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Review of Decision No 280/2004/EC (Monitoring Mechanism Decision) in view of the agreed Climate Change and Energy package

Draft final report

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Content

1 Executive summary 12

2 Introduction and background 17

3 Task 1: Assessment of previous projects related to the Monitoring Mechanism Decision 20

3.1 Key areas for revision 20
3.2 Streamlining of reporting requirements 23
3.2.1 EU ETS 24
3.2.2 F-Gas Regulation 26
3.2.3 E-PRTR and NEC Directive 28
3.2.4 Energy Statistics Regulation 29
3.3 Reporting of NF_3 as part of reported greenhouse gases under the Monitoring Mechanism Decision 29
3.4 Reporting on financial support provided to developing countries 31
3.5 Reporting on climate change impacts and adaptation 31

4 Task 2: Analysis of reporting requirements under Article 6 of the Effort Sharing Decision 33

5 Task 3: Need to distinguish between the ETS and non-ETS sectors 40

5.1 Coverage of emissions under the Effort Sharing Decision 40
5.2 Differentiation of ETS and non-ETS emissions at source category level 43
5.3 Conclusions and recommendations 50

6 Task 4: Establishment of final data for 2005 and 2008 to 2010 51

6.1 Establishment of final inventory data for the year 2005 and for the years 2008, 2009, 2010 52
6.1.1 Options for the timing of establishing final data to determine the annual emission allocations for the period from 2013 to 2020 53
6.1.2 Quantitative implications of 2006 IPCC Guidelines for national GHG inventories 58
6.1.3 Quantitative implications of GWPs from IPCC 4th Assessment Report on MS inventories 75
6.2 Changes in the scope of ETS emissions 83
6.2.1 Methodology to calculate the 2020 emission limit 84
6.2.2 Expansion of ETS scope in the period 2013-2020 84
6.3 Conclusions and recommendations 85

7 Task 5: Reporting on auctioning revenues 87

8 Task 6: Inclusion of maritime shipping in the EU's reduction commitments 91

8.1 Introduction to the monitoring of ships 91

8.2 Modelling of Greenhouse Gas Emissions from Ships 93
8.2.1 The usability of bottom-up marine emission modelling 95
8.2.2 The potential use of IMO's energy efficiency indicators for modelling and monitoring purposes 98
8.3 Data types, sources and monitoring options post the implementation of policy measures 100
8.3.1 Fuel consumption monitoring 100
8.3.2 Monitoring of distances travelled 103
8.3.3 Discussion on automated vessel monitoring for distance tracking 108
8.4 Communicating marine data ship to countries and within Europe 109
8.4.1 Ship to state data exchange 109
8.4.2 Systems for data sharing within the European Union 110
8.5 Legal constraints regarding data exchange and monitoring 111
8.6 Conclusions regarding monitoring 112
8.7 Recommendation for the European Commission with regard to a monitoring mechanism for internationally travelling marine vessels 113

9 Task 7: Full climate change impact from aviation 116

9.1 Background 116
9.2 Climate impact of aviation 116
9.2.1 Direct greenhouse gases 117
9.2.2 Indirect greenhouse gases 118
9.2.3 Cloud formation 118
9.3 Monitoring the full climate effect of aviation 119
9.3.1 Modelling 119
9.3.2 Applying a multiplier 119
9.3.3 No monitoring 120
9.4 Addressing non-CO_2 effects of aviation 121
9.4.1 Minimising the climate impacts of NOx emissions 121
9.4.2 Minimising contrail impacts through route optimisation 121
9.5 Relationship with the climate and energy package 122
9.6 Proposed changes to the Monitoring Mechanism Decision 123
9.7 Conclusions concerning the full climate impact of aviation 124

10 Task 8: Establishment of an annual compliance cycle 125

10.1 Timelines for an annual compliance cycle 126
10.2 Reporting as part of the annual compliance cycle 133
10.3 Inventory recalculations in the annual compliance cycle 135
10.3.1 Option 1 – recalculations of previous years not taken into account 135
10.3.2 Option 2 - Annual recalculations of net emissions of past years 136
10.3.3 Option 3 – Annual recalculations with effects added/ subtracted from most recent submitted inventory 137
10.3.4 Option 4 - Recalculation at certain intervals/at the end of the 2013-2020 period 138
10.3.5 Conclusions and recommendations 139

10.4 Tracking and assessment of the use of flexibilities under the Effort Sharing Decision ... 139
10.4.1 Registries ... 139
10.4.2 Links between annual emission allocation and AAUs ... 140
10.4.3 Annual Emission Allocation (AEA) ... 141
10.4.4 Limits ... 142
10.4.5 Accounts ... 142
10.4.6 Presentation of information on AEA and flexibilities in the registries ... 144
10.4.7 Description of processes ... 146
10.4.8 Reports to be created by the registry ... 156
10.5 Inventory review under the Effort Sharing Decision ... 157
10.5.1 Option 1 – Review based on UNFCCC review results ... 159
10.5.2 Option 2 – Professional review by Commission / EU institutions ... 164
10.5.3 Option 3 – Determination of corrective action based on submitted data, potential adjustments occur after the review ... 169
10.5.4 Option 4 – Estimation of Member States annual emission at EU level ... 170
10.5.5 Conclusions ... 170
10.6 Compliance assessment and corrective action in the annual compliance cycle ... 171
10.6.1 Who should determine excess emissions? ... 172
10.6.2 When should the determination be made? ... 172
10.6.3 Follow-up Action ... 174
10.6.4 Other issues ... 176
10.7 Implications of the Copenhagen agreement ... 177

11 Additional issues ... 179

11.1 Reporting requirements related to LULUCF activities ... 179
11.2 Increased carry forward rate due to extreme meteorological conditions ... 180
11.2.3 Extreme meteorological conditions ... 180
11.2.4 Substantially increased GHG emissions due to extreme meteorological conditions ... 187
11.2.5 Conclusions ... 190
11.3 Reporting on adaptation action ... 191

12 Task 9: Analysis of legal instrument ... 193

12.1 Recitals for revised legal text for Decision 280/2004/EC ... 193
12.2 Revised legal text for Decision 280/2004/EC ... 198
12.3 Revised legal text for the Implementing Provisions ... 221
12.3.1 Recitals ... 221
12.3.2 Proposal for revision of Commission Decision 2005/166/EC ... 223

13 References ... 291

14 Annex 1– Reporting guidelines for maritime emissions ... 296

15 Annex 2 – Project Workshop 308

15.1 Workshop Agenda 308
15.2 Workshop report 311

List of abbreviations

AAU	Assigned amount unit
AD	activity data
AEA	Annual emission allocation
AEAT	AEA Technology: Energy and climate change consultancy
AIS	Automated Information System
AR4	IPCC 4th Assessment Report
AWG-KP	Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol
BFDN	Bunker fuel delivery notes
COP 15	Fifteenth session of the Conference of the Parties
CDM	Clean development mechanism
CDEM	Construction, design, equipment and manning
CEN	European Committee for Standardization
CER	Certified emission reduction
CION	European Commission
CITL	Community international transaction log, renamed in European Union transaction Log
CO	Carbon monoxide
CO_2	Carbon dioxide
CPR	Commitment Period Reserve
CRF	Common reporting format
DG	Directorate-General
DG CLIMA	Directorate-General for Climate Action
DG Env	Directorate-General for the Environment
EC	European Commission
EEDI	Energy Efficiency Design Index
EEOI	Energy Efficiency Operational Indicator
EF	Emission factor
E-PRTR	European Pollutant Release and Transfer Register
EMEP	European Monitoring and Evaluation Programme
EMSA	European Maritime Safety Agency
ERU	Emission reduction unit
ESD	Effort Sharing Decision

ETS	(European) Emissions Trading Scheme
EU	European Union
EUROCONTROL	European Organization for the Safety of Air Navigation
EUTL	European Union Transaction Log (previously CITL)
GHG	Greenhouse gas
F-Gas	Fluorinated greenhouse gas
GT	Gross tonnage
GWP	Global warming potential
HFC	Hydrofluorocarbons
HFE	Hydrofluoroethers
HFO	Heavy fuel oil
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IMO	International Maritime Organization
ISO	International Organization for Standardization
ISSR	Ice-supersaturated regions
JI	Joint implementation
LCD	Liquid crystal display
lCER	Long-term certified emission reduction
LDC	Least developed country
LRIT	Long Range Identification and Tracking System
LULUCF	Land use, land use change and forestry
MARPOL	International Convention for the Prevention of Pollution From Ships (abbreviation for marine pollution)
MS	Member State
MW	Megawatt
Mt	Million tons
NACE	General Industrial Classification of Economic Activities in the European Communities (franz.: Nomenclature generale des activites economiques)
NEC	National Emission Ceilings
NF_3	Nitrogen trifluoride
NMVOC	Non methane volatile organic compounds
NO_x	Nitrogen oxides

O_3	Ozone
OECD	Organisation for Economic Co-operation and Development
PFC	Perfluorocarbons
PSC	Port State Control
QA/QC	Quality assurance/quality control
REDD	Reducing emissions from deforestation and degradation
RFI	Radiative forcing index
RMU	Removal unit
SF_6	Sulphur hexafluoride
SIDS	Small island developing States
SO_2	Sulphur dioxide
SOLAS	International Convention for the Safety of Life at Seas
SRES	Special Report on Emissions Scenarios
tCER	Temporary certified emission reduction
UNCLOS	United Nations Convention on the Law of the Sea
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nation Framework Convention on Climate Change
VE	Verified emissions
VMS	Vessel Monitoring system
WG	Working group
XML	Extensible Markup Language

1 Executive summary

Decision No 280/2004/EC concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol (Monitoring Mechanism Decision)[1] and Commission Decision 2005/166/EC laying down rules implementing Decision No 280/2004/EC (Implementing Provisions)[2] set out the details for reporting of greenhouse gas emissions by sources and removals by sinks and for providing information as regards national programmes to reduce emissions, greenhouse gas emission projections and policies and measures in accordance with the provisions under the UNFCCC. The Climate Change and Energy package and in particular Decision No 406/2009/EC on the effort of Member States (MS) to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (Effort Sharing Decision) and the Emission trading (ETS) Directive 2009/29/EC introduced new requirements as regards monitoring and reporting. These additional requirements have to be incorporated in the Monitoring Mechanism Decision and the Implementing Provisions.

The **Effort Sharing Decision** (ESD) sets out annual limitations of greenhouse gas emissions in a linear manner in 2013-2020 and changes the current system from a yearly reporting cycle into an **annual compliance cycle** based on reviewed information. The timeline and specifications for each step of this cycle mark a significant change compared to the current Monitoring Mechanism Decision. The report established a detailed future procedure with timelines for the reporting, the review, the assessment of compliance and the decision on corrective action (see Chapter 10) and elaborated respective additions for the revision of the Monitoring Mechanism Decision. A major change in the future will be the establishment of an **annual EU review process for Member States' greenhouse gas inventories** which is performed in a shorter time frame than the current UNFCCC inventory review. It is recommended that such a review will be conducted by a core team at Commission level supplemented by contracted review experts. Respective legal provisions were elaborated to specify the procedures during the review and the mandate to develop specific EU review guidelines.

To comply with annual emission targets under the Effort Sharing Decision (ESD), Member State can make of a number of **flexibilities (banking, borrowing, transfers of emission allocations between countries, use of CDM credits**). The report provides a detailed assessment of the use of the flexibilities by Member States that can be monitored and tracked in the future (see chapter 10.4). With amendments in the registries used under the ETS, most of provisions related to the use of flexibilities can be transparently and accurately tracked and few additional reporting requirements in this area arise for Member States.

[1] OJ L 49, 19.2.2004, p.1, referred to as 'Monitoring Mechanism Decision' in the remaining text of this proposal

[2] Referred to as 'Implementing Provisions' in the remaining text of this proposal.

National inventories may be annually updated to take into account methodological improvements, more recent data or the correction of errors. The ESD does not specify the implications of such updates when they concern the years used for the definition of the targets (2005 and 2008-2010) or the years of the compliance period (2013-2020) although these updates can have a very significant impact on the level of effort of Member States. The report analysed the **implications of inventory recalculations** as well as the **implications of future methodological changes under the UNFCCC** on the setting of quantitative targets for Member States for the non-ETS emissions under the Effort Sharing Decision and on the annual compliance procedure and developed different options how recalculations could be treated (see chapter 6 and chapter 10.3).

The review of the ETS Directive has introduced reporting requirements in particular on **auctioning revenues** which are addressed in the revised Monitoring Mechanism Decision and a reporting format was elaborated as part of the Implementing Provisions (Chapter 7).

The Climate Change and Energy package also introduced a commitment for the **emissions from international maritime shipping** to be quantified in the EU's reduction commitments in case of "no international agreement including these emissions that can be ratified by 2011" (recital 3, ETS Directive, recital 2 Effort Sharing Decision). To date there has been a lack of transparency of emissions for the sector in general and especially in relation to emissions from international shipping activities. In order to fully understand the emissions from maritime shipping an appropriate monitoring and reporting scheme would need to be devised. This will facilitate implementation in case that legislation is adopted either by the International Maritime Organization (IMO) or at the EU level. The analysis of the technical, administrative and legal aspects of **monitoring internationally travelling marine vessels** in the report shows that it is **possible from a technical, operational or legal point** of view to **introduce a requirement that would collect fuel consumption data from internationally travelling marine vessels by countries** (chapter 8). It is recommended that this regime will be limited to vessels that call at EU seaports with a weight of more than 500 gross tonnage (GT) in order that it is consistent with thresholds set in international law (Marpol[3]). The authority for monitoring by Member States could possibly be based on the existing Port State control regime or other designated authority for this purpose. The specific methodology for monitoring (detailed guidance) once a policy measure on greenhouse gas emissions from ships has been agreed at IMO or once a Commission proposal has been made needs to be implemented. Reporting requirement for Member States related to greenhouse gas emissions from vessel have been added to the revised Monitoring Mechanism Decision and guidelines for the monitoring requirements of emissions from marine vessels have been prepared which are introduced in an Annex to the Implementing Provisions. The guidelines establish an annual reporting mechanism that in-

[3] International Convention for the Prevention of Pollution From Ships (abbreviation for marine pollution)

cludes information on the voyages, distances, fuel consumed and associated CO_2 emissions. Emissions are reported to a central registry to be established. The Commission may seek assistance in implementing the guidelines and operating the central registry from organizations such as the European Maritime Safety Agency (EMSA).

Aviation has an impact on the global climate through releases of carbon dioxide, nitrogen oxides, water vapour and sulphate and soot particles. In this context, the IPCC has estimated that **the total climate impact of aviation** is currently two to four times higher than the effect of its past carbon dioxide emissions alone. Recent EU research indicates that the total climate impact of aviation could be around two times higher than the impact of carbon dioxide alone. However, none of these estimates takes into account the highly uncertain cirrus cloud effects. The Directive on the inclusion of Aviation in the EU ETS foresees that pending scientific progress, all impacts of aviation should be addressed to the extent possible. Therefore a **new reporting requirement on the non-CO_2 effects of aviation for Member States** is proposed in the report to be included in the revised Monitoring Mechanism Decision. Under the new requirement the non-CO_2 impact of aviation would be reported, either based on detailed modelling data or based on a simple multiplier approach, on an annual basis as part of the national inventory reports.

The **experience** gained through the implementation of the Kyoto Protocol and the various UNFCCC requirements has shown that the **current monitoring and reporting system**, although it has many merits, **needs to be improved** as it is not always fully effective. Envisaged revisions and/or additional provisions proposed in the report, that reflect the experiences with the current system and the proposals for revised legal text in this area are:

- An improved specification of means and process of submission for requested information and reports (eg, electronic vs. paper means, to whom by when);
- Mandatory electronic reporting templates, e.g. related to projections and policies and measures;
- A requirement that underpinning reports detailing any relevant methodological issues be provided related to reporting on projections, policies and measures;
- A harmonization of main modeling parameters used by MS for their projections (fuel price, carbon price);
- The establishment a new set of indicators for both annual and projected emissions;
- A mandate to establish enhanced methodological requirements for the estimation of effects of policies and measures and greenhouse gas emission projections;
- A requirement to establish national systems by Member States for reporting of projections, policies and measures.

The problems identified through the implementation of the Monitoring Mechanism Decision also relate to the **need to increase the synergies in reporting under different directives**. The MM Decision touches on cross-cutting areas with the reporting under

the EU-ETS, with the reported information in the European Pollutant Release and Transfer Register (E-PRTR), with Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants (NEC Directive) and the F-Gas Regulation (Regulation No 842/2006). While streamlining of substantial reporting requirements will depend on modifications of the individual legal instruments, the use of consistent data is an area in which the report proposed revisions to the Monitoring Mechanism Decision (chapter 3.2). Specific revisions and/or additional provisions that are proposed for the revised legal text are inter alia:

- A requirement that the Member States' national inventory systems should allow access for inventory agencies to ETS data;
- A requirement to check and to report on the consistency of emission information reported in the GHG inventoris with the reporting under the EU ETS, the E-PRTR, the NEC Directive, the F-Gas Regulation and the Energy Statistics Regulation, as well as on the quality assurance and quality control checks conducted to ensure consistency across the different legal instruments;
- A requirement that Member States, in their annual GHG inventory reports make use of the reporting systems established under the F-gas regulation.

The European Commission's White Paper on 'Adapting to climate change: Towards a European framework for action' (April 2009) set out a framework to reduce the EU's vulnerability to the impacts of climate change. In order to take forward the actions of the White Paper reporting on the progress by Member States in implementing adaptation actions is needed. Member States currently report on climate change impacts and adaptation under the UNFCCC, but not to the Commission. Therefore a **new reporting requirement on the climate change impacts, costs, vulnerability, adaptation strategy, and measures** is proposed as part of the biennial information in the report and the legislative proposal for the revised MM Decision (Chapter 3.5).

The Monitoring Mechanism Decision currently does not include the reporting on financial and technology support to developing countries. Such information is included in Member States national communications. However, in the national communications the information is reported in rather inconsistent ways and cannot be aggregated to an EU figure of financial support provided by the EU. It is important for the EU's credibility that the EU can present clearly the overall financial support to developing countries as well as the concrete project support provided for specific technologies, countries, activities or sectors. Therefore the report proposes a new **reporting requirement on the financial and technology support provided to developing countries** in the area of climate change as part of the biennial information under the revised Monitoring Mechanism Decision (Chapter 3.4).

The Effort Sharing Decision requires the Commission to assess ways of including emissions and removals related to LULUCF in the EU's reduction commitment and, as appropriate, make a legislative proposal. The outcome of this assessment will have to be reflected in the Monitoring Mechanism Decision as regards the emissions monitoring and reporting. Under the UNFCCC, the discussions on the revision of decision

16/CMP.1 related to the accounting of LULUCF activities under the Kyoto Protocol could result in several **changes in the reporting and accounting of LULUCF activities** under the Kyoto Protocol or to a potential other legally binding international agreement. The attached report and draft legislative proposal address the enhanced requirements for LULUCF monitoring and reporting as currently discussed under the UNFCCC (chapter 11.1).

The **draft legislative proposals for the revised Monitoring Mechanism Decision** and the revised Implementing Provisions are included in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** and chapter 12.3.

2 Introduction and background

Decision No 280/2004/EC of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol[4] and Commission Decision of 10 February 2005 laying down rules implementing Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol (Commission Decision 2005/166/EC)[5] set out the details for reporting of anthropogenic greenhouse gas emissions by sources and removals by sinks and for providing information as regards national programmes to reduce emissions, greenhouse gas emission projections and policies and measures in accordance with the provisions under the UNFCCC.

The Climate Change and Energy package as agreed between the Council and the European Parliament and as adopted by the European Parliament on 17 December 2008 and in particular Decision No 406/2009/EC on the effort of Member States (MS) to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (hereinafter the "Effort Sharing Decision (ESD)" and the Directive 2009/29/EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community (hereinafter the "ETS Directive") introduced new requirements as regards monitoring and reporting. These additional requirements have to be incorporated in Decision No 280/2004/EC.

The Effort Sharing Decision sets out annual limitations of greenhouse gas emissions in a linear manner in 2013-2020 and changes the current system from a yearly reporting cycle into an annual compliance cycle including a number of flexibilities (banking, borrowing, transfers between countries, use of CDM credits) for Member States to comply with the annual targets. The timeline and specifications for each step of this cycle - reporting, use of flexibilities, verification, compliance, corrective action - need to be carefully analysed as they mark a significant change compared to the current Monitoring Mechanism Decision which primarily reflects Kyoto requirements. Given the flexibilities provided through the Effort Sharing Decision, the reporting and verification complexity increases substantially which makes it even more imperative to devise an efficient, transparent and cost-effective monitoring, reporting and verification system.

The Effort Sharing Decision introduces several new provisions that have to be considered for the revision of the Monitoring Mechanism Decision. One key provision is accurate reporting of the split of the total effort for greenhouse gas emission reductions between the EU Emissions Trading Scheme (ETS) and non-ETS sectors. The current Monitoring Mechanism Decision does not provide any reporting requirements for such

[4] OJ L 49, 19.2.2004, p.1, referred to as 'Monitoring Mechanism Decision' in the remaining text of this proposal

[5] Referred to as 'Implementing Provisions' in the remaining text of this proposal.

a clear quantitative differentiation between ETS and non-ETS emissions. In addition, further implementation of the Effort Sharing Decision requires that the annual emission limits from 2013 to 2020 need to be specified for each Member State.

There are also new considerations brought forward by other parts of the climate change and energy package. The review of the ETS has introduced reporting requirements in particular on auctioning revenues (recital 15 and Article 10(3) ETS Directive).

The Climate Change and Energy package also introduced a strong commitment for the emissions from international maritime shipping to be quantified in the EU's reduction commitments in case of "no international agreement including these emissions that can be ratified by 2011" (recital 3, ETS Directive, recital 2 Effort Sharing Decision). So far emissions related to international maritime shipping were only reported as a memo item in the GHG inventories. If maritime transport would be included in the ESD or the EU ETS then an appropriate reporting scheme will need to be devised and the MS emission data and reduction targets adjusted accordingly.

Another area of new considerations is the reporting on full climate change impacts for the emissions from aviation that should be addressed in the revision of the decision.

The climate change package sets out the emission reduction targets in 2020 for the 27 EU Member States. As emissions are constantly revised under the UNFCCC and changes in the coverage of emissions occur under the ETS, it becomes challenging to finalize the base year emissions and the absolute commitment period reduction figures for the EU-27.

This project is aiming at:

a) Providing input to a legislative proposal for revising Decision No 280/2004/EC and its Implementing Provisions Commission Decision 2005/166/EC and other related Community legislation, to be drafted by the Commission.

b) Identifying and integrating the monitoring and reporting requirements arising from the agreed Climate Change and Energy package and in particular from the ESD as required by its Article 6, the ETS review directive, and the potential international agreement at COP15 in Copenhagen. In particular, this project will identify how to accurately report the exclusion of EU ETS emissions under reporting for the purposes of the ESD.

c) Devising a precise methodology and updating figures for establishing the final 2005 emission data and 2013- 2020 emission limits for each MS (Article 3(2) fourth paragraph of the Effort Sharing Decision), consistent with the Annex to the energy and climate package's Impact Assessment (SEC(2008)854) and the text of the Effort Sharing Decision.

d) Updating the impact assessment that will accompany the proposal for amendment of Decision No 280/2004/EC and its Implementing Provisions Commission Decision 2005/166/EC.

After the kick-off meeting at 27 October 2009, the task numbers have been revised in this report compared to the task numbers in the proposal to ensure a closer linkage in the report between the task on the discrimination between non-ETS and ETS sectors and the establishment of final data for the year 2005.

The inception report presented in detail the proposed methodology for completing the tasks of this project, the sources of information to be used and the issues to be addressed taking into account the discussions and guidance provided during the kick-off meeting which took place.

A project meeting at 14 January 2010 on the inception report provided further clarifications on the tasks and on the timelines.

Two separate notes were provided on the review and compliance cycle as well as on on fixing of inventory data to determine the final target for 2020 and the annual allocation under Decision No 406/2009/EC by 28 January 2010. The contents of these notes have been integrated into this report, but at the same time the options have been reduced and the remaining options have been elaborated further in this report.

For the draft final report the remaining outstanding sections were added and proposals for draft legal text for a revised Decision No 280/2004/EC a revised Commission Decision 2005/166/EC and for guidelines for monitoring and reporting of greenhouse gas emissions from marine vessels were added.

The draft final report does not include an update of the impact assessment that will accompany the proposal for amendment of Decision No 280/2004/EC and its Implementing Provisions Commission Decision 2005/166/EC because the project on the impact assessment of the project on the revision of the Monitoring Mechanism Decision was delayed.

It also does not yet include the recitals for the revised decisions which will be delivered as soon as possible, but need some further checking.

The final report addresses the comments received on the draft final report and added the few outstanding parts such as the recitals of the legal texts. The input to the impact assessment is provided in a separate report as it is merged with the impact assessment report conducted in another project.

3 Task 1: Assessment of previous projects related to the Monitoring Mechanism Decision

Under this task the project team examined and assessed the results, proposals and recommendations of the four previous projects related to elements of the revision of the Monitoring Mechanism Decision. The four projects were

- "Assessment of GHG methodologies for projections"
- "Ex-post quantification of the effects of policies and measures"
- "Streamlining climate change and air pollution reporting requirements"
- “Assistance with the Revision of the Monitoring Mechanism Decision”

Öko-Institut and Umweltbundesamt were the contractors for the project “Assistance with the Revision of the Monitoring Mechanism Decision” which is already summarizing the recommendations from the three other projects. Many improvements proposed to the current decisions are unrelated to the Climate Change and Energy package. In addition to the four previous projects this project

- Added monitoring and reporting provisions to the existing legislation to take into account the additional requirements under the Effort Sharing Decision and other elements of the Climate Change and Energy package;
- Changed existing provisions to take into account the requirements of the Effort Sharing Decision;
- Elaborated new legal provisions for the review and the assessment of compliance under the Effort Sharing Decision;
- Elaborated new legal provisions for the reporting of auctioning revenues;
- Elaborated new legal provisions for the reporting of GHG emissions from marine vessels including monitoring and reporting guidelines;
- Elaborated new legal provisions for the reporting of non-CO_2 impacts from aviation.

3.1 Key areas for revision

The four previous projects propose the following key areas for revision of Decision No 280/2004/EC and Commission Decision 2005/166/EC:

- The **National Inventory Report (NIR)** submission under the Kyoto Protocol is divided into two parts, of which the first part provides the relevant inventory information under the Convention and the second part includes the supplementary information under the Kyoto Protocol. The revised Monitoring Mechanism Decision should define a **third part** for information that addresses **reporting requirements** in the NIR **specific for EU internal purposes**. This third part of the NIR would address requirements related to data consistency between the inventory submission and verified emissions under the ETS, other elements proposed in the projects on

streamlining and ex-post quantification of policies and measures that go beyond the requirements under the UNFCCC and the Kyoto Protocol and reporting on finance provided to developing countries. This recommendation matches with the requirements of the Effort Sharing Decision; all supplementary elements that are elaborated in this project can be addressed in reporting requirement for this third part of the NIR. This relates e.g. to qualitative criteria for the credits used under the Effort Sharing Decision or to the reporting on the use of auctioning revenues.

- The requirement to report within the **geographical scope** of the European Union should be part of the Implementing Provisions and a sentence should be included that Member States must ensure that reported emissions in CRF reporting format cover emissions from the territory of the European Community. Currently the United Kingdom and Denmark report inventories and information under the Kyoto Protocol in a different geographical scope. While Denmark provides two different inventories, one for the EU and one separate, the UK only summarizes the non-EU emissions in one category for subtraction and the sectoral information still includes emissions from Non-EU territories.
- In relation to the reporting on **policies and measures** the requirements should be extended
    - to submit a separate report describing the methodologies and data used to quantify the ex-ante quantitative emission reductions of policies and measures. For each policy and measure (or subset of policies if several policies and measures were assessed together) such a report should address the estimation methodology used, the data and assumptions used and the reference levels/baselines used, against which the expected emissions reduction effects were quantified. Such methodologies will also be important for an assessment of the corrective action plan if required from a Member State. In the legal proposal this information has been integrated in the NIR part III, but a separate report would also be possible.
    - The reporting of policies and measures should be based on new methodological guidance to be developed. Such methodological guidance should also refer to specific indicators appropriate for the monitoring of individual policy effects.
    - Member States should also report on how they take into account the interactions of different climate change policy and measures as well as interactions of policies targeting air pollutants on mitigation policies.
- In relation to the reporting on **projections** the requirements should be extended
    - to submit separate information describing the **projection methodologies** as well as data and assumptions used in accordance with more specific guidance for such methodological descriptions.

  - The reporting on projection **parameters** should be amended to include **two historic years** and the frequency of projected years should be made consistent with the reporting on projection estimates.
  - It is suggested that the **parameters fuel prices and carbon prices should be harmonised** and all Member States should use the same assumptions. The assumption to be used for the reporting of projections should be determined by DG Tren (fuel prices) and DG CLIMA (Carbon prices) and then be agreed upon in the Climate Change Committee for reporting. This decision should be updated annually in a regular cycle to have updated information available to Member States when they plan the domestic updating of projections.
  - At the detailed level a number of additional changes in the reported projection parameters are proposed in the report.

- With regard to the **gap filling** in Article 4 paragraph 1 of Decision No 280/2004/EC it is proposed that the legal basis could be strengthened for the gap filling procedure in the Monitoring Mechanism Decision and the provisions could be shortened in the Implementing Provisions and only the mandate, the procedure and the timelines for gap filling could be included. The articles on methodologies could be shortened with a **reference to the "inventory for the year X-1**". The gap filling procedure seems to be less relevant from the point of view of this project, thus shortened provisions may be more appropriate.
- Regarding the establishment of **national inventory systems** by Member States (Article 4, paragraph 4 Decision No 280/2004/EC) it is proposed that the article should **be linked with a mandate to adopt implementing provisions** related to the national inventory system in accordance with the procedure referred to in Article 9(2) Decision No 280/2004/EC. Currently there are no specific EC provisions for national inventory systems beyond the UNFCCC requirements; however activities such as streamlining of reporting as well as data consistency with verified emissions from ETS require such EU-specific features of national systems to be further specified in implementing provisions. The national system should also be expanded to cover the reporting on policies and measures and projections. Under the Effort Sharing Decision the system will be further expanded in particular in relation to the accounting functions for annual emission allocations and credits.
- In the future there will be a need for **specific additional methodological guidance** that goes beyond the level of reporting recommendations as currently included in the EU legislation at least for the following purposes:

  a) The UNFCCC review requires harmonisation of reporting by Member States in some areas. In order to be able to aggregate Member States' data in a correct way, it is necessary that Member States follow the same allocation principles and some more harmonised reporting rules. Such harmonization is currently implemented in the work of WG1 without further legal provisions and seems to be too detailed taken into account the current character of the decisions.

b) The projects on projection methodologies as well as ex-post assessment of policies and measures provided recommendations in relation to streamlined methodologies. If such work continued it would result in specific methodological guidance at EU level.

- It is proposed that the following requirements related to **national communications** be included in the revised Monitoring Mechanism Decision:

  o Requirement to submit national communication in parallel to EC as well as to the UNFCCC.

  o Requirement to report on climate change impacts and adaptation, financial resources provided to developing countries and technology transfer to the European Community. For the time being the revised decisions could refer to the section on finance and transfer of technology in the existing UNFCCC reporting guidelines for national communication and add the requirement to report this information to the Commission. For the time being only the additional reporting on financial resources was implemented. The parts on climate change impacts and adaptation are rather extensive in national communications and further discussion is needed, how such reporting should be integrated into the current reporting system. As the amount of additional information collected by the Commission will increase considerably, it would be important to clarify the purpose of the reporting on adaptation and climate change impacts to devise useful reporting provisions.

  o The additional information would be added to part III of the NIR.

During the previous project a number of smaller revisions, in particular related to Commission Decision 2005/166/EC, were elaborated for those Member States which suggested that these changes could already be implemented via comitology procedure without a legal revision. The previous project also proposed a significant amount of smaller changes and improvements that address user-friendliness and other clarifications of the decisions that will be taken into account in this project.

In general the recommendations from the previous project are mostly supplementary or complementary to the proposals and options elaborated in this project.

The legal proposals in chapter 12 of this report integrates the essential elements of the existing Decision No 280/2004/EC and the Implementing Provisions, the recommendations for changes and additions from the previous project and the additional of a substantial amount of additional requirements arising from the effort sharing decision.

3.2 Streamlining of reporting requirements

The problems identified through the implementation of the Monitoring Mechanism Decision also relate to the need to increase the synergies in reporting under different directives. The Monitoring Mechanism Decision touches on cross-cutting areas with the

reporting under the EU-ETS[6], with the reported information in the European Pollutant Release and Transfer Register (E-PRTR)[7], with Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants (NEC Directive)[8], the F-Gas Regulation (Regulation No 842/2006)[9] and the Energy Statistics Regulation (Regulation No 1099/2008)[10]. While streamlining of substantial reporting requirements such as consistent reporting dates or consistent scope and coverage will depend on modifications of the individual legal instruments, the use of consistent data is an area that can be addressed and promoted via the revised Monitoring Mechanism Decision. The options for increased synergies have been considered in a previous project "Streamlining climate change and air pollution reporting requirements". This project translated the recommendations of the previous project into revisions and/or additional provisions to the revised legal text of the Monitoring Mechanism Decision which are explained separately for the different legal instruments in the following sections.

3.2.1 EU ETS

Additional requirements were elaborated for Member States to report on data consistency between verified emissions reported by installations under the EU ETS and GHG emissions reported in the GHG inventory.

Member States should report the share of ETS emissions for each CRF source category that includes ETS emissions to increase the transparency where ETS emissions are reported in the GHG inventory and to clarify the categories where consistency of emissions should occur. At the moment it is not possible to check data consistency at detailed level due to the lack of such additional reporting of ETS emissions at a more disaggregate level. Additional guidance for the allocation of NACE[11] codes to CRF source categories has been elaborated as part of the project and it is recommended to add such guidance to the revised Implementing Provisions. In their reporting under the ETS, installations are required to report the CRF code(s) to which their emissions belong. However, as installations are not familiar with the inventory reporting there are mistakes in this categorization whereas reported NACE codes seem to be reported in a

[6] Commission Decision No 2007/589/EC establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC as amended by Commission Decision No 2009/73/EC as regards the inclusion of monitoring and reporting guidelines for emissions of nitrous oxide of 17 December 2008. OJ L 229, 31.8.2007, p. 1 and OJ L 24, 28.1.2009, p. 18

[7] Regulation (EC) No 166/2006 of the European Parliament and of the Council concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC, OJ L 192, 28.7.2000, p. 36

[8] OJ L 309, 27.11.2001, p. 22

[9] OJ L 161, 14.6.2006, p. 1

[10] OJ L 304, 14.11.2008, p. 1

[11] NACE = Nomenclature generale des activites economiques; General Industrial Classification of Economic Activities in the European Communities

more reliable way because industry is more familiar with the NACE codes. The guidance on allocation of NACE codes to CRF categories can therefore help to disaggregate the verified emissions reported under the EU ETS to the correct CRF categories. Member States should allocate ETS emissions to individual CRF emission categories and should present a table with the verified emissions broken down to CRF categories.

In addition the revised decision should include an obligation to make ETS background data accessible for inventory compilers. Some inventory compilers still face problems in their Member States in gaining access to more detailed information reported by installations to competent authorities under the ETS Directive. The provisions related to the national systems could be strengthened in this respect to clarify that such access is part of a functioning inventory system in the EU.

In the previous project on streamlining it was concluded that the revised decision should also include more specific requirements to directly use verified emissions reported under the ETS for the inventory preparation. However, such rule would not be in line with the IPCC guidelines for inventory preparation. There are some differences between the monitoring and reporting guidelines under the EU ETS and the IPCC reporting guidelines for GHG inventories, which make such direct use of data difficult. In particular the fact exists that IPCC guidelines require countries to use higher tier methods for all installations of a particular source category if this category is a key cateory, whereas the ETS monitoring guidelines apply different tiers depending on the size of individual installations. Thus it is possible that the estimation methods of smaller installations under the EU ETS are not in line with the inventory requirements. Therefore this particular recommendation requiring direct use of ETS data in the GHG inventories from the previous project was not implemented in the revised Monitoring Mechanism Decision.

As already explained in the previous section, the split of the EU mitigation target for 2020 into a target realized under the ETS Directive and a second targets under the Effort Sharing Decision requires an improved separation in the reporting between the ETS sector and the Non-ETS sector which is another element of streamlining with the ETS Directive.

The detailed provisions that were included in the revised Monitoring Mechanism Decision based on these considerations are the following:

- Proposed Article 3(1)(q) requires the allocation of verified emissions reported under the EU ETS to the respective inventory CRF categories as well as the reporting of the ratio of ETS emissions to total emissions of the respective source category. This ratio will be useful for QA/QC activities at EU level.
- Proposed Article 3(1)(r) and Article 4(6)(e)(i) require Member States to conduct verification activities to check verified emissions reported under the EU ETS with the reported inventory emissions and to report about such activities to the Commission.
- Proposed Articles 3bis(1)(a)(iv) and 3bis (c)(ii) require that the MS in their reports split the policies and measures, and projections, in those relating to the ETS-

sectors, those relating to the non-ETS ones and those targeting both sectors. This provision implements the approach adopted in the Climate Change and Energy package that addresses a defined part of the national GHG emissions under the EU ETS and non-ETS sectors under the Effort Sharing Decision.

- Proposed Article 4(6)(a) requires to amend the MS national inventory systems to allow access to detailed ETS data reported by installations to competent authorities under the ETS Directive, because some Member States are facing legal and administrative problems in accessing the information reported under the ETS Directive and consequently cannot ensure consistency between both datasets.

3.2.2 F-Gas Regulation

The F-Gas Regulation (Regulation (EC) No 842/2006[12]) adopted in 2006 includes two reporting elements which are of direct relevance to the reporting obligations under the Monitoring Mechanism and therefore to its revision:

a. Company report submission (Article 6(1))

Article 6(1) requires the submission of annual reports (for year X-1) from companies producing, importing and exporting more than one tonne of fluorinated gases in/from the EU. Quantities contained in pre-charged products and equipment imported or exported are excluded. The aggregation/analysis of these reports at EU level (by the Commission) allows tracking the bulk quantities of F-Gases placed on the EU market and their intended applications. It is highlighted that these quantities are not actual emissions but could potentially be emitted at some future point in time, if not destroyed.[13]

b. Member State reporting systems (Article 6(4))

Article 6(4) requires Member States to establish reporting systems for the sectors addressed by the Regulation, with the objective of acquiring, to the extent possible, emission data.

The reporting systems provided under Article 6(4) of the F-Gas Regulation are, de facto, the ones used for reporting under the Monitoring Mechanism Decision. This link could be made explicit and mandatory in the revised Monitoring Mechanism Decision. While at this stage explicitly making this link would not have any impact upon the qual-

[12] OJ L 161, 14.6.2006, p. 1

[13] Actual emission estimates take into account the time lag between consumption and emission, which may be considerable in some application areas, e.g., closed cell foams, refrigeration and fire extinguishing equipment. Time lag results from the fact that a chemical is placed in new products and then slowly leaks out over time.

ity of the data, a potential evolution of those reporting systems in the context of the Review of the F-Gas Regulation, e.g. to include an evaluation of long-term trend in leakage rates for certain applications, would ensure that the quality of F-Gas inventories reported under the Monitoring Mechanism Decision, is also improved.

The GHG inventories reported under the MM Decision include two types of fluorinated gas emission estimates: potential emissions and actual emissions.

Potential emissions are equal to the amount of virgin chemical consumed in the country minus the amount of chemical recovered for destruction or exported in the year of consideration. The calculation formula for potential emissions is as follows: Potential emissions = production + imports – exports – destruction. This concept is very similar to the Article 6(1) reporting requirement of the F-Gas Regulation (see above). However the data are not comparable at Member State level since Regulation (EC) No 842/2006 requires companies to report imports and exports from outside the EU, whereas potential emissions reported by Member States under the Monitoring Mechanism Decision include all imports and exports (i.e. also imports and exports from EU Member States).

Nevertheless the reporting under Regulation (EC) No 842/2006 is a subset of the reporting under the Monitoring Mechanism Decision. This means that potential emissions from imports and exports as reported in the GHG inventory should be in any case larger than the imports and export data reported under Regulation (EC) No 842/2006. Therefore the latter may be used as input as well as for cross-checks and QA purposes, but not directly as it currently stands. Actual emissions cannot be compared with the data provided in the context of the reporting under Article 6(1) of Regulation (EC) No 842/2006 because actual emissions may result from the leakage of substances put on the market many years ago (as explained above).

It is therefore suggested that Member States should use the data reported under the F-Gas regulation for QA/QC activities of the GHG inventory as described above.

These considerations led to the following revisions and additions to the legal text of the Revised Monitoring Mechanism Decision:

- Proposed Article 3(s)(ii) and Article 4(6)(e)(ii) requires MS to implement verification activities that check the consistency of activity data, background data and assumptions used in the estimation of greenhouse gas inventories with data reported under Article 6 of Regulation (EC) No 842/2006.
- Proposed Article 4(6)(b) require that Member States, in their annual GHG inventory reports make use of the reporting systems established under the F-Gas Regulation (Regulation (EC) No 842/2006).
- Proposed Article 4(6)(c) and (d) of Regulation (EC) No 842/2006 requires that Member States ensure access to emission data, background data and methodologies collected in the reporting systems for fluorinated gases for the relevant sectors under Article 6(4) of Regulation (EC) No 842/2006 to the inventory agency authorized with the preparation of the national greenhouse gas inventory.

3.2.3 E-PRTR and NEC Directive

The reported information in the European Pollutant Release and Transfer Register (E-PRTR) and under Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants (NEC Directive) is another area for streamlining and coherent reporting addressed separately in the project on streamlining of reporting requirements.

Similar to the ETS, the E-PRTR provides data on GHG emissions from about 24,000 installations covered in the register. The methodological guidance provided for E-PRTR reporting is not fully consistent with the reporting in the GHG inventories in terms of coverage of emissions and in terms of methodologies used. Operators covered by the E-PRTR should prepare their reported emissions with "internationally approved methodologies" (Article 5(4) of E-PRTR Regulation[14]) which can either be CEN (European Committee for Standardization) or International Organization for Standardization) (ISO) standards for measurements, guidelines for the monitoring and reporting of GHG emissions under the ETS, the United Nations Economic Commission for Europe/ European Monitoring and Evaluation Programme (UNECE/EMEP) Atmospheric Inventory Guidebook, IPCC guidelines or "equivalent methodologies" other than internationally approved methodologies. Due to these differences, the reported emissions under E-PRTR can often not directly be used for the preparation of the GHG inventories, but it is important to check data consistency between both reporting systems.

For this purpose Article 3(1)(r)(ii) and Article 4(6)(e)(i) require Member States to conduct verification activities to check verified emissions reported under the E-PRTR with the reported inventory emissions and to report about the results of such activities to the Commission.

Proposed Article 4(6)(d) requires to amend the MS national inventory systems to allow access to detailed data and methodologies reported by installations to competent authorities under the E-PRTR.

Under the NEC Directive Member States compile annual inventories of atmospheric pollutants, some of which (SO_2, NO_x, CO and NMVOC) are also reported as indirect GHG emissions in the CRF tables of the annual GHG inventories. Both, the GHG inventories and atmospheric pollutants inventories cover mainly the same sectors energy, transport, industry, agriculture and waste. Underlying activity data for these sectors used for both inventories should be consistent and in many Member States the same institutions compile both types of inventories. To strengthen and ensure this practice, the revised Monitoring Mechanism Decision includes a new requirement that Member State should implement QA/QC activities that analyse the consistency of activity data, background data and assumptions used for GHG inventories with those used for air pollutants inventories.

[14] Regulation (EC) No 166/2006 of the European Parliament and of the Council concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC, OJ L 192, 28.7.2000, p. 36

3.2.4 Energy Statistics Regulation

The Energy Statistics Regulation (Regulation (EC) No 1099/2008[15]) requires in Article 6(2) that

"Every reasonable effort shall be undertaken to ensure coherence between energy data declared in accordance with Annex B and data declared in accordance with Commission Decision 2005/166/EC of 10 February 2005 laying down the rules for implementing Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol."

The consistency of GHG inventories with the EU energy statistics is key for the credibility of the European GHG emission data, therefore it is useful to introduce a more specific requirement for coherence or consistency in the revised Monitoring Mechanism Decision, taking into account that coherence with underlying energy statistics is already an important principle and objective of the current inventory reporting and the IPCC and UNFCCC guidelines.

Based on these considerations the revised Monitoring Mechanism Decision includes new provisions in Article 3(1)(s)(iii) and Article 4(6)(e)(ii) that Member States conduct verification activities that check the consistency of activity data and other parameters used in the inventory preparation with the data declared under the Energy Statistics Regulation and report on the results of such checks in the national inventory reports.

3.3 Reporting of NF_3 as part of reported greenhouse gases under the Monitoring Mechanism Decision

NF_3 is a gas used in electronics industry (semiconductor industry, liquid crystal display (LCD) panel manufac-ture, flat panel screens and for thin-film photovoltaic cells) for plasma etching and chamber cleaning processes. It is increasingly a replacement for the greenhouse gases PFCs and SF_6 which are covered under the Kyoto Protocol and Decision No 280/2004/EC. NF_3 has a long lifetime in the atmosphere of 740 years and a very high global warming potential of 17,200 calculated over a 100-year time horizon (IPCC 2008)

Since 1992, when less than 100 tonnes of NF_3 were produced globally, production grew to an estimated 4,000 tonnes in 2007. It is estimated that global production doubles by 2010 to 8,000 tonnes (UNFCCC 2010). For the mid-term future it is estimated that production increases of about 16% per year. The rapid growth of NF_3 use in semiconductor manufacture is due to the growth in total semiconductor manufacture as well as to the displacement of older PFC technology for new production lines that use NF_3, in particular for LCD panels.

[15] OJ L 304, 14.11.2008, p. 1

The mean global tropospheric concentration of NF_3 has risen exponentially (Weiss et al. 2008). The measured concentration in 2008 corresponds to an emission rate of about 620 metric tons of global NF_3 emissions which is about 16% of the production. This is a significantly higher percentage than has been estimated by industry (Weiss et al. 2008).

Mitigation efforts in the semiconductor industry focus on process improvements/source reduction, alternative chemicals, capture and beneficial reuse, and destruction technologies. The on-site systems could eliminate NF_3 consumption. The use of remote plasma cleaning is an alternative technology that, by breaking NF_3 in a remote container and injecting only the active ingredient, fluorine, together with nitrogen, in the vacuum chamber, can reduce the fraction of gas released from 16 per cent to 2 per cent.

As NF_3 is not included in the current reporting requirements for GHG emissions, it is not exactly known how much NF_3 is emitted in the EU and how these emissions are growing.

Article 10(2) b of the F-Gas Regulation requires the Commission to publish a report which shall, in the light of future assessment reports of the IPCC, assess whether additional fluorinated greenhouse gases should be added to Annex I. This annex lists all fluorinated greenhouse gases referred to in Article 2(1) with their GWP values presented in the 3rd IPCC assessment report from 2001. The assessment has largely focused on NF_3 so far, because the quantities of the other gases placed on the market are estimated to be comparably low.

In an ongoing project for DG CLIMA Öko-Recherche and Öko-Institut estimated the present overall consumption of NF_3 in the European electronics industry at 340 t, thereof 300 t in the semiconductor industry, and 40 t in the photovoltaic industry. Total NF_3 emissions are estimated to be at the level of 113 kt CO_2eq. in 2008.

The main user countries of NF_3 in Europe, according to our own estimate, are Germany (35%), Ireland (28%), France (14%), Italy (11%) and Austria (7%). Minor quantities are used in the Netherlands, Great Britain, Finland, and the Czech Republic.

NF_3 is a very potent greenhouse gas, therefore it is important to start monitoring these emissions in the EU in order to determine whether it is necessary to take further actions to promote mitigation efforts.

Besides the F-Gas regulation, a similar discussion on the inclusion of NF_3 in the quantified emission reduction targets for the period after 2012 has started under the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) and the UNFCCC discussions and the EU has been one of the main promoters to include NF_3 as additional gas in the future reporting guidelines for Annex I GHG inventories (see EU submission in UNFCCC 2010b). As the EU strongly pushes for an inclusion of NF_3 emissions at the international level, it is a logical consequence to add this gas to the revised Monitoring Mechanism Decision.

3.4 Reporting on financial support provided to developing countries

The EU is the world's largest donor of development aid, including climate relevant support. In addition, the EU committed in Copenhagen to provide significant fast-start and long term climate financing to support developing countries (a fair share of the overall funding is foreseen at a level of $100bn per annum by 2020, both from public and private sources). Transparency on those flows is key to ensure the EU's visibility, efficient delivery and in building trust with our partners. However, the scope, level of detail and comparability of data currently provided by Member States in their national communications greatly differs and does not allow a consistent overview of EU climate finance provided to developing countries. The EU reports on its general aid delivery in the form of the annual EU Development Accountability and Monitoring questionnaire (former: Monterrey questionnaire). Although the information increasingly includes activities on climate, the reporting is not harmonised or consistent. It is important for the EU's credibility that the EU can present clearly and coherently the overall financial support to developing countries as well as the concrete project support provided for specific technologies, countries, activities or sectors, and that the methodologies for tracking these flows are transparent and harmonized across the EU.

Therefore a new reporting requirement on the financial and technology support provided to developing countries in the area of climate change is proposed as part of the biennial information under the revised Monitoring Mechanism Decision (Article 3bis(1)(h)). Reporting could be based on indicators for financial flows of the Organisation for Economic Co-operation and Development (OECD) Development Assistance Group (DAC).

3.5 Reporting on climate change impacts and adaptation

An important part of tackling climate change is adapting to the adverse impacts of climate change. Current reporting requirements for Member States to the Commission do not address climate change impacts, vulnerability and adaptation actions being taken or planned. However, Member States report such information to the UNFCCC as part of their national communications. But, in these national communications, the information is reported in rather incomplete and inconsistent ways and cannot be aggregated. It is necessary to collect and collate information on adaptation from Member States in a more structured manner at EU level because

- It will help Member States to evaluate and compare the impacts of climate change at regional and local levels across the EU and to compare and assess the level to which they are prepared for future changes. It will also help to disseminate best practices related to adaptation action.
- It is needed to understand how advanced Member States are in adapting to climate change and what actions they are undertaking. This information is important for the development and update of the Clearinghouse currently under development and the

comprehensive EU adaptation strategy foreseen for 2013, as provided in the White Paper on Adaptation adopted in 2009.

Therefore a new reporting requirement on the climate change impacts, costs, vulnerability and measures being taken on adaptation is proposed as part of the biennial information under the revised Monitoring Mechanism Decision (Article 3bis (1)(g)). This reporting requirement covers the following areas:

a. The observed and projected impacts per sector (e.g., water management, agriculture and forests, biodiversity/nature protection (terrestrial, freshwater), coastal areas, marine (biodiversity) and fisheries, health (human, animal, plant), infrastructure (transport, energy, other), financial instruments and insurance, disaster risk reduction) and per impact category (e.g. floods, sea-level rise, droughts, increased frequency of extreme weather events, depending on the member state/regions) and related costs and benefits.

b. The assessment of key vulnerabilities per region and per sector. This part could include information on research programmes on vulnerability based on risk assessments.

c. The existing national and/or regional adaptation strategy and implemented and planned measures for the relevant sectors, or those in preparation. This could include the main objective, the type of instrument/the method of implementation, the duration and the budgetary and financial implications of each measure. The information on the budget allocation per sector and impact category could also be included.

d. Textual information on strategies and implemented and planned measures and data (including indicators on adaptation).

e. Member States could also provide information on joint activities with other Member States and developing countries, including bilateral and multi-lateral projects on adaptation and the respective budget allocated.

4 Task 2: Analysis of reporting requirements under Article 6 of the Effort Sharing Decision

Article 6 of the Effort Sharing Decision addresses the reporting by Member States on

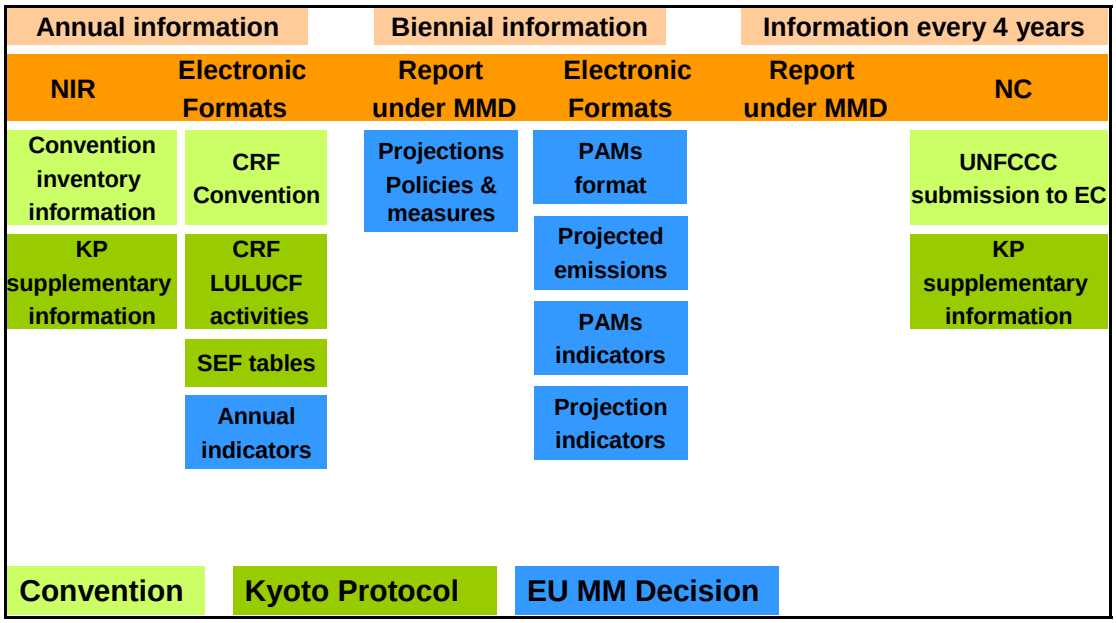
- Annual greenhouse gas emissions as covered by the Kyoto Protocol excluding GHG emissions covered under Directive 2003/87/EC (Article 6, paragraph 1(a));
- Information related to credits from project activities as defined in Article 5 of Decision No 406/2009/EC (the use, geographical distribution, types and qualitative criteria applied, justification for using credits that cannot be used by operators in the EU ETS) (Article 6, paragraph 1(b));
- Information on projected progress towards meeting Member States' commitments under Decision No 406/2009/EC (including information on national policies and measures and national projections (Article 6, paragraph 1(c));
- Information on planned additional national policies and measures beyond the commitments under Decision No 406/2009/EC and in view of the implementation of an international agreement on climate change, as referred to in Article 8 of Decision No 406/2009/EC. (Article 6, paragraph 1(d)).

Article 6, paragraph 2 addresses the situation that Member State use credits from project types that cannot be used by operators in the Community scheme. If this applies, the Member State concerned shall provide a detailed justification for the use of such credits. Such justification would also need to be addressed in the reporting requirements. Related to Article 6, paragraph 2, it would be useful to get further clarification on the type of credits and information expected from the Commission.

Article 6, paragraph 3 addresses the evaluation of progress made by Member States in meeting reduction commitments and related to Community policies and measures and projected progress.

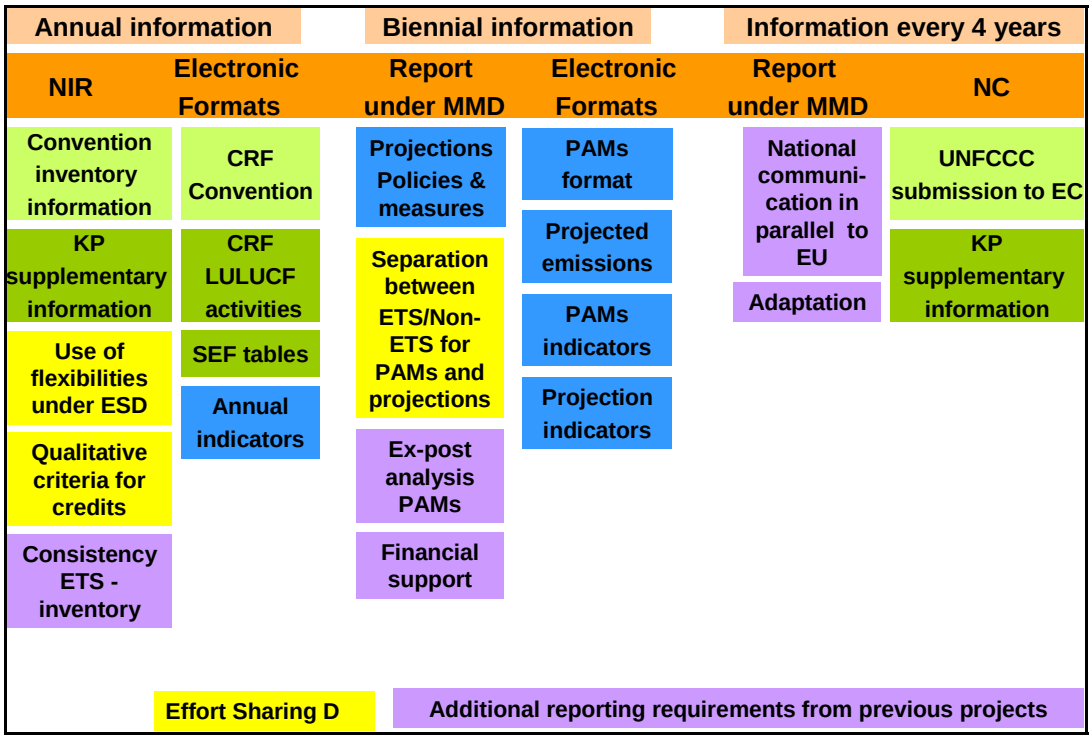
Some elements of the requirements under Article 6 of Decision No 406/2009/EC mentioned above are already covered by Decision No 280/2004/EC and Commission Decision 2005/166/EC. Figure 1 provides an overview on the existing reporting requirements. Figure 2 shows the additional reporting requirements that arise from the implementation of the Effort Sharing Decision and the recommendations of the previous project discussed in task 1. The figures differentiate between the frequency of reporting (annual, biennial and every 4 years) and the type of information (report or reporting format for data submission).

Figure 1 Overview on existing reporting provisions under Decision No 280/2004/EC



Note: light green = Convention requirements
dark green: Kyoto Protocol requirements
blue = requirements specific to Decision No 280/2004/EC

Figure 2 Existing and new reporting requirements arising from the Effort Sharing Decision and recommendations from previous projects to revise the MMD

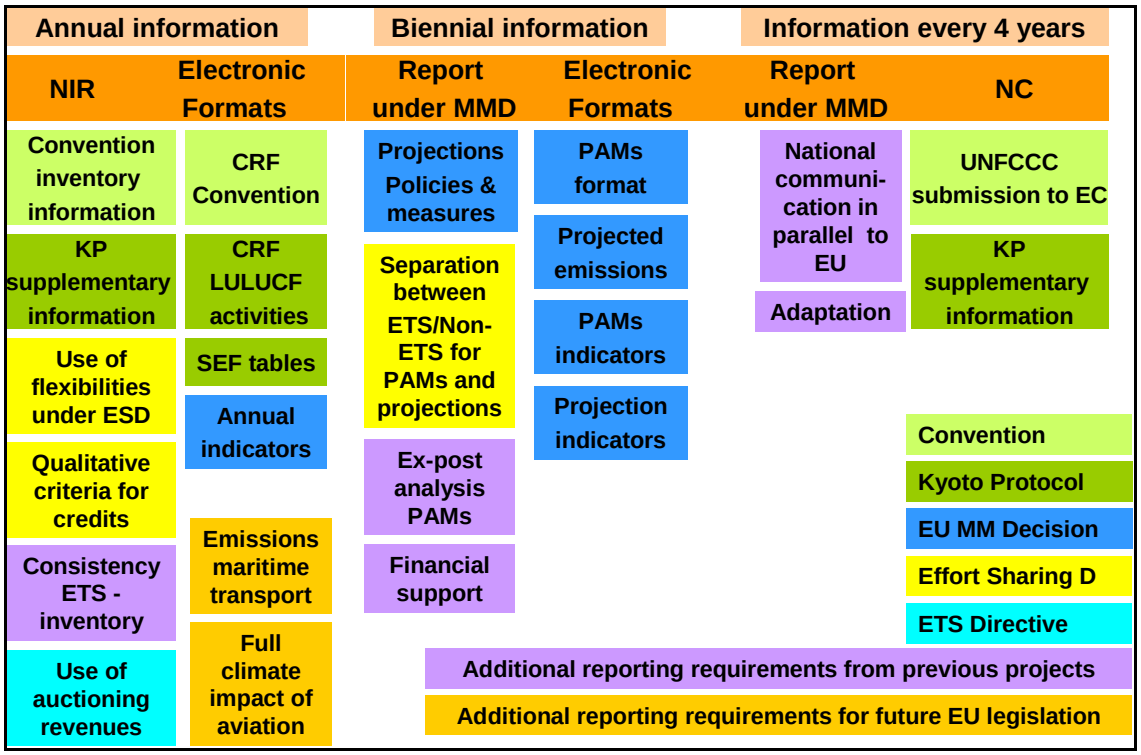


Note: light green = Convention requirements
dark green = Kyoto Protocol requirements

blue = requirements specific to Decision No 280/2004/EC
yellow = requirements arising from the Effort Sharing Decision
violet = requirement arising from the recommendations from the previous projects related to the revision of the Monitoring Mechanism Decision

Apart from the changes introduced by the Effort Sharing Decision, this projects also addresses changes to the Monitoring Mechanism Decision arising from future EU legislation and from the ETS Directive. These additional requirements are incorporated in the overview in Figure 3.

