


**Technical Guidance for Emissions
Inventory Adjustments under the
Amended Gothenburg Protocol:
Inventory adjustments in the context
of Emission Reduction Commitments**

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Contents

1	Introduction.....	3
1.1	The purpose of this technical guidance	3
1.2	Previously approved adjustments for the Gothenburg Protocol ceilings will not be valid for the amended Gothenburg Protocol emission reduction commitments	4
1.3	The European Commission’s National Emissions reduction Commitment Directive	4
2	Inventory adjustments in the context of Emission Reduction Commitments	4
2.1	Introduction	4
2.2	Illustrative examples of adjustments under ERC	5
3	Quantification of inventory adjustments under ERC	8
3.1	Reference version of the EMEP/EEA Guidebook	8
3.2	Information that needs to be reported	8
3.3	Quantification of the adjustment under ERC.....	9
4	Good Practice in calculating and reporting inventory adjustments under ERC	10
4.1	Introduction	10
4.2	On-going commitment to report adjustments under ceilings	10
4.3	Level of detail of the source categories to which an adjustment applies	10
4.4	Scope of an individual adjustment	11
5	Applying for an inventory adjustment under ERC	11
6	Review of inventory adjustments under ERC.....	12
7	Reporting a previously approved inventory adjustment under ERC.....	12
8	Source specific observations relating to inventory adjustments under ERC	12
8.1	Introduction	12
8.2	Road transport.....	12
8.3	Anaerobic digestion	12
8.4	NOx and NMVOC emissions from 3B Manure Management and 3D Agricultural soils	13
8.5	Sources moved into/out of the national total	13

1 Introduction

1.1 The purpose of this technical guidance

Within the Convention there are EB Decisions which explain the concept of several flexibility mechanisms which can be used for demonstrating compliance with emission targets. One of the flexibility mechanisms is the use of adjustments that can be made to emissions inventories¹. Under specific circumstances, such adjustments allow a Party to report national emission estimates for compliance purposes, which differ from their best science national emission estimates.

Technical guidance on inventory adjustments is also available², which explains, amongst other things:

- How a Party should apply for a new adjustment (including the information that needs to be provided);
- How the validity and quantification of the new inventory adjustment are reviewed;
- The steps in determining whether a new inventory adjustment application is approved or rejected; and
- How previously approved inventory adjustments should be reported and reviewed.

This technical guidance also includes case studies and worked examples to support Parties who are considering their options with regards to making a new inventory adjustment application.

However, the existing technical guidance and adjustment reporting templates³ support Parties who wish to use the option of inventory adjustments to demonstrate compliance with emission ceilings specified in the Gothenburg Protocol. The amended Gothenburg Protocol requires Parties to demonstrate compliance with emission reduction commitments (ERCs) for 2020 onwards. Inventory adjustments that are applicable to ERCs (rather than ceilings) require different considerations, and the submission of additional supporting information.

This technical guidance has been prepared in response to a request from the EB (point 13b in the minutes of the 41st session of the EB) to the TFEIP, to draft technical guidance to support Parties wishing to use adjustments to demonstrate compliance specifically with the ERCs in the amended Gothenburg Protocol.

Parties that are signatories to the Gothenburg Protocol and not to the amended Gothenburg Protocol are required to demonstrate continued compliance with emission ceilings. It is necessary to retain the original technical guidance and associated processes that pertain to demonstrating compliance with the ceilings of the Gothenburg Protocol for these Parties. This document therefore presents technical guidance that is *additional* technical guidance, or guidance specifically relating to the amended Gothenburg Protocol. This guidance does not replace the existing technical guidance that refers to inventory adjustments in the context of emission ceilings set under the Gothenburg Protocol.

¹ Executive Body decisions 2012/3 and 2012/4 (see ECE/EB.AIR/111/Add.1) and amended by EB decision 2014/1.

² ECE/EB.Air/130. The guidance is available from the CEIP website, [here](#).

³ Annex II to the EB Decision ECE/EB.Air/130 is used for applying for an adjustment. Annex VII of the Reporting Guidelines is used for reporting previously approved adjustments.

