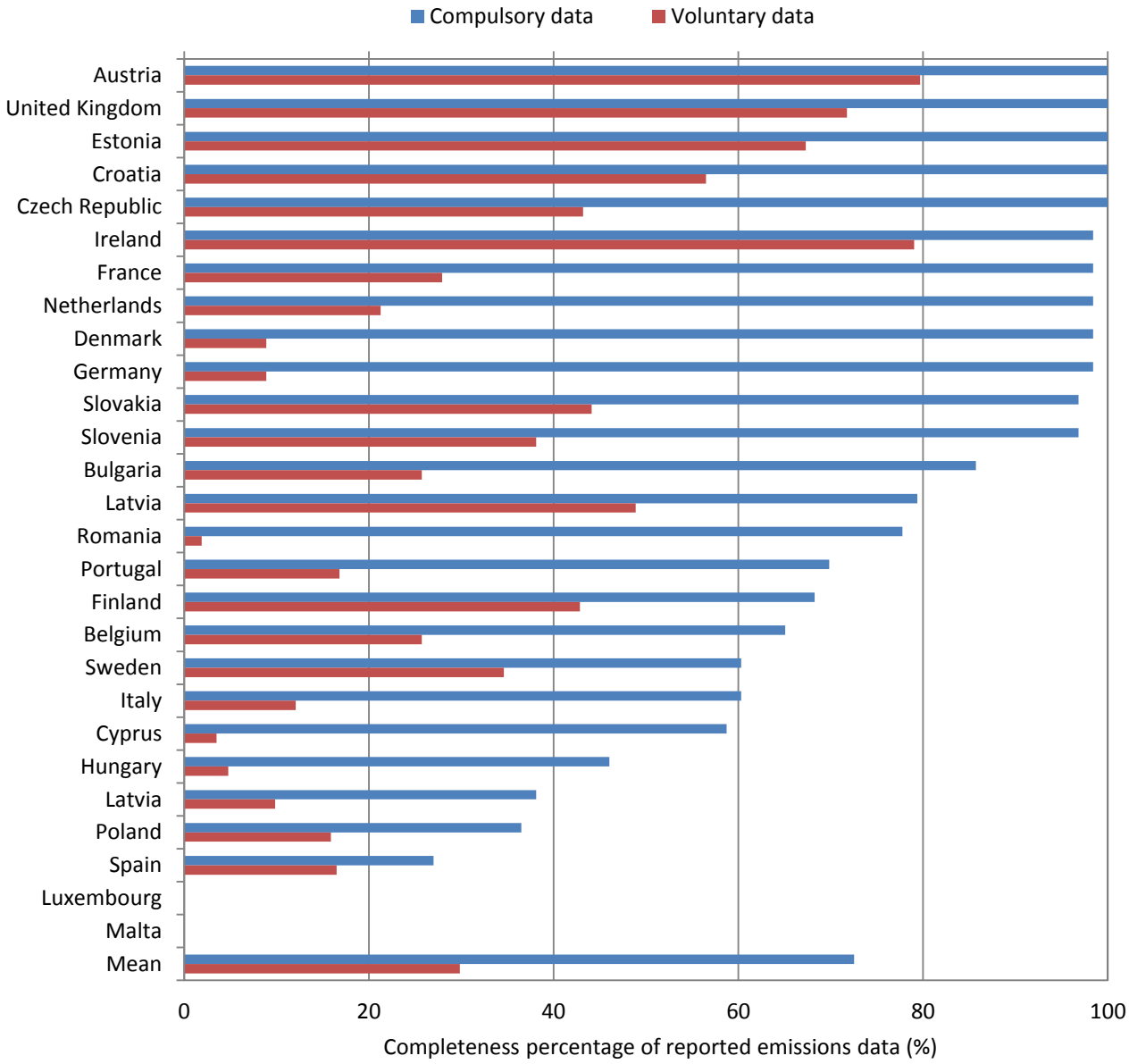
5.4.1 Reported parameters

The completeness of mandatory and voluntary parameters required under the MMR and used in the QA procedure is presented in Figure 5.5. The submitted mandatory data were judged complete if the years (2015, 2020, 2025, 2030 and 2035) for WEM scenario were reported while the voluntary data taken into consideration are reported units, reference year, intermediate years and WAM scenario.

Only five countries (Austria, Czech Republic, Estonia, Croatia and the United Kingdom) have provided all mandatory information whereas two Member States (Luxembourg and Malta) have not provided any.

In general, the completeness of reporting for the projection parameters is satisfactory, with 16 Member States reporting more than 70 % of the information. It should be noted though that not all parameters are actually used for projections and this explains the relatively low completeness rate for some Member States.

Figure 5-22 Completeness percentages for all projections parameters by Member State



5.4.2 Most common parameter issues

Parameter tables (Table 3) were available from 25 Member States of which Latvia, Cyprus and Slovenia submitted after the internal cut-off date (22 May 2015). For Greece, Luxembourg and Malta, no parameter tables were available to date.

The comprehensive overview given in Table 5-4 summarizes the QA/QC process for each Member State and each parameter. It shows that
a follow up with Member States was needed often, but
nearly all issues could be solved. This was the case because either data consistent to surrogate data was resubmitted (middle green) or because an explanation of the differences was submitted by MS experts (blue).

Specifically for gross domestic product (GDP) and gross inland consumption (GIC), default units were often not used by MS, so the sector experts converted the data into default units. Furthermore, the sector experts detected two apparent errors that were corrected (see dark and light purple indications in Table 5-4).

All in all, least follow up was needed for population; most follow up took place for gross inland consumption of all energy carries.