Figure 3 Existing and new reporting requirements arising from the Effort Sharing Decision, recommendations from previous projects to revise the MMD, from the ETS Directive and from envisaged future EU legislation



Note: light green = Convention requirements
dark green = Kyoto Protocol requirements
blue = requirements specific to Decision No 280/2004/EC
yellow = requirements arising from the Effort Sharing Decision
violet = requirement arising from the recommendations from the previous projects related to the revision of the Monitoring Mechanism Decision
turquoise = requirement arising from the ETS Directive
orange = requirements arising from envisaged future EU legislation

For the reporting on policies and measures it is necessary to address the scope of the Effort Sharing Decision which is the Non-ETS sector and the requirements need to

provide a clearer separation between policies and measures that affect the ETS sector and the Non-ETS sector. However it will not be possible to make a clear separation for all policies and measures because a number of measures affect both, the Non-ETS sector and the ETS sector. Thus, there will be at least three categories of policies and measures with regard to the relevant effects on the Effort Sharing Decision.

In a similar way projections will need to make a clearer distinction between projected emissions for Non-ETS and ETS emissions in accordance with the definition of greenhouse gases and the scope of the Effort Sharing Decision.

To get an overview of the already existing responsibilities, requirements and timelines, an analysis regarding the necessary content of the information (What?), person or party responsible (Who?), recipient of relevant information (To whom?), rhythm of reporting (Which frequency?) and respective availability of data (When? Availability?) was conducted (Table 1). The existing requirements were checked with regards to the appropriate integration of the additional requirements from Article 6 of Decision No 406/2009/EC in terms of reporting frequency and type of information (data or explanatory information).

Table 1 Overview of responsibilities, requirements and timelines for the reporting by Member States pursuant Article 6 of the ESD

Requirements under Article 6 of Decision No 406/2009/EC						
	Element	**What?**	**Who?**	**When? Availability?**	**Which frequency?**	**To whom?**
Article 6, paragraph 1 (a)	Submission of annual greenhouse gas emissions by Member States pursuant Article 3 of Decision No 280/2004/EC excluding greenhouse gas emissions covered under Decision No 2003/87/EC	Elements listed in Article 3(1) of Decision No 280/2004/EC:				
		• Greenhouse gas emissions by sources and removals by sinks, excluding greenhouse gas emissions covered in the allowance trading scheme for the year n –2 (a), (c)	Member States	15 January	Annually	European Commission
		• Supplementary information under the Kyoto Protocol regarding accounting of greenhouse gas emissions and removals from activities under Art. 3.3 and 3.4 of the Kyoto Protocol for the year n –2 (d)				
		• Updated time series 1990- year n –3, depending on recalculations (e)				
		• Elements of the NIR (f)				
	'Initial check' of Member States' submissions	Initial checks and consistency checks of emissions inventory (by EEA)	Commission (incl. Eurostat, JRC), assisted by EEA	As soon as possible, at the latest by 1 April		Member States
	Submission of updated or additional inventory data and complete national inventory reports by Member States	Updated or additional inventory data and complete final national inventory report	Member States	15 March		European Commission
	Estimates for data missing from a national inventory	Estimates for missing data	Commission (DG CLIMA) assisted by EEA	31 March		Member States
	Comments from Member States regarding the Commission estimates for missing data	Member States provide comments on the Commission estimates for missing data, for consideration by the Commission.	Member States	8 April		European Commission
	Final annual EC inventory (incl. Community inventory report)	Submission to UNFCCC of the final annual EC inventory	Commission (DG CLIMA) assisted by EEA	15 April		UNFCCC
	Any resubmissions by Member States in response to the UNFCCC initial checks	Member States provide to the Commission the resubmissions which they submit to the UNFCCC Secretariat in response to the UNFCCC initial checks. The Member States should clearly specify which parts have been revised in order to facilitate the use for the EC resubmission.	Member States	15 May		European Commission

Requirements under Article 6 of Decision No 406/2009/EC						
	Element	**What?**	**Who?**	**When? Availability?**	**Which frequency?**	**To whom?**
Article 6, paragraph 1 (b)	Information on the use, geographical distribution and types of, as well as the qualitative criteria applied to, credits used in accordance with Article 5 of Decision No 406/2009/EC to be included in reports pursuant Article 3 of Decision No 280/2004/EC	Elements listed in Article 5(1) of Decision No 406/2009/EC: Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) (a)				
		• Information from the national registry on the issue, acquisition, holding, transfer, cancellation, withdrawal and carryover of AAUs, RMUs, ERUs and CERs for the year n-1 according Article 3(1) of Decision 280/2004/EC (g)	Member States	15 January	Annually	European Commission
				15 April		UNFCCC
		Geographical distribution of GHG emission reduction credits from project activities and qualitative criteria applied		?		?
Article 6, paragraph 1 (c)	Information on projected progress towards meeting Member States' commitments under Decision No 406/2009/EC plus information on national policies and measures and national projections to be included in reports pursuant Article 3 of Decision No 280/2004/EC	Elements listed in Article 3(2) of Decision No 280/2004/EC:				
		• Information on national policies and measures presented on a sectoral basis for each greenhouse gas (a)	Member States	15 March	Biennial	European Commission
		• National projections of greenhouse gas emissions by sources and their removal by sinks, organised by sector (b)				
		• Descriptions of methodologies, models, underlying assumptions and key input and output parameters (b)				
Article 6, paragraph 1 (d)	Information on planned additional national policies and measures beyond the commitments under Decision No 406/2009/EC to be included in reports pursuant Article 3 of Decision No 280/2004/EC	Elements listed in Article 3(2) of Decision No 280/2004/EC:				
		• Information on measures being taken or planned for the implementation of relevant Community legislation and policies (c)	Member States	15 March	Biennial	European Commission
Article 6, paragraph 2	Provision of a detailed justification by Member States for the use of credits from project types that cannot be used by operators in the Community scheme	Elements listed in Article 4(10) of Directive 2009/29/EC (amendment of Directive 2003/87/EC)	-			
		• Member States provide information on the proper implementation of the auctioning rules for each auction, in particular with respect to fair and open access, transparency, price formation and technical and operational aspects.	Member States	One month after the auction concerned at the latest	According frequency of auctions	European Commission
		• Member States provide information on the implementation of the auctions, liquidity and the volumes traded.		Two month before adoption of Commission's report	Annually	European Commission

Requirements under Article 6 of Decision No 406/2009/EC						
	Element	**What?**	**Who?**	**When? Availability?**	**Which frequency?**	**To whom?**
		• Based on Information from Member States, Commission reports on the functioning of the carbon market including the implementation of the auctions, liquidity and the volumes traded.	European Commission	?	Annually	European Parliament and the Council
Article 6, paragraph 3	Information on progress made by Member States pusuant to Article 5(1) and (2) of Decision No 280/2004/EC	Elements listed in Article 5(1) and (2) of Decision No 280/2004/EC:				
		• Member States provides information about progress made towards fulfilling their commitments under the UNFCCC and the Kyoto Protocol.	Member States	April	Annually	European Commission
		• In consultation with Member States the European Commission prepares a report on the basis of the assessment of the progress of the Community and its Member States towards meeting their commitments.	European Commission (DG CLIMA) assisted by EEA	September		European Parliament and the Council
		• Member States provide to the Commission information on indicators to monitor and evaluate progress for the assessment of projected progress pursuant Article 3, paragraph 2 (a) of Decision No 280/2004/EC.	Member States	15 March	Biennial	European Commission
		• In consultation with Member States the European Commission prepares a report on the basis of the assessment of the projected progress of the Community and its Member States towards meeting their commitments.	European Commission (DG CLIMA) assisted by EEA	September		European Parliament and the Council

5 Task 3: Need to distinguish between the ETS and non-ETS sectors

5.1 Coverage of emissions under the Effort Sharing Decision

The EU emission reduction target of 20%[16] until 2020 is split between a) a 21% reduction in EU ETS sector emissions compared to 2005 by 2020, and b) a reduction of around 10% by 2020 compared to 2005 in sectors that are not covered by the EU ETS. The reporting under Decision No 280/2004/EC so far does not provide a differentiation between emissions or emission reductions in the ETS and the Non-ETS sectors.

According to the definition provided Article 2, paragraph 1 in Decision No 406/2009/EC, the Effort Sharing Decision covers the emissions reported under the Monitoring Mechanism Decision subtracting the emissions covered under the ETS Directive. Thus the non-ETS emissions can be defined in an equation as following:

Equation 1:

$$\text{Emissions}_{\text{non-ETS}} = \text{total emissions without LULUCF}_{\text{GHG inventory}} - \text{verified emissions}_{\text{ETS}}$$

For the purposes of establishing the emission reduction targets in absolute terms in tonnes CO_2equivalents the differentiation of non-ETS and ETS emissions is necessary for the following years:

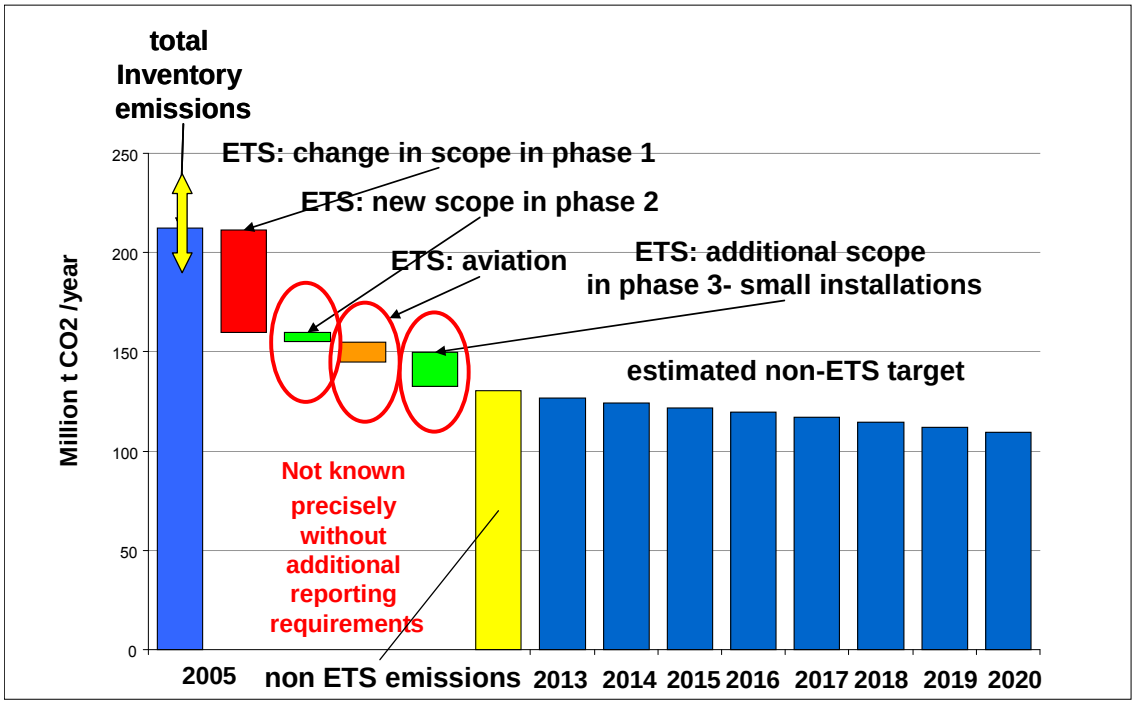
- For the year 2005 to establish the base year emissions under Decision No 406/2009/EC and thus determine the 2020 annual emission allocation.
- For the years 2008, 2009 and 2010 to establish the starting point of the linear trajectory pursuant to Article 3, paragraph 2 of Decision No 406/2009/EC between the average of these three years and the target for 2020.

During the commitment period 2013 – 2020, Member States will report national GHG emission inventories under the Monitoring Mechanism Decision and verified emissions under the EU ETS and with the application of Equation 1 non-ETS emissions can be calculated for each single year of the commitment period.

The relative targets set out in Article 3, paragraph 1 of Decision No 406/2009/EC for individual MS require consistent methodologies and a consistent coverage of sources of the individual terms in Equation 1 between the base year and the commitment period to ensure that the emission reduction effort is not only achieved by methodological changes or changes in scope during the commitment period.

[16] 30% if ambitious international agreement is achieved

Figure 4 Overview on changes in scope of non-ETS emissions between 2005 and 2020



Source: Öko-Institut

The problem with the application of Equation 1 is that neither the inventory data, nor the verified emissions under the ETS are consistent with regard to their coverage or scope. The main consistency problems are presented in Figure 4 and arise due to the following reasons:

For the national GHG inventories the following changes occur:

- The time series of total inventory GHG emissions are recalculated with each inventory submission to reflect methodological improvements, in particular those arising from the recommendations of the review process under the UNFCCC and the Kyoto Protocol. Due to these recalculations, the 2005 total inventory emissions as available at the moment will further change in the future.
- For the 2nd commitment period, the EU argues for the use of 2006 IPCC Guidelines for national GHG inventories. These revised inventory guidelines cover additional sources of GHG emissions where methodologies have not yet been available before, revised estimation methodologies and revised calculation parameters, such as default emission factors (EF). Until the year 2012, the 1996 IPCC Guidelines for national GHG inventories and IPCC 2000 Good Practice Guidance are the methodological basis for the estimation of emissions under the Kyoto Protocol. The implementation of 2006 IPCC Guidelines can result in considerable changes of total na-

tional GHG emissions also for past years as Member States are required to submit consistent time series.[17] Thus, if methodologies from 2006 IPCC Guidelines are used, they have to be applied for all reported years back to 1990. The use of 2006 IPCC Guidelines for the 2nd commitment period is not yet finally adopted and this is one of the issues to be decided at COP 15.

- For the 2nd commitment period, the EU argues for the use of global warming potentials (GWPs) from the IPCC's 4th Assessment Report (AR4) as the metric to convert individual greenhouse gases into CO_2 equivalents. At the moment GWPs from the IPCC's 2nd Assessment Report are used. Revised GWPs for CH_4, N_2O and fluorinated gases will also change total GHG emissions over the entire time series since 1990.
- For the 2nd commitment period, the EU proposes to include additional fluorinated gases, consisting in additional HFCs and PFCs, NF_3, HFEs, and Perfluoroethers. This would result in recalculations to include these additional gases for the entire time series. However, the impact on the year 2005 may be rather limited due to the small production and consumption of these chemicals in that year.

For the ETS emissions the following changes occurred or will occur:

- Between the first phase of the EU ETS from 2005-2007 and the 2nd phase from 2008-2012 the interpretation of the scope of Annex I of the ETS Directive was clarified, resulting in a harmonized and broader scope of emissions under the EU in the period 2008-2012 in particular for those Member States with a narrow scope in the first phase.[18] For UK and Spain the coverage of installations already changed during the period 2005 to 2007 due to opt-outs that were included in the ETS scheme or later due to an earlier expansion of the ETS scope as required for the period 2008-2012.
- In the 3rd phase from 2013 to 2020, the scope of the EU ETS is again broadened and additional activities are included in the revised Annex I of Directive 2009/29/EC. Compared to the previous Annex I of Directive 2003/87/EC the following activities are added:
    - CO_2 and PFC from primary aluminium;
    - CO_2 from secondary aluminium (> 20 MW);

[17] See Herold, A. et al. 2008: Changes and implications of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Background Paper for the Workshop on the implications of the implementation of the 2006 IPCC Guidelines for national GHG inventories, 30-31 October 2008, EEA, Copenhagen. and presentations at http://air-climate.eionet.europa.eu/docs/meetings/081030_ghg_inv_ipcc_gdlns_impl_ws/meeting081030.html

[18] See Communication from the Commission 2005: Further guidance on allocation plans for the 2008 to 2012 trading period of the EU Emissions Trading Scheme, 22.12.2005., COM(2005)703, section 4 "Interpretation of the scope of Annex I of the Directive".

- o CO_2 from non-ferrous metals;
- o CO_2 from mineral wool insulation material (> 20 tons/ day);
- o CO_2 from calcination of gypsum (> 20 MW);
- o CO_2 from carbon black production;
- o CO_2 and N_2O from nitric acid production;
- o CO_2 and N_2O from adipic Acid production;
- o CO_2 and N_2O from glyoxal and glyoxylic acid production;
- o CO_2 from ammonia production;
- o CO_2 from cracking (organic chemicals);
- o CO_2 from hydrogen production;
- o CO_2 from soda ash production;
- o CO_2 from capture, transport and storage;
- o CO_2 from aviation.

5.2 Differentiation of ETS and non-ETS emissions at source category level

A second approach besides Equation 1 to distinguish between ETS and non-ETS emissions, is a comparison of emissions at sectoral/ source category level and a subsequent aggregation of GHG emissions from all inventory categories not covered by the EU ETS resulting in total non-ETS emissions or a derivation of non-ETS emissions based on the GHG inventory data submitted by Member States. This approach faces considerable problems due to the differences in the scope of the EU ETS activities and the CRF source categories in the inventory and differences in the allocation of emission sources to activities and categories. Table 2 explains in which inventory CRF source categories the emissions from the individual ETS sectors can be reported. This table also describes the differences in coverage of both emission reporting regimes.

Table 2 Correspondence of ETS sectors and CRF source categories

ETS sectors	CRF source category of GHG inventory
Combustion installations with a rated thermal input exceeding 20 MW (except hazardous or municipal waste installations)	• Includes all plants without capacity threshold. • Includes non-biogenic CO_2 emissions from waste incineration. • Emissions from stationary combustion are reported in a number of categories: • **1A1a Public Electricity and Heat Production**: Sum of emissions from public electricity generation, public combined heat and power generation, and public heat plants. Public utilities are defined as those undertakings whose primary activity is to supply the public. They may be in

ETS sectors	CRF source category of GHG inventory
	public or private ownership. This source category should be completely covered by EU ETS due to the size of individual installations. • **1A1c Manufacture of Solid fuels and other Energy Industries:** Emissions arising from fuel combustion for the production of coke, brown coal briquettes and patent fuel. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry under 1A2. Combustion emissions arising from the energy-producing industries' own (onsite) energy use are not mentioned above. This includes the emissions from onsite energy use in coal mining and oil and gas extraction. • **1A2 Manufacturing industries and construction:** Emissions from combustion of fuels in industry including combustion for the generation of electricity and heat. • **1A3e Other Transportation:** Combustion emissions from all remaining transport activities including pipeline transportation, ground activities in airports and harbours, and off-road activities not otherwise reported under 1A4c Agriculture or 1A2 Manufacturing Industries and Construction. Only emissions from pipeline compressor stations are included in combustion emissions under the ETS. • **1A5a Stationary:** All remaining emissions from non-specified fuel combustion. Include emissions from military fuel use which are part of the ETS. • **1A4 Other sectors (Commercial/ Institutional, Residential, Agriculture/ Forestry/ Fisheries):** All remaining emissions from non-specified fuel combustion. Some Member States use this category to allocate ETS emissions which they can not clearly allocated to other source categories. • **1B2 Oil and Natural Gas:** The combustion in flares is considered as a non-productive activity and included under fugitive emissions. Flares are defined as part of combustion activities in the monitoring guidelines under the ETS. The source category 1B2aiv refining/storage includes emissions from catalytic crackers in several Member States as well as emissions from hydrogen production in refineries. However some Member States (e.g. Finland) report emissions from Hydrogen Production in separate categories. • **2A3 Limestone and Dolomite Use:** Emissions from Limestone ($CaCO_3$) and dolomite ($CaCO_3.MgCO_3$) use in a number of industries including metallurgy (e.g., iron and steel), glass manufacture, agriculture, construction and desulphurisation equipment. In particular the limestone use for desulphurisation in power plants is included in combustion emissions in the ETS.

ETS sectors	CRF source category of GHG inventory
Coke ovens	• **1A1c Manufacture of Solid Fuels and other Energy Industries**: Emissions arising from fuel combustion for the production of coke, brown coal briquettes and patent fuel. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry 1A2.
Mineral oil refineries	• **1A1b Petroleum Refining**: should be completely covered by EU ETS due to size of individual installations. Allocation of refineries can be different in the inventory; a share of emissions reported under the EU ETS can be allocated to 1B2 Fugitive emissions from oil and gas or to other 1A1 categories (combustion). Emissions from combustion in catalytic crackers in oil refineries should be included in fugitive emissions.
Metal ore roasting or sintering installations	No specific CRF category exists, some Member States report CO_2 emissions from sinter production under 2A7 Other mineral products and combustion emissions as part of 1A2 Manufacturing industries and construction, in particular subcategory 1A2a Iron and steel
Production of pig iron or steel: Installations for the production of pig iron or steel (primary or secondary fusion) including continuous casting, with a capacity exceeding 2,5 tonnes per hour	• No threshold in GHG inventory exists. • **1A2a Iron and Steel** (combustion emissions) and **2C1 Iron and Steel Production** (process emissions) • The allocation is very difficult: Firstly, process emissions need to be clearly separated from combustion emissions and secondly a separation of combustion emissions for iron and steel, in particular the allocation of blast furnace gas and coke oven gas is needed. The allocation at subsource level shows high uncertainties. • **2A3 Limestone and Dolomite Use**: This source category includes emissions from Limestone ($CaCO_3$) and Dolomite ($CaCO_3.MgCO_3$) use in metallurgy (e.g. iron and steel).
Production of cement clinker or lime: Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or lime in rotary kilns with a production capacity exceeding 50 tonnes per day or in other furnaces with a production capacity exceeding 50 tonnes per day	• No threshold in GHG inventory exists. • Combustion emissions are reported under **1A2 Manufacturing Industries and Construction.** • Process emissions are reported under **2A1 Cement Production** and **2A2 Lime Production.**

ETS sectors	CRF source category of GHG inventory
Manufacture of glass: Installations for the manufacture of glass including glass fibre with a melting capacity exceeding 20 tonnes per day	• No threshold in GHG inventory exists. • Combustion emissions are reported under **1A2 Manufacturing Industries and Construction.** • Process emissions are reported under **2A7 Other Mineral Products – Glass Production.** • Some Member States report that also category **2A4 Soda Ash Production and Use** (sodium carbonate, Na_2CO_3) is relevant. Soda ash is used as a raw material in a large number of industries including glass manufacture, soap and detergents, pulp and paper production and water treatment. Carbon dioxide is emitted from the use of soda ash, and may be emitted during production, depending on the industrial process used to manufacture soda ash. • **2A3 Limestone and Dolomite Use**: Emissions from Limestone (CaCO3) and dolomite (CaCO3.MgCO3) used in glass industry.
Manufacture of ceramic products: Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain, with a production capacity exceeding 75 tonnes per day, and/or with a kiln capacity exceeding 4 m^3 and with a setting density per kiln exceeding 300 kg/m^3	• No threshold in GHG inventory exists. • Combustion emissions are reported under **1A2 Manufacturing Industries and Construction.** • Process emissions sometimes are reported under **2A7 Other Mineral Products.**
Production of pulp, paper and board: Industrial plants for the production of (a) pulp from timber or other fibrous materials (b) paper and board with a production capacity exceeding 20 tonnes per day	• No threshold in GHG inventory exists. • Combustion emissions are reported under **1A2 Manufacturing Industries and Construction.** • A share of emissions from 2A4 Soda Ash production and use may also relate to this ETS category.
Other activities opted-in: Other activities for which verified emissions are reported and which are not allocated to a specific ETS sector	Can only be compared to an inventory source category when Member States provided more detailed information on the activities.

Some Member States report that some additional CRF categories include ETS emissions. However not all Member States allocate these emissions to ETS emissions.

Thus, based on the current reporting requirements a detailed comparison at activity/ source category level is difficult because of the different allocation rules under both reporting systems and the differences in separating combustion emissions from process emissions. However, some Member States have implemented efforts to improve the comparability of reported emissions:

- Austria reallocated ETS emissions to CRF categories via the NACE codes. This reallocation of ETS emissions shows a very high data consistency (see example in Table 3).
- Germany reports emissions from fuel combustion for ETS activities as separate source categories under 1A2 Manufacturing industries and construction; the additional disaggregation foresees the following source categories: 1A2f Combustion emissions from cement production, 1A2f Combustion emissions from lime production and 1A2f Combustion emissions from Ceramics production. This additional disaggregation allows for an improved check of data consistency because fuel combustion and process emissions in the inventory can then be combined to check whether total sectoral inventory emissions match with ETS sectoral emissions.

Table 3 Detailed comparison of verified emissions under the ETS with relevant CRF categories as reported in the Austrian NIR

	Categories	2005 Gg CO2		2006 Gg CO2		2007 Gg CO2	
		ETS	Inventory	ETS	Inventory	ETS	Inventory
Total ETS	CITL data	33,373		32,383		31,751	
Total ETS[1)]	**Austrian NIR**	**33,373**	**78,572**	**32,381**	**77,094**	**31,745**	**73,679**
1.A	**FUEL COMBUSTION ACTIVITIES**	**25,299**	**69,875**	**23,998**	**67,989**	**22,836**	**64,143**
1.A.1.a	Public Electricity and Heat Production	11,482	12,743	10,374	12,048	9,037	10,434
1.A.1.b	Petroleum refining	2,827	2,827	2,830	2,830	2,868	2,868
1.A.1.c	Manufacture of Solid fuels and Other Energy Industries	43	525	50	668	52	627
1.A.2.a	Iron and Steel	5,688	6,450	5,527	6,349	5,596	6,225
1.A.2.b	Non-ferrous Metals	0	220	0	224	0	254
1.A.2.c	Chemicals	665	1,583	623	1,696	592	1,528
1.A.2.d	Pulp, Paper and Print	2,245	2,286	2,153	2,189	2,150	2,191
1.A.2.e	Food Processing, Beverages and Tobacco	316	904	278	941	283	899
1.A.2.f	Other	2,010	4,242	2,139	4,567	2,239	4,570
1.A.4.a	Commercial/Institutional	22	2,250	23	2,936	19	1,952
2	**INDUSTRIAL PROCESSES**	**8,091**	8,697	**8,447**	9,105	**8,974**	9,535
2.A.1	Cement Production	1,797	1,797	1,954	1,954	2,131	2,131
2.A.2	Lime Production	579	579	**581**	**586**	596	596
2.A.3	Limestone and Dolomite Use	267	291	272	296	289	303
2.A.4	Soda Ash Production and use	15	15	16	16	17	17
2.A.7.a	Bricks and Tiles (decarbonizing)	128	128	130	130	130	130
2.A.7.b	Magnesia Sinter Production	310	310	312	312	329	329
2.C.1.a	Steel	763	763	778	778	826	826
2.C.1.b	Pig Iron	4,186	4,186	4,366	4,366	4,598	4,598
2.C.1.e.1	Electric furnace steel plant	45	45	49	49	58	58
	Included elsewhere[2)]	*17*		*63*		*65*	

Source: NIR of Austria 2009 submission, Table 22

Figure 5 Reporting of ETS share and remaining emissions for individual source categories in the Polish NIR

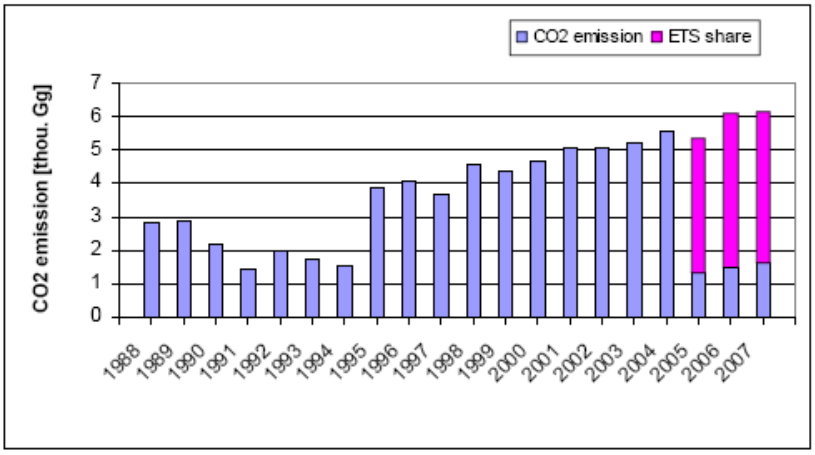


Figure 3.3. CO_2 emission for 1.A.1.b category in 1988-2007

Source: NIR of Poland 2009 submission, Figure 3.3, page 41

- Some Member States systematically indicate the share of ETS emissions at sectoral level for all relevant source categories (e.g. Poland).

The project "Assistance with the Revision of the Monitoring Mechanism Decision" recommended improvement in relation to the reporting of the coverage of ETS emissions in the national GHG inventory. In particular the following changes are recommended:

- Member States should report the share of ETS emissions for each CRF source category that includes ETS emissions. This increases the transparency where ETS emissions are reported in the GHG inventory and enables the identification of the categories for which consistent reporting of emissions should occur.
- Member State shall allocate ETS emissions to individual CRF source categories and should present a table showing the verified ETS emissions allocated to CRF categories. Such reallocation could either be done by the CRF codes that are requested to be reported by installations under the ETS in the ETS Monitoring Guidelines. The ETS emissions and CRF emissions could also be matched via the NACE codes reported by ETS installations and by matching inventory categories with NACE codes. A requirement to provide such an overview should be included in the Implementing Provisions.

If such disaggregation of ETS emissions to the CRF categories is available for several years, it will be possible to derive specific factors how ETS emissions can be derived from inventory emissions, representing the share of ETS emissions in each CRF category. This disaggregated method is likely to be less precise, but it is nevertheless useful and necessary

- as a tool to verify the results from the other approach;
- as a prerequisite for the analysis of the effect of policies and measures targeting non-ETS source categories. For the assessment whether Member States implement sufficient policies and measures in those sectors not covered by the EU ETS, it is important to be able to clearly discriminate between the source categories which are largely covered under the EU ETS and those that are mostly not covered;
- as a prerequisite to establish GHG emission projections separately for the ETS and the non-ETS sector. GHG emission projections will continue to be prepared based on projected activity data and emission factors for individual sectors and source categories. To incorporate effects of the EU ETS in a transparent way in the GHG emissions projections, it is also essential to be able to distinguish source categories largely dominated by ETS emissions from those source categories where most individual sources are not covered by the EU ETS.

Thus, for the linkage to the evaluation of policies and measures and the analysis of projections it is essential to have a clear understanding which inventory emissions are covered by the EU ETS. This will be provided through the additional reporting requirements as explained above. Thus, different purposes (emission limits or projections) will need different approaches distinguishing between ETS and non-ETS emissions.

5.3 Conclusions and recommendations

For the ESD target setting and the compliance assessment Equation 1 should be used as this is how the non-ETS emissions are defined in the Effort Sharing Decision.

The second possible approach, the aggregation of non-ETS emissions from individual inventory categories not covered by the EU ETS, as shown in the previous section might be useful for the analysis of the policies and measures targeting non-ETS emissions as well as for detailed verification activities between GHG inventories and verified emissions under the EU ETS.

6 Task 4: Establishment of final data for 2005 and 2008 to 2010

Several articles of Decision No 406/2009/EC and Directive 2009/29/EC address the final establishment of emission allowances for the ETS and the non-ETS sectors by the Commission:

- According to Article 3, paragraph 2 of the Effort Sharing Decision, measures shall be adopted **within six months when the relevant reviewed and verified emission data are available**, to determine the annual emission allocations for the period from 2013 to 2020 in terms of tonnes of carbon dioxide equivalent.
- Pursuant to Article 9 of Directive 2009/29/EC the Commission shall, by **30 June 2010**, publish the absolute Community-wide quantity of allowances for 2013, based on the total quantities of allowances issued or to be issued by the Member States in accordance with the Commission Decisions on their national allocation plans for the period from 2008 to 2012. Installations which will enter into the ETS system from 2013 onwards due to the expanded scope of the EU ETS have to submit "duly substantiated and independently verified emissions" data by 30 April 2010 to the relevant competent authority. The competent authority shall notify the Commission **by 30 June 2010** of these data and the quantity of allowances to be issued. Pursuant to Article 9(a), paragraph 3 of Directive 2009/29/EC by **30 September 2010**, the Commission shall publish adjusted quantities by the linear reduction factor for the new sectors that are included in the Community ETS scheme from 2013 onwards.
- According to Article 10 of Decision No 406/2009/EC, the related emission limit for the non-ETS sector will be adjusted by the Commission pursuant to **Articles 24 (opt-ins)**, **24a (harmonised projects)** and **Article 27 (exclusion of small emitters)** of Directive 2009/29/EC after approval of opt-ins for new activities and the exclusion of small emitters under Directive 2009/29/EC.
- The inclusion of **international maritime shipping** if no international agreement is reached is foreseen with a legal act entering into force in 2013[19], and emission allowances would need to be determined for maritime emissions before the start of 2013.

Based on these legal provisions, the project team analyzed options for establishing the final 2005 data to calculate on this basis the final emission limit for the non-ETS sector for the year 2020 in terms of tonnes of carbon dioxide equivalent resulting from the relative targets agreed for each Member State in Annex II of Decision No 406/2009/EC.

[19] Recital (2) of decision 406/2009/EC

6.1 Establishment of final inventory data for the year 2005 and for the years 2008, 2009, 2010

GHG emissions as reported in the GHG inventories for historic years are not fixed, even after being reviewed, but continue to change due to recalculations to capture methodological improvements, updated activity data, updated emission factors or other calculation parameters or the correction of errors in previous submissions. The guidelines for national inventory systems under Article 5 of the Kyoto Protocol as well as the IPCC good practice guidance for GHG inventories require countries to continuously improve their emission estimation methods. The UNFCCC inventory review recommends specific improvements to Parties. This also leads to recalculations of emission time series. Thus, recalculations are an integral part of the IPCC estimation methodology.

Recalculations are particularly relevant for the years after a new year was added due to the fact that even in the year X-2 countries often rely on preliminary statistical data that is corrected at a later stage and recalculations allow to incorporate such corrected activity data and to achieve consistency between inventories and final statistics, e.g. in the energy and agriculture sector.

For the start of reporting under the Effort Sharing Decision, a special situation arises due to the fact that new and improved IPCC 2006 Guidelines for GHG inventories need to be implemented in the future which may substantially change the emission estimates in some sector for some countries. The 2006 IPCC Guidelines will only be fully applicable after 2012, because the Kyoto Protocol refers to 1996 IPCC guidelines as the methodological basis for GHG inventories. 2006 IPCC Guidelines include methodologies for the estimation of additional emission source categories and additional fluorinated gases, consisting in additional HFCs and PFCs, NF_3, HFEs, and Perfluoroethers, updated default emission factors and other default parameters, reallocations of emissions to source categories and the sectors agriculture and LULUCF were merged. In particular updated default emission factors can significantly change the national GHG emissions (see section 6.1.2)

A third main reason for recalculations for the arises from a change of global warming potentials (GWPs) in the future at international level from GWPs as part of IPCC's 2nd Assessment report to revised GWPs from IPCC's 4th assessment report.

Recalculations can introduce changes to total GHG emissions without LULUCF of almost ±10%, however deviations of > ±3% are not very frequent. Recalculations can both reduce or increase total emission levels.

The time-series between the base year and the compliance year need to be estimated with consistent methodologies and GWPs, otherwise a significant part of the mitigation effort could be achieved through the methodological change instead of mitigation action.

For the determination of final targets for 2020 as well as for the starting point of the linear trajectory of the emissions in the period 2013 to 2020, Decision No 406/2009/EC

requires to fix the emissions for the years 2005 and 2008 to 2010. The inventory for the year 2010 is the latest element necessary to establish final targets. The regular inventory submission for the year 2010 is submitted 15 March 2012. Thus before 2012 it seems less useful to fix base year emissions, as one element would still be missing which is necessary to calculate the final targets.

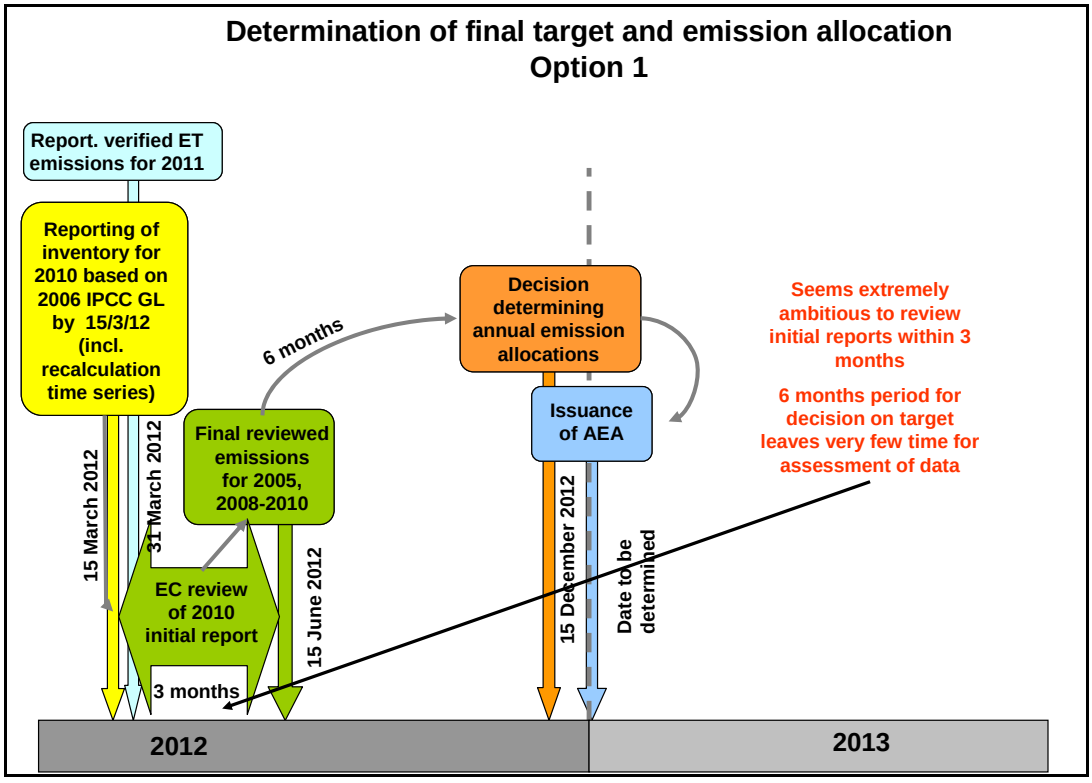
6.1.1 Options for the timing of establishing final data to determine the annual emission allocations for the period from 2013 to 2020

There are different options in relation to the **timing** when final data should be reported and subsequently fixed after having passed the review. Three general options are presented in this section.

6.1.1.1 Option 1: Fixing of targets based on recalculated inventory data submitted in 2012

In Option 1 the ESD targets would be fixed based on recalculated inventory data that incorporate the changes from the 2006 IPCC Guidelines. Such data based on the 2006 IPCC Guidelines would be submitted in the year 2012 for the emission time series 1990-2010.

Figure 6 Timelines for Option 1 for the determination of final emission allocations



Source: Öko-Institut

In order to obtain recalculated GHG emissions based on 2006 IPCC guidelines and including additional HFCs and PFCs in 2012, it is necessary to establish an additional reporting requirement to report an inventory submission in 2012 which includes an emission time series with recalculated GHG emissions based on 2006 IPCC Guidelines, global warming potentials from the IPCC's 4th assessment report and including additional fluorinated GHG not yet covered by the inventories in a mandatory way. This submission would be in parallel to the inventory submission under the Kyoto Protocol based on the 1996 IPCC Guidelines. Thus, Member States would have to prepare two different inventories in the year 2012. The deadline for the additional report should also be 15 March – before March data for 2010 may not yet be available, a later deadline would be difficult for the process to determine absolute targets until the end of 2012.

From a legal point of view it would be necessary to have reporting guidelines referring to the 2006 IPCC Guidelines and the other new requirements. It is unlikely that revised UNFCCC reporting guidelines for GHG inventories incorporating 2006 IPCC Guidelines will be available in time, because the revision process will only start in 2010 and is aiming at a completion of the revision by the end of 2011. However the reporting for the target setting would already be at the beginning of 2012. Thus, the revised MM Decision would need to have a specific reporting requirement for an inventory report based on 2006 IPCC Guidelines and specific reporting guidance would need to be elaborated that defines in which way this inventory submission would deviate from the inventory submission under the Kyoto Protocol and how 2006 IPCC Guidelines should be implemented in the reporting. The most complex task of such guidance is the separation of the AFOLU sector in the 2006 IPCC guidelines in LULUCF and agriculture emissions. As the Effort Sharing Decision does not include LULUCF emissions, the merged AFOLU sector in the 2006 IPCC Guidelines is not very helpful and needs to subdivided which is rather complex at detailed technical level. Member States would need to agree on how to distribute the detailed source/sink categories to the LULUCF and agriculture sector in order to have consistent total emissions from these sectors under the ESD compared to the existing GHG inventories.

For this additional report, no revised CRF reporter software taking into account the changes due to 2006 IPCC Guidelines would be available and the existing CRF reporter software would need to be used. It would be necessary to specify some technical details in how the "old" software should be used for the new coverage, e.g. that new source categories should be reported in "other emissions" categories etc. However, such additional guidance would need to go through the EU internal legislative process in time before 2012.

This option would provide the opportunity for a calculation of the final target for 2020 before the commitment period 2013-2020 starts, but has a number of important disadvantages:

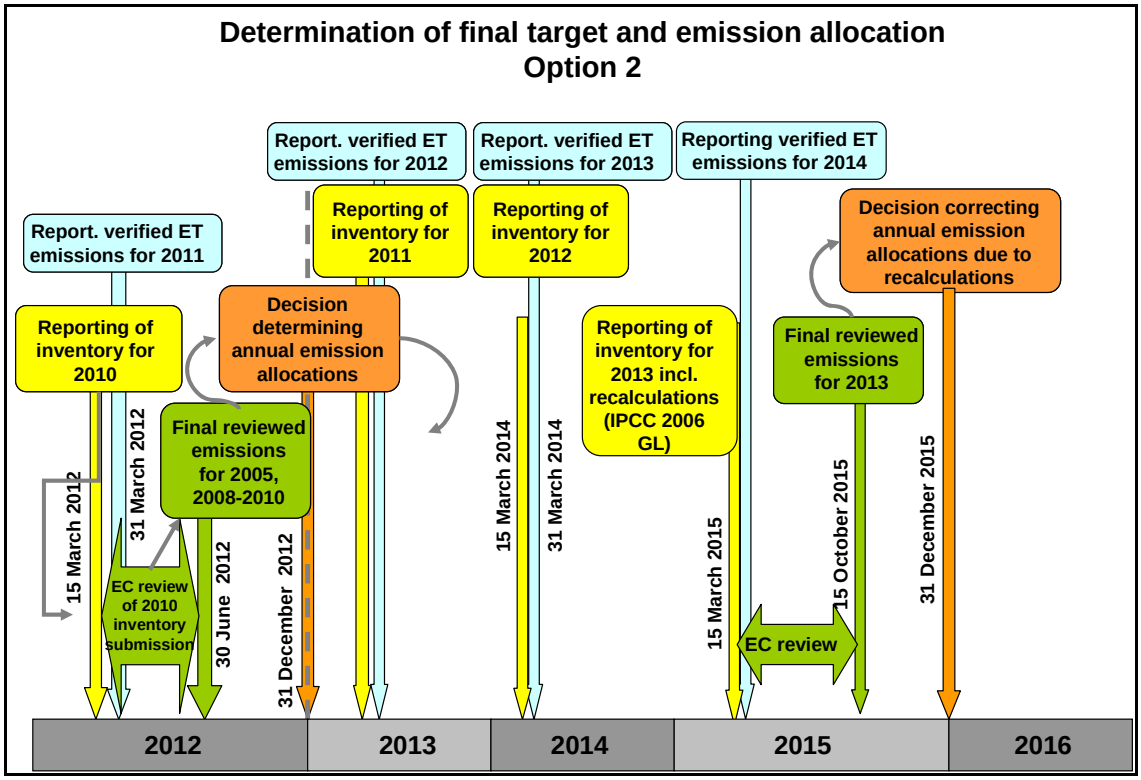
- It leaves rather few time for the adoption of a revised Monitoring Mechanism Decision with guidance for such initial report and few time for Member States to incorporate methodological changes from 2006 IPCC Guidelines in their GHG inventories for a submission in 2012.

- Revised UNFCCC reporting guidelines for GHG inventories incorporating 2006 IPCC guidelines will not be available for this submission. Separate EU reporting guidance would need to be adopted before finalization of the revision of UNFCCC reporting guidelines causing a high probability for inconsistencies in details. This would include the reporting software with all the tables. It would be extremely difficult to adapt the current inventory reporting system until 2012 to all the changes arising from the 2006 IPCC guidelines.
- Member States have to prepare two parallel inventory submissions in 2012 which is a considerable additional effort.
- The option would establish changes in GHG inventories at EU level without a guarantee that these changes will be adopted under the UNFCCC in the future.

6.1.1.2 Option 2: Fixing of targets based on regular submission in 2012 and correction of annual emission allocation based on inventory data submitted in 2015

In Option 2 the base year emissions would be fixed based on an inventory submission in 2012 for the year 2010 which is not based on 2006 IPCC Guidelines, but on the current reporting guidelines. This inventory is reviewed in the new EU review to be established and based on the final numbers, decisions determining the annual emissions allocations taken and AEA issued.

Figure 7 Timelines for Option 2 for the determination of final emission allocations



Source: Öko-Institut

The inventory for the reporting year 2013 which will be submitted in 2015 is the first regular inventory report for which 2006 IPCC Guidelines, revised GWPs or the inclusion of additional fluorinated gases will be implemented under the Convention and the Kyoto Protocol. After the review determined final GHG emissions for the year 2013, recalculations are also taken into account and the previous decisions on the annual emission allocation would be corrected based on the recalculated data

The disadvantages of this option compared to option 1 are:

- The targets established before the start of the commitment period 2013-2020 would not be final.
- It requires two times the process to establish decisions on Member States annual emission allocation.
- If the UNFCCC process cannot agree to revised UNFCCC inventory reporting guidelines in the future, a revision of targets implemented in the legislation would not be necessary.

The advantages of option 2 compared to option 1 are:

- After adoption of a revised Monitoring Mechanism Decision Member States would have time until 2015 to incorporate methodological changes from 2006 IPCC Guidelines.
- EU legislation providing the relevant guidance for the reporting of such “initial report” is more likely to be in place. More time is available to establish an EU review process to assess the submitted data.
- Revised UNFCCC reporting guidelines for GHG inventories incorporating 2006 IPCC guidelines can be used for the reporting of the submission.
- Member States do not have to prepare two parallel inventory submissions in 2012.

Option 3: Fixing of targets without recalculations based on actual IPCC guidelines and GWPs

A third option is that inventory data are not recalculated for the fixing of base year emissions under the Effort Sharing Decision and that the data as actually reported are used for the determination of emissions in 2005 and the target in 2020.

This option ignores potential changes under the UNFCCC related to the 2006 IPCC Guidelines or GWPs. However, it is currently very unclear at which point in time in the future revised reporting guidelines for inventories will be available. The workplan related to the revision of UNFCCC reporting guidelines for Annex I Parties foresees that the final guidelines and new CRF tables would be adopted by COP 19 in 2013. Lack of agreement among Parties on specific issues such as GWPs could further postpone the adoption. Therefore option 3 proposes to include a general review clause in the revised Monitoring Mechanism Decision which provides the Commission the option to propose revisions, if otherwise reporting within the EU would be inconsistent with international

reporting. This option implies that absolute targets may still be subject to change during the period 2013-2020 however only after adoption of key changes under the UNFCCC and only if the Commission decides to make use of the review clause in the revised Monitoring Mechanism Decision.

In this option, final targets for 2020 and annual emission allocations could then be calculated as soon as inventory data for the year 2010 are reported under Decision No 280/2004/EC. These data are reported in 2012. In option 3 a review clause would be included in the revised Monitoring Mechanism Decision that allows the Commission to revise the establishment of final data for the years 2005, 2008, 2009 and 2010 to ensure consistency with the monitoring and reporting of GHG emissions under the UNFCCC. The only additional step necessary compared to the existing situation is a review procedure that reviews the inventories for the target setting. Such review could be implemented in an ad hoc review procedure with support from EEA, ETC/ACC and JRC.

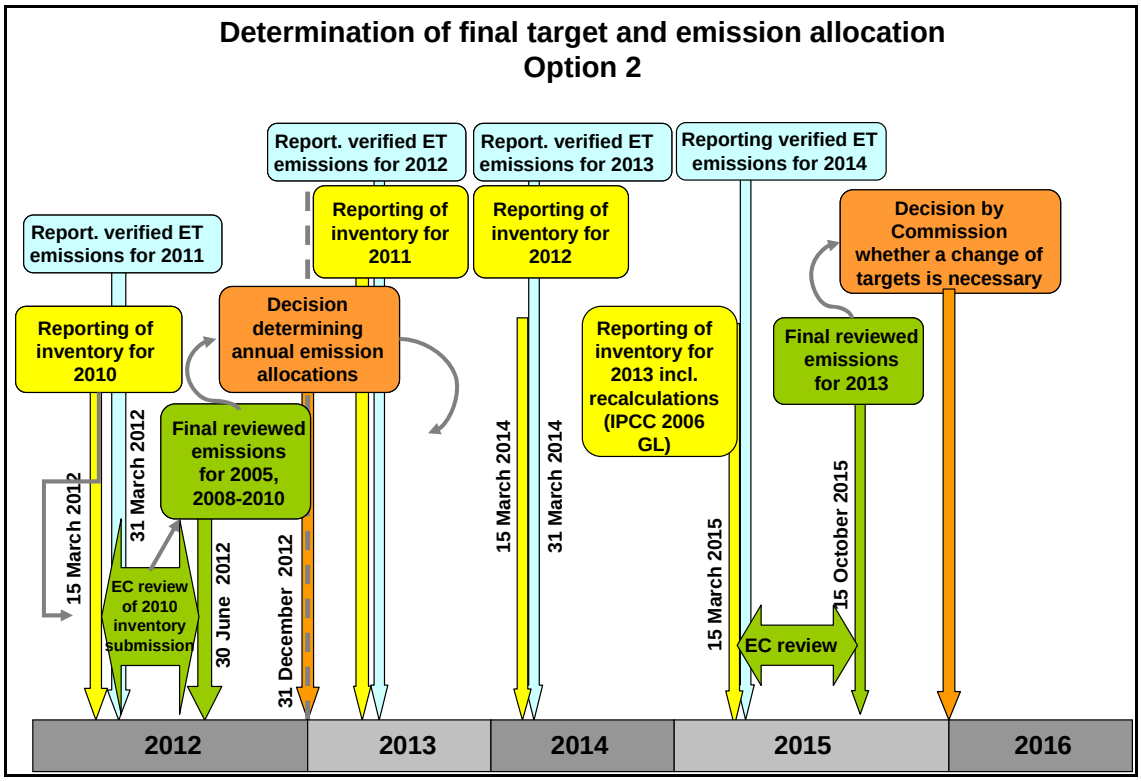
The advantages of option 3 compared to option 1 are:

- The targets established before the start of the commitment period 2013-2020 would be final with an option for the Commission to trigger a revision of the targets if changes in the UNFCCC inventory reporting will be adopted. Such decision can be formed by further analysis of the quantitative implications of 2006 IPCC guidelines on Member States' GHG emissions.
- After adoption of a revised Monitoring Mechanism Decision Member States would have time until 2015 to incorporate methodological changes from 2006 IPCC Guidelines.
- Revised UNFCCC reporting guidelines for GHG inventories incorporating 2006 IPCC guidelines can be used for the reporting of the inventory submission.
- Member States do not have to prepare two parallel inventory submissions in 2012.
- The EU reporting remains close to the UNFCCC reporting and an EU review process of the base year emissions can make use of the UNFCCC review results.

Recommendation

Option 3 is the simplest option for the implementation at Member States level as well as in terms of timelines for the preparation of additional legislation by the Commission. It is recommended not to change the inventory estimation methodologies or GWPs before official decision under the UNFCCC are taken as this would risk inconsistencies with the international and the European inventory reporting. Apart from the review clause, this option does not need many additions to the legal text of the revised Monitoring Mechanism Decision. An automatic recalculation of the targets before the start of inventory reporting for the year 2013 does not seem to be necessary. The review clause suggested in option 3 has been incorporated in Article 10bis of the revised Monitoring Mechanism Decision.

Figure 8 Timelines for Option 3



Source: Öko-Institut

6.1.2 Quantitative implications of 2006 IPCC Guidelines for national GHG inventories

Based on legal provisions, as contained in the Effort Sharing Decision and Directive 2009/29/EC, this subtask analyzed the quantitative implications of 2006 IPCC Guidelines for national GHG inventories.

According to the UNFCCC reporting guidelines (FCCC/SBSTA/2004/8) the Parties to the UNFCCC and to the Kyoto Protocol should use the IPCC 1996 Guidelines to estimate and report on anthropogenic emissions by sources and removals by sinks of greenhouse during the first commitment period. As Article 5 paragraph 2 of the Kyoto Protocol states that methodologies to calculate GHG emissions in GHG inventory submissions shall be those accepted by the IPCC and agreed at COP 3[20] the use of 2006 IPCC Guidelines under the Convention would only become mandatory for Annex I Parties' reporting for years after the first commitment period under the Kyoto Protocol.

[20] Decision 2/CP.3 as contained in document FCCC/CP/1997/7/Add.1

Nevertheless Member States were encouraged to gather experience with the IPCC 2006 Guidelines 2006[21], thus some Member States already used these Guidelines.

The EU already organized a technical workshop on the implications of the implementation of the 2006 IPCC Guidelines for national GHG inventories from 30-31 October 2008 in Copenhagen[22]. A wide range of experiences with the use of 2006 IPCC Guidelines by EU and Non-EU countries could already be found and the implementation of the 2006 IPCC Guidelines by Member States was assumed to increase.

On the basis of the GHG inventory submissions in 2008, 2009 and 2010, the project team analysed the change of GHG emissions for the year 2005 due to the implementation of the IPCC 2006 Guidelines. For this purpose the Member States' GHG emission inventories and National Inventory Reports as submitted under the UNFCCC were reviewed.[23] Table 4 provides an overview about the source categories for which Member States introduced the new Guidelines for their inventory preparation (excluding Land Use, Land Use Change and Forestry (LULUCF)) in 2008, 2009 and 2010.

[21] FCCC/SBSTA/2007/4, paragraph 56

[22] http://air-climate.eionet.europa.eu/docs/meetings/081030_ghg_inv_ipcc_gdlns_impl_ws/meeting081030.html

[23] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php

Table 4 – Overview of source categories for which IPCC 2006 Guidelines were used for the estimation of greenhouse gas emissions as contained in inventory submissions 2008, 2009 and 2010

Member State	Energy	Industrial Processes	Solvent/ Product Use	Agriculture	Waste
Austria	–	–	–	4B14	–
Belgium	1B1a	–	–	–	–
Bulgaria	–	–	–	–	–
Cyprus	1A1a, 1A2f, 1A3b, 1A4b, 1A5b, 1C	–	–	4A1, 4B1, 4B3, 4B4, 4B8, 4B9	6A1
Czech Republic	–	–	–	–	6C
Denmark	–	–	–	–	6C
Estonia	1A1a, 1A2a, 1A3a, 1A3b, 1A3d, 1A4c, 1A5b	2F1 to 2F4, 2F8	–	–	6A1, 6C, 6D
Finland	1B2d	2A6, 2B1	–	–	6A1
France	–	–	–	–	–
Germany	1A3a	–	–	4A1, 4A2, 4A8, 4B1 to 4B4, 4B6, 4B9, 4B12, 4B13, 4D3.2; re-use of IPCC 1996 GL for 4D1.1,	–
Greece	–	–	–	–	–
Hungary	1A1b, 1B2c	–	–	–	6A
Ireland	1A1a to 1A1c, 1A2a to 1A2f, 1A3c, 1A3d, 1A4a to 1A4c	2A7	–	–	6A1, 6A2
Italy	–	2C2	–	4C1	–
Latvia	1A2c, 1A2f	2A2	–	–	6B2, 6D
Lithuania	1B2b	2C1	–	–	6A1, 6A2
Luxem-bourg	1A1a, 1A1b, 1A2 except for 1A2d, 1A3 except for 1A3e, 1A4, 1A5b, 1B2b, 1C (Aviation)	–	–	4A1, 4A10, 4B1, 4B10,	6A1, 6B2, 6C, 6D
Malta	1C (Aviation)	–	3D1	4B, 4D1.2	–
Nether-lands	–	–	–	–	–
Poland	–	2C1, 2C2, 2C5	–	–	–
Portugal	–	–	–	–	–
Romania	–	–	–	–	–
Slovakia	–	–	–	–	–
Slovenia	–	–	–	–	–
Spain	–	–	–	–	6A1
Sweden	–	2A2, 2C2	–	–	–
United Kingdom	–	–	–	–	6A1

Source: Greenhouse Gas Inventories from EU-27 Member States – submissions under the United Nations Framework Convention on Climate Change in 2008, 2009 and 2010. CRF tables and National Inventory Reports as available from http://unfccc.int.

(-): IPCC 2006 GL have not been used by Member State (according to NIRs)

Table 4 shows that only a few Member States did not yet use the IPCC 2006 Guidelines (Bulgaria, France, Greece, Netherlands, Portugal, Romania, Slovakia and Slovenia), whereas most of the EU-27 Member States already implemented the IPCC 2006 Guidelines for the estimation of greenhouse gas emissions for at least one source category. Several source categories in the energy sector were estimated by using methodologies and emissions factors or default values from the IPCC 2006 Guidelines in 11 Member States (Belgium, Cyprus, Estonia, Finland, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg and Malta). Eight Member States used the Guidelines for the industrial processes sector (Estonia, Finland, Ireland, Italy, Latvia, Lithuania, Poland, Sweden). The Maltese National Inventory Report only refers to the IPCC 2006 Guidelines in the solvent and other product use sector. Agricultural source categories were estimated by using the new Guidelines in six Member States (Austria, Cyprus, Germany, Italy, Luxembourg, Malta); and 12 Member States used the Guidelines for the waste sector (Cyprus, Czech Republic, Denmark, Estonia, Finland, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Spain and the United Kingdom).

The number of source categories which have been estimated by using methodologies emission factors or default values from the IPCC 2006 Guidelines was highest for Luxembourg (24), followed by Ireland (17), Estonia (15), Cyprus and Germany (13 each).

Some Member States implemented the IPCC 2006 Guidelines in order to introduce source categories in the inventory that have not been considered before. This was especially the case if expert review teams observed incompleteness of the greenhouse gas inventory. The Luxembourgian inventory review report, for example, states that the reporting of some source categories in all years, for example, in the agriculture and waste sectors, is very incomplete.[24] Therefore Luxembourg, with its 2007 and 2008 inventory submission, estimated emissions from several source categories by using methods and emission factors from the IPCC 2006 Guidelines: CO_2, CH_4 and N_2O from 6C Waste Incineration, CH_4 and N_2O emissions from 6B Composting, CH_4 emissions from 4A Enteric Fermentation and 4B Manure Management for cervidae species and rabbits.

By using emission factors, default values and methods from the IPCC 2006 Guidelines, emissions from other source categories have been included in the inventory with later Luxembourgian submissions: CO_2, CH_4 and N2O emissions from 1A1a Public Electricity and Heat Production (other fuels); CH_4 and N_2O emissions from 1A1b Petroleum Refining (gas oils, natural gas, RFO, blast furnace gas), CH_4 and N_2O emissions from 1A2a Iron and Steel (solid fuels and natural gas); CO_2 emissions (LPG) and CH_4 and N_2O emissions from 1A2b Non-ferrous metals (liquid fuels); CO_2 emissions (LPG) and CH_4 and N_2O emissions from 1A2b Non-ferrous metals (liquid fuels); N_2O emissions from 1A2f Other (gaseous and solid fuels used for combustion in boilers), CO_2, CH_4, N_2O emissions from 1A3a Civil Aviation (aviation gasoline), 1A3b Road Transportation

[24] FCCC/ARR/2006/LUX, paragraph 8

and 1A3c Railways (gasoline, diesel oil and LPG), N2O emissions from 1A4 Other (all fuels).