1.2 Previously approved adjustments for the Gothenburg Protocol ceilings will not be valid for the amended Gothenburg Protocol emission reduction commitments

Parties wishing to use adjustments to demonstrate compliance with the Emission Reduction Commitments specified in the amended Gothenburg Protocol will not be able to use existing inventory adjustments accepted for compliance with the Gothenburg Protocol ceilings. They will, in effect, need to “start again” in assessing which revisions to their inventory are eligible as adjustments. This is primarily for two reasons:

- The reference version of the EMEP/EEA Guidebook (that is used to determine the scientific knowledge and understanding when the commitments were set) is 2009 for the commitments specified in the amended Gothenburg Protocol i.e. different to that used for adjustments under the Gothenburg Protocol. As a result, it is likely that the validity and quantification of most adjustments will have changed.
- The calculations that are required for an adjustment under the amended Gothenburg Protocol will require consideration, and reporting, of information relating to emissions in 2005 as well as 2020 onwards. Previously accepted adjustments under the Gothenburg Protocol do not provide this information.

1.3 The European Commission’s National Emissions reduction Commitment Directive

Whilst this technical guidance is for use within the Convention, it is also recognised that the European Commission’s National Emissions reduction Commitment Directive (NECD) refers to Convention guidance documents. To facilitate co-operation between the Convention and the NECD, reference is made to the NECD in this guidance where there are relevant and material differences between the two.

2 Inventory adjustments in the context of Emission Reduction Commitments

2.1 Introduction

It is necessary to introduce clear differentiation between inventory adjustments that apply in the context of a compliance regime based upon emission ceilings (Gothenburg Protocol) and those which apply in the context of ERCs (amended Gothenburg Protocol) - henceforth termed “adjustments under ceilings” and “adjustments under ERC” respectively in this note.

Adjustments under ERC are inherently more complicated than adjustments under ceilings. This is because demonstrating compliance with ERCs requires emissions data from the compliance year in question (in this case 2020 onwards), and 2005. For example, a “new source” adjustment (as defined in EB Decision 2012/12) under a ceiling compliance check always provides a beneficial revision to the compliance total. However, this is not the case for determining compliance with ERCs – a new source adjustment may aid or hinder compliance with an ERC, depending on the time trend of the new source (illustrative examples are shown below in Section 2.2).

A valid adjustment under ERC might involve revising down the emissions in the compliance year in question, or it might involve revising up the emissions in 2005 to change non-compliance into compliance. However, in many cases it is likely that both years would need to be revised to capture relevant changes that impact across the entire time series, and the magnitude and direction of the

revisions will determine whether the net effect would bring a Party into compliance and is therefore considered eligible for an adjustment application.

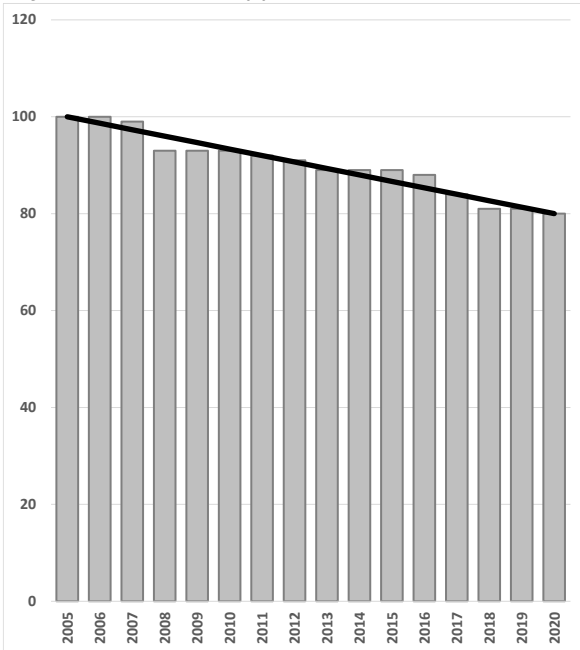
2.2 Illustrative examples of adjustments under ERC

Given the relative complexity of adjustments under ERC compared to adjustments under ceilings (both in terms of conceptualising them, and also providing sufficient supporting information), it is helpful to consider some illustrative examples (below in Figures 1A-F). These demonstrate some of the many possible combinations that might be considered for an adjustment under ERC application and explain which are theoretically valid, and which are not.