Table 5-4 'Heat Map' of QA/QC procedure and most common issues of the parameter checks

Country	Code	Population	GDP	GIC Coal	GIC Oil	GIC Gas	Electricity Imports
Austria	AT						
Belgium	BE						
Bulgaria	BG						
Cyprus	CY						
Czech Republic	CZ						
Germany	DE						
Denmark	DK						
Estonia	EE						
Spain	ES						
Finland	FI						
France	FR						
Croatia	HR						
Hungary	HU						
Ireland	IE						
Italy	IT						
Lithuania	LT						
Latvia	LV						
Netherlands	NL						
Poland	PL						
Portugal	PT						
Romania	RO						
Sweden	SE						
Slovenia	SI						
Slovakia	SK						
United Kingdom	UK						

Colour Code:

No follow up

value in line with surrogate data

no use of default unit -> corrected by ETC/ACM sector expert

apparent error detected -> corrected by ETC/ACM sector expert

Follow up: Neither value nor notation key given OR value not in line with surrogate data; issue solved

resubmission of notation key -> issue solved

resubmission of value consistent to surrogate data -> issue solved

explanation of reason for difference -> issue solved

Follow up: Neither value nor notation key given OR value not in line with surrogate data; issue NOT solved

no resubmission of MS -> issue not solved

resubmission of value NOT consistent to surrogate data / no explanation of reason for differences but issue also not followed up-> issue not solved

Follow up in progress or no follow up

no values submitted

no check performed because base year is too far in the past

Note: Data of Member States was checked against surrogate datasets from Eurostat and entso-e: Population – Eurostat demo_pjan; GDP - Eurostat nama_10_gdp; GIC - Eurostat nrg_100a; electricity import: entso-e detailed electricity exchange. Thresholds for the checks were 2 % for population and GDP and 4 % for GIC and electricity import.

Source: Oeko-Institut (2015): Short briefing paper on the consistency of GHG projections parameters.

5.4.3 Deviation from recommended parameters

In June 2014, the European Commission provided Member States with recommended and suggested parameters for use in the preparation of GHG projections (COM, 2014). Checks were carried out to gain insights into whether Member States experts used the provided values. See Table 5-5 for an overview. This check is of informative nature only and no follow up was made in case parameters deviated from the recommendations of the European Commission.

In general, it can be observed that mainly the parameters for coal (used by 11 Member States) and carbon prices (used by 10 Member States) have been used by Member States as provided through the guidance. Furthermore, no Member State used the recommended values for GDP. There are four countries that used all of the parameters given in the guidance except for GDP: Bulgaria, France, Croatia and Romania. Except for France these countries are among the newest Member States of the EU. Eight countries did not make any use of the guidance provided by the EC: Austria, Belgium, Germany, Italy, Latvia, Spain, Sweden and United Kingdom.

Table 5-5 Overview: Use of recommended parameters by the European Commission

Country	Code	Coal Price	Gas Price	Oil Price	Carbon Price	Population	GDP[(a)]
Austria	AT	No	No	No	No	No	No
Belgium	BE	x	x	x	x	No	x
Bulgaria	BG	Yes	Yes	Yes	Yes	Yes	No
Cyprus	CY	No	No	No	Yes	No	No
Czech Republic	CZ	Yes	Yes	Yes	Yes	No	No
Germany	DE	No	No	No	No	No	No
Denmark	DK	Yes	No	No	No	No	No
Estonia	EE	Yes	No	No	No	Yes	No
Spain	ES	x	x	x	x	No	No
Finland	FI	Yes	x	Yes	Yes	No	No
France	FR	Yes	Yes	Yes	Yes	Yes	No
Croatia	HR	Yes	Yes	Yes	Yes	Yes	No
Hungary	HU	No	No	No	No	Yes	No
Ireland	IE	No	No	No	Yes	No	No
Italy	IT	No	No	No	No	No	x
Latvia	LV	No	No	No	No	No	No
Lithuania	LT	x	x	x	No	Yes	x
Netherlands	NL	Yes	No	No	No	No	No
Poland	PL	Yes	No	No	No	No	No
Portugal	PT	No	No	No	Yes	No	No
Romania	RO	Yes	Yes	Yes	Yes	Yes	No
Sweden	SE	No	No	No	No	No	No

Country	Code	Coal Price	Gas Price	Oil Price	Carbon Price	Population	GDP[(a)]
Slovenia	SI	Yes	No	No	No	No	No
Slovakia	SK	No	Yes	Yes	Yes	Yes	No
United Kingdom	UK	No	No	No	No	No	No
Number of countries using EU Guidance		**11**	**6**	**7**	**10**	**8**	**0**

Colour Code:

use of guidance

no use of guidance

no values submitted

([a]) To compare GDP submitted by Member States with data supplied by the EC Guidance the following was done: the guidance was given in growth rates for the periods 2015-2020; 2020-2025; 2025-2030, 2030-2035 and 2030-2035. This data was used to create a timeline of absolute GDP values by applying the given growth rates to the latest available GDP value from Eurostat (2015b), and then carry on based on the individual growth rates provided. The absolute numbers were then compared to those supplied by Member States. For some years, some Member State data only deviated little from the provided guidance. Overall, according to this approach for the comparison, no Member State used the complete time series provided by the EC.

Source: Oeko-Institut (2015): Short briefing paper on the consistency of GHG projections parameters.

During the checking process it became clear that it would be helpful if Member States experts provided all parameters relevant to their modelling, no matter if these relate to input or output data. At the same time it seems necessary to stress the point that Member States should provide appropriate notation keys for parameters they did not use.

References

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Eurostat (2015b): nama_10_gdp. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en. Last update: 24.3.2015.

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Oeko-Institut (2015 - unpublished): Short briefing paper on the consistency of GHG projections parameters.