With its 2009 inventory submission, Luxembourg additionally reported CO_2 (RFO) and CH_4 and N_2O emissions from 1A2c Chemicals and 1A2e Food Processing, Beverages and Tobacco (RFO, gas oil, diesel oil, natural gas) as well as CO_2, CH_4 and N_2O emissions from 1A5b Mobile (all fuels), CO_2 emissions from 1B2b Natural Gas Transmission and CO_2, CH_4 and N_2O emissions from 1C Aviation (aviation gasoline). Again, the IPCC 2006 Guidelines were the basis for the calculation of the emissions as listed above.

Other Member States implemented the IPCC 2006 Guidelines for improvement purposes, as the Guidelines provide more detailed reporting categories in the Manufacturing and Construction (1A2) as well as a new small subcategory under Mobile Combustion (1A5b). Furthermore the Guidelines provide re-structured reporting categories for Fugitive Emissions (1B2) and additional subcategories. The Guidelines also include a refinement of methods for Fuel Combustion, Stationary Combustions, Mobile Combustion, Fugitive Emissions, and provide improved default emissions factors or default parameters for several source categories.

If methodologies, emission factors or default values for estimating GHG emissions have been changed, Member States are requested to recalculate the time series. Total national emissions could be lowered or increased if the Guidelines were used.

Thus in a first step an analysis has been undertaken about the status of implementation of 2006 IPCC Guidelines as reported in the 2008, 2009 and 2010 inventory submission for all sector. In a second step the change of source category estimate in absolute terms was identified for each Member State.,The emissions resulting from the use of the IPCC 2006 Guidelines were then summed for each inventory submission.

Table 5 to Table 13 provides an overview of the implementation of the IPCC 2006 Guidelines and the resulting changes of source category estimates in quantitative terms for the year 2005. The table also indicates if changes refer to emission factors, default values or methodologies. The change of source category estimates refers to the difference between two inventory submissions for the year 2005. The year of the implementation of the Guidelines and additional information with respect to changes in activity data is also given in the tables. In order to quantify the effects of the changes due to the implementation of the Guidelines only, changes in activity data has not been considered for the calculation.

Table 5 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates for Fuel Combustion (CRF 1A1) in 2005 due to the use of the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
1.A.1 Energy Industries	Hungary	N2O EF for solid fuels	–	NA	Change of method during 2006 and 2007 submission
1.A.1.a Public Electricity and Heat Production	Cyprus	EF for HFO and diesel (CH4)	-1.9	-40.0%	–
		EF for HFO and diesel (N2O)	-105.5	-92.6%	–
	Estonia	EF for liquid fuels (LPG) (CH4, N2O)	NA	–	CH4 and N2O emissions from LPG have not been reported until submission 2010
		EF for solid fuels (coke oven coke) (CO2)	–	4.7%	Change of AD: 4.5%
		EF for solid fuels (coal, coke oven coke, oil shale) (CH4)	–	9.5%	Change of AD: 4.5%
		EF for solid fuels (coal, coke oven coke, oil shale) (N2O)	–	333.6%	Change of AD: 4.5%
		EF for biogas (CO2)	–	-36%	Change of AD: -21%
		EF for biogas (CH4)	–	-90%	Change of AD: -21%
	Ireland	EF for coal, milled peat (solid fuels) (N2O)	-279.8	-84%	–
		EF for gasoil, RFO (liquid fuels) (N2O)	-136.2	-98%	–
		EF for natural gas (gas turbine, CCGT), landfil gas (gaseous fuels) (N2O)	-29.7	-39%	–
	Luxembourg	EF for gas oils, natural gas, RFO, blast furnace gas (CO2)	–	–	CO2 emissions from gaseous fuels: change of AD: 74% Change during version 2007v2.1 and 2007v.3.1
		EF for gas oils, natural gas, RFO, blast furnace gas (CH4, N2O)	0.1	–	CH4 and N2O emissions from liquid have not been reported until submission 2007v3.1
		EF for other fuels (CO2, CH4, N2O)	72.2	–	CO2, CH4 and N2O emissions have not been reported until submission 2007v3.1
		EF CO2 for gas oil (CO2)	–	-0.9%	Change to country-specific EF; change of AD: -0.08%
1.A.1.b Petroleum Refining	Hungary	EF for liquid fuels (CH4)	0.2	36%	Change of EF during 2008 and 2009 submission
		EF for liquid fuels (N2O)	-23.5	-91%	Change of EF during 2008 and 2009 submission
		EF for gaseous fuels (CH4)	-0.1	-99%	Change of EF during 2008 and 2009 submission
		EF for gaseous fuels (N2O)	-6.9	-97%	Change of EF during 2008 and 2009 submission
	Ireland	EF for liquid fuels (CH4)	0.2	696%	–
		EF for liquid fuels (N2O)	-8.5	-95%	–
	Luxembourg	EF for gas oils, natural gas, RFO, blast furnace gas (CO2, CH4, N2O)	0.2	2%	CH4 and N2O emissions have not been reported until submission 2007v3.1
1.A.1.c Manufacture of	Ireland	EF for milled peat (solid fuels) (CH4)	-0.9	-96%	–
		EF for milled peat (solid fuels) (N2O)	-1.0	-70%	–

Table 6 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates for Manufacturing Industries and Construction (CRF 1A2) in 2005 due to the use of the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
1.A.2 Manufacturing Industries and Construction	Luxembourg	EF for gas oil, diesel oil and LPG changed from IPCC 2006 default to country-specific EFs (CO2)	–	-0.84%	Change of AD: 0.0004%
	Ireland	EF for solid fuels; same EF for all sub-cagetories 1A2a-1A2f (CH4)	-13.4	-90%	–
		N2O EF for solid fuels; same EF for all sub-cagetories 1A2a-1A2f (N2O)	15.4	-50%	–
		EF for liquid fuels; same EF for all sub-cagetories 1A2a-1A2f (CH4)	–	-77%	Change in AD for liquid fuels (- 1.5%)
		EF for liquid fuels; same EF for all sub-cagetories 1A2a-1A2f (N2O)	–	-94%	Change in AD for liquid fuels (- 1.5%)
		EF for gaseous fuels; same EF for all sub-cagetories 1A2a-1A2f (CH4)	-0.5	-50%	–
		EF for gaseous fuels; same EF for all sub-cagetories 1A2a-1A2f (N2O)	-23.1	-97%	–
		EF for biomass fuels; same EF for all sub-cagetories 1A2a-1A2f (CH4)	-0.1	-2.3%	–
		EF for biomass fuels; same EF for all sub-cagetories 1A2a-1A2f (N2O)	-0.2	-2.4%	–
1.A.2.a Iron and Steel	Estonia	EF for solid fuels (coke oven coke) (CO2)	-0.014	-1.0%	–
		EF for solid fuels (coal, coke oven coke, oil shale) (CH4)	-0.003	-90.0%	–
		EF for solid fuels (coal, coke oven coke, oil shale) (N2O)	0.0004	7.1%	–
	Luxembourg	EF for natural gas (CO2)	5.0	2%	Change during version 2007v2.1 and 2007v.3.1
		EF for soild fuels and natural gas (CH4, N2O)	0.2	–	CH4 and N2O emissions have not been reported until submission 2007v3.1
1.A.2.b Non-Ferrous Metals	Luxembourg	Method and EF for LPG (CO2)	41.5	–	CO2, CH4 and N2O emissions have not been reported until submission 2007v3.1
		EF for liquid fuels (CH4 and N2O)	0.03	–	
1.A.2.c Chemicals	Latvia	Method and EF (CO2, CH4, N2O) for emissions from liquid biofuels	–	–	Despite information from NIR, no change of estimates in CRF. Introduction of method and EF during 2008 and 2009 submissions.
	Luxembourg	EF for RFO and method (CO2)	200.60	–	Emissions have not been reported until submission 2009
		EF and method for RFO, gas oil, diesel oil and natural gas (CH4, N2O)	0.19	–	
1.A.2.e Food Processing, Beverages and Tobacco	Luxembourg	EF for RFO (CO2); method	21.41	–	Emissions have not been reported until submission 2009
		EF for RFO, gas oil, diesel oil and natural gas (CH4, N2O); method	0.80	–	
1.A.2.f. Other	Luxembourg	EF for liquid fuels used for combustion; method (CO2)	–	4%	Change during version 2007v2.1 and 2007v.3.1. Change of AD: 1%
		EF for soild fuels used for combustion in boilers (except for tires and fluff); method (CO2)	–	6%	Change during version 2007v2.1 and 2007v.3.1. Change of AD: 7%
		EF for gaseous fuels used for combustion in boilers; method (CO2)	–	-57%	Change during version 2007v2.1 and 2007v.3.1. Change of AD: -58%
		EF used for natural gas changed from IPCC 2006 default to plant specific (CO2)	–	-37%	Change during submissions 2008 and 2009. Change of AD: -38%
		EF for liquid fuels used for combustion; method (CH4)	–	182%	Change during version 2007v2.1 and 2007v.3.1. Change of AD: 1%
		EF for soild fuels used for combustion in boilers; method (CH4)	–	58%	Change during version 2007v2.1 and 2007v.3.1. Change of AD: 7%
		EF for gaseous fuels used for combustion in boilers; method (CH4)	–	13%	Change during version 2007v2.1 and 2007v.3.1. Change of AD: -58%
		EF for liquid fuels used for combustion; method (N2O)	–	-58%	Change during version 2007v2.1 and 2007v.3.1. Change of AD: 1%
		EF for soild fuels used for combustion in boilers; method (N2O)	1.47	–	N2O emissions have not been reported until submission 2007v3.1
		EF for gaseous fuels used for combustion in boilers; method (N2O)	1.00	–	
1.A.2.f. Other Non-metallic minerals	Cyprus	EF for pet-coke (CH4)	-119.59	-99.7%	–
		EF for pet-coke (N2O)	-6.02	-85.0%	–
		EF for solid biomass (CH4)	-31.45	-99.9%	–
		EF for solid biomass (N2O)	-1.16	-62.5%	–
		solid fuels (tires) (CH4)	-0.78	-90.0%	–
1.A.2.f. Used tires	Latvia	CO2 EF for emissions from used tires (CO2)	-0.61	-4.1%	Introduction of EF during 2008 and 2009 submissions
		CH4 EF for emissions from used tires (CH4)	0.1	–	CH4 and N2O emissions have not been reported until submission 2009
		N2O EF for emissions from used tires (N2O)	0.2	–	
1.A.2.f. Other (unspecified industrial power plants)	Luxembourg	EF for RFO and natural gas from clinker (CO2)	–	4%	CO2 emissions have not been reported until submission 2007v3.1.; change of AD: 1%

Table 7 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates for Transport (CRF 1A3) in 2005 due to the use of the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
1.A.3.a Civil Aviation	Estonia	EF for LTO, domestic aviation (CO2)	0.07	4.4%	–
		EF for LTO, domestic aviation (CH4)	0.01	2076.4%	–
		EF for LTO, domestic aviation (N2O)	0.003	16.9%	–
	Germany	Method and EF for Aviation gasoline (CH4)	–	768%	Change of AD for Aviation gasoline: -1.7%
		Method and EF for Jet kerosene (CH4)	–	220%	Change of AD for Jet Kerosene: -0.5%
		Method and EF for Aviation gasoline (N2O)	–	-34%	Change of AD for Aviation gasoline: -1.7%
		Method and EF or Jet kerosene (N2O)	–	-29%	Change of AD for Jet Kerosene: -0.5%
	Luxembourg	Method and EF for aviation gasoline (CO2, CH4, N2O)	0.69	–	CO2, CH4 and N2O emissions have not been reported until submission 2007v3.1
1.A.3.b Road Transportation	Cyprus	EF for gasoline (CO2)	–	-2.0%	Change of EF during 2008 and 2009 submission. Change of AD for diesel: 0.28%
		EF for diesel (CO2)	–	4.2%	Change of EF during 2008 and 2009 submission. Change of AD for diesel: 0.28%
		EF for gasoline (CH4)	–	-32.3%	Change of EF during 2008 and 2009 submission. Change of AD for diesel: 0.28%
		EF for diesel (CH4)	–	0.1%	Change of EF during 2008 and 2009 submission. Change of AD for diesel: 0.28%
		EF for gasoline (N2O)	–	56.6%	Change of EF during 2008 and 2009 submission. Change of AD for diesel: 0.28%
		EF for diesel (N2O)	–	-19.9%	Change of EF during 2008 and 2009 submission. Change of AD for diesel: 0.28%
	Estonia	EF for gasoline (CO2)	–	5.1%	Change of AD for diesel: -1.3%
	Luxembourg	Method and EF for gasoline (CH4, N2O)	153.32	–	CH4 and N2O emissions have not been reported until submission 2007v3.1
		Method and EF for diesel (CH4, N2O)	140.78	–	
		Method and EF for LPG (CO2, CH4, N2O)	0.48	–	
1.A.3.c Railways	Ireland	EF for gasoil (CH4)	-0.03	-17%	–
		EF for gasoil (N2O)	-0.72	-4.7%	–
	Luxembourg	Method and EF for gasoline, diesel oil and LPG (CO2)	1.20	6%	CH4 and N2O emissions from liquid fuels have not been reported until submission 2007v3.1. CH4 emissions from LPG have not been reported until submission 2007v3.1; no change in emissions for gasoline and diesel oil
		Method and EF for gasoline, diesel oil and LPG (N2O)	-0.49	-16%	
		Method and EF for gasoline, diesel oil and LPG (CH4)	0.03	–	
1.A.3.d Navigation	Estonia	EF for diesel oil (CO2)	–	2%	Change of AD for diesel oil: 2%
		EF for diesel oil (CH4)	–	2%	Change of AD for diesel oil: 2%
		EF for diesel oil (N2O)	–	2%	Change of AD for diesel oil: 2%
	Ireland	EF for gasoil (CH4)	0.00	40%	–
		EF for gasoil (N2O)	-0.43	-93.3%	–
		EF for RFO (CH4)	0.03	40%	–
		EF for RFO (N2O)	-6.44	-93.3%	–
	Luxembourg	Method and EF for gas oil, diesel oil (CO2)	0.33	6%	Change during version 2007v2.1 and 2007v.3.1
		Method and EF for gas oil, diesel oil (CH4)	-0.20	-94%	Change during version 2007v2.1 and 2007v.3.1

Table 8 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates for Other Sectors (CRF 1A4) and Other (CRF 1A5) in 2005 due to the use of the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
1.A.4.a Commercial/ Institutional	Ireland	CH4 and N2O EF for solid (CH4)	2.7	105%	–
		CH4 and N2O EF for liquid (CH4)	-2.0	-90%	–
		CH4 and N2O EF for gaseous fuels (CH4)	–	3%	Change of AD for gaseous fuels (2.8%)
		CH4 and N2O EF for biomass fuels (CH4)	0.1	1187%	–
		CH4 and N2O EF for solid (N2O)	-73.4	-94%	–
		CH4 and N2O EF for liquid fuels (N2O)	-3.6	-87%	–
		CH4 and N2O EF for gaseous fuels (N2O)	–	-95%	Change of AD for gaseous fuels (2.8%)
		CH4 and N2O EF for biomass fuels (N2O)	0.004	43%	–
	Luxembourg	EF for all fuels, except for natural gas, LPG, gas oil and diesel oil (CO2, CH4); method	23.8	4%	Change during version 2007v2.1 and 2007v.3.1
		EF for all fuels, except for natural gas, LPG, gas oil and diesel oil (N2O); method	1.4	–	N2O emissions have not been reported until submission 2007v3.1
1.A.4.b Residential	Cyprus	EF for diesel (CO2)	–	-35%	Change of EF during 2008 and 2009 submission; change of AD (Diesel: - 42%, Biomass 1629%)
		EF for diesel (CH4)	–	135%	
		EF for biomass (CO2)	–	1463%	
		EF for biomass (CH4)	–	2267%	
		EF for diesel (CO2)	–	-31%	Change of EF during 2008 and 2009 submission; change of AD (-32%)
		EF for diesel (CH4)	–	-52%	
		EF for biomass (CO2, CH4, N2O)	7.9	–	Emissions not reported until submission 2009
	Ireland	CH4 and N2O EF for solid fuels (CH4)	104.3	320%	–
		CH4 and N2O EF for liquid fuels (CH4)	–	60%	Change of AD for liquid fuels (- 0.2%)
		CH4 and N2O EF for biomass fuels (CH4)	3.8	900%	–
		CH4 and N2O EF for solid fuels (N2O)	-46.3	-83%	–
		CH4 and N2O EF for liquid fuels (N2O)	–	-94%	Change of AD for liquid fuels (- 0.2%)
		CH4 and N2O EF for gaseous fuels (N2O)	-15.0	-95%	–
	Luxembourg	EF for all fuels, except for natural gas, LPG, gas oil and diesel oil (CO2, CH4)	24.1	4%	Change during version 2007v2.1 and 2007v.3.1
		EF for all fuels, except for natural gas, LPG, gas oil and diesel oil (N2O)	1.4	–	N2O emissions have not been reported until submission 2007v3.1
1.A.4.c Agriculture/ Forestry/ Fisheries	Estonia	EF for motor gasoline and diesel oil (off-road agricultural transportation) (CH4)	–	91%	Change of AD (184%)
		EF for motor gasoline and diesel oil (off-road agricultural transportation) (N2O)	–	8990%	Change of AD (184%)
	Ireland	CH4 and N2O EF for gasoil (CH4)	-0.1	-5.3%	–
		CH4 and N2O EF for gasoil (N2O)	57.6	158.0%	–
1.A.5.b. Mobile	Estonia	EF for motor gasoline and diesel oil (militaly fuels) (CO2, CH4, N2O)	–	–	Emissions have been reallocated from 1A4a and reported separately
	Luxembourg	EF and method for all fuels (CO2, CH4, N2O)	17.8	–	Emissions have not been reported until submission 2009
1.A.5.b. Agricultural off	Cyprus	EF for diesel (CH4)	-0.04	-55%	–
		EF for diesel (N2O)	3.4	4667%	–

Table 9 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates for Fugitive Emissions from Solid Fuels (CRF 1B) and International Bunkers and Multilateral Operations (CRF 1C) in 2005 due to the use the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
1.B.1.a Coal Mining and Handling	Belgium	Method (CH4)	NA for 2005	–	Emissions have not been reported until submission 2008; AD/EM only occur for 1990 to 1992
1.B.2.b Natural Gas	Lithuania	CH4, N2O EF for distribution and transmission (CH4, N2O)	–	NE	Despite indication in NIR (p. 50), no quantitative change in CRF
	Luxembourg	EF for natural gas transmissions; method (CO2)	0.1	–	CO2 emissions have not been reported until submission 2009
		EF for natural gas transmissions; method (CH4)	–	-17%	Change of EF during 2008 and 2009 submission. Change of AD: 5%
1.B.2.c Flaring	Hungary	EF for Oil and Gas (CH4, N2O)	2.4	–	Emissions have not been reported until submission 2009
1.B.2.d Other non-specified	Finland	Method to calculate indirect CO2 emissions from NMVOC and CH4, carbon content (CO2, CH4)	–	-7%	Change of method during 2008 and 2009 submission. Change of AD (-1%).
1.C Aviation	Cyprus	EF for Jet Kerosene (CO2)	–	-16.3%	Change of EF during 2008 and 2009 submission. Substantial change of AD: 146550%
		EF for Jet Kerosene (CH4)	–	35.0%	Change of EF during 2008 and 2009 submission. Substantial change of AD: 146550%
		EF for Jet Kerosene (N2O)	–	-10.2%	Change of EF during 2008 and 2009 submission. Substantial change of AD: 146550%
	Luxembourg	Method and EF for Aviation gasoline (CO2, CH4, N2O)	0.1	–	CO2, CH4 and N2O emissions have not been reported until submission 2009
	Malta	Method for LTO Aviation (CO2)	-233.0	-84%	Change of EF during 2008 and 2009 submission
1.C Marine	Cyprus	EF for Gas/Diesel Oil (CO2)	–	106%	Change of EF during 2008 and 2009 submission. Substantial change of AD: 361710%
		EF for Gas/Diesel Oil (CH4)	–	492%	Change of EF during 2008 and 2009 submission. Substantial change of AD: 361710%
		EF for Gas/Diesel Oil (N2O)	–	-44%	Change of EF during 2008 and 2009 submission. Substantial change of AD: 361710%

Table 10 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates from Industrial Processes (CRF 2) in 2005 due to the use of the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
2.A.2 Lime Production	Latvia	Method, EF for CO2 (CO2)	–	610%	Change of AD (171%)
	Sweden	Change of CO2 EF from IPCC 1996 to IPCC 2006 (CO2)	–	-17%	Change of AD (-39%)
2.A.6 Road Paving with Asphalt	Finland	Method to calculate indirect CO2 emissions from NMVOC, carbon content (CO2)	-0.1	-6%	Change of method during 2008 and 2009 submission
2.A.7 Glass Production	Ireland	Method and EF (CO2)	0.5	–	CH4 emissions have not been reported until submission 2010
2.B.1 Ammonia Production	Finland	Method to calculate indirect CO2 emissions from NMVOC, carbon content (CO2)	-0.5	-6%	Change of method during 2008 and 2009 submission
2.C.1 Iron and Steel Production	Lithuania	EF CO2 emissions from electric arc furnace (CO2)	7.19	–	CO2 emissions from cast iron have not been reported until submission 2010
	Poland	CH4 EF for coke production (CH4)	–	147%	Change during 2007 and 2008 submissions, revision of AD (-1%)
2.C.2 Ferroalloys Production	Italy	EF (CO2)	–	33%	Change during 2008 and 2009 submissions, revision of AD (+100%)
	Poland	CH4 EF (CH4)	1.37	–	CH4 emissions have not been reported until submission 2008
	Sweden	CH4 EF (CH4)	0.29	–	CH4 emissions have not been reported until submission 2010
2.C.5 Zinc production	Poland	CO2 EF (CO2)	195.77	–	CO2 emissions have not been reported until submission 2008
2.F.1 Refrigeration and Air Conditioning Equipment	Estonia	Method for domestic refrigerators decommissioned, commercial refrigeration, transport refrigeration, industrial refrigeration, stationary air-conditioning, monile air-conditioning (HFCs)	68.69	872%	HFC emissions (except for HFC-134a from stationary air-conditioning) have not been reported until submission 2009
2.F.2 Foam Blowing		Method for foam blowing (HFC)	38.95	–	HFC emissions have not been reported until submission 2009
2.F.4 Aerosols/ Metered Dose Inhalers		Method for metered dose inhalers and aerosols (HFC)	2.62	–	HFC emissions have not been reported until submission 2009
2.F.8 Electrical Equipment		Method for SF6 from electrical equipment (SF6)	0.01	–	SF6 emissions have not been reported until submission 2008

Table 11 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates for Total Solvent and Other Product Use (CRF 3) in 2005 due to the use of the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
3.D.1 Use of N2O for Anaesthesia	Malta	Method and N2O EF (N2O)	2.26	–	Emissions of N2O have not been reported until submission 2009

Table 12 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates for Agriculture (CRF 4) in 2005 due to the use of the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
4.A.1 Dairy Cattle (Option A)	Cyprus	EF CH4 (CH4)	6.9	21%	Change of EF during 2008 and 2009 submissions
4.A.1 Non-Dairy Cattle (Option A)	Germany	MCF (CH4)	849.9	12%	Change of EF during 2008 and 2009 submissions
4.A.1 Mature Dairy Cattle (Option B)	Luxembourg	Digestible energy for dairy cattle and non-dairy cattle (CH4)	-8.2	-8%	–
4.A.10 Mature Non-Dairy Cattle (Option	Luxembourg		0.3	1%	–
4.A.2 Buffalo	Germany	MCF (CH4)	0.1	4%	Change of EF during 2008 and 2009 submissions
4.A.8 Swine	Germany	MCF (CH4)	4.5	1%	Change of EF during 2008 and 2009 submissions
4.A.10 Other non-specified	Luxembourg	Life-weight for rabbits (CH4)	0.001	–	CH4 emissions for rabbits have not been reported until submission 2008
4.A.10 Other non-specified	Luxembourg	Life-weight, EF for cervidae species	0.098	–	
4.B Manure Management	Malta	N2O EF (N2O)	4.7	1391%	–
4.B.1 Dairy Cattle (Option A)	Cyprus	EF CH4 (CH4)	-1.0	-4.55%	Change of EF during 2008 and 2009 submissions
4.B.1 Dairy Cattle (Option A)	Germany	MCF (CH4)	42.9	3%	Change of EF during 2008 and 2009 submissions
4.B.1 Non-Dairy Cattle (Option A)	Cyprus	EF CH4 (CH4)	0.7	5.00%	Change of EF during 2008 and 2009 submissions
4.B.1 Non-Dairy Cattle (Option A)	Germany	MCF (CH4)	-446.3	-30%	Change of EF during 2008 and 2009 submissions
4.B.1 Mature Dairy Cattle (Option B)	Luxembourg	Digestible energy for dairy cattle and non-dairy cattle (CH4)	-7.4	-19%	–
4.B.1 Mature Non-Dairy Cattle (Option B)	Luxembourg	Digestible energy for dairy cattle and non-dairy cattle (CH4)	0.1	1%	–
4.B.2 Buffalo	Germany	VS (CH4)	0.1	80%	Change of EF during 2008 and 2009 submissions
4.B.3 Sheep	Cyprus	EF CH4 (CH4)	0.5	32.14%	Change of EF during 2008 and 2009 submissions
	Germany	VS (CH4)	5.9	56%	Change of EF during 2008 and 2009 submissions
4.B.4 Goats	Cyprus	EF CH4 (CH4)	0.6	44.44%	Change of EF during 2008 and 2009 submissions
	Germany	MCF, VS (CH4)	0.7	154%	Change of EF during 2008 and 2009 submissions
4.B.6 Horses	Germany	MCF, VS (CH4)	37.1	92%	Change of EF during 2008 and 2009 submissions
4.B.8 Swine	Cyprus	EF CH4 (CH4)	81.2	90.00%	Change of EF during 2008 and 2009 submissions
4.B.9 Poultry	Cyprus	EF CH4 (CH4)	7.6	85.62%	Change of EF during 2008 and 2009 submissions
	Germany	MCF (CH4)	-121.1	-61%	Change of EF during 2008 and 2009 submissions
4.B.10 Other livestock	Luxembourg	Life-weight for rabbits (CH4)	0.011	–	CH4 emissions have not been reported until submission 2008
		EF for cervidae species (CH4)	0.001	–	
4.B.12 Liquid Systems	Germany	EF N2O (N2O)	–	264%	Change of EF during 2008 and 2009 submissions; change of AD: 8%
4.B.13 Solid Storage and Dry Lot	Germany	EF N2O (N2O)	–	-62%	Change of EF during 2008 and 2009 submissions; change of AD: 3%
4.B.14 Other AWMS	Austria	EF N2O for deep litter (N2O)	189.8	1162%	–
4.C.1 Irrigated	Italy	Method for intermittently flooded, single aeration (CH4)	NA	-0.5%	Change during 2006 and 2007 submissions. Data comparison for 2004
		Method for intermittently flooded, multiple aeration (CH4)	NA	-1.2%	Change during 2006 and 2007 submissions. Data comparison for 2004
4.D.1.2 Animal Manure Applied to Soils	Malta	N2O EF (N2O)	10.7	–	Emissions of N2O have not been reported until submission 2010
4.D.3.2 Nitrogen Leaching and Run-off	Germany	Method, EF (N2O)	–	-66.5%	Change of EF during 2008 and 2009 submissions; change of AD:

Table 13 – Overview of implementation of IPCC 2006 GL by EU-27 Member States and resulting change of greenhouse gas emissions estimates for Waste (CRF 6) in 2005 due to the use of the IPCC 2006 GL

Greenhouse gas source and sink categories	Member State	2006 IPCC GL implemented	Change of source category estimates		Comments
			[Gg CO_2 eq.]	[%]	
6.A Solid Waste Disposal on Land	Hungary	Method (FOD) (CH4)	–	NA	Change of method during 2006 and 2007 submission
6.A.1 Managed Waste Disposal on Land	Cyprus	DOC (CH4)	–	7%	Change of EF during 2008 and 2009 submission. Change of AD (12%)
	Estonia	k-values (CH4)	–	16%	Change of DOC and k-values during 2007 and 2008 submission. Change of AD (2%)
	Finland	DOC and k-values (CH4)	–	-8%	Change of DOC and k-values during 2008 and 2009 submission. Change of AD (-1%)
	Ireland	Method, parameters (CH4)	–	-29%	Change of AD (annual MSW at the SWDS): NA; AD (unmanaged and managed waste disposal was reported separately from 2010 submission onwards only)
	Lithuania	Method, parameters (CH4)	–	-12%	Change of AD (annual MSW at the SWDS): 19%
	Luxembourg	Method and CH4 EF (CH4)	–	79%	Change of AD (annual MSW at the SWDS): -26%
	Spain	DOC for compost plant refuse, wastewater sludge and others (CH4)	–	8%	Change of AD (annual MSW and SWDS): 24%
	United Kingdom	Modelling approach for estimating methane generation	–	4%	Change during 2008 and 2009 submission. Change of AD (annual MSW and SWDS): 8%; change of Recovery: 5%
6.A.2 Unmanaged Waste Disposal Sites	Ireland	Method, parameters, unmanaged waste disposal on land (CH4)	–	-48%	Change of AD (annual MSW at the SWDS): NA; AD (unmanaged and managed waste disposal was reported separately from 2010 submission onwards only)
	Lithuania	Method, parameters, unmanaged waste disposal on land (CH4)	–	-36%	Change of AD (annual MSW at the SWDS): -18%
6.B.2 Domestic and Commercial Waste Water	Latvia	Method, MCF CH4 (CH4)	-130	-70%	–
	Luxembourg	Method and N2O EF (N2O)	0.00004	50%	Change of method and EF during 2008 and 2009 submission.
		BOD (CH4)	–	-0.8%	Change of method and EF during 2008 and 2009 submission. Change of AD 0.1%
6.C Waste Incineration	Czech Republic	Method for harzadous waste (CH4), EF harzadous waste (CH4)	0.001	–	Not reported until submission 2010
		Method for harzadous waste (N2O), EF harzadous waste (N2O)	2.4	–	Not reported until submission 2010
		Method for MSW (CH4), EF for MSW (CH4)	0.002	–	Not reported until submission 2010
		Method for MSW (N2O), EF for MSW (N2O)	2.0	43%	–
	Denmark	Method for open burning without energy recovery, EF (CO2, CH4, N2O); dry matter content, carbon content, fossil carbon content of the waste fractions, oxidation factor	25.9	–	Emissions of CO2, CH4 and N2O from waste incineration (without energy recovery) have not been reported until submission 2010
	Estonia	Method and EFs for solid waste burnt in controlled incineration facilities (CO2, CH4, N2O)	16.7	–	Emissions of CO2, CH4 and N2O from waste incineration have not been reported until submission 2008
	Luxembourg	Method, EF CH4, N2O (CH4, N2O)	–	–	CH4 and N2O emissions have not been reported until submission 2007v3.1. Emissions included in 1A1a. Change of method and EF during submissions 2007v2.1 and 2007v3.1
6.D Other	Estonia	Method and EFs for biological treatment of solid waste (CO2, CH4, N2O)	84.9	–	Emissions of CO2, CH4 and N2O from biological treatment have not been reported until submission 2008
6.D Composting	Latvia	Method, EF CH4, N2O (CH4, N2O)	NA	–	CH4 and N2O emissions have not been reported until submission 2007
	Luxembourg	Method, EF CH4, N2O (CH4, N2O)	13.8	–	CH4 and N2O emissions have not been reported until submission 2007v3.1.

For EU-27 Member States, the change of source category estimates for the year 2005 due to the implementation of the IPCC 2006 Guidelines amount to 659.4 Gg CO_2eq in 2008 inventory submissions, 569.7 Gg CO_2eq in 2009 inventory submissions and 92.4 Gg CO_2eq in 2010 inventory submissions (Table 14). To identify the contribution of the use of the IPCC 2006 Guidelines to reducing or increasing total greenhouse gas emissions, the calculation does not include a change of the activity data by Member States.

Table 14 – Change of source category estimates in the ETS sector and the non-ETS sector due to the implementation of the IPCC 2006 Guidelines in inventory submissions 2008, 2009 and 2010.

Member State	Change of source category estimates (ETS sector)			Change of source category estimates (non-ETS sector)		
	2007 - 2008	2008 - 2009	2009 - 2010	2007 - 2008	2008 - 2009	2009 - 2010
	Gg CO_2eq. in 2005					
Austria	–	–	–	–	–	189.8
Belgium	–	–	–	–	–	–
Cyprus	–	–	**-266.4**	–	104.3	3.3
Czech Republic	–	–	4.3	–	–	–
Denmark	–	–	25.9	–	–	–
Estonia	–	–	**-0.02**	101.7	110.3	0.1
Finland	–	–	–	–	**-0.6**	–
Germany	–	–	–	–	373.6	–
Hungary	–	**-30.3**	–	–	**-27.9**	–
Ireland	–	–	**-476.0**	–	–	21.1
Italy	–	–	–	–	–	–
Latvia	–	–	–	–	**-0.3**	**-129.6**
Lithuania	–	–	–	–	–	7.2
Luxembourg	121.7	–	–	360.6	241.1	**-15.2**
Malta	–	–	–	–	**-230.7**	15.4
Poland	–	–	–	197.1	–	–
Spain	–	–	–	–	–	–
Sweden	–	–	–	–	–	0.3
United Kingdom	–	–	–	–	–	–
Sum	121.7	-30.3	-712.1	659.4	569.7	92.4

Source: Greenhouse Gas Inventories from EU-27 Member States – submissions under the United Nations Framework Convention on Climate Change in 2008, 2009 and 2010. CRF tables and National Inventory Reports as available from http://unfccc.int.
Bold values indicate a reduction of GHG emissions

A reduction of GHG emissions due to the use of the new Guidelines could be found for five Member States only (Finland, Hungary, Latvia, Luxembourg and Malta). The decrease of emissions in Malta was due to the change of the method for estimating emissions from LTO aviation. Hungary changed the CH_4 and N_2O emission factors for liquid and gaseous fuels from Petroleum Refining and thus reduced its greenhouse gas emissions, whereas Finland changed the method for calculating indirect CO_2 emissions

from NMVOC from Road Paving with Asphalt and from Ammonia Production. Methane emissions from Domestic and Commercial Waste Water in Latvia were calculated by using the method from the IPCC 2006 Guidelines, resulting in a reduction of emissions of 130 Gg CO_2eq.

Based on the analysis the effect of the changes due to the implementation of the IPCC 2006 Guidelines was then quantified in terms of the impact on the emission reduction which is needed in the non-ETS sector to reach the limit as specified in Annex II of Decision No. 406/2009/EC.

GHG emissions from the non-ETS sector were quantified by subtracting GHG emissions from the ETS sector in 2005 from the total GHG emissions without LULUCF for the year 2005 as reported in the inventory submissions in 2008, 2009 and 2010. Emissions from the ETS sector were derived from the European Union Emissions Trading Scheme (EU ETS) data viewer[25] (Table 15).

Table 15 – Emissions from non-ETS sector as derived from national total greenhouse gas emissions and emissions from the ETS sector

Member State	Total emissions without LULUCF, submissions in...			Difference		Emissions from ETS sector [1)]	Emissions from non-ETS sector			Difference	
	...2008	...2009	...2010	2008 - 2009	2009 - 2010	2008 to 2010	2008	2009	2010	2008 - 2009	2009 - 2010
	Gg CO_2eq. in 2005										
Austria	93 260	92 832	92 916	-428	84	33 373	59 887	59 459	59 543	-428	84
Belgium	142 346	141 919	141 464	-427	-455	55 363	86 982	86 556	86 101	-427	-455
Cyprus	9 852	9 857	9 594	5	-263	5 079	4 773	4 778	4 515	5	-263
Czech Republic	145 749	146 249	145 357	500	-892	82 455	63 295	63 795	62 903	500	-892
Denmark	64 250	63 477	64 502	-773	1 025	26 476	37 774	37 001	38 026	-773	1 025
Estonia	19 313	19 637	19 412	324	-225	12 622	6 691	7 015	6 791	324	-225
Finland	69 027	68 696	68 417	-331	-280	33 100	35 927	35 597	35 317	-331	-280
Germany	1 005 000	968 893	977 585	-36 108	8 692	474 991	530 010	493 902	502 594	-36 108	8 692
Hungary	80 198	80 382	79 846	184	-536	26 162	54 036	54 221	53 685	184	-536
Ireland	70 345	70 258	68 821	-87	-1 437	22 441	47 904	47 817	46 380	-87	-1 437
Italy	577 945	573 685	572 638	-4 260	-1 047	225 989	351 955	347 695	346 648	-4 260	-1 047
Latvia	11 130	11 213	11 354	83	141	2 854	8 276	8 359	8 499	83	141
Lithuania	22 681	22 563	22 973	-118	410	6 604	16 077	15 959	16 369	-118	410
Luxembourg	13 291	13 391	13 276	100	-115	2 603	10 687	10 787	10 673	100	-115
Malta	3 139	2 936	2 902	-203	-34	1 971	1 168	964	930	-203	-34
Poland	386 357	386 608	389 963	251	3 355	203 150	183 207	183 458	186 813	251	3 355
Spain	440 887	441 150	435 112	263	-6 038	183 627	257 260	257 523	251 485	263	-6 038
Sweden	66 900	67 200	67 711	300	511	19 382	47 518	47 818	48 330	300	511
United Kingdom	658 733	656 140	658 088	-2 593	1 948	242 513	416 219	413 626	415 574	-2 593	1 948

Source: Greenhouse Gas Inventories from EU-27 Member States – submissions under the United Nations Framework Convention on Climate Change in 2008, 2009 and 2010. CRF tables and National Inventory Reports as available from http://unfccc.int.

(1): Emissions from ETS sector from EEA EU ETS data viewer

[25] EEA EU ETS data viewer: http://dataservice.eea.europa.eu/PivotApp/pivot.aspx?pivotid=473 (27 July 2010)

On the basis of the inventory submissions in 2008, 2009 and 2010 and the Member State greenhouse gas emission limits in 2020 compared to 2005 greenhouse gas emissions levels as included in Annex II of Decision No 06/2009/EC the emission targets for the non-ETS sector was then quantified. The change of source-category estimates as given in Table 14 contributes to the emissions target either positively or negatively (Table 16).

Table 16 – EU-27 Member States' emission targets for non-ETS sector and contribution of the use of IPCC 2006 GL to emission target

Member State (Reduction) [2)]	Emissions target for non-ETS sector in 2020			Contribution to emission target due to use of IPCC 2006 GL	
	2008	2009	2010	2008	2009
	Gg CO_2eq. in 2005			[%]	
Austria (-16%)	50 304.9	49 945.8	50 016.2	–	0.57%
Belgium (-15%)	73 935.1	73 572.5	73 185.8	–	–
Cyprus (-5%)	4 534.7	4 539.3	4 289.2	2.05%	0.07%
Czech Republic (9%)	68 991.3	69 536.2	68 563.9	–	–
Denmark (-20%)	30 219.4	29 601.1	30 421.1	–	–
Estonia (11%)	7 427.4	7 787.2	7 537.5	0.87%	0.00%
Finland (-16%)	30 178.7	29 901.1	29 666.2	-0.002%	–
Germany (-14%)	455 808.3	424 755.6	432 230.9	0.08%	–
Hungary (10%)	59 440.1	59 642.6	59 053.0	-0.11%	–
Ireland (-20%)	38 323.2	38 253.9	37 104.3	–	0.09%
Italy (-13%)	306 201.2	302 495.1	301 584.2	–	–
Latvia (17%)	9 682.9	9 779.7	9 944.4	-0.01%	-4.54%
Lithuania (15%)	18 488.4	18 352.7	18 824.1	–	0.11%
Luxembourg (-20%)	8 549.8	8 629.9	8 538.1	9.26%	-0.58%
Malta (5%)	1 225.9	1 012.7	976.8	-11.70%	0.78%
Poland (1%)	208 856.3	209 142.7	212 967.0	–	–
Spain (-10%)	231 534.2	231 771.0	226 336.5	–	–
Sweden (-17)	39 439.9	39 689.3	40 113.7	–	0.001%
United Kingdom (-16%)	349 624.2	347 446.2	349 082.4	–	–

Source: Greenhouse Gas Inventories from EU-27 Member States – submissions under the United Nations Framework Convention on Climate Change in 2008, 2009 and 2010. CRF tables and National Inventory Reports as available from http://unfccc.int. Emissions from ETS sector from EEA EU ETS data viewer
[(2)]: Bracketed values indicate Member State greenhouse gas emission limits in 2020 compared to 2005 greenhouse gas emissions levels as included in Annex II of Decision No 06/2009/EC

For some Member States, the implementation of the IPCC 2006 GL would lower the individual emission targets (Finland, Hungary, Latvia, Luxembourg and Malta). The Maltese reduction of greenhouse gas emissions by -230.7 Gg CO_2eq amounts to 11.7% of the overall annual emissions reduction which needs to be achieved under the Effort Sharing Decision until 2020. Thus Malta would be able to increase its greenhouse gas emissions by additional 16.7 % and nevertheless achieve its emission target.

For other Member States an additional burden to reduce greenhouse gas emissions would arise, if the implementation of the Guidelines increased the emissions. This is especially the case for Cyprus, whose use of the new Guidelines for the estimation of emissions especially from the agricultural sector in 2008 contributes to the emissions target by additional 2 %. The use of the IPCC 2006 Guidelines for estimating emissions from the agricultural sector (Manure Management) results in additional burden for Austria, Germany and Malta.

However, the increase in emissions and thus the negative contribution to the emissions targets is also caused by the implementation of the IPCC 2006 Guidelines in order to introduce source categories in the inventory that have not been considered before. This is the case for Estonia (F- gases from Refrigeration and Air Conditioning Equipment, Foam Blowing, Aerosols/ Metered Dose Inhaler and Electrical Equipment), Lithuania (Iron and Steel Production, CO_2 emissions from electric arc furnace), Poland (CH_4 emissions from Ferroalloys Production, CO_2 emissions from Zinc production), Sweden (CH_4 emissions from Ferroalloys Production) and Luxembourg (see above for detailed description of the introduction of additional source category estimates by using the IPCC 2006 Guidelines). As completeness of an inventory as assumed to be reached in some point of time, additional greenhouse gas emissions estimates will fade. This could be observed for Luxembourg, whose amount of additional greenhouse gas emissions estimates decreased during submissions in 2008, 2009 and 2010.

According to the analysis of this subtask, the establishment of final inventory data for the year 2005 and for the years 2008, 2009, 2010 based on the use of the IPCC 2006 Guidelines would result in an additional burden to reduce emissions for the majority of EU-27 Member States.

6.1.3 Quantitative implications of GWPs from IPCC 4th Assessment Report on MS inventories

The IPCC 4th Assessment Report provides updated GWPs for CH_4, N_2O and the fluorinated gases. Table 17 provides a comparison between the GWPs as included in the IPCC 2nd Assessment Report and the IPCC 4th Assessment Report. According to the UNFCCC reporting guidelines (FCCC/SBSTA/2004/8) the Parties to the UNFCCC and to the Kyoto Protocol should use the GWPs of the IPCC 2nd Assessment Report for the calculation of CO_2 equivalent emissions in their GHG inventory submissions. The table shows that for most GHGs the GWPs included in the IPCC 4th Assessment Report (AR4) are now higher compared to the values included in the IPCC 2nd Assessment Report (AR2).

Table 17: Global warming potentials relative to CO_2 for a 100 year horizon

GHG	IPCC 2nd Assessment Report	IPCC 4th Assessment Report	Percent difference
CH_4	21	25	19%
N_2O	310	298	-4%

HFC-23	11,700	14,800	26%
HFC-32	650	675	4%
HFC-41	150	92	-39%
HFC-43-10mee	1,300	1,640	26%
HFC-125	2,800	3,500	25%
HFC-134	1,000	1,100	10%
HFC-134a	1,300	1,430	10%
HFC-152a	140	124	-11%
HFC-143	300	353	18%
HFC-143a	3,800	4,470	18%
HFC-227ea	2,900	3,220	11%
HFC-236fa	6,300	9,810	56%
HFC-245ca	560	693	24%
CF_4	6,500	7,390	14%
C_2F_6	9,200	12,200	33%
C_3F_8	7,000	8,830	26%
C_4F_{10}	7,000	8,860	27%
c-C_4F_8	8,700	10,300	18%
C_5F_{12}	7,500	9,160	22%
C_6F_{14}	7,400	9,300	26%
SF_6	23,900	22,800	-5%

For the calculations presented in this chapter the Member States' GHG emission inventory submissions under the EC GHG Monitoring Mechanism in 2010 were used. The Member States' inventory data are the same as those used for the EC GHG inventory submission in 2010 (data deadline 15 May 2010).[26]

Table 18 provides an overview of the recalculations by gas for the year 2005. It shows that overall for all EU Member States the recalculated national total GHGs are higher than those submitted in 2010. The percentage difference, however, varies across Member States depending on the contribution of the individual gases to the national total emissions. For Luxembourg, Germany and Belgium total GHG emission recalculations are below 1 %, whereas Bulgaria, Romania and Ireland show recalculations of 3 % or more. As the Effort Sharing Decision refers to non-ETS emissions the third column in Table 18 provides the share of total GHG emission recalculations in relation to non-ETS emissions. The recalculations range from 0.8 % for Luxembourg to 4.8 % for Ireland.

[26] For detailed data sources see the EEA webpage: http://www.eea.europa.eu/publications/european-union-greenhouse-gas-inventory-2010

Table 18: Recalculations by gas due to revised GWPs for the year 2005 based on the GHG inventories submitted in 2010 under the EC GHG Monitoring Mechanism

	Total GHG			CH_4		N_2O		HFC		PFC		SF_6	
	Gg CO_2 equiv.	% of national total emissions	% of non-ETS emissions	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%
AT	1,067	1.1%	1.8%	1,159	19%	-210	-4%	140	14%	2	2%	-23	-5%
BE	1,186	0.8%	1.4%	1,300	19%	-363	-4%	219	15%	35	25%	-4	-5%
DK	908	1.4%	2.4%	1,039	19%	-259	-4%	126	16%	4	26%	-1	-5%
FI	732	1.1%	2.1%	856	19%	-258	-4%	133	15%	2	24%	-2	-5%
FR	9,900	1.8%	2.3%	10,487	19%	-2,597	-4%	1,767	14%	289	20%	-46	-5%
DE	8,840	0.9%	1.8%	9,804	19%	-2,206	-4%	1,321	13%	145	21%	-225	-5%
GR	1,970	1.5%	3.2%	1,540	19%	-306	-4%	724	20%	11	16%	-0.3	-5%
IE	2,234	3.2%	4.8%	2,435	19%	-303	-4%	58	13%	48	29%	-4	-5%
IT	6,766	1.2%	2.0%	7,341	19%	-1,453	-4%	833	16%	66	19%	-21	-5%
LU	81	0.6%	0.8%	87	19%	-17	-4%	11	14%	-	-	-0.2	-5%
NL	2,829	1.3%	2.1%	3,282	19%	-670	-4%	214	14%	15	6%	-12	-5%
PT	2,268	2.6%	4.5%	2,364	19%	-198	-4%	100	13%	3	26%	-0.3	-5%
ES	6,626	1.5%	2.6%	6,742	19%	-1,047	-4%	895	18%	48	20%	-13	-5%
SE	906	1.3%	1.9%	1,076	19%	-291	-4%	90	11%	38	15%	-7	-5%
GB	8,312	1.3%	2.0%	9,781	19%	-1,426	-4%	-2	0%	10	4%	-51	-5%
EU-15	54,626	1.3%	2.2%	59,294	19%	-11,604	-4%	6,629	12%	717	18%	-410	-5%
BG	2,130	3.0%	3.0%	2,255	19%	-184	-4%	59	15%	-	-	-0.2	-5%
CY	212	2.2%	4.7%	204	19%	-16	-4%	24	18%	-	-	-	-
CZ	2,025	1.4%	3.2%	2,223	19%	-301	-4%	103	17%	3	29%	-4	-5%
EE	297	1.5%	4.4%	317	19%	-36	-4%	17	14%	-	-	-0.05	-5%
HU	1,452	1.8%	2.7%	1,693	19%	-351	-4%	85	16%	34	16%	-9	-5%
LT	424	1.8%	2.6%	629	19%	-208	-4%	3	20%	-	-	-0.1	-5%
LV	324	2.9%	3.8%	378	19%	-57	-4%	3	10%	-	-	-0.3	-5%
MT	42	1.4%	4.5%	43	19%	-2	-4%	0.4	2%	0	33%	-0.1	-5%
PL	6,407	1.6%	3.4%	7,158	19%	-1,153	-4%	361	12%	44	17%	-1	-5%
RO	4,492	3.0%	3.0%	5,040	19%	-641	-4%	1	12%	95	17%	-2	-5%
SI	392	1.9%	3.4%	411	19%	-47	-4%	9	10%	20	16%	-1	-5%
SK	767	1.5%	3.1%	886	19%	-148	-4%	27	16%	3	16%	-1	-5%
EU-27	73,592	1.4%	2.4%	80,532	19%	-14,747	-4%	7,320	12%	915	17%	-429	-5%

Note: Column "Gg CO_2 equiv." under "Total GHG" indicates the total increase or decrease of emissions due to the revision of GWPs in AR4 compared to AR2.
Column "% of national total emissions" under "Total GHG" indicates the percentage of the increase related to total GHG emissions without LULUCF.
Column "% of non-ETS emissions" under "Total GHG" indicates the percentage of the increase related to total GHG emissions without LULUCF minus EU-ETS emissions. Bulgaria and Romania did not participate in the EU ETS in 2005.

Table 19 provides an overview of the contribution of the individual gases to the total national GHG recalculations for the year 2005. It shows that for all Member States CH_4 contributes most to the total recalculations.

Table 19: Contribution of gases to total national GHG recalculations due to revised GWPs for the year 2005 based on the GHG inventories submitted in 2010 under the EC GHG Monitoring Mechanism

	National total GHG	CH_4	N_2O	HFC	PFC	SF_6
AT	100%	109%	-20%	13%	0%	-2%
BE	100%	110%	-31%	18%	3%	0%
DK	100%	114%	-29%	14%	0%	0%
FI	100%	117%	-35%	18%	0%	0%
FR	100%	106%	-26%	18%	3%	0%
DE	100%	111%	-25%	15%	2%	-3%
GR	100%	78%	-16%	37%	1%	0%
IE	100%	109%	-14%	3%	2%	0%
IT	100%	108%	-21%	12%	1%	0%
LU	100%	108%	-21%	14%	-	0%
NL	100%	116%	-24%	8%	1%	0%
PT	100%	104%	-9%	4%	0%	0%
ES	100%	102%	-16%	14%	1%	0%
SE	100%	119%	-32%	10%	4%	-1%
GB	100%	118%	-17%	0%	0%	-1%
EU-15	100%	109%	-21%	12%	1%	-1%
BG	100%	106%	-9%	3%	-	0%
CY	100%	96%	-7%	11%	-	-
CZ	100%	110%	-15%	5%	0%	0%
EE	100%	107%	-12%	6%	-	0%
HU	100%	117%	-24%	6%	2%	-1%
LT	100%	148%	-49%	1%	-	0%
LV	100%	117%	-17%	1%	-	0%
MT	100%	103%	-4%	1%	0%	0%
PL	100%	112%	-18%	6%	1%	0%
RO	100%	112%	-14%	0%	2%	0%
SI	100%	105%	-12%	2%	5%	0%
SK	100%	115%	-19%	4%	0%	0%
EU-27	100%	109%	-20%	10%	1%	-1%

Table 20 provides an overview of the recalculations by sector for the year 2005. It shows that in relative terms for all EU Member States the recalculations in the energy and the industrial processes sectors are rather low, whereas the percent recalculations in the waste and agriculture sectors are rather high. This is due to the importance of CH_4 emissions in the waste and agriculture sectors. This is also underlined by Table 21, which shows the contribution of the individual sectors to the total national GHG recalculations for the year 2005. For most Member States agriculture and waste account for more than 70% of the recalculations. Only for those Member States with substantial fugitive CH_4 emissions in the energy sector, this sector has a higher weight in the recalculations (e.g. CZ, DE, PL, RO). As the emission limitation and reduction commitment under the Effort Sharing Decision regulates most of the non-CO_2 emis-

sions from the non-ETS sectors, the recalculations particularly impact the sectors that are part of the decision (agriculture, waste, fugitive emissions from energy, F-gases).

Table 20: Recalculations due to revised GWPs by sector for the year 2005 based on the GHG inventories submitted in 2010 under the EC GHG Monitoring Mechanism

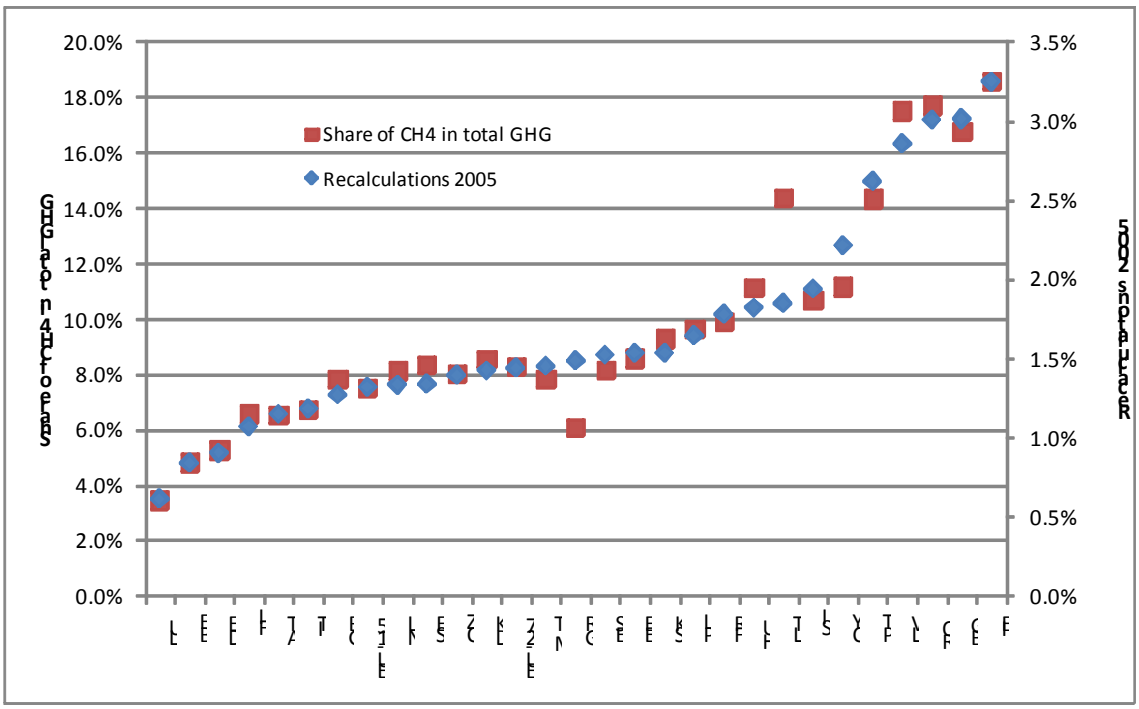
	Energy		Industrial processes		Solvents		Agriculture		LULUCF		Waste	
	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%	Gg CO_2 equiv.	%
AT	70	0.1%	111	1%	-7	-2%	531	7%	-11	0.1%	363	16%
BE	106	0.1%	126	1%	-10	-4%	787	8%	0	0.0%	176	13%
DK	105	0.2%	128	5%	-1	-1%	476	5%	-1	0.03%	200	17%
FI	33	0.1%	73	1%	-2	-2%	207	4%	4	0.0%	421	17%
FR	692	0.2%	1,764	4%	-3	0%	5,913	6%	315	-0.5%	1,534	13%
DE	2,743	0.3%	982	1%	-48	-1%	3,281	5%	-31	-0.1%	1,882	14%
GR	312	0.3%	714	5%	-6	-2%	441	5%	1	0.0%	508	16%
IE	33	0.1%	102	3%	0	0%	1,898	10%	-1	0.2%	201	17%
IT	1,118	0.2%	590	1%	-32	-1%	2,106	6%	7	-0.01%	2,984	16%
LU	10	0.1%	11	1%	-0.1	-1%	50	8%	0	0.0%	10	13%
NL	299	0.2%	30	0.2%	-3	-1%	1,315	7%	0	0.0%	1,188	17%
PT	92	0.1%	87	1%	-3	-1%	746	9%	100	1.9%	1,346	17%
ES	560	0.2%	887	3%	-15	-1%	2,840	7%	44	-0.1%	2,354	17%
SE	32	0.1%	104	1%	-5	-2%	416	5%	-3	0.0%	360	17%
GB	1,901	0.3%	-132	-0.5%	0	-	2,584	6%	4	-0.2%	3,959	17%
EU-15	8,105	0.2%	5,576	2%	-134	-1%	23,591	6%	429	-0.2%	17,487	16%
BG	352	0.7%	29	0.4%	-2	-3%	241	5%	-6	0.1%	1,510	19%
CY	0.2	0.002%	24	2%	0	0%	68	9%	0	0.0%	121	19%
CZ	1,069	0.9%	78	1%	-8	-2%	350	4%	21	-0.3%	536	16%
EE	102	0.6%	17	2%	0	-	67	5%	0	0.0%	111	16%
HU	431	0.7%	45	1%	-12	-3%	310	4%	5	-0.1%	677	18%
LT	76	0.6%	-74	-2%	0	0%	229	5%	-1	0.01%	193	17%
LV	75	0.9%	2	1%	0	0%	96	5%	1	-0.002%	151	17%
MT	0.4	0.02%	0	1%	-0.1	-4%	12	14%	0	0.0%	29	17%
PL	3,087	1.0%	301	1%	-5	-1%	1,539	4%	435	-1.2%	1,486	16%
RO	2,312	2.3%	-16	-0.1%	0	0%	1,008	5%	0	0.0%	1,188	18%
SI	70	0.4%	29	2%	-2	-4%	173	9%	1	-0.01%	122	17%
SK	236	0.7%	-15	-0.1%	-3	-4%	131	4%	4	-0.5%	419	18%
EU-27	15,917	0.4%	5,997	1%	-165	-1%	27,814	6%	889	-0.2%	24,029	16%

Table 21: Contribution of sectors to total national GHG recalculations due to revised GWPs for the year 2005 based on the GHG inventories submitted in 2010 under the EC GHG Monitoring Mechanism

	Energy	Industrial processes	Solvents	Agriculture	LULUCF	Waste
AT	7%	10%	-1%	50%	-1%	34%
BE	9%	11%	-1%	66%	0%	15%
DK	12%	14%	0%	52%	0%	22%
FI	5%	10%	0%	28%	1%	58%
FR	7%	18%	0%	60%	3%	15%
DE	31%	11%	-1%	37%	0%	21%
GR	16%	36%	0%	22%	0%	26%
IE	1%	5%	0%	85%	0%	9%
IT	17%	9%	0%	31%	0%	44%
LU	12%	14%	0%	62%	0%	12%
NL	11%	1%	0%	46%	0%	42%
PT	4%	4%	0%	33%	4%	59%
ES	8%	13%	0%	43%	1%	36%
SE	4%	11%	-1%	46%	0%	40%
GB	23%	-2%	0%	31%	0%	48%
EU-15	15%	10%	0%	43%	1%	32%
BG	17%	1%	0%	11%	0%	71%
CY	0%	11%	0%	32%	0%	57%
CZ	53%	4%	0%	17%	1%	26%
EE	34%	6%	0%	23%	0%	37%
HU	30%	3%	-1%	21%	0%	47%
LT	18%	-17%	0%	54%	0%	46%
LV	23%	1%	0%	30%	0%	47%
MT	1%	1%	0%	28%	0%	70%
PL	48%	5%	0%	24%	7%	23%
RO	51%	0%	0%	22%	0%	26%
SI	18%	7%	0%	44%	0%	31%
SK	31%	-2%	0%	17%	1%	55%
EU-27	22%	8%	0%	38%	1%	33%

The importance of CH_4 emissions in the recalculations of national total GHG emissions due to the revised GWPs is also shown in Figure 9. It shows that the percentage of recalculations increases with the importance of CH_4 in total national GHG emissions. There are only few Member States where this link is less evident, e.g. GR and LT. For Greece the recalculations of HFCs in the industrial processes sector are much more important than in all other Member States mainly because of important HFC-23 emissions from fluorinated gas production in 2005. The GWP of HFC-23 increased from 11,700 in the IPCC 2nd Assessment Report to 14,800 in the IPCC 4th Assessment Report. Lithuania has a comparatively high share of N_2O in national total GHG emissions. As the GWP of N_2O is lower in the IPCC 4th Assessment Report, the N_2O recalculations offset a substantial part of the CH_4 recalculations.