Figure 1 A – 1G: Illustrative examples of adjustments that impact 2005 and 2020 emissions in different ways

Example Base case

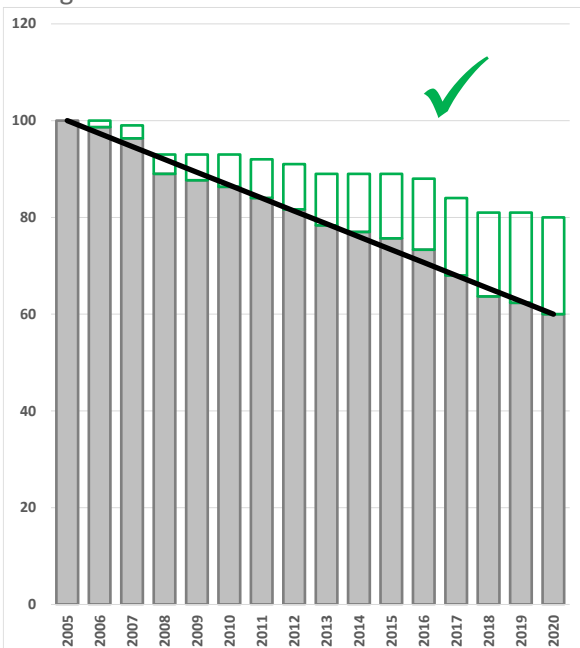
Emissions fall from 100 in 2005 to 80 in 2020. The reduction achieved is 20%, which is not sufficient to meet the ERC of 25%. So an adjustment can be applied for.



Example adjustment A: A new growing source

The impact of the adjustment reduces emissions in later years by more than the earlier years. This could be from e.g. a new source that grows with time.

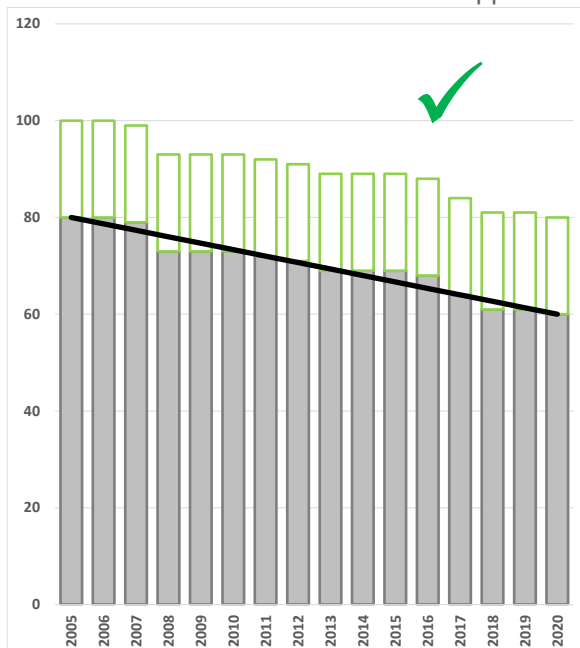
It is an appropriate case for an adjustment application. In this case the percentage reduction changes from 20% to 40%.



Example adjustment B: A new constant source

This is an example of an adjustment that relates to a new source that is constant with time.

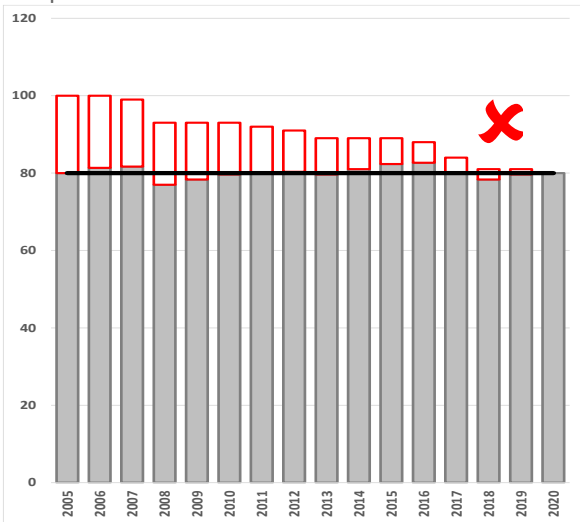
Even though the adjustment value is the same for each year of the time series, it acts to increase the percentage reduction between the first and last years in the timeseries – in this case from 20% to 25%. It is therefore a valid case for an application.