Figure 9: Share of CH_4 in total GHG emissions in 2005 related to recalculations due to revised GWPs of national total GHG emissions for the year 2005



Finally Table 22 and Table 23 explore the impact of the recalculations due to revised GWPs on emission trends. Table 22 shows that for most Member States the recalculations for 1990 are higher than for 2005 and 2008. This reflects the fact that between 1990 and 2008 in most Member States: (1) methane emissions declined more rapidly than total GHG, or (2) methane emissions declined whereas total GHG emissions increased, or (3) methane emissions increased more slowly than total GHG emissions. Consequently in most countries the share of methane in total GHG emissions was higher in 1990 than in recent years. Table 23 shows that for these countries increases in the percent change 1990-2008 of total GHG emissions get smaller due to the recalculations (e.g. Austria, Ireland) whereas emission decreases get larger (e.g. Germany, UK).

Table 22: Recalculations of total GHG due to revised GWPs for the years 1990, 2005 and 2008 based on the GHG inventories submitted in 2010 under the EC GHG Monitoring Mechanism

	% of national total emissions			% of non-ETS emissions		
	1990	2005	2008	1990	2005	2008
AT	1.9%	1.1%	1.2%	NA	1.8%	1.9%
BE	1.3%	0.8%	0.9%	NA	1.4%	1.6%
DK	0.9%	1.4%	1.5%	NA	2.4%	2.5%
FI	1.3%	1.1%	1.0%	NA	2.1%	2.1%
FR	1.9%	1.8%	1.9%	NA	2.3%	2.5%
DE	1.4%	0.9%	0.9%	NA	1.8%	1.7%
GR	1.6%	1.5%	1.2%	NA	3.2%	2.6%
IE	4.1%	3.2%	3.2%	NA	4.8%	4.5%
IT	1.3%	1.2%	1.3%	NA	2.0%	2.2%
LU	0.6%	0.6%	0.6%	NA	0.8%	0.8%
NL	2.7%	1.3%	1.5%	NA	2.1%	2.5%
PT	2.9%	2.6%	3.1%	NA	4.5%	4.9%
ES	1.7%	1.5%	1.7%	NA	2.6%	2.9%
SE	1.4%	1.3%	1.3%	NA	1.9%	1.9%
GB	2.3%	1.3%	1.3%	NA	2.0%	2.2%
EU-15	1.7%	1.3%	1.4%	NA	2.2%	2.3%
BG	2.9%	3.0%	2.7%	NA	3.0%	5.7%
CY	2.5%	2.2%	2.0%	NA	4.7%	4.3%
CZ	1.6%	1.4%	1.5%	NA	3.2%	3.4%
EE	1.1%	1.5%	1.4%	NA	4.4%	4.2%
HU	1.7%	1.8%	2.0%	NA	2.7%	3.1%
LT	1.9%	1.8%	1.8%	NA	2.6%	2.4%
LV	2.1%	2.9%	2.7%	NA	3.8%	3.5%
MT	1.4%	1.4%	1.4%	NA	4.5%	4.6%
PL	1.6%	1.6%	1.5%	NA	3.4%	3.2%
RO	2.9%	3.0%	3.0%	NA	3.0%	5.4%
SI	2.2%	1.9%	1.7%	NA	3.4%	2.9%
SK	1.0%	1.5%	1.6%	NA	3.1%	3.4%
EU-27	1.8%	1.4%	1.5%	NA	2.4%	2.6%

Table 23: Recalculations of total GHG percentage changes 1990-2008 due to revised GWPs based on the GHG inventories submitted in 2010 under the EC GHG Monitoring Mechanism

	% change 1990-2008	
	2010 submission	recalculated
AT	10.8%	10.0%
BE	-7.1%	-7.4%
DK	-7.4%	-6.9%
FI	-0.3%	-0.6%
FR	-6.4%	-6.4%
DE	-22.2%	-22.6%
GR	22.8%	22.4%
IE	23.0%	21.9%
IT	4.7%	4.7%
LU	-4.8%	-4.7%
NL	-2.4%	-3.5%
PT	32.2%	32.4%
ES	42.3%	42.4%
SE	-11.7%	-11.8%
GB	-18.6%	-19.4%
EU-15	-6.5%	-6.8%
BG	-37.4%	-37.5%
CY	93.9%	92.9%
CZ	-27.5%	-27.6%
EE	-50.4%	-50.3%
HU	-24.9%	-24.7%
LT	-51.1%	-51.1%
LV	-55.6%	-55.3%
MT	44.2%	44.3%
PL	-12.7%	-12.8%
RO	-39.7%	-39.7%
SI	15.2%	14.6%
SK	-33.9%	-33.5%
EU-27	-11.3%	-11.5%

6.2 Changes in the scope of ETS emissions

The following areas will need to be elaborated with greater attention in relation to the changes introduced in the EU ETS. This includes the adjustment of the scope of the EU ETS between phase 1 (2005-2007) and phase 2 (2008-2012), the inclusion of aviation of the EU ETS in 2012 and an enhanced scope for stationary sources for the period 2013 to 2020.

Overall, the main target is to keep the determination of final caps under the ETS and the determination of allowed emissions under the ESD in close connection. In this way, the objective is to ensure that the emission reductions by MS add up to a 20% total emission reduction for the EU. Therefore any changes in the ETS cap, for instance due

to added installations as a result of the extended scope as of 2013, should be mirrored by equivalent deductions from the national emission allocation under the ESD. The determination of the final cap under the ETS is foreseen for July 2010 (current scope ETS) and September 2010 (extended scope).

6.2.1 Methodology to calculate the 2020 emission limit

The following approach suits best to derive the final emission limit for the year 2020:

Preferred Option:

$(Inv_{2005}$ (without aviation) $– CITL_{2005} – Add.scope_{2008-2012}) \times (1 – Red\%) = Limit_{2020}$

$Limit_{2020, adjusted} = Limit\ 2020 – Alloc.scope_{2013-2020}$

The approach excludes the emissions of national aviation reported in the inventories which will simplify the process of calculating the emission limits. Any approach based on emission data from the CITL could lead to methodological inconsistencies since emissions are reported for a different scope under the inventories and under the CITL (the inventories include only national flight and flight starting from the EU; the EU ETS will also include landing flights).

For the establishment of the linear trajectory that determines the annual allocation of emissions under Decision No 406/2009/EC, the starting point has to be calculated in which the linear path begins. It is assumed that for the starting point emissions, a similar adjustments as for the non-ETS base year emissions in 2005 would be applicable, resulting in the following equations:

Preferred Option:

$ØEmissions_{start2008-2010} = ØInv_{2008-2010}$ (without aviation) $– ØCITL_{2008-2010}$

6.2.2 Expansion of ETS scope in the period 2013-2020

All changes in the ETS cap, for instance due to added installations in the EU ETS as a result of the extended scope as of 2013, will be mirrored by equivalent adjustments in national caps under the ESD (zero sum game, Article 10 ESD). Installations which will enter into the ETS system from 2013 onwards due to the expanded scope of the EU ETS have to submit “duly substantiated and independently verified emissions data” by 30 April 2010 to the relevant competent authority. The competent authority shall notify the Commission by 30 June 2010 of these data and the quantity of allowances to be issued. The adjustment of the emission limit under the Effort Sharing Decision will be equal to the Member States' contribution to the adjustment of the EU-ETS cap. Data are envisaged to be available in September 2010.

As mentioned above Article 10 (b) and (c) ESD require some additional adjustments due to opt-ins for new activities and exclusion of small emitters under Directive 2009/29/EC pursuant to Articles 24 (opt-ins), 24a (harmonised projects) and 27 (exclusion of small emitters) Directive 2009/29/EC. According to Article 24 of the ETS Directive the Commission has to approve the inclusion of additional activities and gases in

the ETS scheme and authorize the issuance of allowances. Thus, the Commission will obtain detailed data on the quantities of allowances issued for any opt-ins under Article 24 and can refer the adjustment of the non-ETS emission limit on these figures.

Pursuant to Article 27 Directive 2009/29/EC, Member States can exclude small emitters from the ETS scheme if the emissions are subject to measures that will achieve equivalent contribution to emission reductions as under the ETS. Member States have to notify the Commission and the installations concerned about the related emissions as well as the equivalent measures applied. Due to the exclusion of small emitters, the ETS cap will be adjusted downwards to reflect the average annual verified emissions of those installations in the period from 2008 to 2010, subject to an adjustment by the linear factor referred to in Article 9 Directive 2009/29/EC. The main principle is to make sure that adjustments in the ETS cap will be mirrored by equivalent adjustments in national caps under ESD (zero sum game). Thus, the numbers with which the ETS cap will be adjusted for each year of the trading period shall also be used for equivalent adjustments in the 2013-2020 emission limits from the MS.

Adjustments of the emission limit due to harmonized rules for projects that reduce emissions under Article 24(a) of the ETS Directive will be subject to further implementing measures. Based on a first analysis it is not necessary to take projects under Article 24 (a) (Harmonized rules for projects that reduce emissions) into account when base year emissions or the emission limit are calculated. However, it is necessary to adjust the non-ETS emission limits once Member States have issued credits for projects covered by Article 24 (a) ETS Directive. The process would be similar to the current procedure for JI projects. If ERUs are issued by Member States the number of AAUs in the party holding account of the Member State decreases (this is similar to an adjustment of the non-ETS emission limit). This will be addressed by the chapter on the use of the community registry.

6.3 Conclusions and recommendations

It is proposed that inventory data are not recalculated for the target setting under the Effort Sharing Decision and that the data as actually reported in Member States GHG inventories are used for the determination of emissions in 2005 and the target in 2020. A general review clause proposed for the revised Monitoring Mechanism Decision would provide a mandate to the Commission to propose revisions, if otherwise reporting within the EU would be inconsistent with international reporting. This option implies that absolute targets may still be subject to change during the period 2013-2020, however only in the case when reported inventory changes are implemented under the UNFCCC.

Final targets for 2020 and annual emission allocations could then be calculated as soon as inventory data for the year 2010 are reported and reviewed. These data will be reported in 2012. For the review of these inventory years an ad hoc review procedure could be established, e.g. with support from EEA, ETC/ACC and JRC.

The review clause would only be applied after the respective UNFCCC reporting guidelines were adopted and after the Member States submitted the first GHG inventory based on the revised UNFCCC reporting guidelines. This would likely be in the year 2015 with the inventory for the year 2013. The Commission could then analyse whether the changes of GHG emissions for the years 2005, 2008 to 2010 are so substantial compared to the original inventories used for the target setting for many Member States so that a revision of the targets should be performed. If the review clause is used, all targets for all Member States should be recalculated and re-established based on the revised guidelines. After the EU review for the inventory submission in the year 2015 will be completed, the target setting decision could be revised based on the final reviewed GHG estimates.

The difference in scope of the ETS emissions does not need to be taken into account specifically in the calculation of targets under the Effort Sharing Decision, because both the ETS Directive and the Effort Sharing decision implement complementary targets for emission reductions. If the scope of the ETS increases between the establishment of non-ETS base year emissions and the commitment period, the corresponding emission reductions have to be achieved under the ETS, but no longer under the Effort Sharing Decision. Such reallocation however, does not change the overall economy wide target of Member States or the EU.

7 Task 5: Reporting on auctioning revenues

According to Article 10 paragraph 3 of Directive 2009/29/EC 50% of the revenues from auctioning of allowances in the EU ETS and the revenues from auctioning of allowances under Article 3d(4) of Directive 2008/101/EC are “earmarked”. This means that they need to be spent for one of the environmental purposes listed in Article 10 paragraph 3 of the ETS Directive. Article 10 of Directive 2009/29/EC also establishes the requirement that Member States need to report how they spent the “earmarked” revenues. Article 10, paragraph 3 covers a rather wide range of purposes.

The areas for which auctioning revenues should be used can be distinguished in international support for developing countries which includes the following areas:

- contributions to the Global Energy Efficiency and Renewable Energy Fund and to the Adaptation Fund under the Kyoto Protocol, demonstration projects for reducing emissions and for adaptation to climate change (Article 10, paragraph 3(a) Directive 2009/29/EC);
- measures to avoid deforestation and increase afforestation and reforestation in developing countries (Article 10, paragraph 3(c) Directive 2009/29/EC);
- measures to transfer technologies to developing countries (Article 10, paragraph 3(c) Directive 2009/29/EC);
- measures facilitating adaptation to the adverse effects of climate change in developing countries (Article 10, paragraph 3(c) Directive 2009/29/EC);
- the environmentally safe capture and geological storage of CO_2, in particular in from solid fossil fuel power stations and a range of industrial sectors and subsectors, including in third countries (Article 10, paragraph 3(e) Directive 2009/29/EC);

The second broad category is the use of auctioning revenues for domestic and EU internal purposes, comprising the following areas:

- Reduction of GHG emissions and adaptation to the impacts of climate change and to fund research and development as well as demonstration projects for reducing emissions and adaptation to climate change, including participation in initiatives within the framework of the European Strategic Energy Technology Plan and the European Technology Platforms(Article 10, paragraph 3(a) Directive 2009/29/EC);
- the development of renewable energies and other technologies contributing to the transition to a safe and sustainable low-carbon economy and to help meet the commitment of the Community to increase energy efficiency by 20 % by 2020 and to help meeting the renewable energy target (Article 10, paragraph 3(b) Directive 2009/29/EC);
- forestry sequestration in the Community (Article 10, paragraph 3(d) Directive 2009/29/EC);
- the environmentally safe capture and geological storage of CO_2 (Article 10, paragraph 3(e) Directive 2009/29/EC);

- the encouragement to a shift to low-emission and public forms of transport (Article 10, paragraph 3(f) Directive 2009/29/EC);
- the financing of research and development in energy efficiency and clean technologies (Article 10, paragraph 3(g) Directive 2009/29/EC);
- measures intended to increase energy efficiency and insulation or to provide financial support in order to address social aspects in lower and middle income households (Article 10, paragraph 3(h) Directive 2009/29/EC);
- the coverage of administrative expenses of the management of the Community ETS scheme (Article 10, paragraph 3(i) Directive 2009/29/EC).

Article 10, paragraph 3 Directive 2009/29/EC lists many different purposes for which auctioning revenues should be spent, some of them are rather general such "to reduce GHG emission, including…" or "to adapt to the impacts of climate change" while some others are straightforward to identify, such as the contributions to the Global Energy Efficiency and Renewable Energy Fund (GEEREF).

Areas of reporting

Auctioning revenues could be spent in the listed areas either for activities on national/ European level or activities in developing countries. For reporting purposes under the revised Monitoring Mechanism Member States should differentiate between auctioning revenues spent at national or European level and revenues spent for financial support on mitigation and adaptation activities in developing countries. This ensures that the reported information can also be used for reporting on how auctioning revenues from ETS have been used for financial support to developing countries provided under the UNFCCC.

Article 10, paragraph 3 (e) Directive 2009/29/EC related to CCS differentiates between third countries and not developing countries which is a further complexity for reporting. As the important cooperation currently is with China and as CCS projects are on a rather large scale of financing the suggested reporting format for the auctioning revenues does not differentiate between developing countries and third countries.

It would be preferable if the reported information on the use of auctioning revenues could be directly used for the reporting on financial support in national communications under the Convention. However, the areas indicated in Article 10, paragraph 3 Directive 2009/29/EC do not match very well with the requirements for Annex I national communications. Therefore it is difficult to design reporting requirements for Member States pursuant to Article 10, paragraph 3 ETS Directive that at the same time provide complete information for the purposes of reporting on financial support under the UNFCCC. In national communications Annex I Parties should differentiate between bilateral, regional and multilateral support provided and the recipient countries should be indicated. Article 10, paragraph 3 Directive 2009/29/EC contains a specific reference to two funds, the Adaptation Fund and Global Energy Efficiency and Renewable Energy Fund, but does not refer to any other multilateral fund. Thus, the reporting under these categories listed in Directive 2009/29/EC can be matched with the require-

ment to report on contributions to multilateral funds, limited to these two multilateral funds only.

The UNFCCC requirements also foresee a sectoral breakdown of financial support for mitigation and adaptation. This UNFCCC requirement to report at sectoral level is partly overlapping with the purposes of use of auctioning revenues as indicated in Article 10, paragraph 3 ETS Directivce, e.g. REDD and afforestation/reforestation. However, mitigation is not differentiated into different sectors such as agriculture, industry or waste management. As Article 10, paragraph 3 ETS Directive already indicates a very wide range of areas, an additional sectoral breakdown would create an extremely high level of detail in reporting, therefore the suggested reporting format only implements the categories addressed under Article 10, paragraph 3 ETS Directive and not any further additional sectoral disaggregation.

It is very likely that reporting requirements related to the provision of financial support will be strengthened in a post-2012 agreement. However, international negotiations related to MRV of support for Non-Annex I Parties are currently not yet sufficiently developed so that outcomes could be taken into account for the development of the reporting format or the legal text related to the use of revenues from auctioning.

Additionality

An important question for the reporting on auctioning revenues at the international level is whether the spending of auctioning revenues is additional to the existing financial resources for the earmarked areas or whether auctioning revenues only replace previous spending from other sources. The concept of additionality implies that a baseline is defined which is considered as the 'business-as-usual' or 'normal' support and that support provided beyond this baseline is considered as additional. In the international negotiations under the UNFCCC and the Kyoto Protocol, additionality has so far not been defined, but Kyoto Protocol and the Convention require the provision of 'additional' financial support.

However, the ETS Directive itself does not require any 'additionality' check of the use of auction revenues and the purpose of the reporting requirement was to make the total spending visible.

As it is currently unclear, whether, how and when definitions of additionality of financial support to developing countries will be decided in the negotiations on future commitments under the UNFCCC, it is proposed not to include a baseline for the reporting of additional resources for the time being. If under the UNFCCC respective decisions will be taken, the general review clause proposed in Article 10bis of the revised Monitoring Mechanism Decision would allow to add a baseline to the reporting requirements. The resources required by Member States to report on budgets spent for particular areas and in particular years will be the same if such requirement is implemented now or only at a future point in time.

The reporting format and legal provisions suggested in the revised Monitoring Mechanism Decision also differentiate whether financial resources were actually already

spent in the areas mentioned in Article 10, paragraph 3 of Directive 2009/29/EC or only budgeted, e.g. transferred into funds but not yet distributed or foreseen to be spent. In particular when money is transferred to international funds, Member States can only report when they provided money to the respective fund, but the actual spending of this budget is determined by the fund itself and beyond the control of Member States. Therefore a requirement to only report the revenues that have actually been spent will be very difficult to be implemented by Member States. Similar situations can occur at domestic level, for example when a budget line is created for grants or loans for the improvement of energy efficiency in buildings, the government allocate a budget for this purpose but actual spending will depend on the applications received from building owners and can thus only be reported ex-post after the specific programmes have been implemented. In many cases the difference refers to a gap in time between the allocation and the actual spending of budgets. A reporting requirement that would only cover the budget actually spent would split the reporting of auctioning revenues gained in one year over several following years and it would be difficult to get an overall picture on the general budget that is based on decisions taken by the governments related to the use of auctioning revenues that incurred in one year. A reporting requirement differentiating between allocated and spent budget enables the Commission to check whether and how much money has already been spent.

Member States should also be required to provide references to additional background information on the use of the auctioning revenues in order to substantiate the reported information. Budgetary decisions taken by governments and their budget plans usually are clearly documented. Member States should provide references to the relevant documents that allow a verification of the reported information. This will support any assessment of the reported information. The reporting on the auctions themselves is covered by the Auctioning Regulation and does not need to be covered by the revision of the Monitoring Mechanism decision.

Legal text proposal

The reporting of the use of auctioning revenues was incorporated in the following parts of the legal text:

- Under Article 1(e) ‘Subject matter’ to clarify the changed coverage of Decision No 280/2004/EC.
- Under Article 3(1)(l) ‘annual reporting’ the annual reporting requirement is implemented.
- Article 2(8)(e) of the revised Implementing Provisions requires Member State to provide information in the NIR.
- A reporting format table is annexed to the Implementing Provisions and added to Article 2 (6) of the revised Implementing Provisions.
- Article 6 of the revised Implementing Provisions specifies the specific requirements for the reporting on auctioning revenues.

8 Task 6: Inclusion of maritime shipping in the EU's reduction commitments

8.1 Introduction to the monitoring of ships

The legal framework under which countries can implement monitoring mechanisms for international ocean traffic is the Port State Control (PSC) regime. The jurisdiction of countries with regard to internationally travelling vessels is based on the international law of the sea (UNCLOS 1982), which grants the International Maritime Organization (IMO) the right to establish technical and manning standards. As a consequence, countries under the PSC are not allowed to implement standards that would require additional physical changes to the ship or interfere in manning requirements, so called construction, design, equipment and manning (CDEM) standards (for extended legal assessment see for example BMT 2000, Vranes 2003, Doelle 2005, BIMCO 2006, CE Delft 2009, Öko-Institut 2010). Thus, any monitoring has to rely on already installed technical equipment. Changes to CDEM standards would require amendments to existing conventions at the IMO, which would likely prohibit a timely implementation of a vessel monitoring system. Furthermore, changes to CDEM standards could only be implemented through resolutions, adopted by the majority of Member States of the IMO and thus international opposition could prevent the implementation of new CDEM standards entirely.

Recent studies have indicated that the European seaborne trade accounts for approximately one third of the global seaborne greenhouse gas emissions (CE Delft 2009, Öko-Institut 2010)[27]. This exceeds by far the emissions that are released within the territorial waters of the EU, within the 200 mile Exclusive Economic Zone or of those ships that operate under a European flag. Therefore environmentally effective policy measures aiming at addressing these emissions would need to include vessel traffic in international waters and potentially even between non-European ports. The later is in particular the case for vessels in liner services (e.g. container and car carriers) that stop at multiple ports on a circular return trip. The vessel activity in liner services, which is relevant for seaborne emissions caused by European trade, cannot be reduced to the last port to port trip because vessels may stop at a nearby non-European port before entering European territorial waters and thus shortening the last trip before entering a European port, regardless of the port of origin of its cargo that is destined to a Member Country. A monitoring limitation to the last trip, i.e. port to port

[27] While the Öko-Institut e.V. calculated 340 Mt CO_2 and CE Delft 311 Mt CO_2 from all Europe-related marine traffic, JRC-IPTS (2008) has calculated in the EXTREMIS model 80 MT associated with European seaborne trade (excluding non-trade seaborne emissions). However, some assumptions of the JRC-IPTS report and EXTREMIS model must be called into question, including the vessel utilization and the origin of cargo. Furthermore, EXTREMIS allocates only 50 % of the vessel emissions of a voyage to Europe, while Öko-Institut e.V. and CE Delft attributed the return trip to the European seaborne emissions.

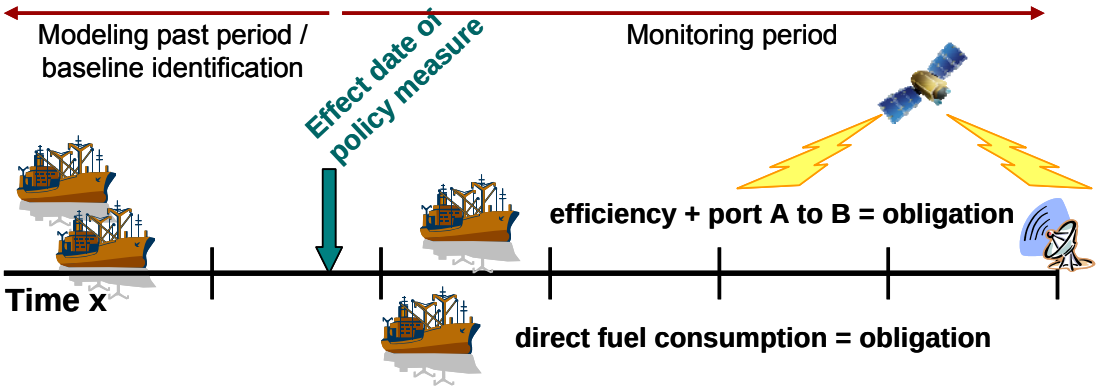
pair, would distort the monitoring results and underestimate the emissions in causal relationship to the seaborne freight movement to a Member Country. Thus a regime would need to be extended to voyages between non-European ports in order to cover the emissions caused by European seaborne trade.

Furthermore, policy measures would need to be applicable to all ships, regardless of their flag, which would be coherent with the equal treatment principle at the IMO. The analysis of the monitoring options is conducted on the premise of the findings of Öko-Institut (2010). Those are in brief:

- A regulation of greenhouse gas emissions of vessels in international waters (extraterritorial jurisdiction) can be implemented based on the principle of territoriality.
- Obligations for vessels that call at a Member State port can be implemented as long as they do not require additional CDEM standards.
- Sanctions need to be proportional, i.e. non-compliance permits the denial of entry; detention of vessels in non-compliance is likely not proportional.
- Discriminations of specific vessel types and of imports from particular states are not permitted.

The implementation of policy measures to reduce the emissions of greenhouse gases from ships requires two distinctly different approaches. First, the establishment of an emissions baseline and policy targets requires the knowledge of historic emissions with a certain degree of accuracy. Since data gathering in the past will not be possible, historic emissions need to be determined through modelling. Second, if vessels' current and future greenhouse gas emissions were regulated, the annual (or periodic) monitoring of greenhouse gas emissions is needed. This is best based on fuel consumption data. Direct smoke stack emissions monitoring on vessels is technically difficult. The conditions at sea, the volume of exhaust gas and variations in physical and chemical conditions makes exhaust gas measurements challenging. However, a second option of quantifying greenhouse gas emissions from seaborne transport is the tracking of distance and linking it with average or vessel specific efficiency factors. (Figure 10)

Figure 10 Principle options of Vessel monitoring through time.



In the following section the possibilities of modelling vessel emissions (section 8.2) will be discussed. Modelling seaborne emissions is particularly useful for establishing historic emission baselines. Models are also the basis for estimating greenhouse gas emissions based on distance and vessel specific efficiency factors.

This study then discusses the challenges of different direct fuel consumption monitoring schemes. Crucial questions include the data availability and the juridical accessibility to data. The technical options for fuel consumption monitoring and distance monitoring will be described in section 8.3. The means how such data could be exchanged between ships and countries (section 8.4) and the possibilities of sharing information within participating countries (section 8.4.2) are also analysed. This study investigates existing structures that could be utilized for marine vessel monitoring systems. The legal challenges for accessing those data are briefly discussed in section 8.5. It should be noted that this legal assessment is based on literature review and expert opinions. A detailed study on the legal terms of using seaborne data is outside of the scope of this study.

8.2 Modelling of Greenhouse Gas Emissions from Ships

Modelling greenhouse gas emissions from ships might be necessary if an emissions baseline in a period prior to ongoing vessel monitoring would be necessary. Modelling greenhouse gas emissions of ships may use either a top-down or a bottom-up methodology, or a combination of both.

Top-down methodologies allocate the fuel used, derived from fuel statistics, to vessels. Fuel statistics are maintained by the International Energy Agency (IEA). The IEA statistic is based on national reports on sold bunker fuels. The shortcomings of top-down estimates are inaccuracies in bunker fuel reporting as well as difficulties stemming from the IEA statistical categories, particularly the distinction between domestic and international bunkers (Buhaug et al. 2008). One indication is for example the discrepancy between the national net-export and net-import figures for oil products, which sums should be equal. Instead net national exports are 23 % higher than net national imports. IEA (2010) explains this discrepancy with different data sources and possible misallocations of bunker sales as export fuels. It is generally believed that global fuel consumption estimates based on national fuel statistics generally underestimate marine emissions. Whereas global fuel consumption from bunker sales statistics is between 170 and 230 million tons (IMO 2009), activity-based estimates assume global fuel consumption to be in the range of 280 to 320 million tons, a corresponding difference of 40 % to over 60 %.

A bottom-up methodology is based on individual marine vessel activity and then scaled up to the monitoring scheme in question. The bottom-up methodology may utilize activity data derived from remote sensing or assumptions on vessel activity and combines this data with vessel specific technical data or fuel consumption data. For modelling

historic emissions vessel-specific fuel consumption data can not be obtained and thus modelling would need to rely on technical vessel data.[28]

A bottom-up approach offers a reliable methodology for estimating emissions from individual ships as well as from groups of ships, ship types and emissions in specific geographical regions. IMO (2009) has estimated the global maritime emissions using a bottom-up approach. "The international team of scientists behind [the IMO] study concluded that the activity-based estimate is a more correct representation of the total emissions from the world fleet […] than what is obtained from fuel statistics." (Buhaug et al. 2009, p. 9). The uncertainties of the bottom-up calculation were assessed differently according to the data source. Whereas the number of ships, the installed main and auxiliary engines, and the average engines specific fuel consumption was assessed to be of high accuracy, other parameters were associated with moderate uncertainties (IMO 2009, Table 3-1 and 3-2). Of those other parameters the following are of particular importance:

- Average main engine operating days (which dominates overall uncertainty);
- Average main engine load;
- Calculation on distances (based on limited data from vessel monitoring systems and cargo assumptions);
- Vessel design speed;
- Average auxiliary engine operating days;
- Average auxiliary engine load.

In order to reflect the degree of uncertainty, an upper and lower bound IMO inventory was calculated at 20 % higher and lower of the central consensus estimate (IMO 2009).

Activity based bottom-up modelling has also been used in various emission inventory studies of port and coastal areas around the world. Helpful guidelines for creating marine vessel emission inventories were developed in the United States (EPA 2009). The validity of scientific assumptions and default technical data were verified through real time monitoring for the inventories of the Ports of Los Angeles and Long Beach (Corbett 2004). Corbett also concluded that "activity-based methodology can provide accurate and transparent estimates of emissions and energy use". Bottom-up emission estimates can further improve if the activity characteristics of the vessels are better known. The improvement of vessel activity data is more important than the additional monitoring of emissions and energy used (Corbett 2004).

[28] CE Delft (2009) describes the use of activity data combined with fuel consumption and emission factors as top-down approach, which is a dissenting definition from former studies. In CE Delft only the combination with the spatially specific estimation is considered bottom-up. For our study the definition of top-down and bottom-up used in Buhaug et al. (2008) is applied.

In contrast, other approaches for determining past emissions have proven to be less reliable for several reasons. Top-down estimates based on fuel statistics have also resulted in large variances of emission estimates (see also Figure 12). Thus, activity-based bottom-up modelling is the best available methodology for deriving emission factors and for developing emissions footprints from marine shipping for a period prior to establishing a permanent vessel monitoring system.

8.2.1 The usability of bottom-up marine emission modelling

Bottom-up emission modelling has been applied for various scopes and geographic boundaries. Activity-based bottom-up modelling has been pioneered and refined in California, USA, where the method was used to estimate emissions related to marine activities within a port boundary (see for example Anderson et al. 2003 and 2004). The technical and activity related assumptions were verified by sampling marine vessels in ports and during their final voyage into port (CARB 2006, Port of Los Angeles 2005). Similar approaches with different geographic scopes have also been applied. Examples are marine emissions in the Mediterranean Sea (Lloyds Register 1999), European seaborne emissions (ENTEC 2002, 2005, CE Delft 2009) as well as global estimates (IMO 2009).

The data needed for modelling are vessel specific technical data, activity data and emission factors. Each commercial vessel is registered on behalf of the International Maritime Organization (IMO). IMO has tasked Lloyds Register Fairplay to maintain a data base of all vessels greater than 100 gross register tonnage (IMO Resolution A.600(15)). The Lloyds data base exist since 1764 and today contains information on 97 800 active vessels. Each registered vessel is officially equipped with an IMO number as an identifier which is also used in official ship communications. While other sources, for example classification societies, may also be able to provide vessel specific technical data, the Lloyds Register of Ships is the most comprehensive source[29].

Activity data for modelling may be constructed based on assumptions, or based on observed vessel movements. The above mentioned inventory studies usually have used a hybrid of both, where real time vessel observations verified the vessel activity assumptions for the inventories. Buhaug et al. (2008) provides a reasonable accurate compilation of average assumptions[30], grouped for vessel type and size categories. Using common bottom-up methodology and those assumptions enables the repetition of the results of the IMO greenhouse gas study (IMO 2009).

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[29] The Lloyds data are commercially available and can be accessed in some libraries and many governmental agencies concerned with maritime transport.

[30] The assumptions on container vessels derivate significantly from assumptions in other publications. It is assumed that due to confidentiality reasons some assumptions were modified. However, the combination of assumptions (including vessel cargo utilization and default load of containers) results in comparable emission figures than as in previous studies.

Emission factors are also readily available and in large parts reliable. Particularly emission factors for carbon dioxide, nitrogen oxide and sulphur oxide emissions as well as fuel consumption are well known (Corbett 2004). More uncertainties exist for particulate matter, hydrocarbon and carbon monoxide emissions. Table 24 lists the most important emission factors and their source that are relevant for greenhouse gas emission bottom-up modelling. Fuel consumption data may be obtained from engine manufacturer or for example Buhaug et al. (2008) and should be vessel size and age specific.

Table 24 Main engine emission factors and sources for CO_2, CO_2 equivalent and nitrogen oxide emissions.

Pollutant	Emisson factor [g/kg] fuel	Source:
CO_2 Heavy Fuel Oil	3.1144	IMO: MEPC Circ. 684 & 681 (2009)
CO_2 Light Fuel Oil	3.1510	IMO: MEPC Circ. 684 & 681 (2009)
CO_2 Marine Diesel & Gas Oil	3.2060	IMO: MEPC Circ. 684 & 681 (2009)
CO_2 upstream		IPCC Guidelines 2006
CH_4	0.2828	IPCC Guidelines 2006
N_2O	0.0808	IPCC Guidelines 2006
NOx SSD Tier (0)	89.5	IMO 2009
NOx SSD Tier (1)	78.2	IMO 2009
NOx MSD Tier (0)	59.6	IMO 2009
NOx MSD Tier (1)	51.4	IMO 2009
NOx Auxiliary Engines	13.9 - 14.7	EPA 2009

SSD = slow speed diesel engine; MSD = medium speed diesel engine

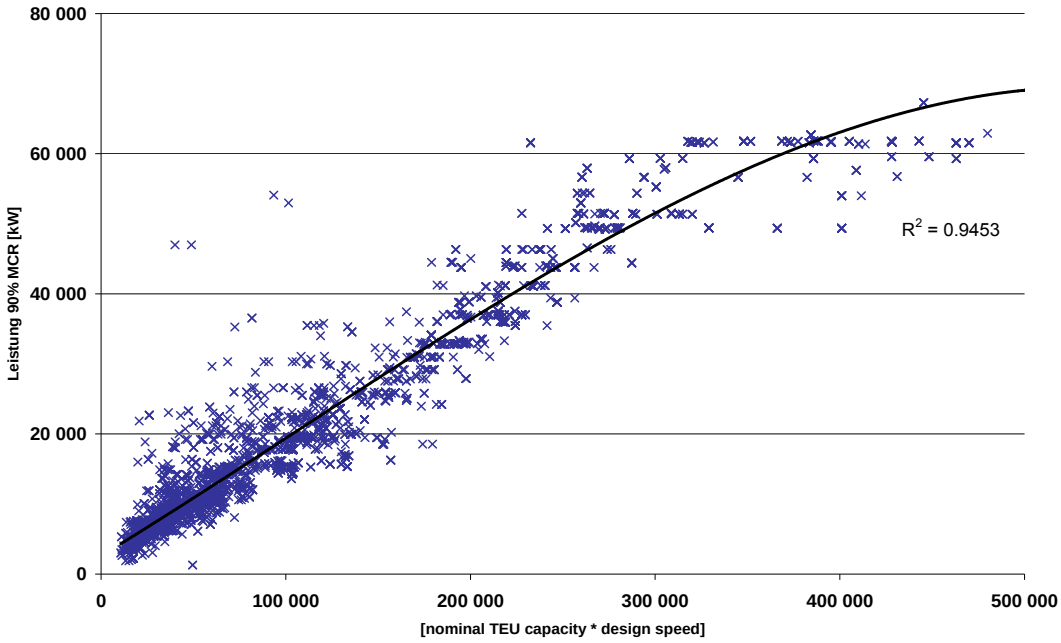
Sources: MEPC (2009a), IMO (2009), IPCC (2007); GWP = global warming potential.

The modelling of maritime emissions is capable of developing emission inventories of specific regions and time periods. Furthermore, vessel specific or vessel type specific benchmark or efficiency figures can be calculated. Both may be important for implementing policy schemes to reduce greenhouse gas emissions from ships.

The historic inventory of particular regions could be used to develop an emissions baseline for a specific policy addressing GHG emissions from maritime transport. The updated IMO (2009) greenhouse gas study offers global figures with regard to the development of greenhouse gas emission from 1990 until 2007. Several Studies have estimated emissions in different European waters/regions (e.g. territorial waters ENTEC 2002, 2005) or for European seaborne trade (CE Delft 2009, Öko-Institut 2010). CE Delft concludes that 311 Mt CO_2 stem from vessel travelling to and from European ports in 2006. Öko-Institut estimated 275 Mt CO_2 related to European seaborne trade and additionally approximately 65 Mt CO_2 from non-freight vessel traffic. Both studies suggest that approximately one third of the global maritime greenhouse gas emissions are related to seaborne activity where at least one country of the European Union is involved.

Besides inventories that may be used to establish emission baselines, bottom-up modelling may be also used to develop vessel specific or vessel type specific efficiency factors for benchmarking purposes. Those efficiency factors would be needed if a monitoring system based on distance without direct measurement and reporting of fuel consumed would be implemented.

Figure 11: Relation between main engine power, nominal container capacity and speed of container vessels.



Data source: www.containership-info.com (2008) verified through Lloyds Register of Ships (Lloyds 2009).

Unlike other vehicles, in particular land-based vehicles, the emissions of individual vessel can be predicted with great accuracy because of the uniform operational characteristic of ocean vessels. While each ocean ship is essentially an individual build, requirements on cargo load, speed and the physics of the marine driving result in a narrow range of technical factors for each individual ship within a vessel category. In particular larger vessels in the bulk carrier and container vessel categories show a good correlation of their technical characteristics, e.g. the Kilowatt disposable per size and speed of the vessel (Figure 11). Furthermore, the match of Lloyds ship registry data and observed data is generally very good. A study showed a 97 % agreement in power and capacity data and 94 % agreement in cruise speed versus maximum speed data between empirical data and the Lloyds data (Port of Los Angeles 2005). However, one cannot compare vessels of different categories with each other (Jokioinen 2009) and the grouping of vessels to vessel categories needs to be done with care. The vessel type categories may be modelled referring to Lloyds Marine Intelligent Unit (LMIU)

code. Furthermore, IMO (2009) offers a template of building vessel type and size categories (11 vessel types differentiated into 42 size classes).

Some limitations might exist for smaller vessels. Vessels with less than 100 gross tonnage weight are not obliged to obtain an IMO number. Although those vessels represent a large number, they only contribute to a small degree to the overall transport activities and emissions. The small vessels below 100 gross tonnage are mainly smaller fishing vessels and ships such as research and supply vessels, towing and push boats, dredging vessels and recreational boats. FAO estimates that there are more than 1.3 million decked fishing vessels with an average size of 20 gross tonnage (10-15 meter in length). Fishing vessels above 100 gross tonnage (longer than 24 meter) represent approximately 24 000 vessels.[31]. However, the smaller vessels register mostly nationally and operate within the territorial waters. As such, they are subject to national inventories under the UNFCCC regime. IMO estimates that 1 054 million tonnes of CO_2 was emitted from total shipping, of which 870 million tonnes (82.5 %) came from international shipping (IMO 2009). In the vessel category larger 100 gross tonnage, the internationally travelling cargo vessels dominate. While they only represent approximately 45 % of the number of ships, they represent 89 % of the marine gross tonnage (IMO 2009).

8.2.2 The potential use of IMO's energy efficiency indicators for modelling and monitoring purposes

In 1997, in the context of the negotiations of the Kyoto Protocol, Annex I Parties committed to pursue the reduction of greenhouse gas emissions from international maritime transport and aviation through the International Maritime Organisations and the International Civil Aviation Organisation. During the Kyoto process it was impossible to find an agreement on the inclusion of these emissions into national quantified emission limitation and reduction targets. However, IMO, which is the competent international organization to establish technical standards for marine vessels, only slowly reacted – reflecting the various interests of its member countries. In 2004 IMO adopted a first resolution that demanded concrete steps to reduce greenhouse gas emissions from ships. In the following three tools have been developed: the Energy Efficiency Design Index (EEDI, MEPC 2009b), the Energy Efficiency Operational Indicator (EEOI, MEPC 2009a) and the Ship Energy Efficiency Management Plan (SEEMP, MEPC 2009c).

At first glance, the voluntary EEOI seems to provide relevant information for the performance and efficiency of vessels. The EEOI goes back to IMO Resolution A.963(23) that requested the development of mechanisms to collect information on greenhouse gas emissions from ships. First trials were conducted with the Greenhouse-Gas-Index, which is now replaced by the EEOI. The IMO guidelines on the voluntary use of the

[31] FAO Fisheries and Aquaculture Department, Fisheries technology, http://www.fao.org/fishery/topic/1616/en, accessed 15 October 2010.

EEOI provide CO_2 emission factors for different fuel types that should be used (MEPC 2009a). However, the EEOI greatest deficiency is that it also includes the real cargo loaded. Vessel efficiency is thus determined by logistics parameters that are outside the control of vessel operators. Meaningful efficiency factors for vessel comparison or for the use in a European policy regime cannot be expected with the EEOI, unless the real cargo utilization of vessels should be included in the performance assessment of a policy regime. This is none withstanding the fact that the EEOI asks for fuel consumption and distance sailed data that will be essential in any monitoring regime. However, a European monitoring mechanism would need to go beyond the EEOI.

A more usable template – particularly for an approach where distance sailed should be linked with the vessel efficiencies – may be the energy efficiency design index EEDI. The design index essentially presents a formula for calculating a theoretical vessel specific efficiency based on technical data of the ship. The values included in the EEDI are parameters for the vessel as it is designed, such as installed engine power, speed, capacity etc. Factors for installed innovative energy efficiency technology are also included. The guidelines are separated in different vessel categories. The index is based on the nominal capacity of the vessel, thus not presenting the real efficiency in operation. However, the EEDI will provide benchmark figures per vessel. For bulk carriers, tankers, car carriers and container vessels the design criteria are relatively uniform and the correlation of the CO_2 efficiency and vessel capacity is quite high. Other vessels, such as special vessels, and the smaller vessels may have larger deviations in their design specifications.

The EEDI is thus essentially following a similar formula as has been established in the bottom-up methodologies for marine inventories (EPA 2009). The only difference is the inclusion of additional correction factors for specific design elements (e.g. for ice class vessels). Furthermore, the EEDI proposes to calculate the emissions with an assumed engine load of 75 % of the maximum continuous engine rating (Design engine rating – Maximum Continuous Ratings (MCR)), while in common inventory calculations 80 % and 85 % MCR have been used. It can be concluded that the EEDI in a simplified form of common bottom-up approaches – without the inclusion of specific correction factors – can also be used for existing ships. It rather re-enforces the notion that baseline emission calculations are feasible using technical vessel data and assumptions on their activity. While Jokioinen (2009) confirms the simplicity of the calculation of vessel specific efficiency values and generally good results and correlations, he calls the calculation of factors for all existing ships using Lloyds data a “mission impossible” due to missing parameters, unknown error margin and inaccurate data. In contrast, empirical tests by CARB (Corbett 2004) and for the emission inventories for the Ports in California (Port of Los Angeles 2005) have come to different conclusions and found close correlations between the Lloyds Register data and the installed equipment on ships. Our experiences also indicate that the accuracy of modelling vessel emissions based on technical data is affected by the reliability of vessel activity data. The availability and reliability of technical data for vessels greater 100 gross tonnage is very good. The

level of accuracy of activity data depends on the scale and vessel location, but sufficiently accurate figures can be estimated[32].

While the EEDI provides a good template for developing energy efficiency values per ship, including in simplified form for existing ships, the EEOI is not usable in its current form. The inclusion of real cargo load may offer information for the vessel operating company, but prevents to derive efficiency factors that would allow a comparison of different ships, against each other or against a benchmark and policy target[33]. A solution if cargo utilization were to be reflected might be to use the nominal vessel capacity (as proposed in the EEDI) and combine it with average cargo utilization factors that were presented by the IMO in its recent greenhouse gas report (Buhaug et al. 2009). With those values, which are essentially behind the modelling calculations of inventories described above, baseline emissions and default vessel efficiencies could be calculated with sufficient accuracy.

8.3 Data types, sources and monitoring options post the implementation of policy measures

The direct measuring of greenhouse gas emissions on ship smoke stacks is not feasible and will likely not be feasible in the foreseeable future. Greenhouse gas monitoring would need to rely on either the amount of fuel consumed combined with emissions factors for the fuel used or on the distance a vessel has travelled combined with a vessel specific efficiency factor (g CO_2/ km). The development of the later is principally possible through modelling based on technical vessel data combined with information on vessel speed.

The data that need to be collected are thus:

- Fuel consumed during a period of time or for certain voyages;
- Distances the vessel has travelled.

8.3.1 Fuel consumption monitoring

Fuel consumption may be directly monitored or reported on the basis of fuel uptakes. Every vessel master (the captain) monitors fuel consumption in order to plan voyages and fuel uptakes. The technical instruments for monitoring fuel consumption differ be-

[32] For local activity profiles, very accurate activity patterns can be empirically studied. For near shore profiles, Automatic Identification System (AIS) data provide moderately accurate values (IMO 2009). For travel in international waters no good activity data exist, but average activity profiles can be estimated using vessel schedule information and vessel information.

[33] The option of measuring transport efficiency is not considered here. Öko-Institut (2010) concluded that any linkage with the cargo onboard ships will likely collide with international trade law and thus should not be the bases of assessment of seaborne greenhouse gas emissions.

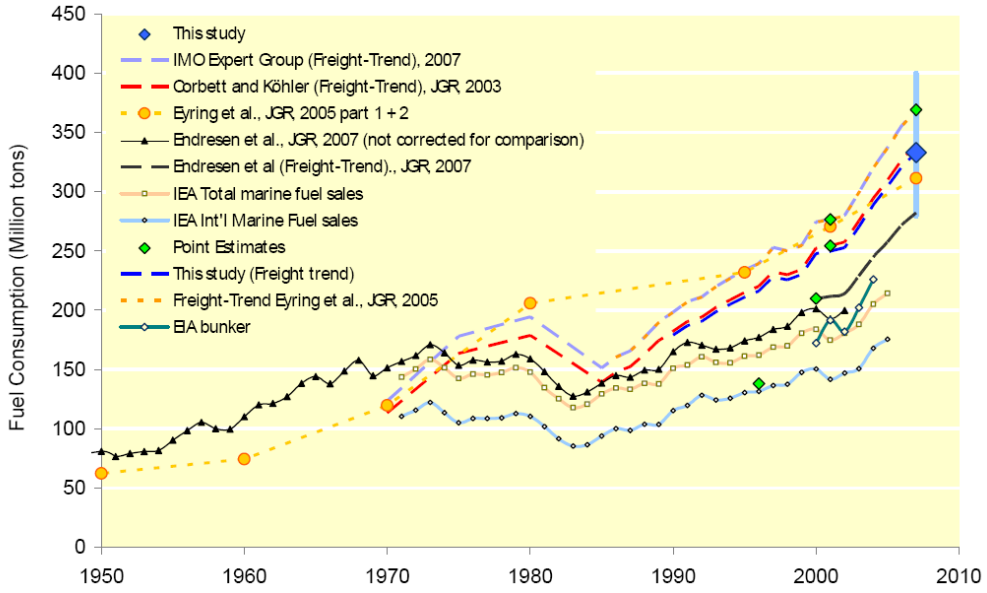
tween vessels. Modern vessels are equipped with fuel flow-through meters that provide real-time information for engine and vessel operations. Contemporary fuel flow meters have accuracies of 2 % and better, in particular if they are combined with other engineering parameters such as fuel temperature and pressure differences. Older and smaller vessels may monitor their fuel consumption with calibration tanks or measure the tank fuel levels with sensors. Calibration tanks are interim tanks of a defined size between the main fuel tanks and the engine. By measuring the amount that flows in a given time through the calibration tank the amount of fuel uptake can be determined. The measurement of the difference in fuel levels of fuel tanks is used to determine fuel usage during a period of time without particular knowledge of the flow-through rate. Calibration tanks and fuel tank level sensors achieve high accuracy over a period of time but not necessarily for short distances and time periods. In either case fuel consumption data are readily available on board ships and are usually recorded in the vessel's log book.

Bunker fuel delivery notes (BFDN) which have to be stored onboard ships for three years according to MARPOL Annex VI may provide the basis for reporting as well. The BFDN are based on the bunkers sold to vessels and shall include information on the bunker port, date, quantities sulphur content and densities of the bunkered fuel. Information on the carbon intensity of the fuel is currently missing.

So far bunker fuel sales statistics and emission inventories based on those (top-down approach) have not proven reliable. Buhaug et al. (2008) argues that bottom up modelling based on technical vessel characteristics and vessel activity produces more reliable results than top-down estimations based on statistics of fuels sold. Historic top-down estimations differed widely from bottom-up estimates (Figure 12); also see discussions in Corbett and Köhler 2003; Eyring et al. 2005; Endresen et al. 2003, 2007; Gunner 2007; Olivier et al. 2001; Skjølsvik et al. 2000; Corbett and Fischbeck 1997). However, it may be argued that the statistics will improve, in particular because bunker fuel delivery notes were made mandatory only in fall 2008. Kågeson (2007) assumes that it will take at least until 2012 for reliable data to be available to European countries. Furthermore, the reporting would need to expand to include the carbon content of the fuel (Kågeson 2007), although deviations if using literature data would be small[34]. Further improvements could be achieved through monitoring and reporting obligations imposed by the EU.

[34] Assuming a 100 % oxidation of all carbon in the fuel, IPCC estimates the possible carbon range in marine fuels with -2 % to +0.9 % for marine diesel and gas oils and -2.5 % to +1.8 % for heavy fuel oils (IPCC 2006).

Figure 12 World fleet fuel consumption based on different bottom-up estimates and statistics based on fuel sold.



Source IMO 2009

A significant level of uncertainties in bunker fuel reporting remains, despite the obviously improving data situation with the mandatory record keeping of BFDN. Ocean vessels can operate over long distances without refuelling in order to purchase fuels to the most economic conditions. In contrast, aircraft normally refuel every time they touch ground, especially in long distance travel. If greenhouse gas reporting from vessels would rely on only one parameter – the fuel purchased in a period of time – a level of uncertainty of BFDN would be reflected in the reported emissions. The reasons for the uncertainties are the lack of controls of such reporting and the manifold opportunities to source bunkers outside the IMO MARPOL control. For example, off-shore bunkering[35] remains common practice and deprive national authorities to implement adequate control measures. Vessel masters may omit reporting bunker amounts due to poor management or deliberately in order to avoid costs. Marine heavy fuel oil (HFO) may be sourced from stocks that were produced as other heating oil products and may thus circumvent marine bunkering reporting mechanisms. Furthermore, the reliability of BFDN has been questioned by industry representatives due to possibilities of corruption and falsification[36]. As a consequence, a risk of mismatching marine fuel consumption and BFDN amounts might persist in the future.

[35] Offshore bunkering means fuel uptake outside of territorial waters.

[36] Personal communications with ocean carriers, fall 2009.

Furthermore, the amount of bunker fuels produced today is determined by refining economics[37] and not primarily by the demand side. What is being sold in marine bunker markets is residual fuel as a secondary recycling product from refining where the cost benefit analysis does not result in further refining (EC 2002). Thus, marine heavy fuel oils are not deliberately produced for marine applications. The available refining 'by-product' will seek the most profitable market; for example low land-based demand may lead to additional capacities sold on the marine market.

Overall, because the reliability of reporting based on the BFDN can not be assured today, a second backup control or a different primary data source needs to be established. This decision may be revised once the BFDN have proven reliable.

The most plausible primary data source for the fuel consumed (or secondary control to verify BFDN) is excerpts of the vessels' log-books that contain the fuel consumed over a period of time or during particular voyages. Each vessel is maintaining a log-book for its own management and to prove the compliance with manifold international and national rules and standards. Modern and large commercial vessels today operate with electronic log-books, often combined with sophisticated fuel and engine monitoring. Older and smaller vessels maintain log-books manually. The measured fuel consumption is one entry in marine log-books for vessel management. Besides fuel data, other data is available on board vessels, in particular data on ports visited, cargo loaded and distances sailed. Both port call data and cargo data could easily be verified – in the case of suspicion of falsification – by contacting port authorities or customs agencies. In conclusion, the data on fuel consumed and purchased is available on board ships and can be verified with data on distances sailed and ports visited.

For monitoring vessel performance in order to regulate marine greenhouse gas emissions a combination of fuel consumption monitoring, BFDN and distances sailed is recommended. The question whether a disclosure of log-book data could be made mandatory is discussed in section 8.4.1.

8.3.2 Monitoring of distances travelled

Distance monitoring may serve different functions. First, the emission obligations of vessels may be determined by using distance monitoring in combination with vessel specific efficiency factors. Second, distance monitoring may be used to verify the fuel

[37] Heavy fuel oil is a residual co-product after atmospheric distillation. The refining process is designed to maximize the yields of valuable products – namely distillate fuels. Thus, the amount of heavy fuel oil that enters the market depends directly on the cost of further refining those oils and the supply and demand balances in the residual and distillate segments. Marine bunker prices are further determined by gas and coal prices for land-based power plants, because heating oil – the dominant heating oil market – has to compete with those competitive fuel types. This explains why current marine HFO prices are below crude oil prices (Prices on 26.07.2009: crude oil (Brent) = 485 US$/t; HFO380 Rotterdam = 400US$/t; HFO380 Singapore = 440 US$/t). In general, the demand for heavy fuel oil is declining, that for distillate fuels increasing. Thus a continuous price down-ward pressure for HFO exists.

consumption data provided by the vessel operator. The monitoring of distances may be conducted through paper reporting or via electronic means of vessel tracking.

Similar to fuel consumption, it is evident that every vessel master knows its history and schedule of port visits and therefore also knows the past distances sailed. The vessels' navigation, whether conducted manually or satellite based, tracks distances, speeds and directions of vessels. Thus, records of distances sailed including the ports visited already exist on board vessels and are recorded in the vessels' log books.

Furthermore, in the wake of the September 11, 2001 attacks on the World Trade Center many states have implemented mandatory reporting of past port visits to improve marine security. IMO responded by adapting the International Convention for the Safety of Life at Seas (SOLAS) and published a guidance in 2004 on the requirements relating to the submission of security-related information prior to entry of a ship into port. Here, the reporting of the ten past ports, where ship to port interface took place, is recommended (MSC 2004).

The record of distance sailed could be falsified easily when no secondary control is used to verify the reporting. For example, certain voyages or ports of call could be omitted in the reporting. A logical secondary control is to focus on a period of time and back-up the reporting of distance sailed with the fuel used in the form of fuel consumption log-book entries or the bunker fuel delivery notes. In this case the distance monitoring is one part of a tandem monitoring system similar to a secondary back up of the fuel consumption reporting as described under chapter 8.3.1.

Automated distance reporting systems

The tracking and reporting of geographic locations and the distances travelled has been established as a measure of marine safety. Today's available instruments are based on chapter V of the International Convention for the Safety of Life at Seas (SOLAS). SOLAS hands the reporting of vessels in international waters to the International Maritime Organization (IMO). "The organization [IMO] is recognized as the only international body for developing guidelines, criteria and regulations on an international level of ship reporting systems." (SOLAS V, Regulation 11.2). Thus, while ship reporting systems might be developed by contracting countries, their mandatory implementation may require action by the IMO. As a consequence, legal constraints might hinder the establishment of monitoring and reporting systems that would go beyond already established technical installations. On the other hand, SOLAS leaves room for national reporting systems not reported to and not disseminated by the IMO. One example of such reporting is the European Unions Vessel Monitoring System (VMS) for European flagged fishing vessels and non-European fishing vessels in European waters.

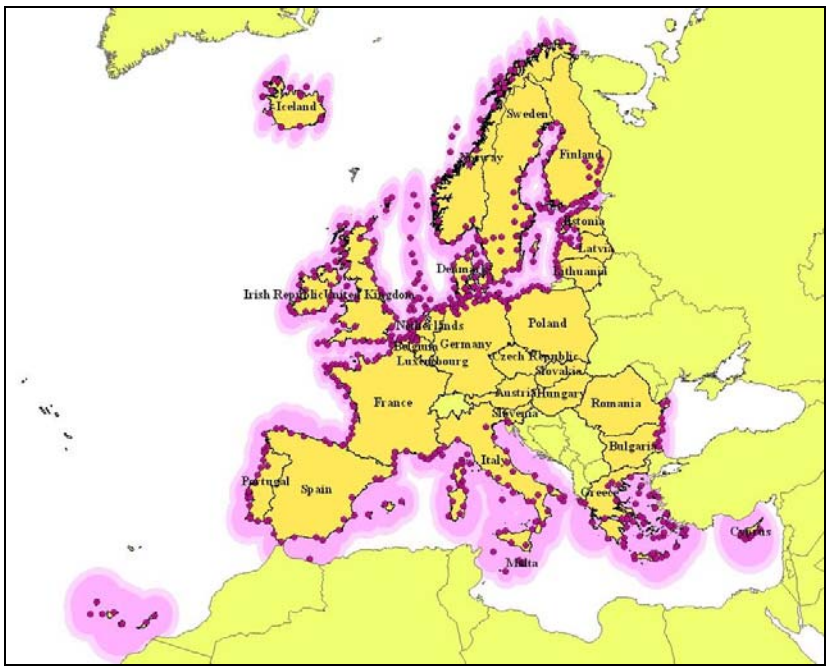
Regulation 19 of SOLAS Chapter V lays out the requirements for ship-borne navigational systems and equipment. All ships with 300 gross tonnage and more, engaged in international voyages, all cargo ships of 500 gross tonnage, and all passenger ships irrespective of their size have been required since 2002 to be fitted with an automatic identification system (AIS). Furthermore, the EU Directive 2002/59/EC requires all ships bound to a European port be fitted with an AIS. In 2006 a second system was

introduced to the SOLAS convention establishing the Long Range Identification and Tracking System (LRIT) (MSC 2006a, 5.74 ff). The LRIT was established with the clear intention of also using the system for environmental purposes.

AIS – Automated Identification System

The AIS is an electronic device that automatically transmits ship information in regular intervals to receiving stations. A European network of base stations has been developed (EU 2002 and EMSA 2009, Figure 13).The information transmitted allows the geographic tracking and distance monitoring of vessels. It includes the vessels' identity (IMO-number) and vessel type, its position, course and speed. The EU further requires the reporting of the port of destination and the estimated time of arrival transmitted via AIS in conformity with IMO Resolution A.851(20) (EU 2002). Port of origin is not reported.

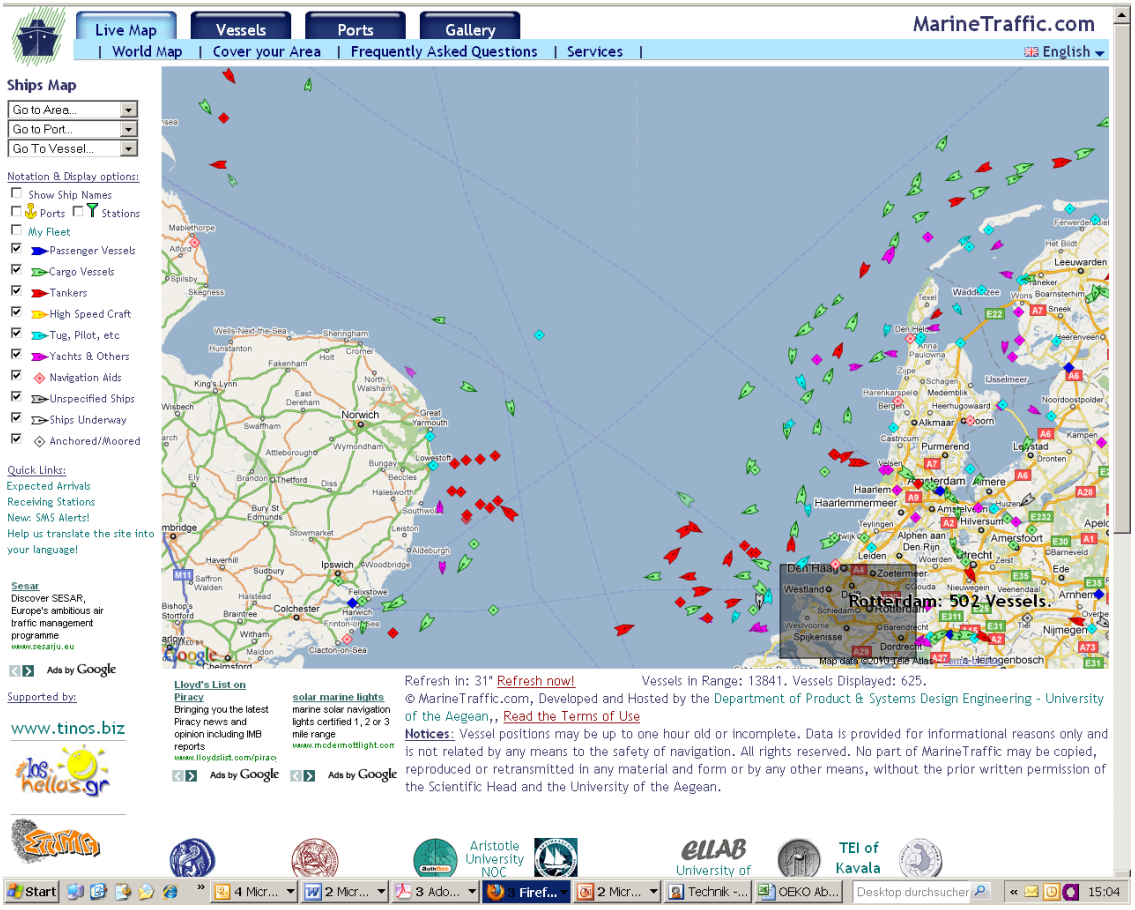
Figure 13 European AIS base stations and coverage.