Example adjustment C: A new shrinking source, example 1

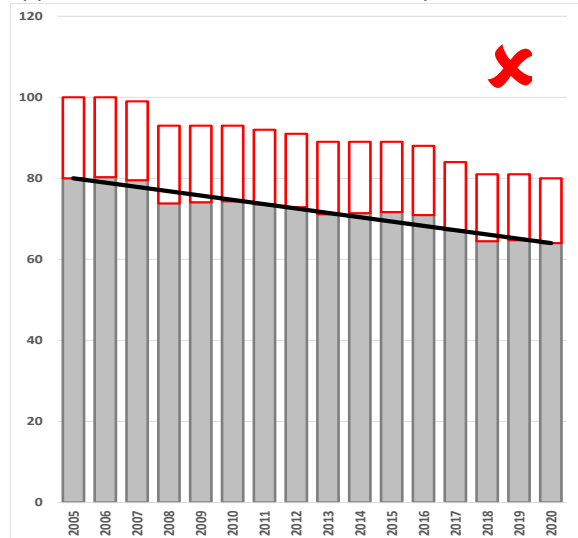
Unlike adjustments under ceilings, not all new sources lead to appropriate adjustments under ERC. In this case a new source (which decreases across the time series) acts to reduce the percentage reduction from 20% to 0%.

This would not be a valid adjustment application as it would not move a Party from non-compliance into compliance.



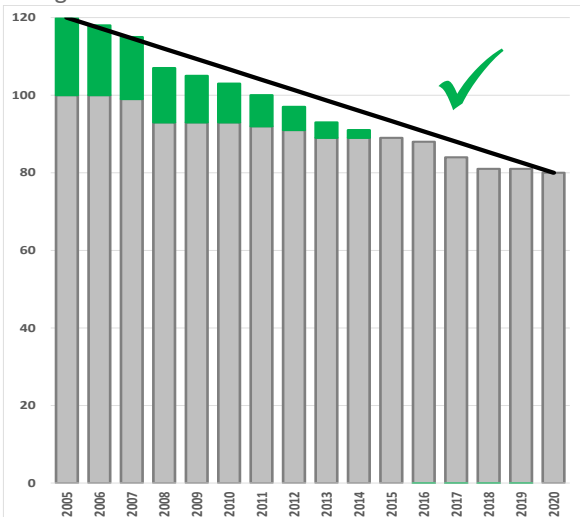
Example adjustment D: A new shrinking source, example 2

Adjustment B (above) shows a new constant source that is a valid application, and adjustment C (left) shows a shrinking source that is detrimental to achieving compliance with an ERC. There is a theoretical “neutral point” between these two examples. A new source that decreases at the same rate as the unadjusted total has no net effect if it is used as an adjustment – in this case the 20% reduction is unchanged after removing the new source, and is therefore not a valid case for an application as it does not achieve compliance.



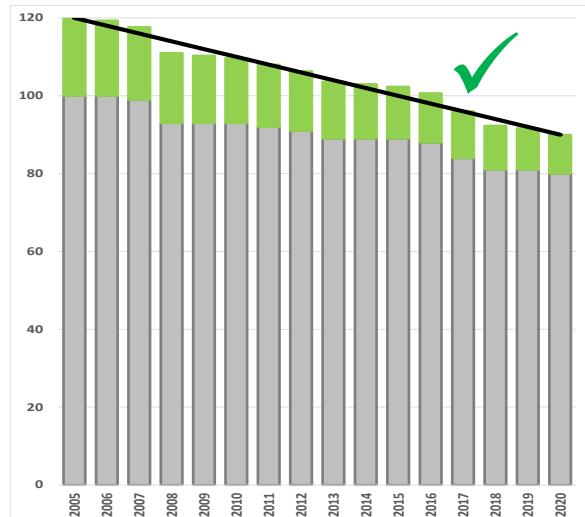
Example adjustment E: No change to 2020 emissions

There are examples of valid adjustments under ERC that make no revision to the 2020 emissions. Rather than the adjustment reducing emissions in 2020 (examples A-D), the adjustment increases emissions in 2005. The example below might arise when changes to the inventory (based on new science) have decreased the estimates for 2005. The adjustment therefore acts to remove this impact, and revises up the 2005 estimates, in this example the percentage reduction changes from 20% to 33%.