Source: EMSA 2009

The AIS is a radio-based (Very high frequency (VHF)) signal with a limited range. The prime purposes of the AIS signals are to inform other vessels and shore-based facilities for safety purposes about the ship movement. The range of the AIS radio signal is approximately 75 km or 40 nautical miles (nm) (Wilkins 2010). However, the real range depends on weather conditions and the height of the antenna and receiver. Thus the existing net of shore-based receivers would not be capable of tracking and monitoring vessel routes and distances in waters beyond approximately 75 km offshore (Figure 14).

Figure 14 Internet snap-shot of the vessels detected through land-based AIS stations.



Source: www.marinetraffic.com/ais/ February 2010

However, the World's Radio Communication Conference allowed the two existing VHF frequencies AIS-1 and AIS-2 to be picked up by satellites as well. AIS signals can be picked up by satellites and aircraft surveillance, covering a much larger area than what would be possible by land-based receivers.

The capabilities of today's AIS and space-based receivers are nonetheless limited. The largest problem is the cancelling out of signals if too many signals are received or if vessels are too close to each other. Analyses of the ship density in European waters have shown that the system may be saturated and ship detection may drop towards zero (Høye et al. 2006). If AIS receivers are elevated (by airplane or satellite) ships to close to each other overlay. Radio signal interferences make the allocation to the vessel impossible (Narheim 2006). The solution to this problem may be to use a more directional AIS antenna, limiting the field of view and thereby decreasing the number of ships simultaneously visible to the AIS sensor. Other options for converting the existing AIS to a functional global monitoring system are dedicated channels, shortening of messages, reducing reporting intervals and limiting the reporting vessels to those outside of land-based receivers in order to increase the capacity of the receivers (Høye et al. 2006). Moreover, those changes could not be implemented unilaterally.

The AIS system already has a long-range option providing the possibility for ships outside coastal areas to transmit their information via satellite (Inmarsat) Inmarsat C, mini-C or D+[38]. Inmarsat is a privately held company that was established by the United Nations to improve the safety at sea in 1979. It currently operates eleven satellites. The capabilities of the satellite reception include voice and data. It is used for example to communicate weather reports to vessels and for vessel to vessel and vessel to shore telecommunications. Reporting information from ships to countries via AIS today would be on demand from coastal authorities and on a voluntary basis, except when vessels approach a European port.

Recent developments indicate that the detection of AIS signals, even in high trafficked areas will become feasible. Private companies and satellite operators are working to offer AIS monitoring data on the commercial market (COM DEV 2009). Whether commercially offered surveillance data could be used for national policy setting and enforcement remains a legal question (EMSA 2010).

Furthermore, while the open accessibility of AIS data may be a benefit for environmental reporting purposes, the open accessibility has been received as deficiency by governments. Concerns were raised in the Marine Security Committee (MSC) that openly accessible AIS data could be detrimental to the safety and security of ships and port facilities. The issue of concern is the use of data by terrorists, pirates and belligerent nations (MSC 2004, Kuhn 2009). Marine insurance companies recommend to switch off the AIS system when in piracy strongholds in front of the East African coast (Intertanko et al. 2009). The vessel master has the discretion to switch off such systems. This too leads to the conclusion that a permanent operation and detection of AIS signals can not be assured.

LRIT – Long Range Identification and Tracking System

The Long Range Identification and Tracking System (LRIT) was made mandatory in 2006 in order to improve the safety at seas. It is applicable to the ship types defined in SOLAS Chapter V Regulation 19. LRIT establishes a multilateral agreement for sharing LRIT information for security and search and rescue purposes amongst SOLAS Contracting Governments. The LRIT information that ships are required to transmit includes the ship's identity, location and date and time of the position. One of the more important distinctions between LRIT and AIS, apart from the obvious one of range, is that, whereas AIS is an openly accessible broadcast system, data derived through LRIT is available only to the recipients who are entitled to receive such information. Safeguards

[38] Inmarsat – International Maritime Satellite – was established in 1979 by the IMO. The purpose is to enhance the safety at areas at sea that are not covered by radio wave systems. Twelve satellites cover nearly the entire globe, except north and south of the 70th latitudes. Inmarsat C is a digital satellite communications system that can send and receive text and numeric data. Mini C is a compact mobile version of Inmarsat C. Most Inmarsat C and Mini C stations are integrated with Global Navigational Satellite Systems, such as GPS, that provides continuous positioning and allows position reporting. Inmarsat D+ is a comparable system with lower transmitting frequencies.

concerning the confidentiality of those data have been built into the regulatory provisions.

Contracting governments are entitled to receive LRIT information of their own flagged ships and of all ships which have indicated entering a port facility of that state, regardless of the location of that vessel. Vessels that have not indicated a call at a port facility are to deliver data if they are within 1000 nautical miles off the shores of the country and not within the jurisdiction of another contracting government (MSC 2006b). Vessels are protected from data requests if they are within the territorial waters of their own flag state. In 2007, the MSC agreed that contracting governments may also request LRIT data for marine environmental protection purposes without further defining those uses (MSC 2007). Today there are 62 contracting governments integrated into the LRIT system or which are awaiting integration (IMO 2009b).

Vessel Monitoring System (VMS) for fishing vessels

The European Union established in 2002 a common fisheries policy with the aim to conserve and sustainably exploit fisheries resources in the European Union. One element of the Common Fisheries Policy is a vessel monitoring system (VMS) for fishing vessels.

The VMS provides little additional information that could be used for deciding on a vessel monitoring system for an integration of marine ships in a European greenhouse gas policy regime. Although the VMS utilizes and mandates the use of AIS to track the vessel's position and movement, it does so only for European flagged ships anywhere and for non-European flagged ships only if they operate in the waters under the sovereignty and jurisdiction of EU Member States. The jurisdiction of the Member States is understood to extend to the exclusive economic zone (EC 2010). It is thus not far reaching enough as a template of an environmentally effective policy regime for reducing greenhouse gas emissions from ships. The only legal hint it may give is that it is one example where the operation of AIS equipment is mandated – however, only when in waters under sovereignty and jurisdiction of the mandating state and with their own vessels.

8.3.3 Discussion on automated vessel monitoring for distance tracking

The benefit of AIS data is their automatic generation and thus their potentially unrestricted access by countries. Land-based receivers are technically sound and data could be freely utilized for environmental monitoring purposes. Whether the unrestricted access is legal under international law has not been finally resolved and access may be limited to territorial waters and vessels that have announced their intent to call at a European Union port.

Furthermore, a **ubiquitous coverage of AIS data can currently not be ensured** because not all signals may be picked up by current satellite technology. Technically, the reception through satellites may become feasible within 5-10 years. More significantly, the space-based use of AIS data is currently not regulated at the IMO level. Regulation may be forthcoming that either restricts or allows the use of AIS data. A use of commercially offered AIS information may not withhold in court cases. Until confirmation on

the technical feasibility of satellite AIS reception and the legal use of such data, a global monitoring and reporting of vessels by using their automated AIS data cannot be implemented.

The LRIT data would be similarly sufficient for distance monitoring and a near global satellite reception exists. Its limitations are the current **legal limits through the guidance and regulations by the IMO**. The stated prime purpose remains safety and security, although it has been extended in 2007 to include environmental purposes as well. LRIT data can only be requested from ships sailing beyond 1000 miles off shore if they have indicated a port visit. Thus, under today's rules, it would be easy for vessels to deny the delivery of LRIT data to governments for large parts of their voyages. The provision to use LRIT data for marine environmental protection purposes may be interpreted to allow data acquisition for climate change protection purposes, but no details have been specified. A defined use of LRIT data for environmental purposes would likely require an amendment of the LRIT regulation by the IMO member countries.

8.4 Communicating marine data ship to countries and within Europe

The analysis shows that the challenges of monitoring of vessel data for the purpose of greenhouse gas reporting are less of technical nature, but of juridical and political nature. The necessary data of fuel used, distance sailed and voyages taken are readily available onboard ships. All relevant vessels are legally equipped with communications systems. Thus a monitoring system for integrating international travelling vessels into a European policy measure should condition the transmission of necessary data with any call at a European port, in addition to today's AIS and safety information. The first question is how such information could be communicated and what systems already in place may ease the administrative burden. The second question is whether data transmission would be legally permitted under the current international law.

8.4.1 Ship to state data exchange

Both electronic systems – AIS and LRIT – principally could be used to transmit information to countries. If the use of AIS and LRIT is not the continuous distance tracking but only the transmission of data, there are no technical or legal hindrances in principle. However, not all AIS transmitters may be capable to add sufficient data lines to be able to fulfil additional reporting requirements. Since SOLAS Chapter V clearly states that IMO is the only international body for developing guidelines, criteria and regulations on international level for ship reporting systems and since an extension of AIS sender capabilities might already be considered a CDEM standard, it is questionable, whether the European Union could legally regulate the AIS capabilities to transmit all necessary data.

The LRIT system is equally not usable for distance tracking beyond 1,000 nautical miles off EU shores. The transmissions of data to port states using the LRIT system,

once a vessel has indicated the call of port, should not pose any technical or legal problems. The LRIT system should also be capable of transmitting sufficient data amounts.

Alternatively, data could be also transmitted via online-reporting forms via the Internet, to which all large commercial vessels have access to. The transmittal in paper form together with other reporting requirements would also be possible, but electronic format would ease the further processing of data. Telecommunication data from ship to shore utilizes the Inmarsat satellite system, which has a near global coverage.

8.4.2 Systems for data sharing within the European Union

The European Council of Ministers adopted in October 2007 a Council Resolution that established the European LRIT Data Centre. The LRIT data centre is housed at the European Marine Safety Agency (EMSA). EMSA is also the centralized data centre for AIS data of EU Member States. The network of AIS data and its exchange is called SafeSeaNet (SSN), operated for EU Member States as well as Norway and Iceland (EMSA 2010). The mandatory data submission of ships to EU Member States and its further sharing in the SSN network is based on the EU Directive 2002/59 and authorized by the national Port State Control regime. However, today not all EU Member States have implemented the mandatory vessel reporting system (see Figure 15).

Figure 15 Status of EU member state reporting to the SSN in June 2009.

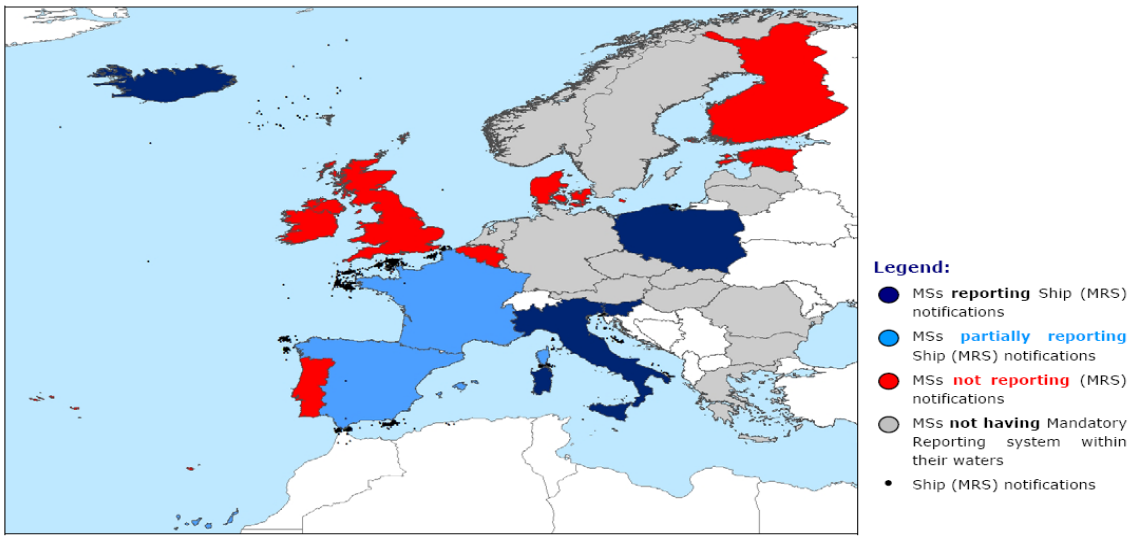


Figure 3 – MRS notifications vs. Mandatory Reporting Systems (June.2009)

Source: EMSA 2009

The central European database SSN already provides a platform to integrate information on fuel consumption, distances sailed and voyages that could be used. Individual ships could be identified through their dedicated IMO numbers. The IMO numbers could also be linked with relevant technical data to enabling the verification of reporting through occasional modelling.

EMSA also houses a database of vessel parameters. However, since the copyright of technical vessel information are in the hands of classification societies, its use for verification and monitoring is restricted or expensive. As EMSA states, “a new legal requirement to communicate this set of data could be beneficial in a second step to populate a dedicated module or database” (EMSA 2010, p. 13)

8.5 Legal constraints regarding data exchange and monitoring

One important question is whether it is legally permitted under the port station control regime for countries to collect data that refers to activities outside the territorial water, based on the premise that the activities within the territorial waters would not sufficiently cover the greenhouse gas emissions from ships. Öko-Institut (2010) argues that based on being affected by climate change, “there are strong reasons for the introduction of an extraterritorial policy regime. The interests of the European Union and of the international community are significant enough to allow for extraterritorial measures. As long as third countries do not enact any legislation that covers the greenhouse gas emissions of marine transport, the interests that can be invoked on the part of third countries are very weak. This is especially true as long as non-EU countries do not enact any legislation with respect to emissions of marine transport. The balancing test therefore supports the notion that an extraterritorial ETS for marine transport is justified in principle.” (Öko-Institut 2010, p. 78)

This analysis implies that establishing a mandatory reporting requirement for vessels that call at a European port regardless of their port of origin and the flag of the vessel is possible under international law. The reporting can also be extended to vessel activities in international waters, for example in order to collect the fuel consumed for a period of time. With regard to the use of an automated vessel reporting system, the ongoing use of such a system could be mandated for European flagged vessels, but may not be proportional to mandate for non-European flagged vessels (Molenaar 2000). The European Union in its fisheries policy for example only requires foreign flagged vessels to switch on their automated vessel monitoring system once they enter the Exclusive Economic Zones (EEZ) of Europe (EU 2009). However, if the monitoring were to rely on fuel consumption and potentially the distances sailed over a period and not on an real time tracking of the vessel’s voyages, such an ongoing use of automated systems would not be necessary.

One template for mandatory reporting of vessel activities in international waters is the US Coast Guard ballast water reporting requirement. The US Coast Guard mandatory reporting requirement superseded a mandatory reporting requirement by the US state of California. On June 14, 2004, the US Coast Guard published regulations on its mandatory ballast water management and reporting. A failure to comply may result in a daily fine of $US 27 500. The reporting includes detailed information on the locations and activities of the ballast water management the vessel has undertaken, its last and arriving port as well as where it took up, exchanged and discharged ballast water, regardless of the location (US Coast Guard 2004, form see Annex). It is therefore an example of the national state enforcing a reporting requirement that stretches into the

extraterritorial voyage of a vessel.

Concluding from this brief analysis the following conclusions can be drawn:

- The EU may require its own flagged vessels to permanently use automated systems for reporting.
- Reporting of necessary data for implementing greenhouse gas policy measures can be made mandatory for every vessel that calls at a European port, regardless of flag or port of origin.
- The data can refer to vessel activity outside the territorial waters and to voyages between non-European ports.
- The data transmission may utilize existing automated systems on board of vessels and the shore-based reception infrastructure.
- Alternatively other means (e.g. online) may be used to transmit relevant data.

The EC could establish a mandatory reporting scheme that requires vessels on voyages to any European port to report – at least once per period – the fuel consumed and other relevant information for verification purposes. In order to verify information, the reporting should mandate:

- Amount of fuel uptakes (e.g. BFDN);
- Location of fuel uptakes (e.g. BFDN);
- Date of fuel uptake (e.g. BFDN);
- List of visited ports (via log-book entries);
- Distances travelled between ports (via log-book entries);
- Fuel consumed per distance travelled [t/nm] and while in ports [t/24h] (via log-book entries).

8.6 Conclusions regarding monitoring

Vessels' log-books are the best source for information. It was shown that, in principle, the monitoring of fuel consumption is feasible with high accuracy. In order to minimize false reporting, **a combination of fuel monitoring and distance monitoring should be used**. Thereby the fuel and distance monitoring form a tandem monitoring system. The monitoring scheme would be based on fuel consumption data and verified with distance data from the port of calls for a trip or within a period. A scheme only based on distance that then links with vessel efficiency factors is possible but less vessel specific. Nonetheless can **vessel efficiency factors and a bottom-up methodology be used to establish an emissions baseline as well as policy targets**.

The means of transmitting vessel data from ships to countries should be left to the discretion of the vessel operators. The reception of the data may at **first be established through manual paper systems and the Internet**, which are immediately available

options. Vessels could easily submit standard texts and forms via fax or utilize online-forms transmitted through the Internet to the national authorities.

The **intra-European communication should use existing networks**, such as the SafeSeaNet. The infrastructure and the authorities of the European Marine Safety Agency (EMSA) could be expanded accordingly.

AIS and LRIT systems can be also used theoretically to transmit data to land-based receivers, although it may not be possible to mandatory require the continuous use of AIS and LRIT equipment on board of ships for a regional environmental reporting regime. There should otherwise be **no legal obstacles to allow the ship to utilize LRIT signals for transmitting their data** once they have announced a port of call in Europe.

A possible entangling in negotiations on reporting at IMO level should be avoided. Thus, while AIS and LRIT represent systems or could be expanded into systems with the necessary technical capabilities, the EU would be advised to primarily design the reporting mandate independently from AIS and LRIT.

Monitoring and reporting of freight movement activities is also theoretically possible through already established customs systems. Alteration to the data use would be intra European and therefore feasible. However, the implementation of policy measures based on freight movements is legally problematic, because measures could be interpreted as un-lawful hindrances to global trade (Öko-Institut 2010). Therefore monitoring vessel emissions based on cargo movements has not been discussed in this study.

8.7 Recommendation for the European Commission with regard to a monitoring mechanism for internationally travelling marine vessels

The analysis of the technical, administrative and legal aspects of monitoring internationally travelling marine vessels shows that it is possible from a technical, operational or legal point of view to introduce a requirement that would collect fuel consumption data from internationally travelling marine vessels by countries.

Several reasons can be stated that support the introduction of a monitoring system of marine bunker fuels consumed by vessels travelling to and from Member States of the European Union that would allow the Member States to calculate and report the corresponding greenhouse gas emissions.

- Foremost, emissions of greenhouse gases including those from marine traffic have the potential to harm the marine environment and human resources, including its fisheries, besides other effects they may create. Thus greenhouse gas emissions should be managed and reduced also from the perspective of marine protection.
- The direct monitoring of the fuel consumed by marine traffic to and from EC Member States would expand and improve the greenhouse gas emission reporting according to the IPCC guidelines, which is based on national bunker

fuel sales statistics. Direct monitoring of seaborne fuel consumption will be more accurately linked with the vessel activities than the measurement of fuel sales.

- An improved knowledge of fuels consumed by vessels to and from EU Member States would allow to better design policy measures to reduce greenhouse gas emissions to the atmosphere and thus would provide a mechanism that would foster the protection of the marine environment as well as the global climate.

Therefore it is recommended that the Commission includes provisions for its Member States in the current revision of the Decision No 280/2004/EC that would implement a reporting requirement on greenhouse gas emissions from internationally travelling marine vessels. Since Decision No 280/2004/EC covers all greenhouse gas emissions associated with Member States' activities, the emissions from marine vessels are inherently included. However, an expansion of the monitoring requirement in addition to the current reporting obligations under the UNFCCC should be included. Furthermore, the revised Decision No 280/2004/EC should provide the basis for coordinating and collaborating with European and potentially other organizations that could offer assistance with implementing such a monitoring requirement. One such European organization is the European Maritime Safety Agency (EMSA). The reporting requirement for Member States would need to also be placed in the revised Commission Decision 2005/166/EC (Implementing Provision). Guidelines for the monitoring requirements would be placed in an Annex to the Implementing Provision Commission Decision 2005/166/EC. Alternatively, these guidelines could be adopted in a separate legal document.

The target of such reporting requirement shall be all vessels that cross the boundaries of territorial waters of a Member State and that call at a Member State port. A monitoring should include vessel activities that is domestic but is operational similar to what is generally understood to be international traffic. Marine traffic from Motherlands to overseas territories belongs in this category. Inland marine traffic and coastal shipping on the other hand is operationally different, utilizes only domestic fuel sources and is already included in the reporting of national emissions to the UNFCCC. In order to reflect the target marine activity all marine vessel activities to and from EU Member States that cross the boundaries of territorial waters shall be covered with a monitoring mechanism. Thus, the terms cross-boundary marine traffic and cross-boundary travelling vessels shall be used.

Furthermore, for reasons of feasibility, environmental effectiveness and to allow the most flexibility for future measures, the scope of the vessel monitoring should be vessel activities within a period of time in contrast to vessel activities within a certain geographical scope. The draft guidelines in the Annex to the Implementing Provision have been drafted accordingly.

As part of the contract, the Öko-Institut e.V. has drafted legal texts for the revisions of Decision No 280/2004/EC and Commission Decision 2005/166/EC as well as the proposed Annex: "Guidelines for the reporting of greenhouse gas emissions from interna-

tionally travelling marine vessels by EC Member States". The guidelines describe a system whereby each vessel that calls at a European Union port must register with one Member State, which is in charge of collecting the relevant data for the purpose of reporting the emissions to the Commission. Thus one Member State, the administering Member State, is responsible for collecting the data, whereas all other Member States receive obligations to report vessel visits at their ports only. The guidelines establish a yearly reporting mechanism that includes information on the voyages, distances, fuel consumed and associated CO_2 emissions. Emissions are reported to a central registry to be established. The Commission may seek assistance in implementing the guidelines and operating the central registry from organizations such as EMSA. Provisions that allow for the extension of duties of such organizations are included in the guidelines.

9 Task 7: Full climate change impact from aviation

9.1 Background

Aviation contributes to the radiative forcing of climate, particularly through emissions of carbon dioxide (CO_2), nitrogen oxides (NO_x), water vapour, aerosols and their precursors (soot and sulphate), and increased cloudiness in the form of persistent linear contrails and induced-cirrus cloudiness. CO_2 emissions from aviation amount in 2005 to 1.6% of total anthropogenic forcing. Aviation's total radiative forcing (excluding induced cirrus) was 3.5% of total anthropogenic forcing. Including estimates for aviation-induced radiative forcing of cirrus increases aviation's total radiative forcing to 4.9% of total anthropogenic forcing (Lee et al., 2009b). Future scenarios of aviation emissions for 2050 that are consistent with IPCC Special Report on Emissions Scenarios (SRES) A1 and B2 scenario assumptions result in an aviation share between 4.0 to 4.7% of total radiative forcing including induced cirrus (Lee et al., 2009b). These figures illustrate that focussing on aviation's CO_2 emissions alone will underestimate aviation's full climate impact.

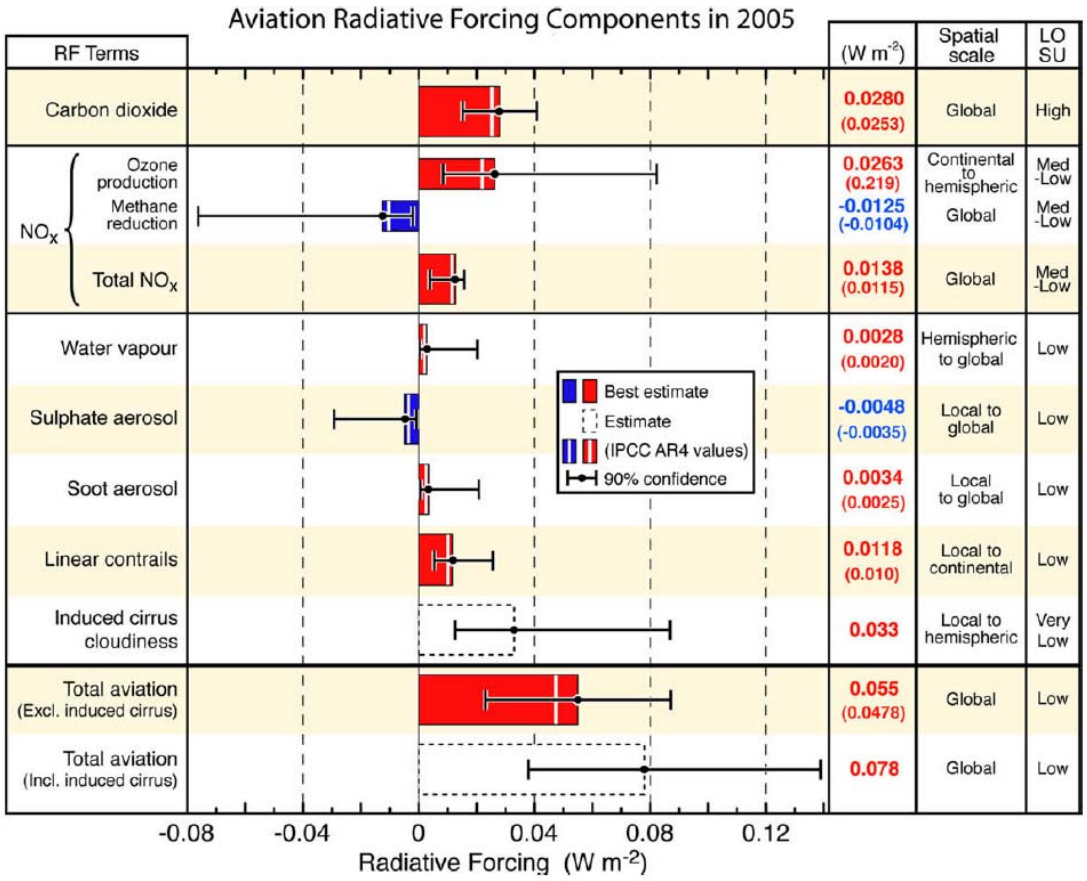
The requirements under recitals 14 and 19 of the Directive 2008/101/EC stipulate that all aviation-related climate change impacts should be addressed and reduced to the extent possible: "Pending scientific progress, all impacts of aviation should be addressed to the extent possible" (EU 2008). This chapter gives a brief overview of the different impacts aviation has on the climate, methodologies to monitor the full impact and possible policy approaches to minimise the full climate impact.

9.2 Climate impact of aviation

The different contributions of aviation to climate change are shown in Figure 16 and explained in more detail in the sections below. Excluding aviation induced cirrus cloudiness the radiative forcing[39] of aviation is about twice as high as the CO_2 effect alone; including aviation induced cirrus clouds the total radiative forcing is about three times higher. The following overview is based on studies by the IPCC (1999), Sausen et al. (2005), Graichen et al. (2006) and Lee et al. (2009a, 2009b).

[39] Radiative forcing is a measure for the change of the earth's energy balance due to a change of greenhouse gas concentrations given in power per area (W/m2). There is an approximately linear relationship between global radiative forcing and global near-surface temperature in the equilibrium state. Radiative forcing depends on the concentration of a given gas in the atmosphere and can therefore vary over time. Estimates for radiative forcing for future years depend on scenarios on global greenhouse gas emissions from all sectors. For the radiative forcing index (RFI), total radiative forcing from aviation is divided by the radiative forcing of CO_2 alone.

Figure 16 Aviation radiative forcing components in 2005



Notes: Radiative forcing components from global aviation as evaluated from preindustrial times until 2005. The error bars represent the 90% likelihood range for each estimate.
LOSU: Level of scientific understanding

Source: Lee et al., 2009a

9.2.1 Direct greenhouse gases

Emissions of the direct greenhouse gases CO_2 and H_2O scale linearly with the amount of fuel burnt and can be estimated with a good level of accuracy. Emissions of soot and their characteristics depend on engine characteristics and can only be estimated with large uncertainties.

- **Carbon dioxide** has a warming effect on the climate and remains in the atmosphere for several decades. CO_2 emissions from aviation can be treated identically to those from other sectors as the gas remains long enough in the atmosphere to be well mixed independent of the source location.
- **Water vapour** has a warming effect on the climate and is generated from the Hydrogen contained in the kerosene. It remains only for a short period in the troposphere, the altitude at which most emissions from aviation occur. The

quantity of water vapour emitted by aviation is small compared to the natural hydrological cycle and the effect on the climate is minor.

- **Soot particles** are produced in the combustion process and have a small warming effect on the climate as they absorb incoming sunlight and heat up the atmosphere.

9.2.2 Indirect greenhouse gases

NO_x and SO_2 emissions do not contribute to global warming directly but produce or destroy greenhouse gases, in particular ozone (O_3), methane and sulphate aerosols. SO_2 emissions can be estimated with good accuracy if the sulphur content of the fuel is known. Estimates on the formation of O_3 and the destruction of CH_4 vary strongly with the atmospheric models used.

- **Ozone** has a warming effect on the climate. The effect is higher at cruising altitude than on the ground due to longer lifetimes and greater radiative forcing in the troposphere. Ozone generation is increased through NO_x emissions from aviation.
- **Methane** is a greenhouse gas which is present in the atmosphere due to natural as well as human induced sources. Very little or no methane is emitted by airplanes but NO_x emissions initiate a destruction of CH_4 molecules and therefore have a cooling effect on the climate (negative radiative forcing). Overall the warming effect of NO_x emissions due to ozone formation is estimated to be higher than the cooling results due to methane destruction.
- **Sulphate aerosols** scatter incoming sunlight back to the atmosphere and lead to a cooling of the climate (negative radiative forcing). Sulphur contained in the kerosene oxidises to SO_2 during combustion out of which a fraction is converted to SO_4 in a further step.

9.2.3 Cloud formation

Additional to the effects discussed above soot particles, sulphate aerosols and water vapour may also lead to contrails and cirrus cloud formation. The impact of aviation emissions on cirrus cloud formation is not well understood but could be the most important effect.

- **Contrails** are formed through emissions of water and particles under certain atmospheric conditions and are visible as white lines with the eye. The trails mainly consist of water already contained in the atmosphere and airplanes only triggered their formation. The effect of contrails is twofold: they cool the climate through increased backscatter of solar radiation but also trap heat on the earth which contributes to global warming. The effect of contrails is highly dependent on the time of day, pre-existing cloudiness and the optical thickness of the formed contrails. Overall contrails have a positive radiative forcing although significant uncertainties remain in the estimation of the magnitude. The formation

of contrails is well understood and can be modelled if sufficient parameters on the atmospheric conditions are available.

- **Cirrus cloud** formation might be augmented through aviation induced contrails and cloud seeding through particles. Increased cirrus cloud formation contributes to global warming but reliable quantifications are not yet possible. The effect is estimated to be within approximately half to three times the contribution of CO_2 alone (90% likelihood range).

9.3 Monitoring the full climate effect of aviation

9.3.1 Modelling

Some obstacles complicate the monitoring of the full climate impact of aviation at the same level of accuracy and timeliness as the GHG inventories of other sectors:

- Several of the non-CO_2 effects do not scale linearly with fuel consumption but depend on other parameters (e.g. engine load factors, atmospheric conditions, engine types). To take these effects into account, detailed models are necessary which use, inter alia, the 4-dimensional flight route, aircraft and engine types, fuel burn and 4-dimensional atmospheric conditions. In addition, these models need to use a fine grid to be able to capture the effects of different flight levels on contrail formation.
- The level of scientific understanding is low for the impacts of H_2O, SO_x, soot, contrails and cirrus clouds. Even with detailed models taking all of the above parameters into account the results still show a considerable margin of error due to uncertainties in the modelling of the underlying science.

Despite this several research groups have been able to estimate the full climate impact of aviation. Based on that work it could be possible to apply a multiplier to the CO_2 emissions as an indication for the full effect (see below). Alternatively, annual detailed estimates could be produced by one of these research groups or other government agencies such as Eurocontrol. So far no studies have been published that attempt to estimate the full impact of aviation annually on a Member State level. Substantial resources might be necessary to produce such estimates with good quality in a timely manner. In contrast, a multiplier would be very easy to apply but would have a lower level of accuracy.

9.3.2 Applying a multiplier

Using a multiplier on CO_2 emissions is the easiest and fastest way to assess the non-CO_2 impacts. Recent studies indicate that the use of a multiplier is feasible but several issues need to be considered:

- For the average impact of a large number of flights a multiplier will produce a reasonable estimate of the full climate impact. For individual flights, the multiplier could have a considerable margin of error. An example is cirrus clouds

formation whose climate impact depends strongly whether they are formed during daytime hours or in the night.

- Policies and measures which only reduce carbon emissions could increase the total impact of aviation on the climate. Examples include engine optimisation for fuel efficiency only which leads to increased NO_x emissions or a purely fuel based flight route optimisation which could lead to more contrail formation. A significant multiplier on CO_2 will increase the cost-effectiveness of such fuel based measures and could therefore be counterproductive.
- A multiplier depends on the climate metric used. Additionally, for some metrics the multiplier depends on the accumulated historic GHG emissions and is therefore not constant over time (e.g. the radiative forcing index RFI).

Lee et al. (2009a) calculate a GWP multiplier of 1.9-2.0 including aviation induced cloudiness (AIC). Excluding AIC, the multiplier would be 1.3 to 1.4. In Lee et al. (2009b) a radiative forcing index of about 3 (including AIC) or about 2 (excluding AIC) is given. Is has to be noted that both studies estimate these figures for the year 2005. If the multiplier approach would be chosen it would require some mechanisms to update the multiplier at regular time intervals, e.g. every 5 years.

There is considerable discussion in the scientific community on the validity of using a simple multiplier to include the non-CO_2 effects. Lee et al. (2009b) specifically discuss in their study that the RFI should not be misinterpreted as a multiplier on CO_2 emissions. The reasons for this are that the RFI a) varies over time depending on the overall GHG emissions from all sources and b) is a backward looking metric which assesses the impact of historic aviation emissions on the current energy balance of the climate system. Due to these two factors the authors believe that it is not a suitable metric for forward looking policies.

To alleviate some of these concerns it is suggested in this study to update the RFI at regular intervals. The RFI shows a gradual development and does not change much in short to mid-term time horizons. Based on Sausen et al. (2005) it can be estimated that the RFI changed by 6% from 2.7 to 2.9 between 1992 and 2000 due to the change of aviation activities and background concentrations of GHGs from other sources. Such a change is much smaller than the uncertainties involved with the RFI and the changes due to improved scientific understanding which decreased the RFI by 35% in the same time period. Based on these arguments and in line with Article 174(2) of the Treaty (precautionary principle), the use of a multiplier for policy reasons can be justified in the absence of detailed and readily available modelling results.

9.3.3 No monitoring

Most of the measures discussed in the following section do not require detailed monitoring of the non-CO_2 effects and could be adopted without a monitoring system. The disadvantage would be that the determination and communication of policy results would be more difficult and that there would likely be less political pressure to act.

9.4 Addressing non-CO_2 effects of aviation

Carbon dioxide, NO_x and contrails/aviation induced cirrus cloudiness are the three main contributing factors to the overall climate change impact. The climate impact of CO_2 emissions has been addressed with the inclusion of aviation into the EU ETS. This section therefore focuses on options to address the impact of NO_x emissions and aviation induced cloudiness. The options are only summarised shortly; a detailed discussion of these options is beyond the scope of this study and has already been done elsewhere (e.g. Lee et al. 2009a, DLR 2010, Green 2003).

9.4.1 Minimising the climate impacts of NOx emissions

Two approaches exist to minimise the climate impacts of NO_x emissions. Firstly, technological standards can reduce emissions, and secondly optimised flight routes can reduce the climate impact of the remaining emissions.

1. **Technical standards**: Ultra-low NO_x combustion technologies could be introduced in aircraft engines in a way which only increases CO_2 emissions slightly (Green 2003). These technologies are still novel and unlikely to be introduced in the absence of regulatory pressure (Lee et al. 2009a).
2. **Optimised flight routing**: NO_x emissions contribute to climate change through the production of ozone and the destruction of methane. Ozone generation and the radiative forcing of ozone depend on the altitude of the NO_x emissions. Flying at lower altitudes reduces the overall radiative forcing of carbon dioxide, ozone and methane by 5-10% despite increased fuel consumption (DLR, 2010). These figures are based on backward looking approaches and require further research.

Regulatory approaches to decrease NO_x emissions have been discussed by Faber et al. (Faber et al, 2008). These include different types of NO_x charges, inclusion of NO_x emissions in the EU emissions trading scheme based on actual emissions or a multiplier and NO_x standards.

9.4.2 Minimising contrail impacts through route optimisation

Contrails from aviation only form under very specific atmospheric circumstances; persistent contrails require ice-supersaturated regions (ISSRs) and temperatures below -40°C (Lee et al., 2009a). There are only limited options to reduce aviation induced contrail formation through technological changes. The decisive factor is the atmospheric condition during the flight. Reducing the level of soot and sulphur emissions impacts contrail thickness and duration but does not change the thermodynamic conditions which govern the formation. These conditions mainly occur at cruise altitude (10-12 km). One option would therefore be to design aircraft for other optimal cruise altitudes but that would increase CO_2 emissions and take decades due to the long aircraft lifetimes (DLR, 2010).

Operational approaches and standards offer more promising approaches to reduce the impact of aviation induced contrails:

1. **Reduction of night flights**: The effect of contrails on the global energy budget depends on the time of day and the background situation. During daytime contrails reflect a part of the sunlight back into space. This effect is strongest during sunrise and sunset. The effect of the increased reflection also depends on the ground albedo, i.e. over dark surfaces such as oceans or forests the cooling effect is higher than over brighter surfaces. In contrast, the reflection of heat back to the earth takes place night and day. Although only 25% of all flights occur at night they account for 60-80% of the contrails' radiative forcing (DLR, 2010). Further restrictions on night flights would reduce the warming effect of aviation induced contrails and cirrus cloudiness.
2. **Optimising flight routes for contrail avoidance**: Ice-supersaturated regions where contrails can form are normally thinner than 500m and can normally be avoided by a vertical step of 2000 ft if there is free airspace. DLR (2010) estimates that only 5% of the entire flight segments would need to be altered by flight level or route to minimise warming contrails and keep or even produce cooling contrails. The authors favour the consideration of contrail formation zones during route planning instead of ad-hoc evasive manoeuvres. A requirement for such an approach would be a better representation of ISSRs in the current weather models. The necessary development and testing is estimated to require about 5-10 years to come into force.

9.5 Relationship with the climate and energy package

Three different options exist to integrate the non-CO_2 effects in the existing Climate Change and Energy package:

- **Inclusion in the EU ETS**: The ETS Directive would need to be amended to also cover non-CO_2 effects of aviation, either based on a multiplier or on the actual climate impact. Several practical questions would need to be addressed including the multiplier/metric used, mechanisms for updating the multiplier and monitoring guidelines for the reporting of the actual non-CO_2 effects.
- **Inclusion in the Community's GHG emission reduction commitment**: The non-CO_2 effects of aviation would be added to the greenhouse gas emissions from sectors not covered by the EU ETS and become part of the emission reduction commitments of Member States. Again, either based on a multiplier or on the actual modelled effect.
- **Separate reporting**: The non-CO_2 effects would not be included in either the EU ETS or the Community's independent emission reduction commitment. Instead, they would be addressed independently of the package. A reporting requirement would ensure that the effectiveness of the policies and measures could be assessed.

Approaches 1) and 2) would guarantee that the non-CO_2 effects would either be directly addressed or compensated through further reductions in other sectors or the use of flexible mechanisms. Option 3) would not preclude the adoption of measures to reduce the non-CO_2 effects but the extent of the mitigation effort would not be guaranteed.

Due to the potential counterproductive effects of measures solely based on carbon dioxide for individual flights it is more appropriate to include the non-CO_2 emissions in the Community's reduction commitment if a multiplier is used for monitoring and reporting. Member States and the EU would then be able to address the non-CO_2 effects through standards and operational measures to reduce the impact of NO_x emissions and contrails/cirrus clouds. If detailed modelling is used for monitoring and reporting it might be better to include these additional effects in the EU ETS; airlines can reduce the overall climate impact of flights through operational measures more efficiently than governments.

9.6 Proposed changes to the Monitoring Mechanism Decision

A new reporting requirement on the non-CO_2 effects of aviation for Member States is proposed. The reporting requirement is based on a two-tiered system:

- Those Members States which reported more than 3% of the total EU CO_2 emissions from aviation shall report the non-CO_2 effects of aviation based on detailed models. Currently, this would apply to France, Germany, Italy, the Netherlands, Spain and UK which are jointly responsible for approx. 80% of the CO_2 emissions.
- All other Member States should report using detailed models as well, but, if not feasible, may use a multiplier instead. The multiplier can be changed by the Climate Change Committee to reflect newest scientific results.

If the threshold of 3% is seen as too high the limit could be lowered to 1%. In that case, another eight Member States would need to use models increasing to coverage to just below 95% of total EU emissions. The detailed modelling requirements start in 2014 to give Member States some time to implement the necessary systems.

In accordance with the UNFCCC reporting requirements the scope has been set to all aircraft departing from a Member State. This will ensure that estimates for CO_2 emissions and non-CO_2 effects cover the same scope. Alternatively, Member States could be responsible for reporting the full impact based on the airlines for which they are responsible under the EU ETS. Thirdly, reporting could be based on all departing aircraft and those aircraft which landed in a Member State but departed from outside of the EU. The last option would have the same total scope as under the EU ETS but with a closer link to the UNFCCC reporting.

The provisions include the reporting of the effects of aviation induced cloudiness. Due to the high scientific uncertainty the requirements could also only cover all other non-CO_2 effects.

9.7 Conclusions concerning the full climate impact of aviation

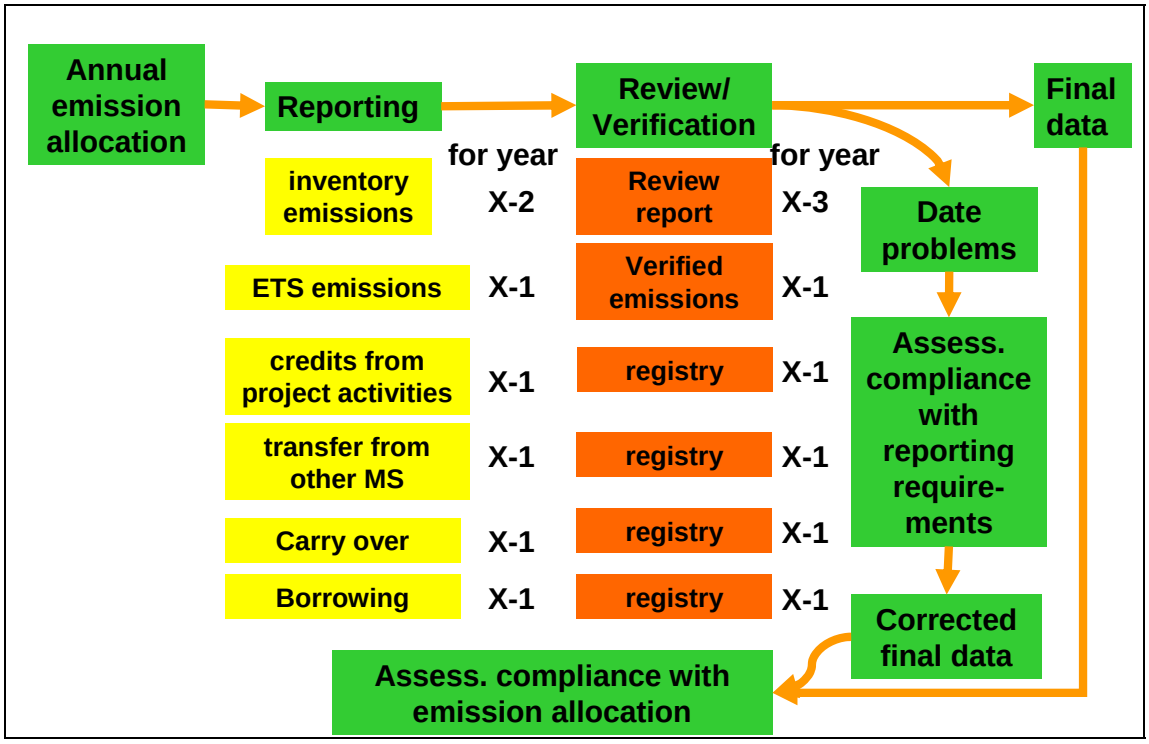
By addressing only CO_2 emissions from aviation at least half of the full climate impact of aviation remains unrestricted. Scientific uncertainties remain with regard to the exact contribution of these effects to global warming and producing annual estimates by Member State would be challenging. Nevertheless, there are several operational and technical measures which would reduce the impacts of non-CO_2 emissions on the climate. An easy way to account for these effects would be the introduction of a multiplier for non-CO_2 effect and their inclusion in the community reduction commitment. If a multiplier is used, mechanisms for regular updates of the multiplier would be needed to reflect the effects of policies and measures taken by the EU and its Member States and to reflect the changing historic emission background in the atmosphere.

10 Task 8: Establishment of an annual compliance cycle

For the implementation of the Effort Sharing Decision a complete compliance cycle has to de defined covering monitoring and reporting of information on emissions during the period 2013-2020, the use of flexibilities and other elements, the review of the information received and the final compliance assessment as well as the application of corrective action, if necessary. A process with clear timelines, tasks and responsibilities has to be established for this purpose. The following sections describe the different elements of the compliancy cycle.

The main elements of the reporting, review/ verification and compliance cycle are presented in Figure 17. The options that will be elaborated under this task will address the reporting of emissions, the review/ verification and the compliance assessment as well as consequences.

Figure 17 Annual reporting, review/ verification and compliance cycle



Source: Öko-Institut

A compliance system under Decision No 406/2009/EC needs to cover the following basic functions:

1. Establishment of final emissions data for the years 2005, 2008, 2009 and 2010 after a review process of the submitted inventories.

2. Issuance of annual emission allocation to Member States under Decision No 406/2009/EC in a database structure.
3. Review of annual GHG emissions inventories from Member States and assessment of compliance with reporting requirements.
4. Review of reported information on the use of flexibilities and assessment of compliance with provisions for the use of flexibilities.
5. Determination of the need for corrective action if annual emission levels exceed the annual emission allocation plus the use of flexibilities.
6. If Member State would be requested for corrective action, the reported information has to be reviewed and compliance with the requirements for corrective action has to be assessed.
7. Assessment of compliance with other requirements of Decision No 406/2009/EC.

These elements are discussed separately in the following sections of this chapter.

10.1 Timelines for an annual compliance cycle

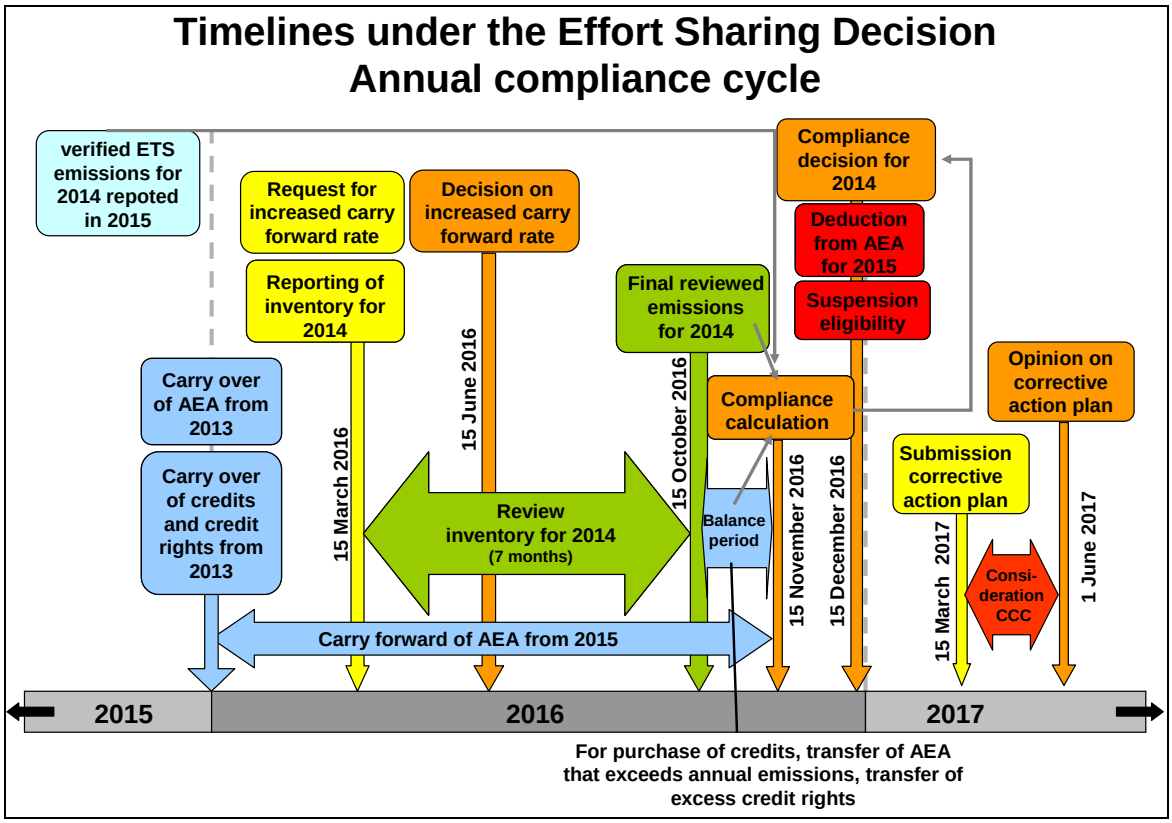
In this section a tentative timeline is explored that results in a compliance system with a final compliance decision at the end of the year in which emissions data under Decision No 406/2009/EC are to be submitted (for the year preceding the last year; i.e. in 2015 for 2013 data). All suggested dates are tentative, the main objective is to show

- how different activities follow in an annual cycle;
- how they are linked with each other and
- how different activities can be combined.

Figure 18 shows a schematic presentation of the timelines in an annual cycle.

The year 2016 was chosen as an example in Figure 18 to represent a middle year of the period 2013 to 2020. The consecutive activities during the reporting, review and compliance cycle are described in the following section in accordance with their occurrence during the year.

Figure 18 Timelines in the annual reporting, review and compliancy cycle under Decision No 406/2009/EC



Source: Öko-Institut

Carry over at the beginning of each year

Action

Pursuant to Article 3(3) of the Effort Sharing Decision, each Member State can **carry over** the **remaining part of its AEA that exceeded its GHG emissions in the previous year** to the subsequent years. This will result in a transaction in the registries transferring the quantity of AEA that remained in the Member States' AEA holding account after deposit/ retirement of AEA to the AEA deposit/ retirement account occurred to the AEA holding account for the subsequent year.

Pursuant to Article 5(6) of the Effort Sharing Decision, each Member State can **carry over the unused part of its annual maximum quantity to use credits** (credit rights) to the subsequent years. This will result in a change of the limit to use credits inscribed in the registry for the particular MS.

Who

The transactions are performed by Member States' registry administrators in Member States' registries. The transactions could potentially also be an automated procedure performed by the central registry administrator following and based on the Commission's Compliance Decision (see below) but in this case, the Member States that would

not want to carry over unused AEAs should be able to prevent the automatic carry over.

Timing

It is important to note that, under the overall timeframe presented here, carry over of AEA issued for a year and of credit rights pertaining to that year will only take place at the end of the next but one year (i.e. at the end of 2015 for AEA and credits rights pertaining to 2013).

The transactions should be performed after the compliance decision has been issued for the previous year (*15 December 2015 for 2013 data etc.*).

If AEA is hold in accounts specific for each year and if a date is established for closure of AEA holding accounts after a year has passed, the transaction should be performed until the date of account closure or could automatically be performed at the date of account closure (*e.g. 31 December*). If no account closure date is set, the carry over will depend on the Member State and AEA could remain in different accounts over the period until transferred by Member States.

Reporting of GHG emission inventories

Action

Submission of **annual GHG inventories** for a given year including **supplementary information specific to the Effort Sharing Decision**. Inventories consist of CRF reporting tables submitted as XML files from CRF reporter software and national inventory reports.

Who

By Member States

Timing

It is suggested to keep the inventory submission deadline of 15 March. This deadline is consistent with the existing submission deadline under Decision No 280/2004/EC. The deadline 15 April is the deadline for the UNFCCC submission, not the submission to the Commission. The deadline of 27 May (6 weeks after 15 April) often used for the UNFCCC inventory submission, is not an official UNFCCC deadline. It is derived from the fact that the UNFCCC review in the annual review cycle shall only take into account inventories submitted until 6 weeks after the deadline. As the EU will continue to have an obligation to compile an EU inventory, it is important to keep the current deadlines. In order to ensure a timely annual compliance cycle, an earlier inventory submission due date would be preferable. However, Member States would face problems with data availability if the deadline was earlier.

Request for increased forward rate

Action

Pursuant to Article 3, paragraph 3, 3rd sentence ESD, a Member State may request in 2013 and 2014 an increased carry forward rate in excess of 5% of its annual AEA in

the event of extreme meteorological conditions which have led to substantially increased GHG emissions in the years 2013 and 2014 compared to normal years. For this purpose, Member States shall submit a report to the Commission substantiating this request.

Who

By Member States

Timing

It is suggested that the report and request for increased carry forward rate is submitted together with the inventory submission in the years 2015 (inventory submission for 2013) and 2016 (inventory submission for 2014). With the inventory submission, Member States finally know whether extreme conditions have caused substantially increased GHG emissions that require an increased carry forward rate. The report should provide information on the extreme meteorological conditions and their effects on emissions and should indicate the requested increased rate and total amount of carry forward from the following year. The review of the inventory could subsequently assist the Commission with a technical analysis of the reported information for the decision on an increased carry forward rate because the inventory review experts have appropriate expertise to judge whether a meteorological event can be considered as extreme (see also section 11.2 of this report). If this suggestion is implemented, it is necessary to add a respective reporting requirement to the revised Monitoring Mechanism Decision.

Decision on increased carry forward rate

Action

Pursuant to Article 3, paragraph 3, 5th sentence ESD, the Commission shall decide whether an increased carry forward can be granted.

Who

Commission

When

The Commission's deadline is three months after the submission of a report substantiating a Member States request for an increased carry forward rate. The Effort Sharing Decision establishes a deadline for the Commission, but not a deadline for the Member State request and report. It would significantly complicate matters during the compliance cycle if such a request could come at any time from Member States as an ad hoc review of the specific case outside the regular procedure would be necessary. It is therefore suggested to establish a deadline for Member States to submit the request and report under Article 3.3 ESD together with the relevant annual GHG inventory (15 March). This would lead to a deadline for the Commission Decision on granting an increased carry forward of 15 June.

Inventory review

Action

The annual inventory has to be reviewed in a procedure to be established under the Effort Sharing Decision as part of the revised Monitoring Mechanism Decision. More detailed proposals for the review are made in section 10.5 of this report. The review should result in a report with the final reviewed emissions for the year under review. This report can be more concise than the current UNFCCC review reports. At the end of the review the Commission notifies each Member States of its final reviewed GHG emissions for the year that had been under review.

Who

The organization/ unit that will get the responsibility to perform the inventory review under the Effort Sharing Decision.

Timing

It is assumed that a more efficient and professional procedure will be established for the inventory review that is able to produce final reviewed emission data 7 months after the submission due date of 15 March in form of a review report with final data. This would be by 15 October each year of the year of submission of data.

Balance period

Action

After the determination of final inventory data for a year of the period 2013-2020, it seems necessary to establish a certain period, here called “balance period” in which Member States can perform any transactions necessary to balance their annual emissions with the AEA and credits. This period has a similar function as the so-called “true-up period” of 100 days under the Kyoto Protocol (officially the “additional period for fulfilling commitments”) following the completion of the review of emission data of the last year of the commitment period 2008-2012. The final reviewed emissions may deviate from the emissions submitted by 15 March and additional purchases or transfers from/ to other Member States or carry forward may be necessary that should be allowed, under specified conditions, after the availability of final reviewed emissions (see also section 9.6.2 below).

Who

Member States perform additional transactions as necessary.

Timing

It is suggested to have one month as a balance period. This is considerably shorter than the “true up” period under the Kyoto Protocol. The transactions may need some negotiations between Member States as well as decisions on budgets to purchase credits. At the same time, Member States already receive reliable information on their needs (and their potentially available surplus AEA) during the preceding review process. It seems appropriate to grant one month to Member States to undertake the nec-

essary steps. The balance period would thus run approximately from 15 October until 15 November (depending on the completion of the review).

Carry forward of AEA from 2015

Action

Pursuant to Article 3, paragraph 3 ESD, a Member State can carry forward from the following year a quantity of up to 5% of its annual emission allocation during the period 2013 to 2019.

Who

Member States

Timing

Carry forward for a given year from the following year, may happen at any time after the issuance of the annual emission allocation for the following year until the end of the balance period for the given year. Due to the overall timeline of reporting and review, carry forward of AEA can occur until after the year from which and to which the amount is transferred. For example, AEA from 2014 may, under the timelines laid out here, be carried forward to 2013 until 15 November 2015. Carry forward could also be automatically performed at the moment of the compliance calculation in case of a MS underachievement within the range of 5%.

Article 3, paragraph 3, first sentence ESD, limits carry forward to the period 2013 to 2019, thus there is no carry forward in the last year of the commitment period (2020).

Compliance calculation

Action

After the balance period, a compliance calculation has to be performed that

1. calculates final non-ETS emissions by subtracting verified emissions from ETS from final total reviewed GHG emissions (without LULUCF) and that
2. compares whether the final reviewed non-ETS emissions are equal or smaller than the AEA and credits in the debit/ retirement account for a particular year.

Who

Commission via the central registry administrator

Timing

It is suggested to perform the compliance calculation directly after the balance period, which would be by 15 November.

Compliance decision

Action

The Commission should prepare final decisions for each Member State on the status of compliance with Article 3 of the Effort Sharing Decision for each Member State.

Who

The Commission

Timing

It is assumed that the compliance decisions can be prepared within the period of one month in order to have a complete compliance cycle within one year. If this would take longer, the final compliance decision would be moved to the subsequent year. In cases of compliance, the decisions are straightforward. In cases of non-compliance, the Commission can assess directly after the availability of final reviewed inventory data whether the use of the flexibilities within the limits provided in the Effort Sharing Decision would enable a Member State to be in compliance. If this is not possible, the Commission could start preparing the decisions shortly after 15 October.

Corrective action – deduction from AEA

Action

Pursuant to Article 7, paragraph 1(a) ESD, in cases of non-compliance with Article 3(2) of the Effort Sharing Decision, a deduction from Member State's emission allocation of the following year equal to the amount in tonnes of CO_2 equivalent of the excess emissions, multiplied by an abatement factor of 1.08 shall be applied.

Who

The Commission as part of the compliance decision with implementation via the central registry administrator.

Timing

The calculation of the deduction from the AEA of the following year should be integrated in the compliance decisions. Due to the time required for reporting and review, a deduction from AEA issued for, for example, 2014 would occur at the end of 2015.

Corrective action – suspension of eligibility

Action

Pursuant to Article 7, paragraph 1(c) ESD, in cases of non-compliance with Article 3(2) of the Effort Sharing Decision, the eligibility to transfer AEA and credits rights from the Member State concerned to another Member State shall be suspended.

Who

The Commission as part of the compliance decision with implementation via the central registry administrator.

Timing

The consequence of the loss of eligibility should be integrated in the compliance decisions and implemented forthwith.

Corrective action – submission of corrective action plan

Action

Pursuant to Article 7, paragraph 2 ESD, a Member State that is in non-compliance with Article 3(2) of the Effort Sharing Decision, shall, within three months, submit to the Commission an assessment and a corrective action plan.

Who

A Member State in non-compliance.

Timing

Three months after the Commission's decision on non-compliance. In the timeline suggested here, this would be by 15 March of the following year and therefore the assessment and plan could be submitted with, and potentially integrated in, the annual inventory submission.

Opinion on corrective action plan

Action

Pursuant to Article 7, paragraph 2 ESD, the Commission may issue an opinion on the corrective action plan. Article 7.2 also determines that the Commission may submit the corrective action plan to the Climate Change Committee for comments. The *may* implies that the Commission does not have to issue an opinion. The revised Monitoring Mechanism Decision could determine under which circumstances/or and in what timeframe the Commission would issue an opinion and/or submit the plan to the Climate Change Committee for comments (but there is no formal requirements for such specification).