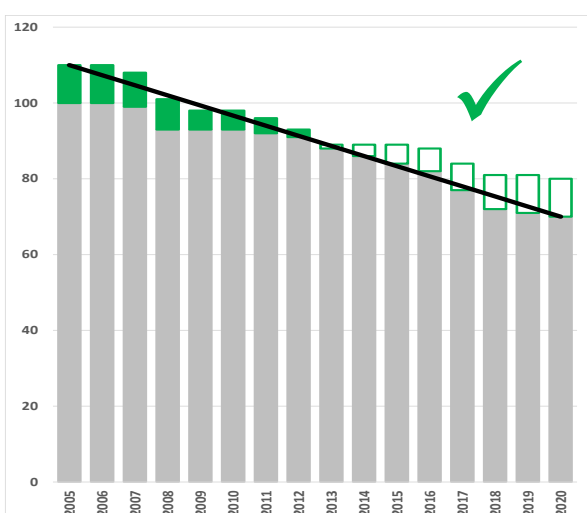
Example adjustment F: Increases in 2020 estimates, but greater increases in 2005

It initially seems counter-intuitive that there may be a valid case for an adjustment which involves revising up 2020 emissions. However, a slightly modified version of Example E (left) can arise where an adjustment increases the 2020 emissions, but also increases the 2005 emissions to a greater extent. In this example, the percentage reduction changes from 20% to 25%, which could be a valid case for an adjustment.



Example adjustment G: Changes to both 2005 and 2020

There are many other examples of changes, or combinations of changes, that could be applied to 2005 and 2020 emissions, and some will be valid cases for an adjustment (assuming all other requirements are met). In the example shown below the adjustment revises up 2005, and revises down 2020, which acts to change the percentage reduction from 20% to 36%



It is evident from the illustrative examples presented above that it can be difficult to assess which revisions to the inventory might be the basis for a valid adjustment under ERC. Inventory compilers will probably need to undertake detailed assessments of their inventory data before they can determine what might be appropriate for inclusion in an adjustment application. It is therefore likely that the resources required for Parties to determine their adjustment applications under ERC will be larger than for adjustment applications under ceilings.

3 Quantification of inventory adjustments under ERC

The following sections outline the principles for quantifying an inventory adjustment under ERC.

3.1 Reference version of the EMEP/EEA Guidebook

The version of the EMEP/EEA Air Pollutant Emission Inventory Guidebook that is to be used as the reference version for the purpose of calculating adjustments for the amended Gothenburg Protocol is the version published in 2009. This version of the Guidebook is available [here](#).

3.2 Information that needs to be reported

An inventory adjustment under ERC makes revisions to the emission estimates for one or more source categories in 2005 and/or relevant years from 2020 onwards.

- **Reporting of data:** The revisions need to be reported in the adjustments under ERC template provided – entitled “Annex IIa to the ECE-EB Air130 adjustment Application”. The adjustment needs to change the status of compliance with the ERC from non-compliant to compliant.

This is not simple to interpret from reported data, so the template includes calculations to check that the impact of the adjustment increases the percentage emissions reduction from 2005.

- **Accompanying methodology and results text:** Sufficiently detailed supporting information also needs to be provided, in either the IIR or a separate adjustments report. This is explained in the existing technical guidance for adjustments.

3.3 Quantification of the adjustment under ERC

Irrespective of whether the inventory adjustment is based on a new source, or revisions to methodologies or emission factors, the underlying calculations used to quantify the adjustment under ERC will be the same.

The emission reduction (prior to any adjustments) is expressed as:

$$ER_Y (\%) = 100 \times (E_{2005} - E_Y) / E_{2005} \quad (1)$$

Where:

ER_Y is the emission reduction (prior to adjustment) in the year Y compared to emissions in 2005, expressed as a percentage

E_{2005} is the national emission total in the year 2005

E_Y is the national emission total in the year Y

When making an adjustment under ERC application, Parties should will need to demonstrate that ER_Y is lower than the corresponding ERC set for a Party for the given pollutant i.e. the Party is in non-compliance.