Who

The Commission may submit the corrective action plan to the Climate Change Committee.

Timing

No timing is provided in the Effort Sharing Decision. It is assumed that the opinion could best be provided until 1 June so as to enable the Member State in question to further develop and implement the plan timely. In any event, the Member State should start the implementation of the plan immediately, i.e. without waiting for any opinion of the Commission, since formal approval of the plan by the Commission is not foreseen and required under the Effort Sharing Decision.

10.2 Reporting as part of the annual compliance cycle

This section covers the reporting requirements necessary to determine the annual emission allocations for the period from 2013 to 2020 pursuant to Article 3, paragraph 2 of Decision No 406/2009/EC and the compliance with the emission limitations for the non-ETS sector pursuant to Article 3, paragraph 2 ESD.

The main reporting provisions relevant for the compliance cycle with the emission limitations under the Effort Sharing Decision are:

1. the **annual reporting of GHG emission inventories** by Member States to the Commission;

   Currently the Monitoring Mechanism Decision (Decision No 280/2004/EC) establishes an annual submission date by **15 March** for Member States to submit their final GHG inventories for the year X -2 to the Commission. A draft inventory is submitted by 15 January each year, but emission data may be updated by 15 March. The deadline of 15 April applies to the inventory submission to the UNFCCC under the Convention and the Kyoto Protocol. It is suggested to keep the current deadline of 15 March for the final Member States' inventory submission. Before 15 March some Member States face problems with the availability of updated statistical data. The deadline should be before the UNFCCC deadline and an early deadline is needed if the compliance cycle should be finalized within the same year in which data was reported. The requirements related to the submission of annual GHG inventories are further elaborated in section 4.

2. the **annual reporting of verified emissions** under the Emissions Trading Directive;

   The Decision on the ETS monitoring and reporting guidelines (Commission Decision 2007/589/EC and its amendments by Commission Decision 2009/73/EC and Commission Decision 2009/339/EC) establishes a reporting deadline by **31 March** for installations under the ETS to competent authorities which is also the deadline for uploading verified ETS emissions in the registries.

3. the annual reporting/tracking of the use of credits and flexibilities under the Effort Sharing Decision;

   As further elaborated in section 10.3, the transactions of annual emission allocations (AEA), and credits allowed under the Effort Sharing Decision can be tracked via the registries. Except for certain aspects of project credits, it is not necessary to include this information in the report submitted by 31 March given that this information could be obsolete in case of transactions during the balance period and this information is available in real time in the registries.

4. reporting requirements related to **GHG emission inventories to fix base year emissions** to determine the final emission allocations of Member States;

   For this purpose, additional reporting requirements need to be defined as outlined in section 6.1.

5. reporting of a corrective action plan in cases of non-compliance;

   In cases of non-compliance with the emission limitation targets under Article 3, paragraph 2 of the Effort Sharing Decision a corrective action plan has to be submitted and the annual progress in the implementation has to be reported.

10.3 Inventory recalculations in the annual compliance cycle

Judging from past experience, recalculation of inventory data for past years occur frequently and repeatedly in the course of submissions for later years (following from improvements in data collection/estimation and applied methodologies). This raises the question of whether and to what extent such recalculations should results in reviews and revisions of the calculation and determination of net emissions as described in section 6.1. At least four general options for how to deal with such recalculations can be presented (with intermediate solutions being principally possible):

The recalculations also affect the regular annual compliance cycle foreseen in Decision No 406/2009/EC. For each inventory submission for the years 2013-2020, it has to be assessed whether Member States comply with the annual emission allocation. It creates problems if the estimates continue to change after compliance has been assessed. There are different options to address the recalculations in the annual compliance cycle:

10.3.1 Option 1 – recalculations of previous years not taken into account

Irrespective of recalculations of inventory data in subsequent data submissions the Commission Decision on the net emission of any year from 2013 could stand unchanged after it has been taken. However, during the review process, Member States could still have the possibility to update data that have only become available after the submission deadline.

- On the one hand, this would provide clarity and certainty. The option achieves an unambiguous determination of excess emissions which is required under Article 7 of Decision No 406/2009/EC to determine consequences.
- On the other hand, this would reduce the time series consistency of data over time and could reduce the incentive to work towards further improvements in data estimation methods.
- It also does not follow the current international practice under the Kyoto Protocol and the final inventory data under the Effort Sharing Decision would deviate from the inventories submitted and reviewed under the UNFCCC and the Kyoto Protocol. These differences will consequently result in a mismatch of total emission reductions achieved over the period 2013 to 2020 under the Effort Sharing Decision and total emission reductions achieved in the UN reporting and review system. This could result in either a positive or a negative difference at EU level at the end of a potential second commitment period under the Kyoto Protocol.
- This option does not allow including updated activity data which was not yet available in the year when the inventory was due. Such updated activity data is particularly relevant for an inventory year which is submitted for the 2nd time. The EU compliance assessment would be based on preliminary statistical data in some areas.
- Compliance assessment would be based on an inconsistent inventory time series over the period 2013 to 2020. However, also under the Kyoto Protocol the time se-

ries is not fully consistent because base year emissions are fixed and commitment period years recalculated.

- Final EU total emissions for a particular year would be different to an emission reduction agreement at international level as under the Kyoto Protocol where recalculations are taken into account in the final compliance assessment at the end of a commitment period. There would be two different sets of final numbers for each year of the period 2013-2020. This would be rather confusing to the public.
- Different sets of total emissions at EU level and international level may also cause a difficult situation in legal disputes. The Commission would argue based on “old and outdated” data for which Member States can easily prove why they are incorrect (preliminary data) and Member States would argue based on more recent data that may have been already recognized and accepted at international level.
- This option potentially could create an additional incentive to improve and speed up data collection/estimation by Member States.

10.3.2 Option 2 - Annual recalculations of net emissions of past years

Any recalculation of emissions data in submissions of inventories by Member States for past years could, after appropriate review, lead to a review and revision of the calculation and determination of net emissions by the Commission for the past years. This would have the advantage of always basing actual net emissions on the latest available data. However, it might require a large number of Commission Decisions changing previous Decisions and compliance findings, either potentially applying corrective action ex post or revoking corrective action applied earlier. There might be a corresponding need to allow Member States to adjust their use of flexibilities for the years in question. Given that Member States have a wide range of flexibilities available under the ESD, it should be difficult to claim that updating of emission data is essential for them to ensure compliance. At the same time, it would raise problems if later methodological improvements led to non-compliance that could not be avoided by the Member State in the first place (because it could not have double-guessed how methodologies would develop).

Advantages and disadvantaged of this option are:

- Final numbers of total emissions would continue to change even after review and compliance assessment.
- All previous decisions taken by the Commission on the compliance status would need to be revised if recalculations occurred.
- Final numbers would be consistent with the recalculated inventories, no inconsistent time series would occur.
- Recalculations due to recommendations from the review process could be implemented in the years subsequent to a particular review as in the current system.

- The consequences for exceeding the annual emission allocation specified in Article 7 of Decision No 406/2009/EC require an unambiguous determination of excess emissions which would not be fulfilled by this option.

10.3.3 Option 3 – Annual recalculations with effects added/ subtracted from most recent submitted inventory

In this option recalculations of previous years of the period 2013 to 2020 would be taken into account without a modification of previous compliance decisions. The quantitative effects of recalculations for the years X-3 and before that have not been taken into account in previous reviews and compliance decisions would be added or subtracted cumulatively to the actual inventory under review for the year X-2. The changes due to recalculations would therefore only impact the subsequent compliance assessment for the inventory that contains the recalculations. In practice a recalculation in the inventory submission for the year 2020 that affects the entire time series would then be added or subtracted cumulatively for the years 2013 to 2019 to the emissions for 2020. The review of the 2020 submission would also review the recalculations performed.

In a sub-option, all the previous decisions would not be modified in case of recalculations but the adjustments will be propagated just as if banking or borrowing would have been used (without regard of the borrowing limit and possibly with an adjustment in case of the use of a corrective factor). The recalculations would then only impact the next compliance assessment as if borrowing or banking would have been used.

Advantages and disadvantaged of this option are:

- All recalculations are taken into account in the EU system. In particular recalculations due to updated activity data – an important reason for recalculations - would be acknowledged in subsequent years and the emissions would be consistent with final activity data (e.g. relevant for some Member States in the energy sector);
- Previous compliance decisions would not be revised;
- Final numbers of total emissions at EU level would always be inconsistent with final inventory figures under the UN because no such cumulative addition/ subtraction of recalculations occur under the UN.
- Improvements in methodologies that lead to larger recalculations of the entire time series could have strong impacts at the end of the period 2013 to 2020. If a recalculations would have an total impact of only 1% increase or decrease in GHG emissions, this would already result in an addition / subtraction of 7% to the emissions in the final year which can influence compliance at the end of the period to an substantial amount.
- Recalculations due to recommendations from the review process could be implemented in the years subsequent to a particular review as in the current system.

- The consequences for exceeding the annual emission allocation specified in Article 7 of Decision No 406/2009/EC require an unambiguous determination of excess emissions which would be fulfilled by this option.

10.3.4 Option 4 - Recalculation at certain intervals/at the end of the 2013-2020 period

It might be possible to determine one moment in time (or a few) when a recalculations would occur. For example, given that the ESD determines annual emission allocations for 2013-2020, it might be feasible to take the latest emission figures into account when assessing the last year of the period. In this case, net emissions of past years would be recalculated on the basis of recalculated data for 2013-2019 submitted together with the data for 2020 (in April 2022). Any changes arising from such recalculations would obviously in principle be known earlier to Member States given their previous calculations and recalculations so that they may prepare for the results of such a recalculation prior to the official result. Changes for previous years would be taken into account in the balance for the final year. Thus, surpluses or deficits of previous years due to recalculations will be added or subtracted to the emissions of the year 2020 and balanced at the end of the commitment period.

- The option achieves an unambiguous determination of excess emissions which is required under Article 7 of Decision No 406/2009/EC to determine consequences.
- This option allows using recalculated time series of emissions and updated data for the final assessment.
- Final EU total emissions for the period 2013-2020 would at the end be consistent with emissions data at international level.
- It would be less likely that recalculations would trigger legal disputes because Member States have a chance to use the most accurate data at the end of the period for compliance purposes.
- Recalculations due to recommendations from the review can be taken into account in the final year.

Such an arrangement for recalculations would, however, raise further questions, including:

- Would any deductions under Article 7.1's abatement factor of 1.08 be subsequently adapted in line with a recalculation?
- Would any further recalculations be allowed after 2020 and how might, in this context, any transition to a post-2020 system be conceived (in other words, should the system be designed considering the possibility that it would not be continued after 2020, or would it be reasonable to assume that its design will basically remain in place so that some continuity beyond 2020 can be assumed to exist?)?
- This system effectively transforms the annual trajectory more into a compliance period and it is doubtful whether this would be in line with Decision No 406/2009/EC.

It may be worth noting that the compatibility of any of these options (or some variation of it) with a future international system is currently not known. The Kyoto Protocol is based on commitment periods rather than emission allocations for individual years and allows recalculations of data for preceding years of the commitment period until submission of data for the last year of the commitment period. While this might be considered close to Option 3, it is uncertain at the time of writing (1) whether the Kyoto system would remain unchanged and (2) what length and design any future commitment period(s) under the Protocol would have (in case of agreement on a continuation of the Protocol).

10.3.5 Conclusions and recommendations

Whereas option 1 – not to take into account recalculations – is the simplest one, it may be not acceptable to Member States because they would not be able to use the most accurate emission data for compliance data. Option 2 is the most complicated option that generates significant legal uncertainty and is therefore not recommended. Option 3 and option 4 both offer compromise solutions between the requirement to produce final data at the end of each year and the possibility to use the most accurate data and one of these compromise solutions is therefore recommended.

10.4 Tracking and assessment of the use of flexibilities under the Effort Sharing Decision

Decision No 406/209/EC establishes an annual emission limit that should not be exceeded by Member States, but allows for a number of flexibilities applicable to the annual emission limit such as

- banking of unused annual emission allocation (Article 3, paragraph 3 ESD);
- borrowing from following years (Article 3, paragraph 3 ESD);
- transfers of annual emission allocations between Member States (Article 3, paragraphs 4 and 5 of the Effort Sharing Decision) and
- the use of certified emission reductions (CERs), Emission Reduction Units (ERUs) and potential credits from Community-level projects and/or credits resulting from projects or other emission reducing activities in accordance with agreements with third countries within specified limitations and conditions (Article 5 ESD).

These flexibilities have to be implemented in the Member States registries. This chapter describes which functions the registries can perform in the tracking and checking the use of flexibilities in the annual compliance cycle.

10.4.1 Registries

Article 11 of Decision No 406/2009/EC states that “the Community and its Member States registries established pursuant to Article 6 of Decision No 220/2004/EC shall ensure the accurate accounting of transactions under this Decision” and also recital 27

ESD confirms that "the registries established under Decision No 280/2004/EC and the Central Administrator designated under Directive 2003/87/EC should be used to ensure an accurate processing and accounting of all transactions for the implementation of Decision No 406/2009/EC."[40] These are the registries that are currently used as the Kyoto Protocol registries.

However, the continuation of the Kyoto Protocol after 2012 and whether there will be an international accounting system similar to the one under the Kyoto Protocol after 2012 is very uncertain at the moment. Without an international accounting system, the Kyoto registry in each Member State will be no longer necessary. In this situation, it would be rather expensive to keep the Kyoto registries in each Member State only for the purposes of the ESD instead of using the Union registry under the ETS Directive for the purposes of tracking transactions under the ESD.

Consequently, there are two options concerning the question which registries to use:

- The Community and its Member States Kyoto Registries;
- The Union registry.

Both options, Member States' registries as under the Kyoto Protocol or an integration into the Union registry should be taken into consideration depending on the outcome of the negotiations under UNFCCC on the future of an international accounting system of emission reductions. Using the Union registry would have the advantage that transfers of Kyoto credits between Member States for the purpose of complying with the requirements of the ESD would not have to pass through the UN International Transaction Log (ITL) but will only be checked by the EU Transaction Log (EUTL). However, it has to be investigated further whether the fact that Member States would hold all Kyoto units that they use for their compliance under the Effort Sharing Decision in the Union registry and not in their national Kyoto registries could lead to a breach of their Commitment Period Reserve (CPR)[41] in case the CPR rules will be still applicable from 2013 onwards.

10.4.2 Links between annual emission allocation and AAUs

Due to the uncertain international situation this report does not elaborate in detail on the links between the annual emission allocation under the ESD and assigned amount

[40] OJ L 140, 5.6.2009, Recital 27, p.139

[41] Under the rules of the Kyoto Protocol each Annex I Party has to maintain in its national Kyoto registry a commitment period reserve which should not drop below 90% of the Party's assigned amount or 100% of five times its most recently reviewed inventory, whichever is lowest. The CPR consists of holdings of ERUs, CERs, AAUs and /or RMUs for the relevant commitment period which have not been cancelled.

units (AAUs) under the Kyoto Protocol in a post-2012 period. The uncertain situation in the international negotiations is related to

- the question whether there will be an accounting system based on units at the international level;
- the length of the commitment period and
- the base year;
- the treatment of recalculations of GHG inventories or
- the time of issuance of AAUs.

If a second commitment period with a similar accounting system was implemented, AEA under the ESD and EUAs under the ETS could be linked with international AAUs based on a depositing mechanism. This means that AAUs to back up AEA and EUAs would be transferred to specific AAU deposit accounts.

However, differences such as diverging commitment period length could make such a linkage more difficult because international AAUs would no longer match the total of AEA and EUAs for a particular commitment period year. Whether a linkage of units between both systems should be pursued will depend on the magnitude of the potential differences between the EU system and the international system.

The following sections will focus on an independent, self-standing EU system that can be linked to an international accounting system.

10.4.3 Annual Emission Allocation (AEA)

Article 2, paragraph 2 of Decision No 406/2009/EC defines the ‘Annual emission allocation’ (AEA) as the annual maximum allowed greenhouse gas emissions in the years 2013 to 2020 as specified in Article 3(2), which is abbreviated as AEA in the following sections.

Article 3 (2), paragraph 4, of the Effort Sharing Decision specifies that the annual emission allocation for the period from 2013 to 2020 has to be determined within six months of the date when the relevant reviewed and verified emission data are available.

The AEA will be different in nature than existing EU allowances (EUAs) in the EU Emissions Trading System or AAUs in the Kyoto system. The AEA can be quantities comparable to money in a bank account. The total quantity held or quantities transferred can be identified, but an AEA does not need a unique identification and thus the system would not track each individual unit. In contrast, EUAs and Kyoto units are currently uniquely identifiable units with an ID for each unit block. Since quantities of AEA will only be traded by Member States of the European Union and not traded via the UN International Transaction Log (ITL), it is not necessary for them to be uniquely identifiable. By treating them as quantities the system can be simplified and software development costs reduced.

10.4.4 Limits

Article 3 and 5 of Decision No 406/209/EC specify a series of flexibilities that Member States can use to fulfil their commitments. These flexibilities are subject to a number of rules that have to be checked by the registry when transfers occur:

- Annual credit limit:

  According to Article 5 (4) of the Effort Sharing Decision the annual use of credits by each Member State is limited to 3% of the greenhouse gas emissions of that Member State in 2005 plus any quantity transferred from another Member State according to Article 5 (6). According to Article 5 (5) this percentage is increased by 1% for certain Member States.

- Ex-ante transfer limit:

  According to Article 3 (4) of the Effort Sharing Decision a Member State may transfer up to 5% of its annual emission allocation (AEA) for a given year to another Member State provided that it is currently in compliance or before the determination of compliance for the first year 2013 has taken place. Since the transfer of AEAs for a given year can take place before the compliance for that year has been calculated the limit is called ex-ante transfer limit in this paper.

- Carry forward limit:

  Article 3 (3) of the Effort Sharing Decision specifies that a Member State can carry forward (borrow) from the following year up to 5% of the annual emission allocation from the year to carry forward from.

10.4.5 Accounts

Registries contain different account types and through transactions AEAs may be transferred from one account to another account. The account system is necessary for the accounting of AEAs against the specified target. Therefore, the accounts necessary under the Effort Sharing Decision have to be specified.

The following account types are suggested:

- AEA holding and surrender/ retirement account[42]

[42] Common terms for surrender/ retirement have to be defined for the purposes of the Effort Sharing Decision. Currently the most recent registry regulation defines “surrender” as the accounting of an allowance or a Kyoto unit by an operator or aircraft operator against the verified emissions of her installation or aircraft and “retirement” as the accounting of a Kyoto unit by a Party to the Kyoto Protocol against the reported emissions of that Party. Both definitions could be expanded to cover the accounting of emission allocation against the reported and reviewed emissions of a Member State under Decision No 406/2009/EC. A third term (e.g. use, commit, deposit) could be created for the same process. In the absence of a new definition, this report uses “surrender/ retirement” because these terms express the type of process discussed.

An AEA holding and surrender/ retirement account will be established for each year of the period 2013-2020 for each Member State. This account shall hold the quantity of AEA issued for a particular year of the period 2013-2020. Any AEAs held on the holding and surrender/ retirement account at the time of the compliance calculation for the respective year are automatically considered as surrendered/ retired. Thus there is no need for separate AEA holding and surrender/ retirement accounts. The transfer of quantities of AEA from this account to other Parties' accounts and any purchases of AEA to this account are checked by the EUTL for the ex-ante transfer limit. The transaction will be blocked if it exceeds the ex-ante transfer limit.

After compliance for a particular year of the period 2013-2020 has been assessed, remaining quantities of AEA in the holding and surrender/ retirement account may be banked to the account for the following year and the account for the previous year may be closed. However, a Member State may wish not to carry over its overachievement (for example, a very climate-friendly government could want to prevent the future governments from using the AEA surplus to reduce their level of ambition). It should then be possible for a Member State to take a specific action to prevent this automatic banking.

- ESD credit surrender/ retirement account

An ESD credit surrender/ retirement account is established for each year of the period 2013-2020. For each year of the period 2013-2020, Member States transfer credits allowed under the Effort Sharing Decision to the credit surrender/ retirement account until a specified date (until the end of the balance period suggested in sections 10.6.2 and 10.1). The total number of credits on the ESD credit surrender/ retirement account and of AEA on the AEA holding and surrender/ retirement account shall be accounted against reviewed annual non-ETS GHG emissions for the year concerned on a specific date.

Transfers to the credit surrender/ retirement account have to comply with the annual credit limit and will be blocked if they exceed the annual credit limit. During the transfer of credits to the credit surrender / retirement account additional information is stored in relation to Article 8(1)(b) of Decision No 406/2009/EC (see section 10.4.7).

Depending on the technical nature of AEAs that will be decided upon in the implementation phase later on the AEA holding and surrender/ retirement account and the ESD credit surrender/ retirement account could probably be merged into one account.

- ESD AAU deposit account (only in case of international post 2012 climate regime that matches ESD requirements)

The ESD AAU deposit account is an option to link AAU under a potential international regime with annual emissions allocations under the ESD. Member States would access their Kyoto registries and transfer AAUs from their Party holding accounts to the ESD AAU deposit account.

10.4.6 Presentation of information on AEA and flexibilities in the registries

There are also several options for the presentation of the information on the AEA and the use of flexibilities under the Effort Sharing Decision. The different options are partly related to the question how strongly the registries system for AEA and credits under the Effort Sharing Decision will be linked with an international accounting system for emissions reductions.

Option 1 - Allocation table

An overview allocation table hides the complexity involved in having specific accounts for each year in the period 2013 – 2020 and presents all information from the different accounts plus the limits to the users. Every Member State will be able to access its allocation table in its registry. The allocation table will show the number of AEAs allocated to a Member State on the AEA holding and surrender/ retirement account for each year of the compliance cycle.

The figures for the flexibility limits have to be uploaded into the allocation table (annual credit limit, ex-ante transfer limit, carry forward limit). In analogy to the current process for uploading the National Allocation Plan, each Member State shall send an xml file with these figures to the European Commission. The data is then uploaded in the EUTL and the Member State registry. Changes to the limits, e.g. the granting of an increased carry forward rate in excess of 5% in 2013 and 2014 in the event of extreme meteorological conditions according to Article 3 (3), paragraph 2, of Decision No 406/209/EC can be updated in the allocation table by sending an updated xml to the Commission.

The figures for the initial AEAs will be entered in the allocation table automatically once the AEAs are created on the AEA holding and surrender/ retirement accounts. If there is an adjustment of the AEA according to Article 10 of Decision No 406/209/EC changes in the scope of Directive 2003/87/EC and the application of Article 24a thereof the correction of AEA on the AEA holding and surrender/ retirement account will automatically lead to an update of the initial AEA value in the allocation Table.

The total annual greenhouse gas emissions and EU ETS emissions have to be entered into the table by the Member States. All other values in the table can then be calculated automatically.

Table 25 presents a draft of how the allocation table in the registry could look like. The figures used in the allocation Table are fictitious. The different limits should not only be expressed as percentages but also in absolute figures so that Member States can see more easily how many AEAs or credits they may transfer, carry over or carry forward. The inventory data and the compliance calculation are also included in this table. Optionally, there could be a separate table for the compliance calculation.

Table 25 Allocation table

Allocation Table for MS X								
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**

Initial AEA	60,0	58,6	57,1	55,7	54,3	52,9	51,4	50,0
Limits (in %)								
Annual credit limit (in % of VE 2005)	3%	3%	3%	3%	3%	3%	3%	3%
Ex-ante transfer limit (in % of AEA)	5%	5%	5%	5%	5%	5%	5%	5%
Carry forward limit (in % of AEA of the year to carry forward from)	5%	5%	5%	5%	5%	5%	5%	5%
Limits (absolute figures)								
Annual credit limit	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8
Ex-ante transfer limit	3,0	2,9	2,9	2,8	2,7	2,6	2,6	2,5
Carry forward limit	2,9	2,9	2,8	2,7	2,6	2,6	2,5	0,0
Unused limits (absolute figures)								
Unused annual credit limit	1,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8
Unused ex-ante transfer limit	3	2,9	2,9	2,8	2,7	2,6	2,6	2,5
Unused carry forward limit	2,9	2,9	2,8	2,7	2,6	2,6	2,5	0,0
Account holdings								
AEA holding and retirement account	65	58,6	57,1	55,7	54,3	52,9	51,4	50,0
Transferred AEAs								
AEA surplus for banking								
ESD credit retirement account	1							
Transferred ESD credits								
Surplus ESD credits for banking								
Total of AEA and credits on AEA holding and surrender/ retirement account and ESD credit surrender/ retirement account	66							
Greenhouse gas emissions								
Total annual greenhouse gas emissions	95							
EU ETS emissions	29							
ESD emissions	66							
Compliance calculation								
Annual balance (ESD emissions – total of AEA and credits on AEA holding and surrender/ retirement account and ESD credit surrender/ retirement account)	0							
Compliance code	A							

Option 2: Account table for each year

A second option for the implementation would be not to use one allocation table, but would present different tables for the different accounts. Each Member State would have account tables for the AEA holding and surrender/ retirement account and the ESD credit surrender/ retirement account for the different years of the period 2013 to 2020. The limits and the use of limits would be displayed in the respective account tables (AEA transfer limit and carry forward limit in AEA holding and surrender/ retirement account table, annual credit limit in ESD credit surrender/ retirement account).

10.4.7 Description of processes

In the registry Member States have to or may carry out a number of processes to fulfil the requirements of the Effort Sharing Decision and make use of the flexibilities.

It is recommended that in case a Member State initiates a process unintentionally or erroneously the Implementing Provisions should contain rules how and under which conditions such a process can be reversed in the registry. A similar provision is currently in place for the EU Emissions Trading System (Article 34a of the Registry Regulation 2007/916/EC).

The following processes have to be implemented in the registries:

10.4.7.1 Issuance of AEA

Description:

After the determination of the annual emissions allocation for the period 2013 to 2020 pursuant to Article 3(2) of Decision No 406/2009/EC, the AEA for each year has to be issued in the AEA holding and surrender/ retirement accounts for each year of the period 2013 – 2020. Through the issuance process the AEA can be created directly by the central administrator or the national administrator on the AEA holding and surrender/ retirement accounts for each year.

Rules and checks:

- The issued AEA should be that approved by the European Commission.

10.4.7.2 Establishment of limits

The annual limits for 2013 to 2020 have to be entered in the registry.

Option 1

In analogy to the current process for uploading the National Allocation Plan table, each Member State sends an xml file with the limits for each year to the European Commission. The data is then uploaded in the Member State registry by the central registry administrator.

Option 2

After the determination of annual emission allocation for the period 2013 to 2020, the central registry administrator enters the limits (annual credit limit, ex-ante transfer limit, carry forward limit) into the registry. The limits are displayed in the allocation table or individual account tables.

Both options:

Static versus dynamic limits

The ex-ante transfer limit is a static value to be uploaded in the registry accounts. The annual credit limit and the carry forward limit are dynamic due to the possibility to transfer quantities between Member States and options for an increase under certain conditions. Therefore, these limits should be managed by the central registry administrator of the European Commission. If the transfers of credit rights are recorded in the registries, the central registry administrator would not need to do anything for the annual credit limit.

10.4.7.3 Adjustment of AEA

According to Article 10 of Decision No 406/209/EC changes in the scope of Directive 2003/87/EC and the application of Article 24a thereof will lead to adjustments of the annual emission allocation. Depending on the general timeline for the determination of the AEA, such adjustments could take place before the issuance of AEA or after the issuance of the AEA. In the first case, the adjustments can directly be taken into account in the issued AEA. In the second case, the AEA on the AEA holding and surrender/ retirement accounts has to be adjusted. Therefore, a process to create additional AEA or delete already issued AEA has to be established.

10.4.7.4 Surrender/ retirement of annual emission allocation

No process to surrender/ retire AEA is needed (except if Member States could cancel their overachievement if they want to) because AEA are issued directly to the AEA holding and surrender/ retirement account. So any AEA on this account will be considered as surrendered/ retired at the time of the compliance calculation for a given year.

10.4.7.5 Surrender/ retirement of credits

Description:

For each year of the period 2013 to 2020, each Member State may surrender/ retire credits to be accounted against its annual emissions under the Effort Sharing Decision within the limits provided in the Effort Sharing Decision. This is done by transferring credits to the ESD credit surrender/ retirement account. This process is comparable to the surrender process in the EU Emissions Trading Scheme or the retirement process under the Kyoto Protocol.

Article 5 ESD also stipulates which types of credits are eligible for use under the Effort Sharing Decision. Paragraph 1 (a) and (b) ESD stipulate that only CERs and ERUs may be used under the Effort Sharing Decision which were eligible for use in the

Community scheme during the period 2008 to 2012. The nature of the credits according to Article 5 (2) and (7) ESD (from agreements with third countries and Community-level projects) is currently unknown. This is why the suggestions in this report on credits relate to the credits listed in Article 5 (1) ESD only, but additional credit types may be defined in the future and could then be treated in the same way.

In order for the registry to know which are the eligible CERs and ERUs a list of eligible projects would have to be drawn up and used by the EUTL to check against. The information of the project ID that a CER or ERU is generated from projects is attached to every unit in the registry. It is suggested to set up a white list of eligible projects, meaning a list that includes all projects that were eligible in 2008 to 2012. The alternative would be the compilation of a black list, which includes all the projects that were not eligible. A white list is preferable because it does not entail the risk that credits from non eligible project are surrendered/ retired because they have not been added to the black list based on the fact that updating the black list will always happen with a certain time lag.

Rules and checks:

- The number of credits retired /surrendered for a single year of the period must not exceed 3% of that Member State's greenhouse gas emissions in 2005 plus any quantity transferred from another Member State.
- If the credit limit has been increased to 4% for a Member State that has fulfilled the criteria of Article 5 (5) ESD the total number of credits retired/surrendered for a single year of the period must not exceed 4% of that Member State's greenhouse gas emissions in 2005 plus any quantity transferred from another Member State.
- 1% of the credits that are retired /surrendered in case of a 4% credit limit must come from Least Developed Countries (LDCs) and Small Island Developing States (SIDS).
- Only credits whose IDs are on the white list can be transferred to the ESD credit surrender/ retirement account.

10.4.7.6 Entry of verified GHG emissions

Description:

After the final reviewed GHG emissions are available for a given year of the period 2013 to 2020, either the Member State or the Commission enters the Member States' reviewed total GHG emissions for the reviewed year into the registry. The total non-ETS emissions under the Effort Sharing Decision are then computed by subtracting total verified emissions under the ETS for the given year.

Alternatively, the Member State or the Commission could calculate the ESD emissions first outside the registry and then directly enter the ESD emissions into the registry.

Rules and Checks:

- The value to be entered must be 0 or a positive figure.

- The value entered should correspond to the ESD emissions that are recorded for each Member State in the EUTL.

Depending on the way recalculations are handled, it may be necessary to add a process "Update of verified GHG emissions" and also "Update of the AEA" and "Update of the credit rights".

10.4.7.7 Compliance calculation

The compliance calculation determines whether a Member State is in compliance with its obligations according to Article 3 of the Effort Sharing Decision.

For the compliance calculation the annual greenhouse gas emissions under the Effort Sharing Decision are calculated by subtracting the verified ETS emissions of a Member State from its total reviewed annual greenhouse gas emissions. In the suggestions in section 10.1 related to compliance assessment and corrective action, this value is calculated after the final reviewed GHG are available.

After a balance period, in which Member States have the opportunity to perform additional transactions, compliance for a given year is assessed by comparing the sum of the total quantity of AEA in the AEA holding and surrender/ retirement account and of credits in the ESD credit surrender/ retirement account for the same year with the non-ETS emissions for the given year.

Four compliance statuses are suggested:

A: compliance: The sum of AEA and credits was equal or higher than the annual non-ETS greenhouse gas emissions.

B: non-compliance: The sum of AEA and credits was lower than the annual non-ETS greenhouse gas emissions.

C: No reviewed ESD emissions available.

D: non-compliance: The sum of AEA and credits was equal or higher than the annual non-ETS greenhouse gas emissions but the Member State is not in compliance with other requirements of the Decision.

The registry automatically calculates the status A, B and C. The status D cannot be calculated automatically but has to be set by the central administrator. This status is used in cases in which a Member State is in compliance with Article 3(2) ESD but not in compliance with other requirements of the Effort Sharing Decision, e.g. the reporting requirements. The legal basis for this are Article 3 (4) and 3 (5) ESD which stipulate that a Member State cannot transfer any part of its annual emission allocation if at the time of transfer, that Member State is not in compliance with the requirements of the Effort Sharing Decision.

10.4.7.8 Carry forward of AEA (Borrowing)

Description:

Member States can transfer 5% of the AEA issued for the following year to a given year. The language of Article 3 (3) ESD

"During the period from 2013 to 2019, a Member State may carry forward from the following year a quantity of up to 5 % of its annual emission allocation."

suggests that the carry forward can only be performed for the given year from the following year. Thus at the beginning of the period, Member States can only carry forward AEA issued for 2014. This is in line with Article 7, paragraph 1 (c) ESD related to the temporary suspension of the eligibility to transfer parts of the Member States' emission allocation. If Member States could carry forward for all years at the beginning of the period 2013 to 2020, this would undermine the eligibility provisions.

Option 1:

The Member State has to initiate the carry forward process in the registry. It has to type in the number of AEA to be carried forward. The registry does not allow a number to be entered that would exceed the carry forward limit.

Option 2:

If the total number of AEA on the AEA holding and surrender/ retirement account and credits on the ESD credit retirement/ surrender account is lower than the ESD emissions at the time of compliance calculation, the registry automatically carries forward the missing number of AEA from the following year up to a maximum of the carry forward limit.

Rules and checks:

- Default carry forward limit in the registry 5% of the AEA from the following year.
- Percentage might be increased for 2013 and 2014 according to Article 3 (3) paragraph 2 ESD. In this case the new percentage has to be uploaded in the registry so that the registry can check for the new percentage.
- The years to carry forward from are 2014 to 2020 and only from the following year to the given year.

Option 1:

- The carry forward process can take place any time before the compliance assessment for the given year.
- The carry forward process can take place repeated times in a given year until the quantity of AEA carried forward has reached the carry forward limit.

Option 2:

- The carry forward process takes place automatically if needed at the time of compliance calculation.

10.4.7.9 Carry over of AEA (Banking)

Description:

The Member States may carry over the quantity of its AEA of a given year that exceeds its greenhouse gas emissions in that year to subsequent years taking into account the use of flexibilities. It is not clear from Article 3 (3), paragraph 1 of Decision No 406/209/EC whether this carry over can take place to any subsequent year. Since there is no limit on carrying over remaining AEA it is suggested that the carry over takes place to the subsequent year only. If the quantity of AEA carried over is not used in the subsequent year, the Member State may again carry over AEA to the following year and so on. AEA that are acquired from other registries under Article 3 (4) ESD that are not needed for compliance in a given year may also be carried over to the following year and so on.

There are several options how to implement the carry over process:

Option 1:

There is no automatic carry over but Member States have to initiate the carry over process themselves if they wish so. The disadvantage of this option is that it means additional workload on the Member States and a potential source of mistakes. Under this option the AEA holding and surrender/ retirement account would not be closed after compliance for the respective year has been calculated.

Option 2:

The carry over process is an automated process taking place after the compliance for a given year has been calculated and before the AEA holding and surrender/ retirement account for a given year is closed. However, Member States should have the possibility to override the automated carry over and decide not to carry over their overachievement. A Member State might decide to do so due to strategic reasons. The AEA holding and surrender/ retirement account for the respective year could then either be closed meaning that the overcompliance is lost or cancelled for the Member State. Alternatively, the account could stay open to allow a carry over (or transfer to another Member State) at a later point in time.

Rules and checks:

- The compliance status for the year to carry over from has been calculated.
- The Member State is in compliance (status A).
- Surrendered/ retired AEA plus surrendered/ retired credits - ESD emissions = AEAs to be carried over

10.4.7.10 Ex-ante Transfer of AEAs

Description:

Article 3 (4) ESD allows Member State to transfer up to 5% of its annual emission allocation for a given year to another Member State provided that its current compliance status is in compliance or no compliance has been calculated so far (e.g. in 2013).

Since the transfer of AEAs for a given year can take place before the compliance for that year has been calculated this limit is called ex-ante transfer limit.

The transfer of 5% AEAs for all the years of the period 2013 to 2020 may take place any time. The disadvantage of being able to transfer any time is that a Member State could transfer the 5% of its annual emission allocation for every single year of the 2013 to 2020 period already in 2013 or 2014 when no compliance status has been calculated so far. In this case the provision in Article 3 (4) of the Effort Sharing Decision that a Member State cannot transfer any part of its annual emission allocation if, at the time of transfer, that Member State is not in compliance with the requirements of the Decision is no limitation if the sale takes place before the compliance status for the first year has been calculated.

Rules and checks:

- A number of AEAs is transferred that is equal or smaller than 5% of its annual emission allocation.
- No compliance status has been calculated so far or the latest compliance status of the Member State is A (in compliance).
- The AEAs are transferred from the AEA holding and surrender/ retirement account of a given year to the AEA holding and surrender/ retirement account of another Member State for the same year (the receiving Member State may only use this quantity for the given year or any subsequent years).

10.4.7.11 Ex-post transfer of AEAs

Description:

Article 3 (5) ESD allows transfers of the part of a Member State's annual emission allocation that exceeds its GHG emissions for a given year to other Member States provided that the transferring Member State is in compliance and taking into account the use of flexibilities pursuant to paragraphs 3 and 4.

Depending on whether the carry-over of excess AEA takes place automatically or not there are two options for this process:

Option 1:

There is no automatic carry over. Excess AEA can therefore stay on the AEA holding and surrender/ retirement account for a given year and can be transferred after the compliance for the year has been calculated. Member States transfer the excess AEA from their AEA holding and surrender/ retirement account of a given year to the AEA holding and surrender/ retirement account of another Member State for any subsequent year (since compliance has already been calculated for the given year it does not make sense to transfer it to the same year's account).

Option 2:

There is an automatic carry over process which will take place after the Commission has issued the compliance decision for a year. Ex post transfers are thus only possible during the balance period before the automatic carry-over to the subsequent year takes place.

Option 3:

Ex post transfers are only possible during the balance period.

Rules and checks:

- AEA to be transferred = Total of AEA on AEA holding and surrender/ retirement account for year x plus credits on the ESD credit surrender/ retirement account for year x – ESD emissions in year x.

- The latest compliance status of the Member State has to be A (in compliance).

10.4.7.12 Carry over of unused credits rights

Description:

Article 5 (6) of the Effort Sharing Decision stipulates that a Member State may carry over the unused credit rights[43] from a given year to subsequent years.It is suggested that the carry over of credit rights takes place to the subsequent year only. If the amount of credits carried over is not used in the subsequent year, the Member State may again carry them over to the following year.

A Member State may only carry over the unused part of its right to use credits where a Member State's annual use of credits does not reach 3% of the greenhouse gas emissions of that Member State in 2005. The additional right to use a credit limit of 1% cannot be carried over because Article 5 (6) of Decision No 406/2009/EC does not refer to it.

Unlike the carry over of AEA there is no reference to compliance in Article 5 (6) ESD. Member States may therefore theoretically carry over the unused part of its entitlement to use credits to the following year even if they are not in compliance in the given year.

Since credits unlike AEA are not held on an annual holding and surrender/retirement account but either on a credit holding account for the whole period or even on accounts outside the ESD system the implementation of the carry over process of credit rights is different from that for AEA. What is carried over is the right to use credits and not the credits themselves. If a Member State, for example, has 3% credit limit, but only uses 2% in a given year the difference of 1% should be added to its credit limit for the following year. The new credit limit should be displayed in the allocation table or individual

[43] Article 7(1)(c) of the ESD addressed JI/CDM rights and therefore this term is used in the report. Article 11a of Directive 2003/87/EC uses "entitlement".

account tables and the EUTL should check against it when credits are transferred to the ESD credit surrender/ retirement account.

There are several options to implement the carry over process of credit rights.

Option 1:

Member States have to initiate the carry over of unused credit entitlements themselves in the registry.

Option 2:

The carry over of unused credit rights is be implemented as an automatic process. The registry would automatically carry over the unused part of its entitlement to use credits except for the additional 1 % under Article 5 (5) ESD to the following year after the compliance status has been calculated. In addition, Member States should have the possibility to override the automatic carry over of unused credit rights it they wish to do so for strategic reasons.

Rules and checks:

- The additional credit limit of 1% cannot be carried over.
- The credit rights to be carried over in year x is thus a maximum of 3% of a Member States's greenhouse gas emissions in 2005 plus any credit rights purchased from other Member States for the year x minus the credit rights used for compliance in year x.
- In the year x+1 the maximum number of credit rights to be carried over equals the number of credit rights carried over from the previous year x plus a maximum of 3% of a Member States' greenhouse gas emissions in 2005 plus any quantity purchased from other Member Sates minus the credit rights used for compliance in year x+1. This rule also applies to the following years.

10.4.7.13 Transfer of right to use credits

Description:

According to Article 5 (6) of the Effort Sharing Decision a Member State may transfer to another Member State the unused right to use credits. In addition, Article 7 (1)(c) states that a Member State that is not in compliance with the Effort Sharing Decision is not eligible to transfer part of its credit use right to another Member State.

The Member State enters the amount of credits use rights to be transferred, the year from which the rights are transferred from and the receiving Member State in the registry. The registry shall display the maximum amount of credit rights that can be transferred. The number of credit rights will then be added to the credit rights of the receiving Member State for a given year. The EUTL will check against the new limit when the receiving Member State surrenders/ retires credits.

The difference to the transfer of AEA is that AEA are transferred themselves whereas in the case of the transfer of credit rights the credits are not actually transferred (they might be held outside the ESD registry system) **but the right to use these credits is transferred**.

Rules and checks:

- The amount of rights to use credits to be transferred is below the unused part of the annual transfer limit of 3% of a Member State's greenhouse gas emission in 2005.
- The additional 1% right to use credits cannot be transferred.
- An unlimited number of transfers may take place until the cumulative transfer limit is reached.
- No compliance status has been calculated so far or the latest compliance status of the Member State is A (in compliance).

10.4.7.14 Corrective action

Article 7, paragraph 1 (a) of the Effort Sharing Decision stipulates that if the greenhouse gas emissions of a Member State exceed the annual emission allocation for a given year a deduction from the Member State's emission allocation of the following year equal to those excess emissions, multiplied by an abatement factor of 1,08 shall apply.

This process of corrective action will be implemented automatically in the registry. After the compliance calculation a quantity of AEA equal to the excess emissions will be cancelled automatically on the AEA holding and surrender/ retirement account for the following year.

The registry sends out automatic warnings during the balance period that corrective action and blocking of transfers of AEA and credits might occur in case of non-compliance because currently there is an insufficient number of AEA and credits on the AEA holding and surrender/ retirement account and the ESD credit retirement/ surrender account.

10.4.7.15 Blocking of eligibility to transfer AEA and credits

Article 7, paragraph 1 (c) of the Effort Sharing Decision stipulates that if the greenhouse gas emissions of a Member State exceed the annual emission allocation for a given year the eligibility of a Member State to transfer AEA and credit rights shall be temporarily suspended.

When a Member State is non-compliant the registry should automatically block the transfer of AEA and credits. The block will be lifted if the Member State is back in compliance in the following year.

The registry sends out an automatic notification to the concerned Member State that it is non-compliant for a specific year, corrective action has been carried out and transfers of AEA and credits are blocked until the Member State is back in compliance.

10.4.7.16 Replacement of tCERs and lCERs

Description:

Article 5 (d) of the Effort Sharing Decision stipulates under which conditions Member States may use tCERs and lCERs for their compliance. Member States must replace tCERs and lCERs that they have used for the period 2008 to 2012 and 2013 to 2020 before their expiry by valid Kyoto units.

Under the current rules of the Kyoto Protocol the International Transaction Log (ITL) sends out automatic notifications to inform registries about the need to replace tCERs and lCERs. If these units have already been retired (units located on Member States retirement accounts) Member States would directly receive these notifications from the ITL and be able to fulfil them. If the tCERs and lCERs were still on an ESD deposit account the ITL notification would either go to the Union Registry in case of a single ESD deposit account or directly to Member States in the case of national ESD deposit accounts.

In case there will be no international climate change regime the European Commission could not rely on the ITL notifications any more and would have to set up its own monitoring regime regarding the replacement of tCERs and lCERs.

10.4.8 Reports to be created by the registry

According to Article 6 of the Effort Sharing Decision Member States have to submit information on the use of credits. Most part of this information could be generated by the registries automatically thus lowering the administrative burden on the Member States.

Paragraph 1 (b) of Article 6 ESD required Member States to report "*the use, geographical distribution and types of, as well as the qualitative criteria applied to, credits used in accordance with Article 5*".

A report of the use, geographical distribution and types of credits used in accordance with Article 5 ESD can be compiled automatically by the registry. However, the qualitative criteria applied to credits can not be checked by the registry. This provision will require separate reporting obligations.

In the registry, a CER, tCER or lCER has a specific unit ID that indicates the country of origin, the type of unit and the commitment period. Here is an example of a unit block of 300 CERs from Honduras with validity in the first commitment period:

HN-5-0-55000-58000-1-1

Based on the transfers of credits that a Member State undertakes (either to the ESD deposit account or to the ESD credit surrender/retirement account) the registry could

then compile statistics for each Member State which shows the use, types and geographical distribution of credits. Whether this would be also possible for the types of credits mentioned in Article 5 (2) and (6) ESD is unclear because the nature of these credit types is not known yet.

Previous sections already explained that a white list of eligible project for use in the Community scheme is recommended for this purpose. This white list would cover the projects eligible for use in the Community scheme during the period from 2008 to 2012 as well as projects from LDCs which were eligible for use in the Community scheme during the period from 2008 to 2012. With the project identifier also the dates of issuance, the number of CERs issued and the verified period can be combined in a list from the information available on issuance of CERs from the Executive Board under the UNFCCC at the following website: http://cdm.unfccc.int/Issuance/cers_iss.html.

What cannot be tracked via the registry is the requirement in the last sentence of Article 5, paragraph 1 of Decision No 406/2009/EC that Member States should ensure that their policies for purchasing these credits enhance the equitable geographical distribution of projects. If Member States use additional credits in accordance with Article 5, paragraph 5 ESD, they should also report which of the four conditions provided in this paragraph is applicable to them.

10.5 Inventory review under the Effort Sharing Decision

The information reported by Member States has to be reviewed at EU level as part of the assessment of compliance. This subtask of task 8 elaborates options for a review process of GHG inventories under the Effort Sharing Decision.

Review versus verification

The term **review** is currently used for an assessment of GHG emissions reported in annual GHG inventories, accounting data and national communications by expert review teams. The term **verification** is currently used for an assessment of annual emissions reported by installations under the ETS by independent verifiers.

The verification of emissions reported under the EU ETS will be subject to a separate regulation to be adopted by 31 December 2011 in accordance with Article 15 of Directive 2009/29/EC. As the term verification in the EU context applies in a particular way to the ETS emissions which is not subject to this task, the term “review” will be used to keep a clear separation between the assessment process under the Monitoring Mechanism Decision and a separate process under such verification regulation pursuant to Article 15 of Directive 2009/29/EC.

The term “verification” in relation to inventories is defined in IPCC guidelines and UNFCCC guidelines on national systems as a substantial part of the QA/QC activities that inventory compilers have to perform.

> *“Verification refers to the collection of activities and procedures conducted during the planning and development, or after completion of an inventory that can help to establish its reliability for the intended applications of the inventory. For the*

purposes of this guidance, verification refers specifically to those methods that are external to the inventory and apply independent data, including comparisons with inventory estimates made by other bodies or through alternative methods. Verification activities may be constituents of both QA and QC, depending on the methods used and the stage at which independent information is used."[44]

Thus, Member States' inventory compilers are responsible for verification. Using the same term for the independent assessment of the inventory under the Effort Sharing Decision would create confusion because as part of the IPCC Guidance verification would be defined as a task Member States have to perform whereas a legal instrument under the Effort Sharing Decision would be the task of an independent entity.

"Verification" is the establishment or confirmation of the truth or accuracy of a fact. This can only be done by the inventory compilers as they have to check and document the accuracy of the underlying data used and how this data is originally compiled.

Under the EU ETS verification is correctly used at installation level, because this verification process checks the original data available like continuous measurements, fuel consumption and measured amounts or measured EFs. Verification checks whether the reported data accurately reflects the documented evidence like fuel bills or laboratory measurements

At national level, the GHG estimation is a much more complex estimation process for all sectors of the economy. E.g. for transport emissions it is not possible to estimate each car as individual emission source separately with its specific EF and documentation of fuel consumption. General approaches and models have to be used that need to follow specific rules. The check of the use of such methodological approaches is no longer verification in a strict sense of the term. In this situation, the term "review" is more appropriate which confirms by examination that specified requirements have been fulfilled and specified methodologies for the estimation have been used.

Thus, for national GHG inventories only a review process is feasible by an independent assessment that checks whether the methodologies and the requirements (e.g. also QA/QC activities and MS verification) are in line with guidelines, that country-specific EF are appropriately justified etc. Verification as an independent procedure would for example imply to proof that statistical data compiled by Member States or Eurostat are accurate or that an emission factor (EF) chosen is accurate. This is not feasible within the assessment procedure in a timely way.

In Article 3, paragraph 2 Decision No 406/2009/EC the 4th sentence uses both terms in the way described above

*"When the relevant **reviews** [inventory] and **verified** [ETS] emission data are available, measures shall be adopted within six months to determine the annual emission allocations for the period from 2013 to 2020 in terms of tonnes carbon dioxide equivalents."*

[44] IPCC 2006 Guidelines, Chapter 6, Box 6.1

It would not make sense to refer to the same process with different terms in one paragraph and the wording here seems to refer to review of GHG inventories and to verification of the ETS data which are both necessary to determine the non-ETS emissions. The same distinction is made in recital (7) of Decision No 406/2009/EC. Therefore this distinction is used in the same way in this report, review for the assessment of GHG inventories and verification for the assessment of ETS data.

10.5.1 Option 1 – Review based on UNFCCC review results

In Option 1 reporting and review of annual emissions continue to draw largely on the reporting and review of GHG emissions under the UNFCCC and a post-2012 agreement as under the current Decision No 280/2004/EC. The Monitoring Mechanism Decision has not established a supplementary EU review process and compliance with Council Decision 2002/358/EC[45] concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the UNFCCC and the joint fulfilment of commitments thereunder at EU level is based on the review under the Kyoto Protocol.

Description of the review process under the Kyoto Protocol

According to the review guidelines under Article 8 of the Kyoto Protocol, the review should be completed within one year after the submission due date. The review consists of an initial check by the secretariat and an individual inventory review by an expert review team composed by a balanced representation of Annex I and Non-Annex I experts. The experts are nominated by Parties, after nomination they have to participate in training courses and pass an exam. The participating of Annex I experts is financed by the nominating Party, the Non-Annex I experts receive travel costs and a per diem but no compensation for the time spent on the review. The initial checks are standardized automatic checks. The results of these automatic routines are considered by the ERT. As part of the EU internal process to compile the EC GHG inventory, similar automatic checks are used as part of the quality control process and results are sent to Member States. The review takes either place as centralized desk review or as an in-country review. Each Party is subject to at least one in-country visit during a commitment period. If the ERT detects problems it should recommend corrections. If those are not taken into account by the Party, or if the inventory is not transparent, the Parties' estimate can be adjusted by the ERT. The adjustment applies conservativeness factors to ensure that the estimate is not underestimated during the commitment period and follows agreed methodologies for adjustments. If inventory gaps or adjustments are above a quantitative threshold, the Party concerned loses its right to use the flexible mechanisms[46].

[45] OJ L 130, 15.5.2002

[46] Decision 5/CMP.1, as contained in document FCCC/KP/CMP/2005/8/Add.2

The following timing currently applies to the review process: Four weeks after the submission date a draft status report with the result of the initial checks is compiled. The timing for the individual review is the following

- 25 weeks after submission due date: ERT lists all problems identified and sends list to Party;
- 6 weeks for comments by Party including revised estimates;
- 8 weeks for preparation of draft review report and adjustments;
- 4 weeks for comments by Party on the draft review report;
- 4 weeks for preparation of final review report.

Thus, the procedure takes 47 weeks.

Problems of the review under the Kyoto Protocol

The UNFCCC inventory review under the Kyoto Protocol takes 47 weeks and for an inventory which is submitted to the EU by 15 January 2009 with data for 2007, the final review report should be published by 15 April 2010 if the ERT keeps the deadlines. Thus final reviewed data for a particular year is only available after X+3.3 years if the compliance committee has not been involved.

The current review under the Kyoto Protocol faces a number of problems.

- The number of review experts is insufficient and the UNFCCC secretariat is facing considerable problems in finding sufficient review experts each year, in particular from Non-Annex I Parties. The pool of experts available is not sufficiently large. Annex I Parties have to finance their own experts' availability and the review is an additional voluntary task of the experts, frequently next to their regular job as inventory complier. Annex I Parties also have to provide funding for the participation of Non-Annex I Parties experts, as well as for the training of experts and for the preparation of review tools which is not provided in time in all years.
- The UNFCCC secretariat's unit on inventories and review has insufficient number of staff.
- The lack of experts impacts the quality of the review as the UNFCCC secretariat cannot select among a pool of experts, but has to use all experts available, independent on their expertise and potential previous bad experiences of the secretariat. The UN review teams need to have an overall composition of 50% Annex I experts and 50% Non-Annex I experts. There is no binding legal requirement for Non-Annex I Parties to produce annual inventories and to prepare a national inventory report. Therefore, Non-Annex I review experts sometimes lack the relevant expertise based on the preparation of GHG inventories.
- The fact that the review is additional to the regular professional tasks of the reviewers impacts on the timing of the review process. Review reports are frequently delayed. For example in mid March 2010, only 19 final review reports of Annex I Par-

ties are finalized and 22 have not yet been finalized 1 month prior to the final deadline.

- The thoroughness of the reviews across Parties is inconsistent and depends on the participating reviewers. The UNFCCC secretariat tries to achieve consistent reviews across Parties which leads to a significant administration burden and lengthy reports because the reports have to show that review experts were considering all relevant issues.

In recent COP and COPMOP decisions in 2009 these problems have been addressed, however the situation for the implementation of the review has so far not changed very much.

Future situation under UNFCCC

In the future it is unclear whether the Kyoto Protocol will continue at the international level or whether a new agreement with a potential different review system would be agreed. Besides the Kyoto Protocol review, there is also an inventory review under the Convention[47]. The key difference between the Kyoto review and the Convention review is that the Kyoto review

- Also reviews the supplementary information required under the Kyoto Protocol (accounting units, LULUCF activities);
- Identified questions of implementation to be forwarded to the compliance committee;
- Calculated adjustments of inventory estimates if inventory estimates are not complete or not prepared in accordance with IPCC guidelines.

The timelines for the Convention review are shorter and centralized reviews should be finalized 6 months after the submission of the inventory and in-country reviews 3 months. Relying on the review process as designed under the Kyoto Protocol is therefore rather risky and would create a lot of uncertainty for the review of the emissions under the Effort Sharing Decision.

Use of UNFCCC review for the Effort Sharing Decision

The explanations in the previous section show that the use of the UNFCCC review for the Effort Sharing Decision would create problems related to

1. the timing of the annual review cycle;
2. the consistency of the inventory review;
3. the coverage of the inventory review;
4. the fixing of base year emissions under the Effort Sharing Decision

1. Problems related to the timing:

[47] See FCCC/CP/2002/8 „Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention".

Final reviewed emissions for the reporting year 2013 would only be available by mid April 2016, thus X+3.3 years after the reporting year. Subsequently it would be necessary to determine compliance at EU level, whether corrective action applies and the Commission would have to draft corresponding decisions. This process would need potentially an additional period between 1-3 months (July 2016). Thus, after the submission in year X+2, there would be an additional period of 1.5 years for the compliance cycle and assessment of compliance would occur 3.5 years after the year for which the emissions are reported. Corrective action based on these final reviewed emissions includes a corrective action plan prepared three months after the non-compliance finding (October 2016). This would be rather late and would no longer affect the emissions of the years 2014 to 2016. Suspension of eligibility to transfer part of the Member State's emission allocation and JI/CDM rights is another consequence foreseen as corrective action. A loss of eligibility would also come rather late.

A particular difficult situation would also arise for the determination of the annual emission allocation under Article 3, paragraph 2 ESD. For this purpose, reviewed emissions for the year 2010 are necessary. In the procedure under the Kyoto Protocol, these reviewed emissions would only be available by 15 April 2013, the determination would then occur by mid October 2013, after the commitment period under the Effort Sharing Decision already started. Until autumn 2013 AEA would not be determined and issued to the registries and no flexibilities could be used.

2. Problems related to the consistency and the quality of the inventory review

The lack of consistent treatment of Parties, in particular different recommendations for the same problem, the potential inconsistent application of adjustments (some Parties may get adjusted for a particular problem, others not) and the potential lack of detection of certain problems for some countries may create problems with the acceptance of EU compliance decisions based on the UNFCCC review reports. Compliance decisions on such basis may not stand rulings by the European Court of Justice. In general it may be questionable whether the European Court of Justice would accept that the Commission bases its decisions on corrective action on an assessment of a Non-EU body.

3. Problems related to the coverage of the inventory review under the Kyoto Protocol.

The review under the Kyoto Protocol would cover the reporting of annual GHG emissions under Article 6, paragraph 1 (a) of Decision No 406/2009/EC. The other reporting requirements under Article 6, paragraph 1(b) (*use, geographical distribution, types and qualitative criteria of credits*), 1 (c) (*projected progress*), 1 (d) (*additional policies and measures*) as well as paragraph 2 (*justification of the use of credits from projects that cannot be used by operators in the community scheme*) are specific to the information required in the EU and would not be covered in parallel by international reporting obligations. If a corrective action plan is required, the review should also include the assessment of the implementation of a corrective action plan pursuant to Article 7, paragraph 2 ESD. This activity would also not be covered under the Kyoto Protocol review.

Thus, even in an option in which the EU would strongly rely on the international reporting and review cycle, a considerable part of the procedures would need to be established at the EU because they will not be part of the international procedures. In addition there is a high uncertainty about the future continuation of the Kyoto Protocol in the future which would create a highly uncertain situation for the implementation of the Effort Sharing Decision, if the EU would strongly reply on the Kyoto procedures.

4. Establishment of final inventory data for the year 2005 and for 2008, 2009, 2010

For the determination of final targets for 2020 as well as for the starting point of the linear trajectory of the emissions in the period 2013 to 2020, Decision No 406/2009/EC requires to fix the emissions for the years 2005, 2008 – 2010. No corresponding need to fix base year emissions for the years 2005, 2008, 2009 and 2010 exists at the international level. The international review therefore will not scrutinize the data for potential overestimation of base year emissions. The year 2005 will not be considered in-depth under the Kyoto Protocol review as it does not have particular relevance. The years 2008 to 2010 are regular reporting years of the commitment period under the Kyoto protocol and the review is likely to correct and adjust these years for potential underestimations. As base year emissions, such corrections will increase base year emissions due to potential conservative corrections or adjustments. If the Kyoto Protocol continues with a second commitment period, it would be necessary to fix revised base year emissions taking into account methodological changes such as the implementation of the 2006 IPCC Guidelines or revised global warming potentials. The final inventory for the last year of the first commitment period under the Kyoto Protocol has to be reported in 2015. It is likely that other Annex I Parties want to continue reporting GHG inventories based on the rules under the first commitment period until the reporting year 2015. Otherwise they would need to prepare two different inventories and submit them in parallel to the UNFCC. The Russian Federation, Japan and Canada have already expressed in the negotiations under AWG-KP that they would not like to prepare two parallel submissions based on different methodologies. In addition, Japan and Russia requested a transition period for the implementation of 2006 IPCC Guidelines. Thus, it is not likely that there will be a mandatory fixing of base year emissions prior to the submission year 2016 for the reporting year 2014. It may be possible to agree on a flexible time when base year emissions are fixed and then EU Member States could undergo such base year fixing procedure prior to the end of the reporting under the first commitment period, e.g. in 2012 for the reporting year 2010, while base year emissions for a second commitment period would be fixed later for other Annex I Parties. Thus, in order to establish final data for the years 2005, 2008, 2009 and 2010 as required under Decision No 406/2009/EC, it is not directly possible to rely on the UN process where no similar need exists and no such procedure will be established. Thus, this part of the compliance cycle should be implemented based on internal EU rules because international rules will likely not match with the EU needs in terms of timing of the process and the years under consideration.

Summary

The current system to use the results of the review under the Kyoto Protocol for the assessment of Member States emissions under the Effort Sharing Decision would have the following advantages:

- It would incur the lowest costs;
- Comparable few changes to the current legislation would need to be implemented;
- It would avoid parallel processes in the EU and under the UNFCCC with potentially different results for final GHG emissions for a particular year.

The disadvantages are

- That the timing of the annual review cycle under the Kyoto Protocol implies that reviewed emissions would only be available X+3.5 years after the reporting year which is rather late for the application of corrective action.
- That the review may be inconsistent across Member States and not with the same level of quality for all years;
- That the UNFCCC review would not cover all reporting elements of the Effort Sharing Decision and that for these additional elements a separate EU review would be necessary. This includes the assessment of the implementation of a corrective action plan pursuant to Article 7, paragraph 2 ESD;
- That the fixing of base year emissions under the Effort Sharing Decision for the determination of the annual emission allocation requires an internal review that is not foreseen in the UN system.
- That the future of the Kyoto Protocol is rather uncertain at the moment, which would create high uncertainty related to the implementation of the Effort Sharing Decision.

10.5.2 Option 2 – Professional review by Commission / EU institutions

In this option. the Commission would have the overall responsibility for a self-standing EU review process of Member States' GHG inventories which is performed in parallel to any UNFCCC review. The actual review work could be performed in different institutional arrangements:

Option 2a:

DG Climate Action is directly performing the review with staff from the DG. DG Climate Action could also delegate this task to other Commission bodies or EU institutions. Institutions currently already involved in the inventory compilation and review process are EEA with assistance of the European Topic Centre on Air and Climate Change, JRC in Ispra and Eurostat. There could also be an institutional system in which both the Commission, supported by EEA, JRC and Eurostat would cooperate and would have certain roles in the review of the inventories.

A permanent team could have 4 staff members for each big sector (energy, industrial processes and agriculture, 2 staff members for the waste sector (which is smaller in terms of material to be reviewed) as well as 4 generalists. The involvement of LULUCF

experts would depend on further decisions how to deal with the LULUCF sector under the Effort Sharing Decision. This would overall be 18 staff members.

Timeline of EU review procedure

Table 26 suggests a timeline for such EU review procedure based on the experience with the current inventory review. The review would be finalized within 7 months from the submission due date by mid October each year for all Member States. For Member States without big problems during the review, the final review reports would be available already by end of June.

The first step, the initial review would already start based on the preliminary inventory data submitted by 15 January. This initial check is part of the current procedure under Decision No 280/2004/EC and is necessary for the preparation of the EC inventory submission to the UNFCCC. The initial checks are currently already performed even in a more detailed way as by the UNFCCC secretariat and are available within a few weeks after the Member States' submissions. This procedure is already available faster than in the UN system.

Table 26 Potential timing of an EU review procedure

Step in procedure	**Duration**	**Date**
Initial check of MS inventory submissions	6 weeks after the submission due date by 15 January	End of February each year
Member States' comments on initial checks	2 weeks after receipt of initial check results	15 March
Final inventory submission		15 March
In-depth review	1 week per MS => 27 weeks for 4 experts per sector => about 7 weeks for all MS	3rd week of March until beginning of May
Comments/ questions to Member States	1 to 8 weeks after the due date of the final submission	End of March until 15 May all Member States finalized, some already after 1 week
Response from Member States and additional information	4 weeks after receipt of comments/ questions	End of April until 15 June
Finalization of draft review reports	4 weeks after response for all reviews	End of May until 15 July
Comments by Member State	2 weeks	Mid June until end of July

Step in procedure	Duration	Date
Adjustments to Member States data, complicated cases	8 weeks	End of September
Finalization of final review reports	2 weeks	End of June until 15 October

The in-depth review would only start after the final inventory submission by 15 March. It is assumed that the experts would on average spend one week per Member State. After this week comments and questions would be sent to Member States and Member States should provide answers or additional information within 4 weeks. 4 weeks after this response was received, the review teams would finalize a draft review report and provide this report to the Member State under review. Member State should send comments within 2 weeks and afterwards the review team should finalize the report within 2 weeks. In cases of problems the suggested timeline foresees additional 8 weeks time for the finalization of these cases. This is based on the experiences that the complicated cases with problems take more time to be resolved. It is also assumed that adjustments would be applied and that additional 8 weeks would be necessary for the adjustment cases.

At UN level it takes a lot of time to prepare the review reports, because they are highly formalized and are also used as a means to document the work performed by the review experts. Such extensive documentation and formalized reports will not be necessary at EU level. More concise reports would considerably fasten the review process.

It is suggested that similar to the review under the Kyoto Protocol, some reviews would be performed as country visits, while a larger number would be performed as a centralized desk review. If each year 6 Member States would be subject to an in-country review, after 4 years all Member States would have been subject to an in-country review.

Feedback with Member States

In the review under the UNFCCC feedback with Parties is a very important part of the procedure. At EU level, it may not be strictly necessary to allow for feedback with Member States on the decisions taken by the Commission. However, as the inventories are highly complex, it is strongly recommended to also include feedback to Member States in an EU review system. At defined steps in the procedure, the review unit would send notifications with potential inventory problems to Member States or request additional clarifications from Member States and would allow Member States to comment on these problems and to submit additional information and draft review reports would also distributed to Member States for comments.

Many inventory problems currently detected by the review cannot be quickly resolved, but may involve the gathering of additional data and scientific studies to resolve the problems. Under the UNFCCC review teams provide recommendations for improvements to Parties, and in the following years, it is checked whether these recommenda-

tions were implemented. It is difficult how this crucial element of the review can be integrated in an annual compliance cycle that should determine final data for a submitted year at the end of the review. Adjustments could be used in such cases, however this may be difficult to justify in the absence of reliable data.

Adjustments

Adjustments of inventories in the case of underestimations in commitment period years and overestimation of base years have been proven as an important element to increase the quality of GHG inventories under the Kyoto Protocol. Therefore it is recommended to also implement adjustments as part of the EU review procedure. Adjustments mean that at the end of the Commission's review Member States' emission estimates would be replaced by more conservative values for source categories for which substantial problems were detected. This would only occur if recommendations for corrections of emissions by the review team had not been taken into account by the Member State concerned. Adjustments can be more important in an annual compliance cycle with the aim to establish final data at the end of each year then in the current review process under the Kyoto Protocol where the resolution of problems can be forwarded to the following year.

The Member State would receive a notification of the final adjusted emissions together with the final review report at the end of the review procedure. This implies that the Monitoring Mechanism Decision is clear on the competence of the Commission to adjust Member States emissions' and clear and binding criteria, methodologies and procedures to be followed in calculating the emissions are laid down (see below). If the MS disagrees with the adjustments it would have to file an action of annulment pursuant to Article 263 of the Treaty on the Functioning of the European Union (TFEU) presumably on grounds of infringement of an essential procedural requirement, or misuse of powers.

Legal requirements

In terms of additional legal provisions this option would require the development of a legal instrument similar to the UNFCCC review guidelines outlining the review tasks, criteria, methodologies, modalities and procedures, including the procedure to calculate adjustments of the Member States emissions. The content of such legal instrument could be based in general terms on the existing guidelines under the Convention and the Kyoto Protocol. The methodological guidelines for adjustments would need to get updated to integrate the 2006 IPCC guidelines. It would be important that the revised Monitoring Mechanism Decision gives the Commission the power to adjust Member States' emissions in cases of underestimation. Potential cases of overestimation of the years 2005, and 2008 to 2010 to establish the annual emission allocation seem less relevant for adjustments because the GHG inventories for these years are submitted and reviewed as part of the compliance with Kyoto targets under the Kyoto Protocol. Potential overestimations of source categories in these inventories would increase the burden for compliance under the Kyoto Protocol and is therefore not very likely to occur intentionally.

Option 2b: Professional review team assisted by selected MS experts

A core professional review team could be assisted by selected review experts from Member States to enhance the knowledge and experience of the core team. The current review process shows that in particular those experts that are compiling inventories for a certain sector in their countries have the highest expertise to detect problems with the data and methodologies. Thus, a meeting with a duration of a week could be held during the review process. In this meeting the core team would present particular cases and problems and would exchange with Member States experts.

Option 2c: Review by private verifiers

The inventory assessment could be delegated to independent private verifiers similar as under the EU ETS.

Auditing processes have some common key principles, including:

1. Certification of individual auditors by an independent institution that is not participating in audits.

2. Independent auditors are not allowed to participate in performing the tasks (e.g establishment of management systems) that they are assessing.

3. Auditing processes are generally used for standardized tasks (e.g. management procedures for environmental management (ISO 14000), quality management, management of production processes (e.g. organic farming)) where clear guidelines have been established for all participating actors. Existing international auditing schemes are applied in sectors where many individual companies and other actors submit themselves to rules and guidelines established under the monitoring regime that needs to be verified for many actors according to comparable procedures.

4. Auditors are mainly responsible for audits in their countries, sometimes they are working across country's borders.

Review by expert teams as it is performed under the FCCC is not a standardized procedure but an incremental development process. Nevertheless some key principles can also be outlined:

1. There is no certification for experts, but they are nominated by Parties and selected from a roster of experts.
2. Most review experts are involved in some way in inventory development in their home countries. This is the main source of their knowledge and expertise. These experts are reviewing inventories from other Parties. Thus they are reviewers and inventory developers at the same time.
3. Experts do not review inventories of their own countries.
4. Reviews only consider inventories from Annex I Parties (36 Parties), that means 36 inventories per year. In the EU, it will be 27 inventories per year

The independence of private verifiers would mean that they should not be involved in the inventory compilation. However, if they are not, they will lack the necessary exper-

tise to perform the task. Currently only private institutions that are involved in inventory compilation have the necessary expertise to review inventories and are involved in these tasks. These institutions will have a conflict of interest and may not opt to act as verifiers. Other private institutions currently lack expertise in inventories and the quality of reviews would likely be low at least at the beginning. This option would make it necessary to create an accreditation process and a high level of administration.

Similar to the current review under the Kyoto Protocol, such process would not guarantee for consistent review results with the same level of quality and stringency due to different participating institutions and experts. MS are likely to select private auditors with weakest competences as those will not be able to detect any problems.

As the total market would be very small (27 inventories per year), there would not be much competition resulting in a weak quality.

It may also be problematic for the Commission to base its final decision on compliance and corrective action on reports from private entities where may be difficult to fully justify all decisions taken during the review process. If a Member State would not accept any corrections or adjustments during the review and take legal action, it may be difficult to prove for the Commission that the guidelines and criteria have been followed appropriately.

The timeline for this option would look different because it is assumed that Member States would submit to the Commission an already reviewed GHG inventory.

In terms of additional legal provisions this option would require the development of review guidelines outlining the review tasks, criteria, methodologies, modalities and procedures, including the option to calculate adjustments of the Member States emissions. Such guidelines could be based in general terms on the existing guidelines under the Convention and the Kyoto Protocol. The methodological guidelines for adjustments would need to get updated to integrate the 2006 IPCC guidelines.

In addition there would need to be a process of accreditation of verifiers, a definition of the required competences and the development of exams to test the knowledge.

It would be difficult to set up such procedure in time for the review of the data to establish final base year emissions.

10.5.3 Option 3 – Determination of corrective action based on submitted data, potential adjustments occur after the review

The timing problems of option 1 could potentially be resolved, if the determination of corrective action would be based on the inventory data submitted by Member States. This could already occur shortly after the inventory submission by 15 March each year. After final reviewed emissions would be available, any changes of the annual emissions would result in an adjustment of the compliance decision and potential corrective action about 1 year later. While the review frequently changes the final GHG emissions, the magnitude of such changes are often minor and below 1% of total GHG

emissions. In addition, the review does not always change the emissions submitted by Member States.

This option could either be combined with option 1 or option 2 and would make compliance assessment for the majority of Member States to be expected without significant inventory problems much faster.

Article 7, paragraph 1 ESD on corrective action says:

"If the GHG emissions of a Member State exceed the annual emission allocation specified pursuant to Article 3(2), taking into account the flexibilities used pursuant to Articles 3 and 5, the following measures shall apply:"

The Article is not specific with regard to the fact whether corrective action can only be applied to reviewed emissions.

The advantaged of this option are:

- A very fast decision on compliance and corrective action which provides more time to implement a corrective action plan in time to show results in the period from 2013 to 2020.

The disadvantages of this option are:

- It would be very unusual to base a legal decision on compliance and on corrective action on emission data that could rather likely change during the review.
- The need to have two different decisions on compliance for the same year within a period of one year.
- It may be confusing to the public which results are valid.

10.5.4 Option 4 – Estimation of Member States annual emission at EU level

A third option with further competences at the EU level would be a system that requires Member States to report activity data, emission factors and other parameters to the EU level and the performance of emission estimation at the European level for all Member States which would avoid a detailed review of the emission estimation for each Member State and which would provide full transparency for the Commission on the methods and data used. This option could be combined with new elements for the verification of reported activity data in the Member States. In the meeting on the inception report, it was decided that the project team should not further consider this option, because of the substantial changes it implies to the current reporting and review system which may neither be mandated by Decision No 406/2009/EC, nor would it be possible to implement such system in time for the implementation of Decision No 406/2009/EC.

10.5.5 Conclusions

It is recommended that a self-standing and independent review in the EU is established as described in option 2. This option is also implemented in the draft proposals for the legal text of the revised Monitoring Mechanism Decision. However, it will be necessary

to elaborate additional guidelines for such EU review defining the principles, the scope, the tasks of the reviews as well as the procedures and organization of the review.

10.6 Compliance assessment and corrective action in the annual compliance cycle

Article 7 of Decision No 406/2009/EC (Effort-Sharing Decision, ESD) stipulates that a Member State whose GHG emissions exceed its annual emission allocation (taking into account available flexibilities) will be subject to the following measures:

a) A deduction of 1.08 times the excess emissions from the allocation of the following year;

b) The development of a “corrective action plan”; and

c) Suspension of eligibility to transfer part of the emission allocation and JI/CDM rights to another Member State until the Member State is back in compliance.

The corrective action plan needs to be submitted, together with an “assessment”, within three months and needs to specify the action that the Member State will implement in order to come back in compliance (with priority to domestic policies and measures and to the implementation of Community action) and a timetable for the implementation of such action that enables the assessment of annual progress in the implementation. The Commission may issue an opinion on the plan, possibly after seeking comments from the Climate Change Committee.

The requirement to develop and implement a corrective action plan in the Effort Sharing Decision is a key driver for a fast annual reporting, review and compliance cycle. Additional policies and measures adopted under a corrective action plan should be implemented timely in order to contribute effectively to meeting the GHG emission mitigation obligations in the period 2013 to 2020.

For example, if a determination of non-compliance and of corrective action took two years from the reporting of the emissions, it may only occur at the end of the year 2016 for the reporting year 2013 and the consequential corrective action plan may only be submitted during the first half of 2017. To the extent that implementation requires the adoption of domestic legislation in the Member State concerned, the measures may actually not be implemented before the end of 2017, leaving only three years until 2020.

For the purposes of a further clarification of the implementation of the ESD, Article 7 especially raises the following main issues:

(1) Who will determine non-compliance and thus apply the corrective action?

(2) When would/should such a determination occur?

(3) How would potentially applied corrective action be followed up (submission and assessment of corrective action plan, information on progress in the implementation, determination of compliance/repeated finding of non-compliance)?

In addition, this section discusses some related issues (the relationship with the normal infringement procedure under the TFEU and the implementation of corrective action during the final years of the period 2013-2020).

10.6.1 Who should determine excess emissions?

Somebody independent of the Member States needs to determine the final emission balance of each Member State and compare this emission balance with the annual emission allocation and the use of flexibilities and credits for each year of the period 2013 to 2020 ("compliance assessment"). This determination involves a calculation of the emission balance in accordance with the ESD provisions (annual reviewed emissions plus/minus use of flexibilities, etc.: in the following referred to as "compliance calculation") and, in the case of excess emissions, has as a consequence the application of corrective action according to the Decision's Article 7.1.

It would seem most logical for the European Commission to make the required determination. The Commission is the actor that would have the necessary emission data available, including data on the use of flexibilities allowed under the Decision (see section 10.3 related to registries). This would also be in line with the role of the Commission as the "guardian of the treaties". For the following, it is therefore assumed that the Commission would determine final annual emission data and undertake the compliance assessment.

10.6.2 When should the determination be made?

Any reliable compliance assessment can only be concluded once reviewed data are available.

The possibility of adjustments/modifications of inventory data during the review process provides an important rationale for allowing adaptations in the use of flexibilities provided for under the ESD until after the conclusion of the review of data so that Member States may be able to balance any shortfall (or excess). Developed country parties to the Kyoto Protocol have an "additional period for fulfilling commitments" (also known as "true-up period)" of 100 days following the completion of the review of emission data of the last year of the commitment period 2008 to 2012 that serves the same purpose. Including a similar "balance period" under the ESD would enable Member States to make use of any flexibilities they had not exhausted by the time of their data submission.

Upon the conclusion of the review of emission data, the Commission would immediately issue its initial compliance calculation per Member State so as to enable each Member State to balance its accounts. To come to a compliance calculation, an appropriate cut-off date for the use of flexibilities for the year in question would need to be determined.

It is suggested to introduce an additional "balance period" for Member States to balance their accounts through the use of the flexibilities provided for under the ESD of 1

month. Such a balance period should be available for Member States whose reviewed data are higher than its reported data to buy additional emission allowances/credits (up to the limits defined by the ESD) from other Member States with surplus AEA/credits.

After the expiration of that “balance period”, the relevant accounts would be closed and the Commission could make a final compliance calculation and determine compliance or non-compliance by means of a Commission Decision, including the application of corrective action as appropriate. For a completion of the compliance cycle within a year, it would be essential that such a decision can be issued within one month. However, a minimum timeframe for such a decision that has been pursued in other cases (e.g. decision on national allocation plans) would be three months. If the final compliance decision took longer, the final compliance decision would be moved to the year subsequent to the one in which emissions have been reported and the cycle would no longer be finalized within the year in which the emissions were reported.

Both decisions on compliance and on non-compliance could use standard text according to different templates. In cases of compliance with Article 3(2) ESD, the decision would need to contain predefined elements of information including the final emissions, the AEA plus/minus flexibilities retired, etc.). In cases of non-compliance, the decision would in addition need to apply the three elements of corrective action in accordance with Article 7(1) of the Effort Sharing Decision, including information on excess emissions, etc. Slight adaptations would be required in the cases of a return into compliance or continued non-compliance.

As mentioned above, in cases of non-compliance, the compliance decisions should apply the corrective action, including:

- For the deduction of AEA from the following year, the decision should specify the quantity of AEA to be deducted and the year. The transaction should then be performed in the Member States’ AEA holding account for the year in question in the registries via the central registry administrator after the release of the decision (Article 7(1)(a) ESD).
- For the development of the corrective action plan, the decision should specify the deadline by which an assessment and the corrective action plan should be submitted by the Member State concerned (Article 7(1)(b) ESD).
- For the temporary suspension of eligibility to transfer part of the Member States’ AEA and credit rights, the decision should include a statement that the Member State is no longer eligible to perform such transfers. The respective limits for these transfers should be set to 0 by the central registry administrator after the release of the decision resulting in a blocking of such transactions in the registry system, or the compliance status should be set to B (non-compliance) which would automatically block the transfers (Article 7(1)(c) ESD).

10.6.3 Follow-up Action

After the submission of a corrective action plan, several issues regarding follow-up arise:

- the result of any assessment of the corrective action plan by the Commission (opinion);
- the reporting on progress in the implementation of the corrective action plan;
- and the taking of follow-up decisions, either (a) that a Member State is back in compliance and the suspension of eligibility under Article 7(1)(c) is to be lifted or (b) that non-compliance continues.

The Commission's assessment of and opinion on the corrective action plan

Article 7(2) of the Effort Sharing Decision empowers the Commission to "issue an opinion on the corrective action plan of the Member State in question". Issuing an opinion can be assumed to imply that the Commission would (have to) assess the adequacy of the corrective action plan in light of the requirements of the ESD. While the ESD does not provide a timeframe for the issuance of the Commission's opinion, it might be useful to indicate such a timeframe in the revision of the Monitoring Mechanism Decision. In order to enable the Member State concerned to take into account the opinion in the further development and implementation of the plan, the opinion should be issued in the shortest timeframe possible (e.g. 2-3 months). The Decision also does not specify under what circumstances the Commission may issue an opinion. A revision of the Monitoring Mechanism could specify that the Commission will always strive to issue an opinion, will primarily do so when discovering problems, or stay silent on the issue thereby leaving this to the discretion of the Commission. In any event, the characterization "opinion" suggests that the Commission's agreement on a corrective action plan is not formally required. Article 7(2) furthermore stipulates that the Commission may, before issuing the opinion, submit the corrective action plan to the Climate Change Committee for comments. A specification of the procedure for doing so may not be required. If the Commission opts to seek comments from the Climate Change Committee, it may be expected to take these comments into account in its opinion and to explain what it did with the comments received (but this is not a requirement under the Effort Sharing Decision). It may be considered whether an indicative timeline for the issuance of any Commission opinion as well as any consultative process with the Climate Change Committee could be useful in shaping the expectations of all actors involved.

Reporting on the implementation of a corrective action plan

While such reporting is not explicitly provided for, it is implied by Article 7(2)(b) of Decision No 406/2009/EC which requires any corrective action plan to include "a timetable for implementation of such action, which enables the assessment of annual progress in the implementation". It is worth noting that Article 6(1)(c) and (d) would seem to already require Member States to include relevant information in their annual inventory reports. It would thus be reasonable to assume that Member States would report on the implementation of the additional measures undertaken under the corrective action plan in the

framework of their annual inventory reports pursuant to Article 3 of Decision No 280/2004/EC. This could be further clarified in the revision of this decision elaborated in this project. For example, further guidance on how to include such information (e.g. clear identification of measures implemented under the corrective action plan in the reporting) could be included. The review of the implementation of the corrective action plan could then be integrated in the annual inventory review. The definition of special guidance/procedures for the review in this respect should be considered.

Inclusion of the reporting on the implementation of the corrective action plan in any updates that are required in case of a repeated non-compliance in the following year might be an alternative, but is considered a clearly inferior option. If a Member State is found to be in non-compliance for a second consecutive year, it is suggested that it would have to submit an updated corrective action plan (see below). It might be considered that the Member State could report on the implementation of its previous corrective action plan with its updated corrective action plan. However, this would have a number of drawbacks. First of all, Member States would, if reporting on the implementation of their corrective action plan separately from their annual inventory reports, again have to include various data that are required to assess the corrective action plan and otherwise included in the annual inventory report, their report on the implementation of the plan (emission trends, aggregate effect of measures, etc.). Furthermore, such separate reporting would make it impossible or at least difficult to get the reported information reviewed in the standard expert review procedure.

Finally, such an alternative arrangement seems to suggest that the Member State concerned would only have to report on the implementation of the corrective action plan in case non-compliance is repeated for a second year. This could give the wrong/problematic signal to the Member State concerned that it will only have to initiate its reporting on the implementation of the plan, once repeated non-compliance has been determined (i.e. by 15 December of a given year), which would leave only three months for actually initiating and preparing the report. Perhaps more importantly, it is questionable whether such an arrangement would be in line with the spirit and logic of Article 7 of Decision No 406/2009EC. According to Article 7(2) of that decision, the Member State concerned would base its corrective action plan on an “assessment” (of the reasons for non-compliance and the required remedial action) and the corrective action plan would consequently spell out action to be taken and a timetable for its implementation. If the assessment led the Member State to commit to implementing additional action over several years, it would seem illogical to stop reporting on that action where the Member State comes into compliance in the subsequent year for reasons that are clearly not related to the implementation of the plan (because the plan lags behind by 2-3 years: for non-compliance in 2013, the plan would be submitted in March 2016 so that it could not have affected emissions in 2014). The reasons may be special for that year (rainfall, economic situation) and may lead to a situation of repeated non-compliance thereafter (in the example, 2015). For this reason, it would seem logical for the Member State to continue to report on the implementation of the planned measures and to provide reasons for any changes of these plans (in the context of its annual in-

ventory reports). It should be noted that such an approach does not necessarily mean that the Member State concerned would have to report for an extended period of time. This remains dependent on the assessment of the reasons for non-compliance. For example, it seems possible that non-compliance came about in large part as the result of extreme weather events and that the corrective action plan would simply state that, due to this assessment, no additional measures are required (in which case no reporting on additional measures would be required either).

Follow-up decision on resolution of compliance issue or continuing non-compliance

Any follow-up decision should reasonably be taken on the basis of data for years subsequent to the first year of non-compliance. The new data could either show continued non-compliance or a coming back into compliance:

- Lifting of suspension of eligibility and finding of compliance: Once a previously non-compliant Member State's most recent annual net emissions (as adjusted under Article 7(1)(c) ESD and taking into account any deduction under Article 7(1)(a)) show it to be in compliance, the Commission Decision on net emissions for the subsequent year would seem to have to find that the Member State is back in compliance and would have to lift the suspension of eligibility forthwith. The Member State could/should still be obliged to undertake and report on any pending additional measures implemented under the corrective action plan so as to ensure it stays in compliance.
- Finding of continued non-compliance: If the non-compliant Member State's next annual net emissions (as adjusted under Article 7(1)(c) ESD and taking into account any deduction under Article 7(1)(a)) show continuing non-compliance, the Compliance Decision for the year in question would again have to apply the corrective action in accordance with Article 7(1) ESD. It would thus have to determine the deduction from the emission allocation of the following year and to reconfirm the continuing suspension of eligibility. However, the requirement of the development of a corrective action plan raises questions in a situation where a corrective action plan had already been developed and could not be expected to already have made an impact on the year (because it was only developed two years after the year in question). At the same time, the new data may raise issues as regards the adequacy of the existing plan. A possible way forward may be that the Commission, in its decision applying the corrective action for the second year (and any further years) of non-compliance asks the Member State to submit an update of the corrective action plan, as appropriate, to take account of the most recent data.

10.6.4 Other issues

Relationship with infringement procedure

Under Article 258 TFEU, the Commission, if it considers that a Member State has failed to fulfil an obligation under the Treaties, shall deliver a reasoned opinion on the matter after giving the Member State concerned the opportunity to submit its observations. If

the State concerned does not comply with the opinion within the period laid down by the Commission, the latter may bring the matter before the Court of Justice of the European Union. There is no formal relationship between this formal “infringement procedure” and the corrective action under Article 7 of the Effort Sharing Decision. The privileges of the Commission under Article 258 TFEU cannot be reduced/curtailed by secondary legislation. Accordingly, the Commission may, in principle, decide at any point in time to initiate the infringement procedure with respect to the Effort Sharing Decision, if it considers that a Member State has failed to fulfil its obligations thereunder. However, there may be a reasonable assumption/expectation that the Commission would only bring any matter before the Court of Justice of the EU in response to repeated non-compliance and/or if non-compliance cannot, in view of the Commission, be sufficiently addressed under Article 7 ESD. Such an expectation would also be supported by considerations of legal certainty which would militate against the Commission pursuing two different means to obtain exactly the same result. In this context, the Commission may also employ the means available to it under the Effort Sharing Decision and Article 258 TFEU in combination so as to enhance implementation. For example, if the Commission finds a corrective action plan of a non-compliant Member State insufficient, it may – at the same time as issuing an opinion under Article 7(2) ESD and possibly building on that opinion – deliver a reasoned opinion to the Member State under Article 258 TFEU. This would enable the Commission to bring the matter to the EU Court of Justice, if the Member State fails to strengthen its measures (and potentially subsequently fails to come back into compliance).

Corrective action towards the later years of the period 2013-2020:

The applicable timelines raise the question of what use a corrective action plan will have if there is not sufficient time to implement measures that could influence emissions by 2020. Under the current (ambitious) timelines, non-compliance with the AEA for 2017 would only be determined in late 2019 and the related corrective action plan would be submitted in early 2020. Already from then on, there would be little prospect for a corrective action plan to influence actual emissions by 2020. Furthermore, the Effort Sharing Decision does not address the issue of non-compliance in 2020. At present, such non-compliance could not lead to a deduction from the AEA of the following year. The danger of such “late” non-compliance provides a strong rationale for instituting strong mechanisms to review implementation of appropriate policies and measures (including resulting emission trends) from the early stages of the period 2013 to 2020 in order to provide for early warning of potential problems and to minimize the risk of “late” non-compliance. Apart from that, the questions raised could primarily be addressed in a revision of the Effort Sharing Decision extending it beyond 2020 (which is not the subject of this project).

10.7 Implications of the Copenhagen agreement

In this subtask, it had been planned that the project will examine the potential agreement reached in the Conference of the Parties under the UNFCCC in Copenhagen (COP 15), assess the potential linkages and implications for this project and incorpo-

rate any elements as appropriate in the analysis and the subsequent legislative proposals. As no agreement was achieved in Copenhagen with all Parties, no further analysis can be provided in this section.

11 Additional issues

11.1 Reporting requirements related to LULUCF activities

According to Article 8 of the Effort Sharing Decision, the Commission shall propose to include emissions and removals related to land use, land use change and forestry in the Community reduction commitment, as appropriate, on the basis of rules agreed as part of an international agreement on climate change. The international accounting rules for LULUCF activities were not yet agreed during the course of the project. However the design of a complete compliance cycle at EU level after 2012 remains incomplete if the contributions of LULUCF activities to compliance with Member States' targets are not taken into account.

In the international scene, the discussions on the revision of decision 16/CMP.1 related to the accounting of LULUCF activities under the Kyoto Protocol could result in several changes in the accounting of LULUCF activities under the Kyoto Protocol or even to a potential other legally binding international agreement that would also require changes in the reporting of emissions and removals from LULUCF activities. Being aware of the fact that no final agreement has been reached yet on the revision of decision 16/CMP.1 under AWG-KP in the UNFCCC negotiations and of the fact that the IPCC is requested in such draft decision to revise the existing methodological guidance it is hard at this point in time to decide on the exact provisions to be included in a revised MM Decision.

Taking into account the existing status of the negotiations after COP16 in Cancún, the following additional provisions on LULUCF monitoring and reporting should be included in the revised Monitoring Mechanism Decision to mirror future changes under the UNFCCC and the Kyoto Protocol or another international agreement:

- Estimate and report emissions and removals from forest management, cropland management and grazing land management on a mandatory basis;
- Estimate and report data on emissions from the harvested wood products pool;
- Estimate and report emissions and removals from rewetting and drainage ;
- Estimate and report emissions and removals subject to "force majeure" events (beyond the control and not materially influenced by the country) including a demonstration that no land use change has occurred on lands subject to force majeure events, a demonstration that the occurrences were beyond the control of the Party, a demonstration of efforts taken to rehabilitate the lands subject to force majeure events, a demonstration that emissions associated with salvage logging were not excluded.

Respective reporting obligations have been inserted in Article 3(1)(d) of the revised Monitoring Mechanism Decision.

11.2 Increased carry forward rate due to extreme meteorological conditions

According to Article 3, paragraph 3, 2nd sentence of Decision No 406/2009/EC "A Member State may request an increased **carry forward rate in excess of 5 % in 2013 and 2014 in the event of extreme meteorological conditions** which have led to **substantially increased greenhouse gas emissions in those years** compared to years with normal meteorological conditions. To this end, the Member State shall submit a report to the Commission substantiating this request. Within three months, the Commission shall decide whether an increased carry forward can be granted."

The two conditions for an increased carry forward rate are: (1) extreme meteorological conditions; and (2) substantially increased greenhouse gas emissions due to extreme meteorological conditions. The following sections provide a proposal for defining these two conditions.

11.2.3 Extreme meteorological conditions

In general, extreme meteorological conditions affecting greenhouse gas emissions could include: (1) very cold winters increasing the energy use for heating, (2) very hot summers increasing the energy use for air conditioning and cooling (which in most cases is electricity based), (3) very dry weather conditions decreasing hydro power production and, therefore, potentially increasing thermal power production. In addition, extreme meteorological conditions may have substantial cross border effects as can be seen in the Nordic electricity market: Denmark increases coal-fired power production in order to export electricity in years with low hydro power production in Norway and Sweden.

In the context of the emissions covered by the Effort Sharing Decision, however, hot summers and dry weather conditions are not relevant because these conditions mainly affect electricity production whose emissions are covered under the EU-ETS Directive. Therefore, this chapter only addresses very cold winters. Extreme meteorological conditions could also affect emissions and removals from forests, however these emissions are also not addressed under the Effort Sharing Decision.

Cold winters affect CO_2 emissions in various ways. Fossil fuels are used directly for heating purposes in households and other buildings (e.g. offices, other commercial buildings e.g. factories, hospitals, schools, etc). Indirect use of fossil fuels occurs where buildings are heated via district heating or electrical heating and the heat/electricity is produced in fossil fuel heating/electricity plants. As the vast majority of fossil fuel based district heat and electricity is produced in EU-ETS plants, indirect emissions are not considered in this section.

Heating degree days as measure for cold winters

The most common indicator related to the need for heating due to temperature variations is the indicator of "Heating degree days**"**. Eurostat publishes such heating degree

days for all EU Member States and uses the following method to calculate the indicator (see Eurostat, 2007):

Heating degree days =

(18°C - T_m) x days (d)

if T_m is lower or equal to 15°C and are nil if T_m is greater than 15°C

where 15°C is the heating threshold and T_m is the mean ($_{Tmin}$ + T_{max} / 2) outdoor temperature over a period of d days.

Relative heating degree-days are in turn defined as the ratio of actual degree-days to long-term average degree days.

Table 27 shows the actual heating degree days and the long-term average 1980-2004 for all EU-27 Member States as available from Eurostat in March 2010. Heating degree days are very diverse across Member States due to different climatic conditions with the lowest values for Malta and the highest values for Finland.

Table 27: Actual and long-term average heating degree days

	Actual heating degree days										Long-term average
	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008	1980-2004
Austria	3469	3164	3497	3225	3465	3560	3650	3487	3171	3252	3574
Belgium	2675	2522	2730	2535	2696	2798	2669	2591	2437	2707	2872
Bulgaria	2464	2431	2501	2513	2869	2500	2650	2623	2357	2430	2687
Cyprus	766	803	582	656	731	767	644	724	694	640	782
Czech Republic	3328	3096	3555	3254	3441	3488	3564	3445	3175	3204	3571
Denmark	3072	3106	3470	3167	3315	3305	3262	3074	2988	3017	3503
Estonia	4073	3908	4346	4261	4422	4288	4319	4154	4041	3873	4445
Finland	5566	5219	5744	5715	5660	5530	5293	5426	5312	5336	5850
France	2288	2223	2376	2176	2344	2467	2457	2275	2212	2397	2483
Germany	2948	2782	3119	2961	3124	3186	3137	3012	2798	2971	3239
Greece	1621	1581	1539	1490	1713	1545	1624	1685	1489	1434	1663
Hungary	2683	2495	2826	2669	3089	2866	3030	2809	2552	2541	2922
Ireland	2834	2816	2826	2734	2662	2721	2633	2624	2552	2827	2906
Italy	1884	1695	1767	1711	1913	1883	2051	1824	1715	1776	1971
Latvia	3813	3742	4155	4040	4244	4196	4184	4010	3889	3725	4265
Lithuania	3619	3570	3936	3823	4079	4046	4014	3873	3724	3543	4094
Luxembourg	3056	2754	3020	2827	2934	3184	3041	2923	2738	2993	3210
Malta	436	470	381	419	597	500	662	474	332	307	560
Netherlands	2585	2488	2721	2596	2759	2805	2658	2573	2424	2694	2902
Poland	3203	3092	3581	3337	3594	3510	3547	3454	3222	3164	3616
Portugal	1271	1268	1257	1160	1248	1380	1360	1197	1258	1299	1282
Romania	2832	2774	2964	2861	3264	3008	3155	3072	2750	2776	3129
Slovakia	3237	3007	3390	3197	3445	3390	3519	3353	3076	3023	3453
Slovenia	2839	2583	2874	2673	3048	3049	3188	2970	2678	2782	3053
Spain	1811	1806	1751	1632	1754	1896	1937	1655	1789	1829	1842
Sweden	5045	4940	5402	5156	5230	5240	5097	4982	5068	5076	5444
United Kingdom	2853	2979	3093	2884	2880	2881	2879	2814	2818	3043	3115
EU-27	3030	2926	3164	3013	3172	3163	3162	3038	2943	3008	3254
EU-15	3013	2911	3116	2967	3078	3115	3085	2957	2913	3010	3201

Source: Eurostat website downloaded in March 2010:

http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/database

Table 28 shows the heating degree days relative to the long-term average 1980-2004. It shows that for most Member States and for the EU as a whole the years since 2000 were warmer than the average 1980-2004.

Table 28: Heating degree days relative to the long-term average 1980-2004

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008
Austria	0.97	0.89	0.98	0.90	0.97	1.00	1.02	0.98	0.89	0.91
Belgium	0.93	0.88	0.95	0.88	0.94	0.97	0.93	0.90	0.85	0.94
Bulgaria	0.92	0.91	0.93	0.94	1.07	0.93	0.99	0.98	0.88	0.91
Cyprus	0.98	1.03	0.74	0.84	0.93	0.98	0.82	0.93	0.89	0.82
Czech Republic	0.93	0.87	1.00	0.91	0.96	0.98	1.00	0.97	0.89	0.90
Denmark	0.88	0.89	0.99	0.90	0.95	0.94	0.93	0.88	0.85	0.86
Estonia	0.92	0.88	0.98	0.96	1.00	0.97	0.97	0.94	0.91	0.87
Finland	0.95	0.89	0.98	0.98	0.97	0.95	0.91	0.93	0.91	0.91
France	0.92	0.90	0.96	0.88	0.94	0.99	0.99	0.92	0.89	0.97
Germany	0.91	0.86	0.96	0.91	0.97	0.98	0.97	0.93	0.86	0.92
Greece	0.97	0.95	0.93	0.90	1.03	0.93	0.98	1.01	0.90	0.86
Hungary	0.92	0.85	0.97	0.91	1.06	0.98	1.04	0.96	0.87	0.87
Ireland	0.98	0.97	0.97	0.94	0.92	0.94	0.91	0.90	0.88	0.97
Italy	0.96	0.86	0.90	0.87	0.97	0.96	1.04	0.93	0.87	0.90
Latvia	0.89	0.88	0.97	0.95	1.00	0.98	0.98	0.94	0.91	0.87
Lithuania	0.88	0.87	0.96	0.93	1.00	0.99	0.98	0.95	0.91	0.87
Luxembourg	0.95	0.86	0.94	0.88	0.91	0.99	0.95	0.91	0.85	0.93
Malta	0.78	0.84	0.68	0.75	1.07	0.89	1.18	0.85	0.59	0.55
Netherlands	0.89	0.86	0.94	0.90	0.95	0.97	0.92	0.89	0.84	0.93
Poland	0.89	0.86	0.99	0.92	0.99	0.97	0.98	0.96	0.89	0.88
Portugal	0.99	0.99	0.98	0.90	0.97	1.08	1.06	0.93	0.98	1.01
Romania	0.91	0.89	0.95	0.91	1.04	0.96	1.01	0.98	0.88	0.89
Slovakia	0.94	0.87	0.98	0.93	1.00	0.98	1.02	0.97	0.89	0.88
Slovenia	0.93	0.85	0.94	0.88	1.00	1.00	1.04	0.97	0.88	0.91
Spain	0.98	0.98	0.95	0.89	0.95	1.03	1.05	0.90	0.97	0.99
Sweden	0.93	0.91	0.99	0.95	0.96	0.96	0.94	0.92	0.93	0.93
United Kingdom	0.92	0.96	0.99	0.93	0.93	0.93	0.92	0.90	0.91	0.98
EU-27	0.93	0.90	0.97	0.93	0.98	0.97	0.97	0.93	0.91	0.92
EU-15	0.94	0.91	0.97	0.93	0.96	0.97	0.96	0.92	0.91	0.94

Source: Eurostat website downloaded in March 2010:

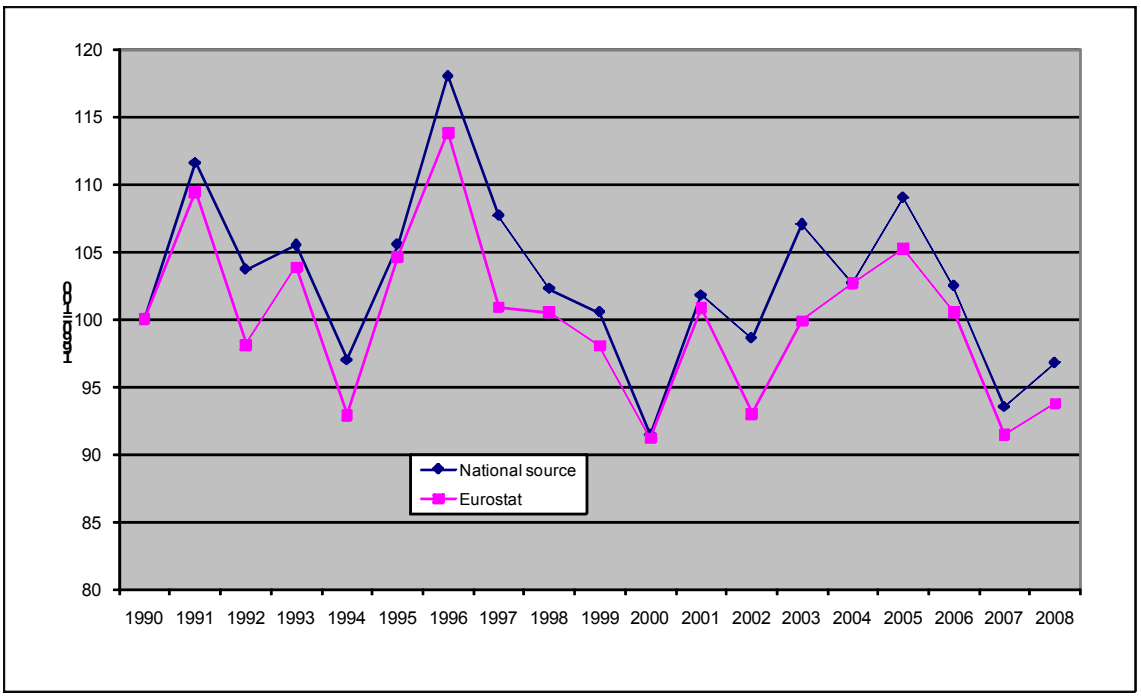
http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/database

Eurostat heating degree days versus national heating degree days

It is important to note that the heating degree days depend on the assumptions made for calculating the indicator, i.p. the assumptions from which outdoor temperature onwards heating is needed (marginal heating temperature). Eurostat has used the same definition for all EU Member States, but the Member States themselves may use other definitions (according to national circumstances). In many cases different definitions will have only marginal impacts on the annual change of heating degree days but in some cases the message can be fundamentally different. This can be shown for Austria. Austria uses 20°C as reference temperature (instead of 18°C used by Eurostat) and 12°C as marginal heating temperature (instead of 15°C used by Eurostat). Figure 19 shows that for most years the annual changes are very similar but for the year 2004 there is a striking difference: Eurostat heating degree days suggest that 2004 was a colder year than 2003, whereas the Austrian heating degree days suggest that it was warmer. As the national heating degree days take into consideration national circum-

stances the project team suggests that for increasing the carry forward rate Member States should use national heating degree days, if available.

Figure 19: Annual change of heating degree days for Austria according to Eurostat and national method (1990=100)



Definition of an extreme year

When defining an extreme year it has to be noted first, that each Member State needs to be treated separately because of the large differences in meteorological conditions across Member States. A cold winter in Italy may be a rather mild winter in Finland. Second, there are various methods to use statistical measures for defining extreme values. Two common measures for the dispersion of data are the standard deviation and the percentiles.

(1) The standard deviation shows how much variation there is from the "average" (mean) value. A low standard deviation indicates that the data points tend to be very close to the mean, whereas high standard deviation indicates that the data is spread out over a large range of values. Assuming a normal distribution about 68 % of the values are within the range of +/- one standard deviation; about 95 % fall within the range of +/- two standard deviations.

(2) A percentile (or centile) is the value of a variable below which a certain percent of observations fall. So the 10th percentile is the value below which 10 percent of the observations may be found.

The following tables show for each Member State the years with heating degree days above a certain threshold: one standard deviation, two standard deviations, 90th percentile, 95th percentile. Two observations are obvious:

(1) For most countries the years 1991 and 1996 are the coldest years. Recent years do not fall among the very cold years. This is consistent with the general trend towards warmer winters due to global warming.

(2) Table 31 identifies two years per country, Table 32 identifies one year per country irrespective of the distribution of the values. In contrast to this the analysis based on the standard deviations may yield more years or no year for one country depending on the distribution of the values.

The project team proposes to use the method with heating degree days of more than the mean value + two standard deviations (as indicated in Table 30). This method does not provide too many years per country and it also considers the distribution of the heating degree days. The period analysed is also important for the determination of extreme events. It is proposed to use the period 1990-2009 as in the example calculations in this section which seems to be sufficiently long to identify rather few yeas as exceptionally cold.

Table 29: Years with heating degree days of more than the mean value + one standard deviation (SD)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU-27		SD		SD			SD													
EU-15		SD		SD			SD													
Belgium		SD					SD													
Bulgaria		SD					SD	SD						SD						
Czech Republic		SD					SD													
Denmark				SD			SD													
Germany		SD					SD													
Estonia				SD	SD		SD													
Ireland		SD	SD	SD			SD													
Greece		SD	SD				SD	SD												
Spain		SD	SD	SD												SD				
France		SD		SD			SD													
Italy		SD														SD				
Cyprus			SD	SD																
Latvia				SD	SD		SD													
Lithuania				SD			SD													
Luxembourg		SD					SD													
Hungary		SD					SD	SD						SD						
Malta		SD	SD													SD				
Netherlands		SD		SD			SD													
Austria		SD					SD													
Poland							SD													
Portugal		SD		SD											SD					
Romania				SD			SD	SD						SD						
Slovenia		SD					SD									SD				
Slovakia		SD					SD													
Finland				SD	SD		SD		SD											
Sweden		SD				SD	SD		SD											
United Kingdom		SD		SD			SD													

Table 30: Years with heating degree days of more than the mean value + two standard deviations (2SD)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU-27							2SD													
EU-15							2SD													
Belgium							2SD													
Bulgaria																				
Czech Republic							2SD													
Denmark							2SD													
Germany							2SD													
Estonia							2SD													
Ireland																				
Greece		2SD																		
Spain																				
France		2SD					2SD													
Italy		2SD																		
Cyprus			2SD																	
Latvia							2SD													
Lithuania							2SD													
Luxembourg							2SD													
Hungary																				
Malta		2SD																		
Netherlands							2SD													
Austria							2SD													
Poland							2SD													
Portugal																				
Romania																				
Slovenia		2SD																		
Slovakia							2SD													
Finland																				
Sweden							2SD													
United Kingdom							2SD													

Table 31: Years with heating degree days above the 90th percentile (90P)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU-27		90P					90P													
EU-15		90P					90P													
Belgium		90P					90P													
Bulgaria							90P							90P						
Czech Republic		90P					90P													
Denmark				90P			90P													
Germany		90P					90P													
Estonia				90P			90P													
Ireland		90P		90P																
Greece		90P						90P												
Spain		90P		90P																
France		90P					90P													
Italy		90P														90P				
Cyprus			90P	90P																
Latvia					90P		90P													
Lithuania				90P			90P													
Luxembourg		90P					90P													
Hungary		90P					90P													
Malta		90P	90P																	
Netherlands		90P					90P													
Austria		90P					90P													
Poland				90P			90P													
Portugal		90P		90P																
Romania							90P	90P												
Slovenia		90P					90P													
Slovakia		90P					90P													
Finland					90P				90P											
Sweden							90P		90P											
United Kingdom				90P			90P													

Table 32: Years with heating degree days above the 95th percentile (95P)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU-27							95P													
EU-15							95P													
Belgium							95P													
Bulgaria							95P													
Czech Republic							95P													
Denmark							95P													
Germany							95P													
Estonia							95P													
Ireland				95P																
Greece		95P																		
Spain				95P																
France		95P																		
Italy		95P																		
Cyprus			95P																	
Latvia							95P													
Lithuania							95P													
Luxembourg							95P													
Hungary							95P													
Malta		95P																		
Netherlands							95P													
Austria							95P													
Poland							95P													
Portugal		95P																		
Romania							95P													
Slovenia		95P																		
Slovakia							95P													
Finland									95P											
Sweden							95P													
United Kingdom							95P													

11.2.4 Substantially increased GHG emissions due to extreme meteorological conditions

The second condition in order to make use of an increased carry forward rate is that greenhouse gas emissions increased substantially due to extreme meteorological conditions. As mentioned above cold winters affect CO_2 emissions from direct fossil fuel use for heating purposes in households and other buildings (e.g. offices, other commercial buildings e.g. factories, hospitals, schools, etc). In terms of CRF source categories mainly the source categories 1A4a 'Commercial/Institutional' and 1A4b 'Residential' are relevant. However, also other CRF source categories include CO_2 emissions from heating e.g. 1A4c 'Agriculture/Forestry/Fisheries' including farms and greenhouses or 1A2 'Manufacturing Industries and Construction' including factories. As these source categories are very heterogeneous the link between temperature variations and CO_2 emissions is not as close as for source categories 1A4a 'Commercial/Institutional' and 1A4b 'Residential'. In addition it has to be noted that cold winters do not affect CO_2 emissions to the same extent across all countries. It has been shown in Table 27 above that the heating degree days are very diverse across Member States with the lowest values for the Mediterranean countries.

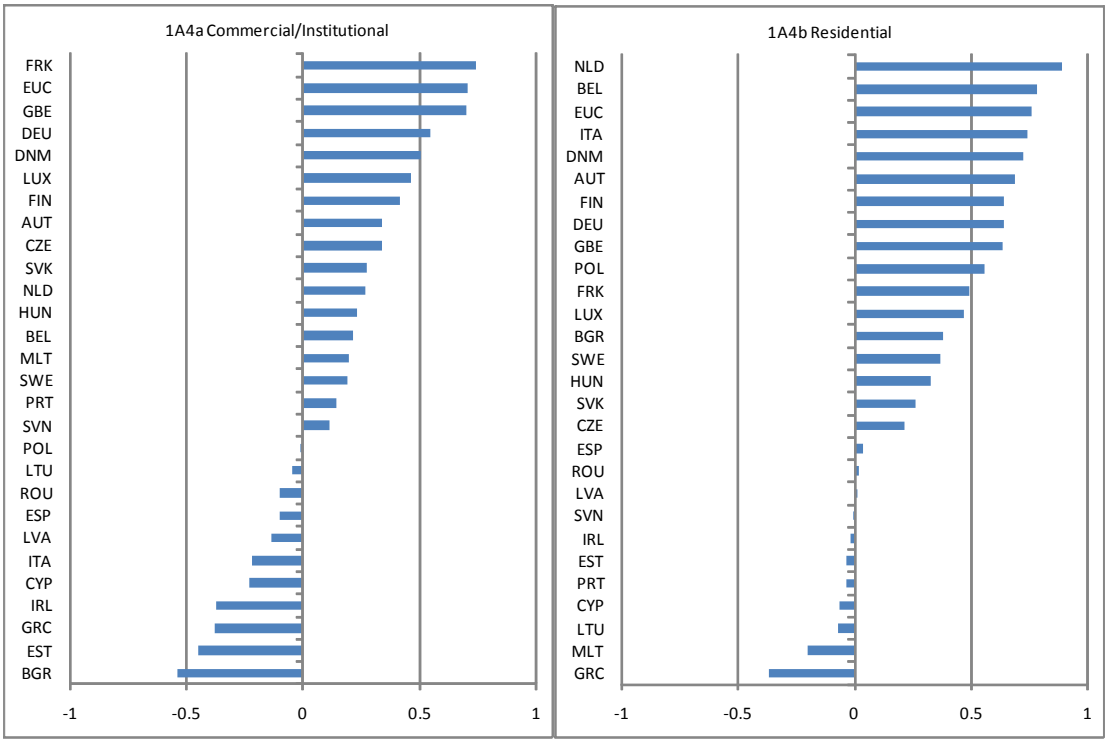
Figure 20 examines the correlation between CO_2 emissions and heating degree days for CRF categories 1A4a 'Commercial/Institutional', 1A4b 'Residential', and 1A4c 'Agriculture/Forestry/Fisheries'. The figure shows that:

(1) The highest correlation between CO_2 emissions and heating degree days can be observed for 1A4b 'Residential', the lowest for 1A4c 'Agriculture/Forestry/Fisheries'. Ten Member States show a correlation coefficient of more than 0.5 for 1A4b 'Residen-

tial' whereas for source categories 1A4a 'Commercial/Institutional' and 1A4c 'Agriculture/Forestry/Fisheries' four respectively five Member States show a correlation coefficients of more than 0.5.

(2) For several Member States no correlation between CO_2 emissions and heating degree days can be observed. One reason is that for some Member States (in particular the Mediterranean countries) cold winters do not trigger higher needs for heating because the need for heating is low anyway. One other reason for no or little correlation between CO_2 emissions and heating degree days seems to be the importance of renewable energies, district heating and electricity in total final energy consumption for heating purposes (e.g. for the Baltic countries).

Figure 20: Correlation coefficients between CO2 emissions and heating degree days for CRF categories 1A4a 'Commercial/Institutional', 1A4b 'Residential', and 1A4c 'Agriculture/Forestry/Fisheries'.



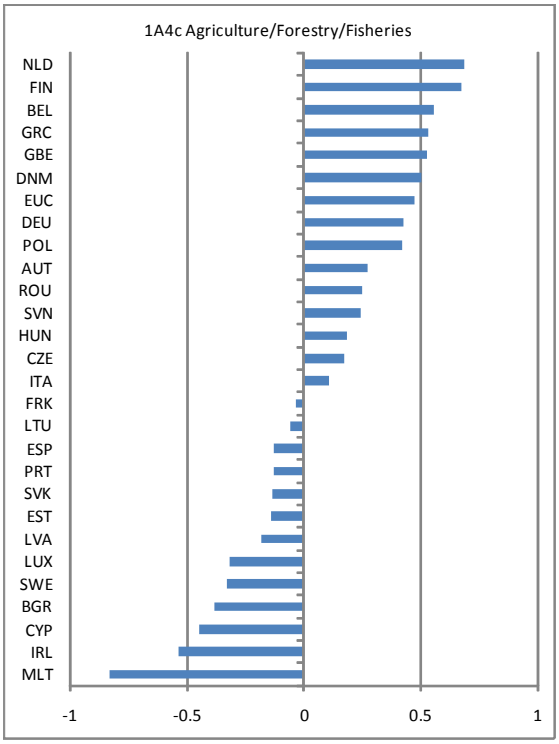


Table 33 shows that eleven Member States show a correlation coefficient of more than 0.5 for any of the three source categories mentioned. The project team proposes that these Member States should be allowed to increase the carry forward rate in case of extreme meteorological conditions.

Even in these Member States fuel consumption for heating purposes and temperatures do not necessarily completely correlate in the same way for all years of a time series because fuel prices may also be an important factor for the purchase of fuel oil. Thus fuel oil purchases can be high in warm years when prices are down and may be low in cold years with high fuel prices because fuel stocks are preferably consumed. As inventory estimates are based on the amounts of fuel sold and not the amounts actually emitted such strategic purchases may increase or decrease the temperature effects.

Thus, the analysis to allow an increased carry forward rate should also require Member States to develop a decomposition analysis of factors influencing the emissions in CRF categories 1A4a 'Commercial/Institutional', 1A4b 'Residential', and 1A4c 'Agriculture/Forestry/Fisheries' which shows the individual contribution of separated factors for particular years. Such decomposition analysis would also be helpful as part of the Member States' report to the Commission substantiating the request for an increased carry forward rate.

Table 33: Overview of Member States with correlation coefficients of more than 0.5 for CO_2 emissions and heating degree days

	1A4a Commercial / Institutional	1A4b Residential	1A4c Agriculture / Forestry / Fisheries	1A4a or 1A4b or 1A4c
AUT	No	Yes	No	Yes
BEL	No	Yes	Yes	Yes

BGR	No	No	No	No
CYP	No	No	No	No
CZE	No	No	No	No
DEU	Yes	Yes	No	Yes
DNM	Yes	Yes	Yes	Yes
ESP	No	No	No	No
EST	No	No	No	No
FIN	No	Yes	Yes	Yes
FRK	Yes	No	No	Yes
GBE	Yes	Yes	Yes	Yes
GRC	No	No	Yes	Yes
HUN	No	No	No	No
IRL	No	No	No	No
ITA	No	Yes	No	Yes
LTU	No	No	No	No
LUX	No	No	No	No
LVA	No	No	No	No
MLT	No	No	No	No
NLD	No	Yes	Yes	Yes
POL	No	Yes	No	Yes
PRT	No	No	No	No
ROU	No	No	No	No
SVK	No	No	No	No
SVN	No	No	No	No
SWE	No	No	No	No
EUC	Yes	Yes	No	Yes

11.2.5 Conclusions

The proposal of the project team for increasing the carry forward rate due to extreme meteorological conditions as outlined in the two sections above can be summarised as follows:

(1) Only extremely cold winters reflected in corresponding heating degree days can be taken into account.

(2) The heating degree days must be higher than the mean + two standard deviations for the period 1990 to year x-1 using country specific heating degree days, where available. In the case that there are no country-specific heating degree days available Eurostat data should be used.

(3) Only those Member States are allowed to increase the carry forward rate for which the emissions increase substantially due to extremely cold winters. The list of these Member States is reflected in Table 33. For this purpose a decomposition analysis of GHG emissions in relevant sectors should be submitted which separates relevant factors for the development of GHG emissions. Such requirement could be further specified in the revised Implementing Provisions.

Finally it has to be decided if there is a limit for the increase of the carry forward rate. The Effort Sharing Decision does not mention such a limit, therefore, the project team does not make a proposal for such a limit. In addition, as it is about carrying forward certificates the countries need to submit the certificates in the following years. Therefore, the countries do not have an incentive to carry forward as many certificates as possible and the decision about the number of certificates to be carried forward could be left to the countries.

11.3 Reporting on adaptation action

The European Commission's White Paper on 'Adapting to climate change: Towards a European framework for action' (April 2009) set out a framework to reduce the EU's vulnerability to the impacts of climate change. In order to take forward the actions of the White Paper reporting on the progress by Member States in implementing adaptation actions is needed. In the course of the project the the Network of European Environmental Protection Agencies (EPA) submitted a Position paper on the 2009 White paper on adaptation to the Commission with proposals for possible future reporting on adaptation.[48] European Environment Agency (EEA) proposed reporting requirements for an integrated and coherent framework for the monitoring and reporting by Member States on their adaptation activities. This proposal includes the following reporting requirements by Member States:

1. Reporting on the existing national adaptation plans and/or strategies, or those in preparation. This should include providing information on when such plans were developed or are expected to be developed, as well as their objectives.

2. Reporting on the institutional and legal framework for adaptation activities. This should include providing information on which national ministries and agencies have been given the mandate to undertake climate change adaptation activities. It should also include providing information on any national laws and/or regulatory measures that facilitate climate change adaptation activities.

3. Reporting on key climatic vulnerabilities, based on risk assessments, for instance, by region and sector.

4. Reporting on national (and European) research programmes and databases that address climate change adaptation and risk assessments. Identify links to these programmes and databases in order to avoid duplication.

5. Reporting on policies and measures that are undertaken as adaptation activities (both implemented and proposed). The information on policies and measures should include, where possible and relevant:

> a) Objectives of the measure: For example, is the main objective of the measure to proactively reduce the risks of, and sensitivity to any climatic change, or to mitigate damages following an extreme climatic event, or to capitalise or benefit from a changing climate? Or is the main objective to raise national public awareness on climate change and climate change adaptation?
>
> b) Aims and targeted sectors of the measure: Which sector or issue domain is the policy measure addressing? These could include, for example:

[48] EPA, 2009: Position Paper by the Network of European Environmental Agencies (EPA) on the EU While Paper 'Adapting to climate change: towards a European Framework for Action', annex

i. Coastal zone and water management (incl. water quality);

ii. Energy, security of supply;

iii. Biodiversity and ecosystem management;

iv. Health and disease management (human and animal);

v. Pollution control (implications for other pollution from climate change);

vi. Agriculture and food security;

vii. Financial markets and institutions;

viii. Overseas development cooperation.

c) Type of (policy) instrument/method of implementation: How will a measure be implemented, such as, for example, a tax regulation?

d) Key stakeholders involved

e) Elements of the adaptation strategies and plans that are covered by the policies and measures

f) Possible links to existing (European and national) regulations/policies

g) Implementing scale of the instrument: Is the measure implemented nationally, regionally or locally?

h) Duration and target dates and deadlines: Implementation date of the measure and its duration.

i) Budgetary and financial implications of the measure.

6. Reporting on joint activities with other Member States and developing countries, including joint implementation of measures, research activities or agreements. Again, tune this to other reporting activities, to avoid duplication.

This proposal was taken into account in developing new reporting requirements related to adaptation for the revised Monitoring Mechanism Decision which are covered by Article. 3(bis)(1)(h).