The emission reduction after an adjustment has been applied is expressed as:

$$AER_Y (\%) = 100 \times (AE_{2005} - AE_Y) / AE_{2005} \quad (2)$$

Where:

AER_Y is the adjusted emission reduction in the year Y compared to the emissions in 2005, expressed as a percentage

AE_{2005} is the adjusted national emission total in the year 2005 (in some cases $AE_{2005} = E_{2005}$)

AE_Y is the adjusted national emission total in the year Y (in some cases $AE_Y = E_Y$ i.e. the emission in year Y is not adjusted)

When making an adjustment under ERC application, Parties should demonstrate that the impact of all adjustments result in AER_Y being greater than the corresponding ERC i.e. the net impact of the adjustments move the Party from non-compliance to compliance.

AE_{2005} and AE_Y and are defined as:

$$AE_{2005} = E_{2005} + A_{2005} \quad \text{and} \quad AE_Y = E_Y + A_Y \quad (3)$$

where A_Y and A_{2005} are the adjustments made (in absolute terms) to the national emissions totals in years Y and 2005 respectively. These are calculated using the same principles outlined in the existing technical guidance, which explains how revisions to emission factors and methodologies are used in

the quantification of the adjustment. In the case of adjustment under ERC, it may be that one of A_Y and A_{2005} is zero.

The following worked example shows the calculations that relate to the example shown in figure 1G above, where the adjustment under ERC application increases the emission in 2005 from 100 to 110 and decreases the emission in 2020 from 80 to 70.

Equation (1) gives:

$$\text{Emission reduction } ER_Y (\%) = 100 \times (100 - 80)/100 = 20\%$$

Equation (2) gives:

$$\text{Adjustment emission reduction } AER_Y (\%) = 100 \times (110 - 70)/110 = 36\%$$

As a reduction of 36% is greater than the ERC of 20%, this would move the Party from non-compliance into compliance⁴, and is therefore a valid case for an adjustment under ERC application.

4 Good Practice in calculating and reporting inventory adjustments under ERC

4.1 Introduction

The review of adjustments under ceilings has highlighted several points that benefit from some clarification. They are included here in relation to adjustments under ERC, but Parties should note that this is best practice that can be applied to all adjustments.

4.2 On-going commitment to report adjustments under ceilings

Parties that are signatories to the amended Gothenburg Protocol are required to demonstrate compliance with relevant ERCs. They are no longer requested to submit adjustments that demonstrate compliance with emissions ceilings, and any such adjustments under ceilings that are submitted will not be reviewed.

Parties that are signatories to the Gothenburg Protocol, but not the amended Gothenburg Protocol, are required to demonstrate compliance with relevant ceilings. Their potential use of adjustments remains unchanged, and they may apply for a new adjustment under ceilings and/or continue to report previously approved adjustments.

4.3 Level of detail of the source categories to which an adjustment applies

Existing technical guidance on adjustments does not provide much information on the extent to which changes across several NFR sources could, or should, be aggregated and reported as one adjustment application, or reported as many individual adjustment applications.

It is considered good practice to report an adjustment for each individual source category (as defined in the NFR reporting structure), and not at a finer resolution. However, the sectoral resolution to

⁴ The value of 36% is quoted here to zero decimal places for convenience. All calculations relating to compliance assessments are undertaken using full precision.

which an adjustment is applied should be guided by the underlying reason for the methodology revisions, so that all changes can be captured in a single adjustment. This is particularly the case where there are links or impacts across different sources. For example in manure management, if an underlying parameter is changed that impacts on NH₃ emissions from all livestock classes, then it is sensible to aggregate these and report the total impact as a single adjustment, labelled as being for the source sector “3B Manure Management” even if it is a sum of changes to several sources.

This approach avoids the need for Parties to include an excessive amount of data in the reporting templates, and also allows the expert reviewers to work more efficiently. However, it may not always be simple to present the adjustment in this way if there are impacts across numerous or diverse NFR sources.

In the example given above, it would be particularly important for the Party to provide sufficiently detailed supporting information as part of the adjustment application so that all of the revisions within 3B Manure Management are transparent and can be reviewed by an expert review team.

4.4 Scope of an individual adjustment

The adjustment process allows Parties to create a version of their national emission estimates for compliance assessment, and which changes non-compliance into compliance for those pollutants for which an adjustment application is requested or has in the past been approved. This is done by removing the impact of selected past improvements that have been made to the inventory which are detrimental to achieving compliance with given ceilings or ERCs. This process does not require the removal of revisions to the inventory that have been beneficial to achieving compliance.

However, when considering revisions that have been made to an individual source (an “individual source” being defined by the NFR reporting structure), many national inventory compilers have considered it appropriate to include all revisions in their adjustment application (both beneficial and detrimental) and report a net change. The expert review teams have considered this to be best practice but note that this approach is not required by the EB decisions relating to adjustments.

In some cases, selecting only the revisions that would be beneficial to attaining compliance would be very complex. For example, quantifying an adjustment under ERC for passenger cars by accounting for revisions to emission factors is expected to be complex. It is even more involved for a national inventory compiler to selectively include only the changes to specific types of passenger cars or driving conditions that would be beneficial for compliance with an ERC.

5 Applying for an inventory adjustment under ERC

Applying for an adjustment under ERC uses the same process as for adjustments under ceilings, with the exception that the ERC version of the adjustment application template should be used. The templates titled “Annex IIa to the ECE-EB Air130 adjustment Application” accompanies this technical guidance and is specifically for applying for adjustments under ERC.

The template is similar in format to the template that is used for adjustments under ceilings. Instructions are included in a “Read me” sheet in the template.

6 Review of inventory adjustments under ERC

The review of inventory adjustments under ERC uses the same process as for adjustments under ceilings, and is detailed in existing technical guidance.

7 Reporting a previously approved inventory adjustment under ERC

From 2023 onward, reporting of previously approved inventory adjustments under ERC uses the same process as for inventory adjustments under ceilings, with the exception that the ERC version of the Annex VII adjustments summary template should be used.

8 Source specific observations relating to inventory adjustments under ERC

8.1 Introduction

As illustrated in Chapter 2, there is a complex relationship between revisions made to the inventory and valid examples of adjustments under ERC. Some sector specific comments are made in the sections that follow.

8.2 Road transport

There have been numerous revisions to emission factors for different classes of road vehicles, and hence there are likely to have been some substantial revisions to the emission estimates. However, as noted previously, Parties will need to undertake some detailed analysis of the revisions and the trends with time to understand whether the revisions are a valid basis for an adjustment under ERC.

8.3 Anaerobic digestion

An adjustment under ERC that relates to anaerobic digestion needs to split the digestate into that which comes from animal manure, and that which is other organic material.

Other Organic Material: As the 2009 version of the EMEP/EEA Guidebook does not include a methodology for “other organic material”, this can be considered a new source. Therefore, the adjustment process would act to remove it from the current estimates. This is expected to be beneficial for achieving compliance for most Parties, because it is likely to be a source that has grown with time (see Figure 1A).

Animal Manure: Given that there was no specific methodology included in the 2009 version of the EMEP/EEA Guidebook, it is reasonable to assume that NH₃ emissions from anaerobic digestion and digestate application to soils would be calculated in the same way as applying the manure directly to soils. Hence, the adjustment would require the following to be quantified:

Current emission estimates (from anaerobic digestion and digestate application to land, caused by animal manure only - irrespective of whether these are reported in agriculture or waste)

Minus

Emission calculated from “normal” manure application (using EFs from the 2009 version of the EMEP/EEA Guidebook)

For 2005 and all relevant compliance years.

This may or may not be beneficial for compliance, depending on the trends with time, and the differences in EFs. Parties will need to undertake their own assessment.

8.4 NO_x and NMVOC emissions from 3B Manure Management and 3D Agricultural soils

For some Parties in the **Convention** (such as the EU Member States), NO_x emissions from 3D Agricultural Soils are included in reporting requirements but are excluded when calculating ERCs. NO_x Adjustment applications under ERC for this source category are therefore not valid in the Convention.

In the European Union’s **NECD**, emissions of both NO_x and NMVOC from both 3B Manure Management and 3D Agricultural Soils are reported but are excluded when calculating ERCs. Adjustment applications under ERC are therefore not valid for NO_x and NMVOC from these source categories in the NECD.

8.5 Sources moved into/out of the national total

There may be examples of sources being reported in 6B Other (not included in national total), and then moved to another NFR source that is included in the national total, or visa-versa.

These are often small sources but may be valid cases for adjustments under ERC. Parties will need to assess whether the revision to reporting and the emission trends with time would mean that an adjustment under ERC based on these changes would result in a beneficial change to achieving compliance and would hence be a valid basis for an adjustment application.

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