12 Task 9: Analysis of legal instrument

The following colour coding has been used to better identify the changes to the different themes that are addressed in the revised Monitoring Mechanism Decision:

Black: unchanged text from Decision No 280/2004/EC
Red: change related to Decision No 406/2009/EC
Blue: change related to recommendation to previous project on revision of the Monitoring Mechanism Decision and changes due to comments received.
Light green: Change related to streamlining of reporting requirements
Orange: Change related to improved reporting on projections
Pink: Change related to the ETS Directive (Directive 2009/29/EC)
Violet: Change related to the introduction of monitoring and reporting requirements for maritime emissions
Brown: Change related to the reporting of the full climate impact of aviation
Dark red: Change related to reporting on climate change impacts and adaptation
Dark turquoise: Change related to the reporting on financial support
Dark green: Change related to the reporting related to LULUCF

The revised text below also shows all deletions compared with the existing Decision 280/2004/EC. Changes that are not triggered by one of the purposes for the revision have been avoided, however this also means that legal drafting of the existing decision has not been improved, recognizing that there are potential areas for improvements. However, additional changes improving the existing text apart from the outspoken objectives may also lead to additional discussions and misunderstandings with Member States in the revision process.

12.1 Recitals for revised legal text for Decision 280/2004/EC

Whereas:

(1) Council Decision No 280/2004/EC of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol[49] established a mechanism for monitoring anthropogenic greenhouse gas emissions by sources and removals by sinks, evaluating progress towards meeting commitments in respect of these emissions and implementing monitoring and reporting requirements under the UNFCCC and the Kyoto Protocol in the European Union. In order to take into account recent developments under the European Union legislation, the need to establish enhanced assessment and review procedures of greenhouse gas emissions and removals, policies and measures and projections, the need to improve coherence of reporting under different legislative acts and the experiences with the

[49] OJ L 49, 19.2.2004, p. 1

implementation of Decision 280/2004/EC, it is appropriate for that Decision to be replaced.

(2) The Climate and Energy package adopted in 2009, in particular Decision No 406/2009/EC of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the EU's greenhouse gas emission reduction commitments up to 2020[50] and Directive 2009/29/EC of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the EU[51] introduced new requirements as regards monitoring and reporting of revenues from auctioning of allowances. These changes relate to the annual assessment of Member States' compliance, the review and verification of emissions, the use of flexibilities, reporting on policies and measures, to differentiating between the ETS and non-ETS sectors and the reporting on the use of auctioning revenues.

(3) Decision No 406/2009/EC sets out annual limitations of greenhouse gas emissions which follow a linear path from 2013 to 2020 and significantly enhances the current system from an annual reporting cycle to an annual compliance cycle, including a number of flexibilities for Member States to comply with the yearly targets. The timeline and specifications for each step of this cycle mark a significant change in procedures. Such annual compliance system requires a self-standing EU review process of Member States' greenhouse gas inventories to be performed in a shorter time frame than the current United Nations Framework Convention on Climate Change (UNFCCC) inventory review to provide for an compliance assessment at the end of each year. A functioning annual compliance cycle also needs the specification of procedural steps from the submission of data, the review of data, the assessment of compliance and the decision on any potential corrective action taken that provide clarity on information exchange between Member States and the Commission.

(4) Directive 2009/29/EC and Directive 2008/101/EC of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community [52] have introduced reporting requirements on the use of auctioning revenues that should ensure that at least 50 per cent of the proceeds from the auctioning of allowances or the equivalent in financial value of these revenues should be used for the purpose of one or more of the activities referred to in Article 10(3) of Directive 2003/87/EC as amended by Directive 2009/29/EC.

(5) The experience gained with the implementation of Decision 280/2004/EC revealed that there is a lack of transparency for specific types of information, that

[50] OJ L 140, 5.6.2009, p. 136
[51] OJ L 140, 5.6.2009, p. 36
[52] OJ L 8, 13.1.2009, p. 3

national systems for estimation and reporting of information should be enhanced and that improved methodological guidance will enhance the comparability of the information provided.. These experiences require changes in relation to the harmonization of information, improved methodological information or the establishment of national systems for reporting of projections and policies and measures.

(6) An assessment of the information available on the effects of policies and measures and of Member States' projections at EU level is extremely difficult due to a lack of harmonized reporting, methodological information and background information. Enhanced information on policies and measures and projections is essential to support the Europe 2020 strategy. The requirement to establish national systems for mitigation policy evaluation and projections constitutes an elements to advance the implementation of improved information on policies and measures and projections. The Europe 2020 strategy leads to an integrated economic policy agenda which requires that further efforts be made with regard to the reporting of policies and measures as these will be more directly linked to the emission reductions targets agreed upon; that existing information and data streams be clearly identified; and that synergies with other on-going domestic and international processes be developed.

(7) The problems identified with the implementation of Decision 280/2004/EC also relate to the need to increase the synergies in reporting under different legal acts. The Decision covers cross-cutting areas with the reporting under Directive 2009/29/EC, with the reported information in the European Pollutant Release and Transfer Register (E-PRTR) pursuant to Regulation (EC) No 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC[53], with the emissions reported under Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants (NEC Directive)[54], the reporting under the Regulation No 842/2006 of 17 May 2006 on certain fluorinated greenhouse gases[55] and the data submitted under Regulation No 1099/2008 of 22 October 2008 on energy statistics[56]. While streamlining of substantial reporting requirements will depend on modifications of the individual legal instruments, the use of consistent data for the reporting of greenhouse gas emissions is an essential element for the quality of European greenhouse gas emission inventories and verification of data consistency is essential for the quality of reporting of emissions under the different legal instruments.

[53] OJ L 33, 4.2.2006, p. 1
[54] OJ L 309, 27.11.2001, p. 22
[55] OJ L 161, 14.6.2006, p.1
[56] OJ L 304, 14.11.2008, p. 1

(8) Nitrogen trifluoride (NF_3) is a gas for which the Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) identified a very high Global Warming Potential of 17,200. Thus relative small amounts released in the atmosphere can have a large impact on temperature increase. NF_3 is used in the electronics industry (semiconductor industry, LCD panel manufacture, flat panel screens and for thin-film photovoltaic cells) for plasma etching and chamber cleaning processes. It is increasingly a replacement for PFCs and SF_6 which are covered under the Kyoto Protocol. The precautionary principle requires the monitoring of this substance in order to assess the level of emissions already released in the EU and to assess the need to take action to reduce emissions of NF_3.

(9) Aviation has an impact on the global climate through releases of carbon dioxide, nitrogen oxides, water vapour and sulphate and soot particles. The IPCC has estimated that the total climate impact of aviation is currently two to four times higher than the effect of its past carbon dioxide emissions alone. Recent Commission research indicates that the total climate impact of aviation could be around two times higher than the impact of carbon dioxide alone. However, none of these estimates takes into account the highly uncertain cirrus cloud effects. In accordance with Article 191(2) of the TFEU, Union environment policy is to be based on the precautionary principle. Pending scientific progress, all impacts of aviation should be addressed to the extent possible. Monitoring and reporting requirements related to non-CO_2 emissions from aviation should be added to allow the determination of the impacts and the assessment of the need for policy developments in this area.

(10) In the event that no international agreement which includes international maritime emissions in its reduction targets through the International Maritime Organisation has been approved by the Member States or no such agreement through the UNFCCC has been approved by the Union by 31 December 2011, the Commission should make a proposal to include international maritime emissions in the European Union reduction commitment with the aim of the proposed act entering into force by 2013. Such a proposal should minimise any negative impact on the Union's competitiveness while taking into account the potential environmental benefits. Monitoring and reporting of greenhouse gas emissions from the maritime sector are necessary to prepare and implement such instrument for emissions reductions.

(11) Improved information on climate change impacts, vulnerability and adaptation from Member States is necessary to understand how advanced Member States are in adapting to climate change and what actions they are undertaking. This information is important for the development of a comprehensive European adaptation strategy following the White paper on 'Adapting to climate change: Towards a European framework for action'. The information on adaptation will also assist Member States in evaluating and comparing the level to which they

are prepared for future climate changes as well as to disseminate best practices related to adaptation action.

(12) At the 15th Conference of the Parties under the United Nations Framework Convention on Climate Change in Copenhagen, the Union committed to substantial climate financing to support adaptation and mitigation action in developing countries. Information from Member States on financial flows is key to ensure accurate aggregate information for the Union and monitoring of the commitment made at Union level. Reporting on technology activities should also be enhanced in order to provide transparent and comparable information for recognition of the Union's actions and support.

(13) A number of technical elements related to the reporting of greenhouse gas emissions in greenhouse gas inventories such as global warming potentials, the scope of greenhouse gases reported and the methodological guidance from the Intergovernmental Panel on Climate Change to be used for the estimation of national greenhouse gas inventories are currently discussed under the UNFCCC. Revisions of these methodological elements under the UNFCCC and subsequent recalculations of time series of greenhouse gas emissions may change the level and trends of greenhouse gas emissions. It is essential that inventories in the Union are consistent with inventories submitted under the UNFCCC. The Commission should monitor such developments at international level and propose revisions to the decision, as appropriate, to ensure consistency between EU greenhouse gas inventories and UNFCCC inventories which may also affect the establishment of final targets under Decision No 406/2009/EC..

(14) The European Environment Agency assists the Commission, as appropriate, with monitoring and reporting activities, especially in the ambit of the Union inventory system, in the preparation of the Union's inventory and approximated inventory, in the review of Member States' inventories, the assessment of biennial information, the evaluation of progress towards the fulfilment of the emission reduction commitments and in quality assurance and quality control activities of the information submitted to the Commission and the information compiled for the Union in line with its mission to provide sound and independent information on the environment.

(15) Since the objectives of the proposed action, namely to comply with the Union's commitments under the UNFCCC and the Kyoto Protocol and the commitments under Decision No 406/2009/EC, in particular the monitoring and reporting requirements laid down therein, cannot, by their very nature, be sufficiently achieved by the Member States and can therefore be better achieved at Union level, the Union may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 TEU. In accordance with the principle of proportionality, as set out in that Article, this Decision does not go beyond what is necessary in order to achieve those objectives.

(16) The measures necessary for the implementation of this decision should be adopted in accordance with Regulation (EU) No 181/2011 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission.

12.2 Revised legal text for Decision 280/2004/EC

Article 1 - Subject matter

1. This Decision establishes a mechanism for:

(a) monitoring all anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol on substances that deplete the ozone layer in the Member States;

(b) monitoring, reporting, review and verification of greenhouse gas emissions and other information pursuant to Article 6 of Decision No 406/2009/EC[57];

(c) evaluating progress towards meeting greenhouse gas emission reduction commitments of the Union and of its Member States including progress by the Member States towards meeting their obligations under Decision No 406/2009/EC ~~in respect of these emissions by sources and removals by sinks~~;

(d) implementing the UNFCCC and the Kyoto Protocol, as regards national programmes, policies and measures, greenhouse gas inventories, national projections, the use of greenhouse gas emission reduction credits, national systems and registries of the Union ~~Community~~ and its Member States, the relevant procedures under the Kyoto Protocol and the support provided to developing countries;

(e) monitoring and reporting of the use of revenues generated from the auctioning of allowances pursuant to Article 10 (3) of Directive 2003/87/EC;

(f) monitoring and reporting of climate change impacts, vulnerability and adaptation to climate change;

(g) ensuring the timeliness, completeness, accuracy, consistency, comparability and transparency of reporting by Member States to the Commission and by the European Union ~~Community~~ and its Member States to the UNFCCC Secretariat.

[57] OJ L 140, 5.6.2009, p. 36

2. This Decision shall apply to:

(a) greenhouse gases listed in the Annex from sectors and source and sink categories covered by national greenhouse gas inventories under the UNFCCC and emitted from the territory of the Member States in accordance with Article 52 of the Treaty of the European Union and Article 355 (1) of the Treaty on the Functioning of the European Union.

(b) greenhouse gas emissions from marine vessels calling at Member States' seaports.

(c) the reporting of the non-CO_2 climate impacts from national and international aviation.

Article 1 ter - Definitions

For the purposes of this Decision, the following definitions shall apply:

(a) '**adjustment'** means corrections of the national greenhouse gas inventory estimates performed in the context of the review pursuant to Article 4quant when submitted inventory data are incomplete and / or are prepared in a way that is not consistent with the IPCC Guidelines and intended to replace originally submitted estimates for the purpose of the assessment of compliance with the annual emission allocation under Decision No 406/2009/EC;

(b) **'assigned amount'** means the amount of greenhouse gas emissions in tonnes of carbon dioxide equivalent equal to the emission levels determined pursuant to the third paragraph of Article 3 of Decision 2002/358/EC and the Kyoto Protocol;

(c) **'assigned amount unit' or 'AAU'** means a unit issued by Member States corresponding to their emission levels determined pursuant to Decision 2010/778/EU[58] and the Kyoto Protocol and is equal to one metric tonne of carbon dioxide equivalent, calculated using global warming potentials as defined in Decision 2/CP.3;

(d) '**certified emission reduction'** or 'CER' means a unit issued pursuant to Article 12 of the Kyoto Protocol and the relevant decisions adopted under the UNFCCC and the Kyoto Protocol;

(e) **'Clean Development Mechanism'** means a mechanism pursuant to Article 12 of the Kyoto Protocol that allows Annex I Parties to purchase emission allowances from projects in non-Annex I Parties that reduce or remove emissions. The emission allowances from CDM projects are called CERs;

(f) **'climate change adaptation-related aid'** means support for activities in developing countries that are intended to reduce the vulnerability of human or natural systems

[58] OJ L322, 16.12.2010, p. 41

to the impacts of climate change and climate-related risks, by maintaining or increasing adaptive capacity and resilience;

(g) **'climate change mitigation-related aid'** means support for activities in developing countries that contribute to the objective of stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system by promoting efforts to reduce or limit greenhouse gas emissions or to enhance greenhouse gas sequestration;

(h) An '**emission reduction unit'** or 'ERU' means a unit issued pursuant to Article 6 of the Kyoto Protocol and the relevant decisions adopted under the UNFCCC or the Kyoto Protocol;

(i) **'ex-ante assessment of policies and measures'** means an evaluation of the projected future effects of a policy or measure.

(j) **''ex-post assessment of policies and measures'** means an evaluation of the past effects of a policy or measure conducted during or after completion of a policy intervention;

(k) **'Global Warming Potentials' or '**GWP' means the ratio of the radiative forcing of one kilogramme greenhouse gas emitted to the atmosphere to that from one kilogramme CO_2 over a period of 100 years;

(l) **'joint implementation'** means a mechanism pursuant to Article 6 of the Kyoto Protocol [mechanism that allows Annex I Parties to purchase emission allowances from projects in other Annex I Parties that reduce or remove greenhouse gas emissions. The emission allowances from JI projects are called emission reduction units (ERUs)];

(m) **'long-term CER' or 'lCER'** means a lCER as defined in Article 2 of Commission Regulation (EC) No 994/2008[59] [issued for an afforestation or reforestation project activity under the CDM which, subject to Decision 5/CMP.1 under the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, expires at the end of the emission reduction crediting period of the afforestation or reforestation project activity under the CDM for which it was issued];

(n) '**national inventory system'** means a system of institutional, legal and procedural arrangements established within a Member State for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and for reporting and archiving inventory information in accordance with Decision 19/CMP.1;

(o) '**national system for mitigation policy evaluation and projections'** of anthropogenic greenhouse gas emissions by sources and removals by sinks means all institutional, legal and procedural arrangements established within a Member State for

[59] OJ L 271, 11.10.2008, p.3.

the purpose of policy evaluation and the preparation of projections of greenhouse gas emissions by sources and removals by sinks;

(p) **'Quality Assurance' or 'QA'** means a planned system of review procedures conducted by personnel not directly involved in the compilation of greenhouse gas inventories and greenhouse gas projections and development processes to verify that data quality objectives are met, ensure that the inventory represents the best possible estimate of greenhouse gas emissions and sinks given the current state of scientific knowledge and data available, support the effectiveness of the quality control (QC) programme and assist Member States in improving their greenhouse gas inventories and projections;

(q) '**quality control'** or **'QC'** means is a system of routine technical activities to measure and control the quality of the information and estimates compiled. The QC system is designed to provide routine and consistent checks to ensure data integrity, correctness and completeness, to identify and address errors and omissions and to document and archive data and other material used and record all QC activities. Quality control activities include general methods such as accuracy checks on data acquisition and calculations and the use of approved standardized procedures for emission calculations, measurements, estimating uncertainties, archiving information and reporting. Higher tier QC activities also include technical reviews of source categories, activity and emission factor data, methods, models or other parameters used.

(r) **'registry'** means a registry established, operated and maintained to ensure the accurate accounting of the issue, holding, transfer, acquisition, cancellation and withdrawal of AAUs, RMUs, ERUs and CERs and the carry-over of AAUs, ERUs and CERs;

(s) **'removal unit' or 'RMU'** means a unit issued pursuant to Article 3 (3) and (4) of the Kyoto Protocol [. RMUs are equivalent to the net removals of anthropogenic greenhouse gases resulting from its activities under Article 3 (3), and its elected activities under Article 3 (4), accounted in accordance with Decision 16/CMP.1 under the Kyoto Protocol.;

(t) **'sensitivity analysis'** means an investigation of a model algorithm or an assumption to determine how sensitive (or stable) the estimated output data is to variations of its input data or underlying assumptions by varying input values or model equations and observing how the model output varies correspondingly;

(u) '**temporary certified emission reduction' or 'tCER'** means a tCER as defined in Article 12 of Commission Regulation (EC) No 994/2008; [issued for an afforestation or reforestation project activity under the CDM which, subject to Decision 5/CMP.1, expires at the end of the Kyoto Protocol commitment period following the period during which it was issued;]

(v) **'with additional measures projections'** means projections that include implemented and adopted policies and measures as well as planned policies and measures;

(w) **'with existing measures projections'** means projections that include implemented and adopted policies and measures;

(x) **'without measures projections'** means projections that exclude all policies and measures implemented, adopted or planned after the year chosen as the starting point for this projection.

Article 2 - National and EU low-emission development strategy~~Community programmes~~

Member States and the Commission shall devise and implement national low-emission development strategies ~~national programmes~~ and a Union strategy ~~Community programme~~ respectively, in order to contribute to:

(a) the fulfilment of the Union~~Community's~~ and its Member States' commitments relating to the limitation and/or reduction of ~~all~~anthropogenic greenhouse gas emissions under the UNFCCC and the Kyoto Protocol;

(b) meeting the greenhouse gas emission reduction commitments of Member States under Decision No 406/2009/EC and achieving long-term emission reductions and enhancements of removals by sinks in all sectors,

(c) transparent and accurate monitoring of the actual and projected progress made by Member States, including the contribution made by Union ~~Community~~ measures, in meeting the Union~~Community~~'s and its Member States' commitments relating to the limitation and/or reduction of anthropogenic~~all~~ greenhouse gas emissions under the UNFCCC and the Kyoto Protocol.

These strategies ~~programmes~~ shall include the information referred to in Article 3 and 3bis and shall be updated as appropriate.

~~2. To this effect, the use of joint implementation, the clean development mechanism and international emissions trading shall be supplemental to domestic action, in accordance with the relevant provisions of the Kyoto Protocol and the Marrakech Accords.~~

~~3. Member States shall make national programmes and updates thereof available to the public, and within three months of their adoption shall inform the Commission.~~

~~At subsequent meetings of the committee referred to in Article 9(1), the Commission shall inform the Member States of any such national programmes and updates thereof that it has received.~~

Article 3 - Annual Reporting by Member States

1. Member States shall, ~~for the assessment of actual progress and to enable the preparation of annual reports by the Community, in accordance with obligations~~

~~under the UNFCCC and the Kyoto Protocol,~~ determine and report to the Commission by 15 January each year (year X):

(a) their anthropogenic emissions of greenhouse gases listed in the Annex of this decision ~~A I the Kyoto Protocol~~ (carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3) during the year ~~before last (year~~ X-2~~)~~;

(b) ~~provisional~~ data on their emissions of carbon monoxide (CO), sulphur dioxide (SO_2), nitrogen oxides (NOx) and volatile organic compounds (VOC) during the year ~~before last (year~~ X-2~~)~~, ~~together with final data for the year three years previous (year~~ X-3~~)~~;

(c) their anthropogenic greenhouse gas emissions by sources and removals of carbon dioxide by sinks resulting from land-use, land-use change and forestry during the year ~~before last (year~~ X-2~~)~~;;

(d) their anthropogenic greenhouse gas emissions by sources and removals of carbon dioxide by sinks resulting from land use, land-use change and forestry activities under the Kyoto Protocol and information with regard to the accounting of these greenhouse gas emissions and removals from land use, land-use change and forestry activities, in accordance with Article 3(3) and, where a Member State decides to make use of it, Article 3(4) of the Kyoto Protocol, and the relevant decisions thereunder, for the years between ~~1990~~2008 and the year ~~before last (year~~ X-2). Member States that elected cropland management, grazing land management or revegetation under Article 3(4) of the Kyoto Protocol shall in addition report greenhouse gas emissions by sources and removals by sinks for each elected activity for the year 1990. If a new international agreement under the UNFCCC or a legislative act for the inclusion of land-use, land-use change and forestry in the Union's greenhouse gas emission reduction commitment pursuant to Article 9 of Decision No 406/2009/EC is adopted, any changes in the reporting and accounting provisions for LULUCF activities, such as related to the mandatory accounting of forest management, cropland management and grazing land management, the mandatory use of reference levels for the accounting of forest management, the mandatory estimation and reporting of changes in the harvested wood products pool, the voluntary reporting of emissions and removals from rewetting and drainage of wetlands and emissions and removals related to 'force majeure' events, shall be reported following the adoption of related decisions by the Council and the Parliament or under the UNFCCC, as applicable, and for the reporting years from 2013 onwards.

(e) greenhouse gas emissions from marine vessels with a weight of more than 500 gross tonnage (GT) calling at Member States' seaports during the year before last (year X-2) after the regulation pursuant to paragraph 4 has been adopted.

(f) non-CO_2 climate impacts of domestic and international aviation during the year X-2;

(g) information on annual indicators for the year ~~before last (year~~ X-2~~);~~ ~~and~~

(h) any changes to the information referred to in points (a) to (e) relating to the years between 1990 and the ~~year three years previous (~~year X-3~~)~~ and indicating the reasons for the recalculations performed;

(i) information from the national registry, ~~once established,~~ on the issue, acquisition, holding, transfer, cancellation, withdrawal and carryover of AAUs, RMUs, ERUs and CERs during the ~~previous year (~~year X-1~~);~~;]

(j) information on the qualitative criteria applied to, credits from project activities used in accordance with Article 5 of Decision No 406/2009/EC for the year X-1, in particular:

(i) indicating the way in which they ensured that their policies for purchasing credits enhanced the equitable geographical distribution of projects and

(ii) stipulating which of the four conditions provided in Article 5(5) of Decision No 406/2009/EC is applicable when they use additional credits pursuant to this paragraph.

(k) information on the use of joint implementation, the clean development mechanism and international emissions trading, pursuant to Articles 6, 12 and 17 of the Kyoto Protocol or any future flexible mechanism adopted by the Conference of the Parties under the UNFCCC, to meet their quantified emission limitation or reduction commitments pursuant to Article 2 of Council Decision 2002/358/EC (1) and the Kyoto Protocol or any future commitments under the UNFCCC and/or the Kyoto Protocol.

(l) quantitative and qualitative information on the use of revenues generated from the auctioning of allowances for the purposes specified in Article 10(3) of Directive 2003/87/EC[60] and in Article 3d(4) of Directive 2008/101/EC[61] for the previous year;

(m) a detailed justification for the use of credits from project types that cannot be used by operators in the EU emissions trading scheme pursuant to Article 6(2) of Decision 406/2009/EC.

(n) if Member States use credits from Union-level projects issued pursuant to Article 24a of Directive 2003/87/EC from those sectors covered by Decision 406/2009/EC towards their emission reduction commitments, they shall report how they avoided double-counting of emission reductions with emission reductions in national greenhouse gas inventories.

(m) a description of any changes to their national inventory system;

[60] OJ L 140, 5.6.2009, p. 63

[61] OJ L 8, 13.1.2009, p. 3

(n) a description of any changes of the national registry;

(o) ~~information on legal entities authorised to participate in mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol, in compliance with relevant national or Community provisions;~~

(p) information on steps taken to improve inventory estimates, in particular ~~for example where~~ in areas of the inventory that have been subject to adjustments or recommendations by the expert review;

(q) quantitative information on the amount of verified emissions reported by installations and operators under Directive 2009/29/EC[3] allocated to those source categories of the national greenhouse gas inventory that include such greenhouse gas emissions and the ratio of verified emissions to total reported greenhouse gas emissions in these source categories.

(r) results from verification activities checking the consistency of emissions reported in greenhouse gas inventories:

i. with verified emissions reported under Directive 2009/29/EC[3];

ii. with facility emissions reported to the E-PRTR;

(s) results from verification activities checking the consistency of activity data, background data and assumptions used in the estimation of greenhouse gas inventories:

i. with inventories of air pollutants reported under Directive 2001/81/EC[62];

ii. with data reported under Article 6 of Regulation No 842/2006[63];

iii. with energy data declared under Article 4 and in accordance with Annex B of the Regulation No 1099/2008[64].

(t) the elements of the national inventory report necessary for the preparation of the European Union ~~Community~~ greenhouse gas inventory report and the elements of the national inventory report necessary for the annual compliance cycle under Decision No 406/2009/EC, ~~such as information on the Member State's quality assurance/quality control plan, a general uncertainty evaluation, a general assessment of completeness, and information on recalculations performed~~;

2. Member States shall communicate to the Commission, by 15 March each year (year X):

(a) their complete updated national inventory report;

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[62] OJ L 309, 27.11.2001, p. 22

[63] OJ L 161, 14.6.2006, p.1

[64] OJ L 304, 14.11.2008, p. 1

(b) any updates of the data reported for the year X-2 by 15 January;

3. Implementing provisions for the reporting of the information referred to in paragraphs 1 and 2 shall be adopted in accordance with the procedure~~s~~ referred to in Article 9.

4. By [*date to be inserted*], the Commission shall adopt a regulation with guidelines for the monitoring and reporting of greenhouse gas emissions from marine vessels pursuant to paragraph 1(e). That measure shall be adopted in accordance with the procedure referred to in Article 9(2).

Article 3bis - Biennial reporting

1. Member States shall, ~~for the assessment of projected progress,~~ report to the Commission, by 15 March in every odd-numbered ~~2005 and every two~~ years ~~thereafter~~:

(a) information on ~~adopted and implemented~~ **national policies and measures**, as well as on the implementation of common and coordinated polices and measures which limit and/ or reduce greenhouse gas emissions by sources or enhance removals by sinks, ~~presented on a sectoral basis for each greenhouse gas,~~ including:

(i) the objective of the policy or measure and a short qualitative description of the policy or measure;

(ii) the type of policy instrument;

(iii) the status of implementation of the policy or measure differentiating between planned, adopted, implemented and expired policies and measures;

(iv) information that differentiates policies and measures into those targeting the emission trading sectors covered by Directive 2003/87/EC, those targeting the non-emission trading sectors covered by Decision No 406/2009/EC and policies and measures targeting both sectors;

(v) the greenhouse gases affected by the policy or measure;

(vi) indicators to monitor and evaluate progress with policies and measures over time, including those indicators specified in the implementing acts adopted pursuant to paragraph 3;

(vii) quantitative estimates of the effects of policies and measures on emissions by sources and removals by sinks of greenhouse gases ~~between the base year and subsequent years, including 2005, 2010 and 2015, including their economic impacts to the extent feasible; and~~ differentiated into:

(i) expected ex-ante effects of policies and measures between the actual reporting year and during a period of 20 years in the future. Quantitative esti-

mates shall be provided at least for five year intervals for the years ending with 0 and 5;

(ii) ex-post effects of those policies and measures with significant impacts on greenhouse gas emissions and removals between the actual reporting year and a past year before the implementation of the policy or measure. Quantitative estimates shall be provided at least for five year intervals for the years ending with 0 and 5.

If appropriate, policies and measures addressing the same emission source or removal categories could be clustered to policy packages for the quantification of effects.

(viii) descriptions of methodological approaches, models and underlying assumptions used for the quantification of effects of policies and measures reported pursuant to paragraph (vii);

(ix) quantitative estimates of the specific and absolute costs of the policies and measures;

(x) descriptions of methodological approaches, definitions of costs and underlying assumptions used for the estimation of costs of the policies and measures;

(xi) a description of the actual and expected interactions with other relevant policies and measures and with relevant Union policies and legislation;

(xii) a description of their national system for mitigation policy evaluation and projections pursuant to Article 4(7).

(b) the extent to which domestic action actually constitutes a significant element of the efforts undertaken at national level as well as the extent to which the use of joint implementation and the clean development mechanism and international emissions trading pursuant to Articles 6, 12 and 17 of the Kyoto Protocol is, in accordance with relevant decisions under the Kyoto Protocol, supplemental to domestic actions, in accordance with the relevant decisions under ~~provisions of~~ the Kyoto Protocol;

(c) **national projections** of greenhouse gas emissions by sources and removal by sinks between the actual reporting year and during a future period of 20 years. Quantitative estimates shall be provided at least for 5 year intervals for the years ending with 0 and 5; ~~as a minimum for the years 2005, 2010, 2015 and 2020~~, organized by gas (type?)and by sector. National projections shall include: ~~including:~~

i. a 'with existing measures' and a 'with additional measures' projection ~~such as mentioned in the guidelines of the UNFCCC and~~ as further specified in the implementing provisions adopted pursuant to paragraph 3;

ii. total GHG projections and separate estimates for the projected greenhouse gas emissions for the sectors covered by Directive

2003/87/EC and for the sectors covered by Decision No 406/2009/EC;

iii. a clear identification of the policies and measures included in the projections;

iv. results of a sensitivity analysis performed for the projections in all sectors; and

v. descriptions of methodologies, models, underlying assumptions and key input and output parameters for each sector.

(d) information on policies and measures being taken or planned for the implementation of relevant Union ~~Community~~ legislation and policies~~, and information on legal and institutional steps to prepare to implement commitments under the Kyoto Protocol~~ and information on the national compliance and enforcement procedures;

(e) information related to Article 6(1)(d) of Decision No 406/2009/EC on planned additional national policies and measures envisaged with a view to limiting anthropogenic greenhouse gas emissions beyond the commitments under Decision No 406/2009/EC and in view of the implementation of an international agreement on climate change.

(f) information on legal and institutional steps for the implementation of commitments under the Kyoto Protocol and commitments under Decision No 406/2009/EC ~~information on institutional and financial arrangements and decision making procedures to coordinate and support activities related to~~ including participation in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol~~, including the participation of legal entities.~~; and

(g) additional information on their low emission development strategies and the progress with the implementation of such strategies which is not yet covered by the reporting under paragraph 1(a) to (f).

(h) Information on climate change impacts, vulnerability to climate change, the adaptation strategy, and adaptation measures, in particular the following:

i. the observed and projected impacts per sector (addressing the following sectors: water management, agriculture and forests, biodiversity/nature protection (terrestrial, freshwater), coastal areas, marine (biodiversity) and fisheries, health (human, animal, plant), infrastructure (transport, energy, other), financial instruments and insurance, disaster risk reduction) and per impact category (addressing the following impact categories: floods, sea-level rise, droughts, increased frequency of extreme weather events) and related costs and benefits;

ii. the assessment of key vulnerabilities per region and per sector, including information on research programmes on vulnerability based on risk assessments;

iii. the national and/or regional adaptation strategy and implemented and planned adaptation measures for the relevant sectors, or those being prepared. This information should include the main objective, the type of instrument, the method of implementation, the duration and the budget allocation per sector and impact category;

iv. information on joint activities with other Member States and/or developing countries, including bilateral and multilateral projects on adaptation.

(i) Information for the year X-2 on financial support provided to developing countries under the UNFCCC. This information shall include:

i. an indication concerning the manner in which Member States have determined whether financial resources provided to developing countries are “new and additional” in the context of the UNFCCC and the Kyoto Protocol or any other agreements adopted under the UNFCCC;

ii. quantitative information on financial flows based on the Rio markers for climate change mitigation-related aid and climate change adaptation-related aid of the OECD Development Assistance Group (DAC) an methodological information concerning the implementation of the climate change Rio markers methodology;

iii. detailed information on the assistance provided to developing country Parties that are particularly vulnerable to the effects of climate change in meeting the costs of adaptation to those climate change effects, distinguishing between activities undertaken by the public and the private sector, where appropriate;

iv. detailed information on assistance provided for the purpose of mitigating greenhouse gas emissions in developing countries; distinguishing between activities undertaken by the public and the private sector, where appropriate;

v. information on any financial resources related to the implementation of the UNFCCC provided through bilateral, regional and other multilateral channels;

(j) information on activities related to technology transfer support provided to developing countries under the UNFCCC.

2. Implementing provisions for the reporting of the information referred to in paragraphs 1 and 2 shall be adopted in accordance with the procedure referred to in Article 9(2).

3. The Commission may, in accordance with the procedure referred to in Article 9(2), develop methodological guidelines for the ex-ante and ex-post quantification of the effects of policies and measures including recommendations for the reporting of methodological information.

4. The Commission may, in accordance with the procedure referred to in Article 9(2), develop methodological guidelines for projections of greenhouse gas emissions and removals including recommendations for the reporting of methodological information.

5. Member States shall provide the quantitative information referred to in the points (a), (c), (e) and (f) of Article 3 bis (1) using an electronic reporting format. The Commission shall, in accordance with the procedure referred to in Article 9(2), develop such electronic reporting format..

~~These implementing provisions may be revised, as appropriate, taking into account decisions taken under the UNFCCC and the Kyoto Protocol~~.

Article 3ter - Irregular reports

1. Pursuant to Article 3(3) of Decision No 406/2009/EC a Member State that requests an increased carry forward rate in the event of extreme meteorological conditions which have led to substantially increased greenhouse gas emissions shall submit a report substantiating this request together with the submission of the greenhouse gas inventory for the year in which the increased greenhouse gas emissions occurred.

2. Implementing provisions for the reporting of the information referred to in paragraph 1 shall be adopted in accordance with the procedure referred to in Article 9(2).

Article 3quant - National Communications

Member States shall submit their national communications under Article 12(2) of UNFCCC to the Commission [at the same date as required under the UNFCCC. If decisions for the submission of biennial reports are adopted under the UNFCCC, Member States shall also submit their biennial reports to the Commission at the same date as required under the UNFCCC..

Article 4 – Union ~~Community~~ and national inventory system

1. The Commission shall, in cooperation with the Member States, annually compile a Union ~~Community~~ greenhouse gas inventory and a Union ~~Community~~ greenhouse gas inventory report~~, circulate these in draft to the Member States by 28 February, and publish~~ and submit them to the UNFCCC Secretariat by 15 April each year.~~ Estimates for data missing from a national inventory shall be included in accordance with implementing provisions adopted pursuant to paragraph 2(b), unless updated data are received from Member States by 15 March of that year at the latest~~.

2. If a Member State does not submit complete inventory estimates required to compile the EU inventory by 15 March, the Commission shall prepare estimates for data re-

quired for the compilation of the Union inventory but not reported in Member States' inventories. The estimates shall be used for the corresponding reporting year and the relevant source categories. The methodologies used for this purpose shall be in line with the UNFCCC reporting requirements and IPCC methodologies.

3. The Commission, taking into account the national inventory systems of the Member States, shall maintain and continuously improve~~, adopt by 30 June 2006 at the latest,~~ a Union ~~Community~~ inventory system to ensure the accuracy, comparability, consistency, completeness and timeliness of national inventories with regard to the Union ~~Community~~ greenhouse gas inventory. This system shall provide for:

(a) a quality assurance/quality control programme including the establishment of quality objectives and an inventory quality assurance and quality control plan. The Commission shall provide assistance to Member States for the implementation of quality assurance/quality control programmes;

(b) a procedure for the estimation of data missing from a national inventory, including consultation with the Member State concerned; and~~.~~

(c) an annual internal review of Member States' national greenhouse gas inventories.

4. The European Environment Agency shall provide assistance to the Commission for the implementation of paragraphs 1, 2 and 3, as appropriate, in particular by compiling the Union inventory data and the Union inventory report, by conducting quality assurance and quality control procedures for the inventory,d by preparing estimates for missing data and conducting the internal review in accordance with the agency's annual work programme.

5. Member States shall~~, as early as possible and in any case by 31 December 2005 at the latest, establish~~ maintain and continuously improve national inventory systems ~~under the Kyoto Protocol~~ for the estimation of anthropogenic emissions of greenhouse gases by sources and removals of carbon dioxide by sinks.

6. The national inventory system of Member States shall ensure:

(a) access to data and methodologies reported for activities and installations under Directive 2003/87/EC to the competent authority for the purpose of preparing national greenhouse gas inventories to ensure consistency of reported greenhouse gas emissions under the emission allowance trading scheme of the Union and in greenhouse gas inventories;

(b) access to emission data collected in the reporting systems for fluorinated gases for the relevant sectors under Article 6(4) of Regulation No 842/2006[65] to the competent authority for the purpose of preparing national greenhouse gas inventories.

(c) that they make use of the reporting systems established under Article 6(4) of

[65] OJ L 161, 14.6.2006, p. 1

Regulation No 842/2006[66] to improve the estimation of fluorinated gases in the greenhouse gas inventories;

(d) access to emissions, underlying data and methodologies reported by facilities to the competent authority for the purposes of the E-PRTR);[67].

(e) continuous verification activities checking :

i. the consistency of emissions reported in greenhouse gas inventories with verified emissions reported under Directive 2009/29/EC and with emissions reported to the E-PRTR;

ii. the consistency of activity data, background data and assumptions used in the estimation of greenhouse gas inventories with inventories of air pollutants reported under Directive 2001/81/EC[68]; with data reported under Article 6 of Regulation No 842/2006[69] and with energy data declared under Article 4 and in accordance with Annex B of the Regulation No 1099/2008[70].

7. Member States shall establish by [*insert year*], maintain and continuously improve national systems for mitigation policy evaluation and projections. These national systems shall include all institutional, legal and procedural arrangements established within a Member State for policy evaluation and projections of greenhouse gases emissions by sources and removals by sinks. They shall be designed and operated:

(a) to ensure the transparency, consistency, completeness and accuracy of the information on effects of policies and measures and projections;

(b) to ensure the quality of the information on effects of policies and measures and projections through appropriate data collection and data selection, selection of methods and models, the implementation of quality assurance/quality control (QA/QC) activities, the implementation of sensitivity analysis and procedures for the verification of the estimates.

8. The Commission shall also establish, maintain and continuously improve national systems for mitigation policy evaluation and projections which shall provide for:

a. regular assessments of the ex-post and ex-ante effects of Union common and coordinated policies and measures on emissions by sources and removals by sinks of greenhouse gases and the costs of these policies and measures.

b. Regular preparation and updating of projections of greenhouse gas

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66 OJ L 161, 14.6.2006, p. 1

67 OJ L 33, 4.2.2006, p. 1.

68 OJ L 309, 27.11.2001, p. 22

69 OJ L 161, 14.6.2006, p.1

70 OJ L304, 14.11.2008, p. 1

emissions by sources and removals by sinks at EU level.

c. ensure the quality of the information on effects of policies and measures and projections through appropriate data collection and data selection, selection of methods and models, the implementation of quality assurance/quality control (QA/QC) activities, the implementation of sensitivity analysis and procedures for the verification of the estimates.

9. Implementing provisions for the reporting of the information referred to in this Article shall be adopted in accordance with the procedure referred to in Article 9(2).

Article 4bis - Review of annual information

1. The Commission shall perform an initial check of the annual data submitted by Member States under Article 3(1) for completeness and potential problems and communicate the results to Member States within 6 weeks after the submission deadline. Member States shall respond to any questions raised in the initial check by 15 March together with the final inventory submission for the year X-2.

2. The Commission shall annually conduct an expert review of the national inventory submitted by Member States under Article 3(2):

a. to verify the completeness, accuracy, consistency, comparability and transparency of the submitted information;

b. to identify cases in which submitted inventory data are incomplete and / or are prepared in a way that is not consistent with the IPCC Guidelines; and

c. to calculate adjustments of submitted emission and removal estimates in such cases.

3. The review shall start immediately following the submission of the national inventory reports and shall be completed by 15 October of the same year. The review shall regularly be performed in the form of a centralized desk review for each Member State and, where deemed necessary, in the form of a country visit in a Member State.

4. The review shall be conducted by review experts selected and coordinated and supervised by the Commission.

5. By [insert date] the Commission shall develop guidelines for the review of national inventories addressing procedures, timelines, the selection and qualifications of review experts, the scope of the review, the identification of problems, the calculation of adjustments and the reporting of the review.

6. After the completion of the inventory review, the Commission shall determine the final inventory data for the year X-2 for the determination whether a Member State exceeds the annual emission allocation pursuant to Decision No 406/2009/EC. The final inventory shall include all adjustments calculated during the review.

7. The EEA, Eurostat and the Joint Research Centre shall provide assistance to the Commission for the implementation of paragraphs 1 to 6 as appropriate in accordance with its annual work programme.

Article 4ter - Compliance calculation

1. Following the completion of the review pursuant to Article 4bis and the determination of final inventory data, Member States whose final adjusted greenhouse gas emissions are higher than their originally submitted greenhouse gas emissions may continue to use the flexibilities pursuant to Articles 3 and 5 of Decision No 406/2009/EC for the purpose of implementing their obligations under Article 3 of that Decision for the relevant year for a period of four weeks. Other Member States shall only continue to use these flexibilities to the extent that the transfer of emission credits from project activities or parts of their annual emission allocation does not result in their own non-compliance. Four weeks after the determination of final inventory data Member States accounts for the year under review shall be closed.

2. Within one month of the expiry of the period referred to in paragraph 1, the Commission shall make a final calculation of the greenhouse gas emissions of each Member State and determine whether the Member State has exceeded its annual emission allocation under Article 3(2) of Decision No 406/2009/EC. Where a Member State has exceeded its annual emission allocation, the Commission shall apply the corrective action pursuant to Article 7 of Decision No 406/2009/EC.

3. Where the Commission had previously applied the corrective action pursuant to Article 7 of Decision No 406/2009/EC to a Member State, it shall forthwith reinstate this Member State's eligibility to transfer part of its emission allocation and JI/CDM rights to another Member State once it decides that the Member State is in compliance with Article 3(2) of Decision No 406/2009/EC pursuant to paragraph 2 above. The Member State shall continue to implement its corrective action plan and report on annual progress in this implementation pursuant to paragraph 2 above until the full implementation of the plan.

If a Member State continuously or repeatedly exceeds its annual emission allocation specified pursuant to Article 3(2) of Decision No 406/2009/EC during the implementation of a corrective action plan, it shall report an update of the corrective action plan under implementation to take into account the most recent verified data and clearly indicating the additional action and the improvements that will be taken to achieve compliance.

Article 4 quant - Corrective action plan

1. The Commission shall [endeavour to] issue any opinion on the corrective action plan of a Member State submitted pursuant to Article 7(2) of Decision No 406/2009/EC within [two] months from the date of receipt of the plan. Where the Commission under-

takes to submit the corrective action plan to the Climate Change Committee for comments before issuing its opinion, it shall do so within one week from the date of receipt of the plan. The Climate Change Committee shall provide any comments within four weeks from the date of receipt of the plan.

2. The Member State concerned shall report on its annual progress in the implementation of the corrective action plan in the context of the national inventory reports to be submitted to the Commission pursuant to Article 3. To this end, these reports shall contain information on:

a. the status of implementation of the corrective action specified in the corrective action plan;

b. quantitative estimates of the effects of this action on greenhouse gas emissions;

c. any additional action that the Member State intends to implement; and

d. an updated timetable for the further implementation of the corrective action.

3. The information on annual progress in the implementation of the corrective action plan of a Member State shall be reviewed as part of the annual review pursuant to Article 4bis.

Article 4quint – Assessment of biennial information

1. Every two years, the Commission shall assess the biennial information submitted by Member States under Article 3bis to verify the completeness, accuracy, consistency, comparability and transparency of the submitted information,

2. The assessment shall start immediately following the submission of the biennial information and shall be completed by [*date to be inserted*] of the same year. The assessment shall regularly be performed in form of quality assurance / quality control checks for each Member State, addressing in particular the information on policies and measures and projections.

3. The EEA shall provide assistance to the Commission for the implementation of paragraphs 1 and 2 as appropriate in accordance with its annual work programme.

Article 5 - Evaluation of progress and reporting

a. The Commission shall annually prepare an approximated greenhouse gas inventory for the Union and each Member State for the year X-1 as soon as relevant data become available. Member States are encouraged to prepare approximated greenhouse gas inventories for the year X-1 and to make these approximated inventories available to the Commission as soon as possible.

b. The Commission shall regularly assess the ex-post and ex-ante effects of Union common and coordinated policies and measures on emissions by sources and removals by sinks of greenhouse gases and the costs of these policies and measures and regularly update this evaluation.

c. The Commission shall regularly prepare and update projections of greenhouse gas emissions by sources and removals by sinks.

d. The Commission shall assess annually, in consultation with Member States, the progress of the Union ~~Community~~ and its Member States towards fulfilling their commitments under the UNFCCC, the Kyoto Protocol and any future international obligations ~~as set out in Decision 2002/358/EC~~ and towards fulfilling the commitments under Decision No 406/2009/EC, with a view to determine whether sufficient progress towards the fulfillment of these commitments has been made. This assessment shall take into account:

(a) progress in Union ~~Community~~ policies and measures and information submitted by Member States in accordance with Article 3, 3(bis), information contained in registries under Article 6(2) of this Decision and with Article 21 of Directive 2003/87/EC;[71]

(b) information from the approximated greenhouse gas inventories for the year X-1 prepared by the Commission;

(c) if available, information from approximated greenhouse gas inventories for the previous year prepared by Member States;

(d) the results of the most recent reviews in Articles 4bis and 4quint, any findings of non-compliance with the annual targets under Decision No 406/2009/EC and on corrective action under Article 7 of Decision No 406/2009/EC and of the Commission's opinion on the corrective action plan and related comments of the Climate Change Committee, if applicable.

5. On the basis of the assessments referred to in paragraph 1, 2, 3 and 4, the Commission shall submit annually a report to the European Parliament and the Council. This report shall contain sections on actual and projected greenhouse gas emissions by sources and removals by sinks, policies and measures and on the use of mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol and the use of flexibilities pursuant to Article 5 of Decision No 406/2009/EC.

~~3. The Commission shall prepare a report on the demonstration of progress achieved by 2005 by the Community, taking into account updated information on emission projections submitted by Member States not later than 15 June 2005, in accordance with the implementing provisions adopted pursuant to Article 3(3),~~

[71] OJ L 275, 25.10.2003, p. 32

~~and submit this to the UNFCCC Secretariat by 1 January 2006 at the latest.~~

~~4. Each Member State shall prepare a report on the demonstration of progress achieved by 2005 by that Member State, taking into account information submitted in accordance with the implementing provisions adopted pursuant to Article 3(3), and submit this to the UNFCCC Secretariat by 1 January 2006 at the latest.~~

~~5.~~ 6. The Union ~~Community~~ and each Member State shall submit a report to the UNFCCC Secretariat on the additional period for fulfilling commitments pursuant to Decision 13/CMP.1 under the Kyoto Protocol ~~the Marrakech Accords for fulfilling commitments~~ upon the expiry of that period.

~~6.~~ 7. In accordance with the procedure referred to in Article 9(2), the Commission may adopt provisions containing requirements for reporting ~~on the demonstration of progress as required by Article 3(2) of the Kyoto Protocol and for reporting~~ on the additional period for fulfilling commitments pursuant to Decision 13/CMP.1 ~~the Marrakech Accords~~ .

~~7.~~ 8. The European Environment Agency shall provide assistance to the Commission for the implementation of paragraphs 1 to 6 as appropriate, in accordance with the agency's annual work programme.

Article 6 - National registries

1. The Union ~~Community~~ and its Member States shall establish and maintain registries in order to ensure the accurate accounting of the issue, holding, transfer, acquisition, cancellation and withdrawal of assigned amount units, removal units, emission reduction units and certified emission reductions and the carry-over of assigned amount units, emission reduction units and certified emission reductions or any other units for credits from projects defined pursuant to Article 11a (5) of Directive 2003/87/EC. These registries shall incorporate registries established pursuant to Article 19 of Directive 2003/87EC,

The Union ~~Community~~ and Member States may maintain their registries in a consolidated system, together with one or more other Member States.

2. The elements referred to in the first sentence of paragraph 1 shall be made available to the central administrator designated under Article 20 of Directive 2003/87/EC.

Implementing provisions for the establishment and maintenance of national registries shall be adopted in accordance with the procedure referred to in Article 9(2).~~in accordance with provisions adopted in accordance with the procedure referred to in Article 9(2) of this Decision.~~

Article 7 - Assigned amount

~~1. The Community and each Member State shall, by 31 December 2006 at the latest, each submit a report to the UNFCCC Secretariat determining their assigned amount as equal to their respective emission levels determined pursuant to the first paragraph of Article 3 of Decision 2002/358/EC and the Kyoto Protocol. Member States and the Community shall endeavour to submit their reports simultaneously.~~

1. Member States shall, following the completion of the review of their national inventories under the Kyoto Protocol for each year of the first commitment period under the Kyoto Protocol, including the resolution of any questions of implementation, forthwith withdraw assigned amount units, removal units, emission reduction units and certified emission reductions equivalent to their net emissions during that year.

In respect of the last year of the commitment period, retirement shall take place prior to the end of the additional period set in the Marrakech Accords for fulfilling commitments.

2. Member States shall issue assigned amount units in their national registries corresponding to their emission levels determined pursuant to Decision 2002/358/EC (Decision 2010/778/EU) and the Kyoto Protocol.

~~3. The Community and each Member State shall, by 31 December 2006 at the latest, each submit a report to the UNFCCC Secretariat determining their assigned amount as equal to their respective emission levels determined pursuant to the first paragraph of Article 3 of Decision 2002/358/EC and the Kyoto Protocol. Member States and the Community shall endeavour to submit their reports simultaneously.~~

Article 8 - Procedures ~~under the Kyoto Protocol~~

1. Member States and the Union ~~Community~~ shall ensure full and effective cooperation and coordination with each other in relation to obligations under this Decision concerning:

(a) the compilation of the Union ~~Community~~ greenhouse gas inventory and the Union ~~Community~~ greenhouse gas inventory report, pursuant to Article 4(1);

(b) the review and compliance procedures under the Kyoto Protocol in accordance with the relevant decisions thereunder as well as the Union's review procedure of Member States' greenhouse gas inventories;

(c) any adjustments under the UNFCCC review process or other changes to inventories and inventory reports submitted, or to be submitted, to the UNFCCC Secretariat;

~~(d) the preparation of the Community's report and the Member States' reports on the demonstration of progress by 2005 pursuant to Article 5(3) and (4);~~

~~(e)~~ d) ~~the preparation and submission of the report referred to in Article 7(1); and~~

(d) reporting in relation to the additional period set in paragraph 13 of ~~the Marrakech Accords~~ Decision 13/CMP.1 for fulfilling commitments pursuant to Article 5(5) and (6).

2. Member States shall submit national inventories to the UNFCCC Secretariat by 15 April each year containing information identical to that submitted in accordance with Article 3(1), unless information removing any inconsistencies or gaps has been provided to the Commission by 15 March of that year at the latest.

3. The Commission may, in accordance with the procedure referred to in Article 9(2), lay down procedures and time scales for such cooperation and coordination.

Article 9 - Committee

1. The Commission shall be assisted by a 'Climate Change Committee'.

2. [Where reference is made to this paragraph, Articles 5 of Regulation No 182/2011 shall apply, having regard to Article 291 of the Treaty on the Functioning of the European Union.]

3. The Climate Change Committee shall adopt its Rules of Procedure.

Article 10 - Further measures

~~Following the submission of the report on the demonstration of progress by 2005, I~~ In accordance with Article 5(3), the Commission shall forthwith review the extent to which the Union ~~Community~~ and its Member States are making progress towards their emission levels, determined in accordance with Decision 2002/358/EC and the Kyoto Protocol, and the extent to which they are meeting their commitments under the Kyoto Protocol. In the light of this assessment, the Commission may make proposals, as appropriate, to the European Parliament and the Council to ensure that the Union ~~Community~~ and its Member States comply with their emission levels and that all their commitments under the Kyoto Protocol are met.

Article 10bis - Review clause

The Commission shall forthwith review the consistency of the monitoring and reporting provisions in this Decision with future requirements adopted under the UNFCCC or the Kyoto Protocol and make proposals, as appropriate, to revise the respective provisions of this Decision as well as the establishment of final data for the years 2005, 2008, 2009 and 2010 to ensure consistency of monitoring and reporting in the EU and under

future international agreements and to ensure time-series consistency between the establishment of targets and the annual reporting for compliance with Decision No 406/1009/EC. Such revisions shall be adopted in accordance with the procedure referred to in Article 9(2).

Article 11 - Repeal

Decision 280/2004/EC is hereby repealed.

Any references made to the repealed Decision shall be construed as references to this Decision and shall be read in accordance with the correlation table in the Annex.

Article 12 - Addressees

This Decision is addressed to the Member States.

~~Done at Strasbourg, 11 February 2004.~~

Annex

Carbon dioxide (CO_2)

Methane (CH_4)

Nitrous Oxide (N_2O)

SF_6

NF_3

Hydrofluorocarbons (HFCs):

HFC-23	CHF_3
HFC-32	CH_2F_2
HFC-41	CH_3F
HFC-125	CHF_2CF_3
HFC-134	CHF_2CHF_2
HFC-134a	CH_2FCF_3
HFC-143	CH_2FCHF_2
HFC-143a	CH_3CF_3
HFC-152	CH_2FCH_2F
HFC-152a	CH_3CHF_2
HFC-161	CH_3CH_2F
HFC-227ea	CF_3CHFCF_3
HFC-236cb	$CF_3CF_2CH_2F$
HFC-236ea	$CF_3CHFCHF_2$

HFC-236fa $CF_3CH_2CF_3$

HFC-245fa $CHF_2CH_2CF_3$

HFC-245ca $CH_2FCF_2CHF_2$

HFC-365mfc $CH_3CF_2CH_2CF_3$

HFC-43-10mee $CF_3CHFCHFCF_2CF_3$ or ($C_5H_2F_{10}$)

Perfluorocarbons (PFCs):

PFC-14, Perfluoromethane, CF_4

PFC-116, Perfluoroethane, C_2F_6

PFC-218, Perfluoropropane, C_3F_8

PFC-318, Perfluorocyclobutane, c-C_4F_8

PFC-3-1-10, Perfluorobutane, C_4F_{10}

PFC-4-1-12, Perfluoropentane, C_5F_{12}

PFC-5-1-14, Perfluorohexane, C_6F_{14}

PFC-9-1-18 $C_{10}F_{18}$

12.3 Revised legal text for the Implementing Provisions

12.3.1 Recitals

Having regard to Decision No [*Revised Monitoring Mechanism Decision*] and in particular Articles 3(3), 3bis (1) (2), 3ter (2), 4(9) and 6(2) thereof,

Whereas this decision incorporates the existing Implementing Provisions concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol as contained in Commission Decision 2005/166/EC;

Whereas at the same time decision [X] made certain modifications to this legislation to make it more coherent with other EU legislative acts, to incorporate experiences with its implementation and to address requirements resulting from recent EU legislation such as Decision No 406/2009/EC of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the EU's greenhouse gas emission reduction commitments up to 2020[72] and Directive 2009/29/EC of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the EU[73];

Whereas it therefore constitutes complete Community legislation in this area;

Whereas the same reasons which led to the adoption of the decision apply equally to this implementing legislation;

[72] OJ L 140, 5.6.2009, p. 136

[73] OJ L 140, 5.6.2009, p. 36

Whereas the revised Monitoring Mechanism Decision establishes the monitoring and reporting requirements for climate related information as well as coorperation procedures, it is nevertheless necessary, in the light of experience:

- to make some amendments in order to adapt the Implementing Provisions to the changes in the revised Monitoring Mechanism Decision;
- to adopt to changes in current reporting practice under the Monitoring Mechanism Decision and the UNFCCC;
- to extend the reporting of information in electronic reporting formats,
- to formulate certain parts more precisely in order to achieve greater legal security in their application and increased consistency in the implementation.

12.3.2 Proposal for revision of Commission Decision 2005/166/EC

Chapter I Subject matter

Article 1 - Subject matter

This Decision establishes rules implementing Decision (EU) No [X *insert new decision number*] as regards the following:

(a) the reporting of information referred to in Article 3, 3bis and 3ter ~~and (2)~~ of Decision (EU) No [X], in accordance with Article 3(3), 3bis (3) and 3ter (2) ~~(3)~~ of that Decision;

(b) the establishment and maintenance of a Union ~~Community~~ inventory system, Member States inventory systems and national systems for mitigation policy evaluation and projections referred to in Article 4 of Decision (EU) No [X] in accordance with Article 4(~~92~~) of that Decision;

~~(c) the requirements for reporting on the demonstration of progress as required by Article 3(2) of the Kyoto Protocol and for reporting in relation to the additional period set in the Marrakech Accords for fulfilling commitments in accordance with Article 5(6) of Decision No 280/2004/EC;~~

(d) (c~~d~~) the procedures and timescales for the cooperation and coordination of the obligations listed in Article 8(1) of Decision (EU) No [X], in accordance with Article 8(3) of that Decision.

Chapter II Reporting by Member States

Section 1 Annual reports

Article 2 – Determination and Reporting guidance

1. Member States shall determine the information reported pursuant to Article 3(1) of Decision (EU) No [X] accordance with:

(a) the revised 1996 Intergovernmental Panel on Climate Change (IPCC) guidelines for national greenhouse gas inventories, hereinafter referred to as 'the revised 1996 IPCC guidelines for national greenhouse gas inventories';

(b) the IPCC good practice guidance and uncertainty management in national greenhouse gas inventories, hereinafter referred to as 'the IPCC good practice guidance';

(c) the IPCC good practice guidance for land use, land-use change and forestry (LULUCF), hereinafter referred to as 'the IPCC good practice guidance for LULUCF';

(d) for NF_3 the IPCC 2006 Guidelines for national greenhouse gas inventories;

(e) any revised IPCC guidelines if adopted in the future under the UNFCCC for the reporting of annual greenhouse gas emissions and removals. If future decisions under the UNFCCC replace IPCC guidelines for greenhouse gas inventories listed in paragraphs (a), (b), (c) or (d) above with revised IPCC guidelines, such guidance shall be applied mutis mutandis to the reporting under Decision (EU) No (X);

(f) for the air pollutants CO, SO_2, NO_x and VOC the EMEP[74]/EEA (European Environment Agency) air pollutant emission inventory guidebook 2009 and any adopted revised future EMEP/EEA air pollution inventory guidance;

(g) methodological guidelines for the monitoring and reporting of emissions from marine vessels if adopted in accordance with Article 3(4) of Decision (EU) No [X];

2. Member States shall report the information reported pursuant to Article 3 of Decision (EU) No [X] to the Commission ~~with a copy to the European Environment Agency~~ in accordance with:

(a) the guidelines for the preparation of national communications by Parties included in Annex I to the Convention, part I: UNFCCC reporting guidelines on annual inventories;

(b) the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol, hereinafter referred to as 'the guidelines under Article 7 of the Kyoto Protocol'.

(c) the guidance provided as part of the modalities for the accounting of assigned amounts under Article 7 (4) of the Kyoto Protocol.

(d) any additional methodological and reporting guidance adopted under the UNFCCC related to reporting and accounting of annual information by Annex I Parties.

3. Member States shall report the information reported pursuant to Article 3(1)(a), (b), (c) and (d) of Decision (EU) No [X] to the Commission using the most recent common reporting format reporter software published by the UNFCCC secretariat.

4. Member States shall only report emissions in the CRF reporting format from territories within the scope of application of the Treaties as specified in the Articles 52 TEU and 355 TFEU.

5. Member States shall report the information on Kyoto units reported pursuant to Article (i) using the standard electronic format provided by the UNFCCC secretariat.

6. Member States shall report the information on auctioning revenues pursuant to Article 3(1)l using the electronic reporting format as provided in Annex X to this decision.

7. Member States shall report the information on financial support pursuant to Article 3bis(1) (h) in accordance with UNFCCC reporting guidelines for national communica-

[74] European Monitoring and Evaluation Programme under the UNECE Long-range Transboundary Air Pollution Convention

tions and reporting formats contained therein. If future decisions under the UNFCCC provide for new and revised guidance on reporting of financial support, such guidance shall apply to the reporting under Decision (EU) No [X].

8. Member States shall add a part III to the national inventory report for reporting of methodological information specific to the requirements of Decision (EU) No [X] including:

(a) greenhouse gas emissions from marine vessels pursuant to Article 3(1)(e);

(b) non-CO_2 climate impacts of domestic and international aviation pursuant to Article 3(1)(f);

(c) information on indicators pursuant to Article 3(1)(g);

(d) information on the use, geographical distribution and types of, and qualitative criteria applied to credits from project activities pursuant to Article 3(1) (j);

(e) information on the use of auctioning revenues pursuant to Article 3(1) (l);

(f) information justifying the use of credits from project types that cannot be used by operators in the European emissions trading scheme pursuant to Article 3(1)(m);

(g) information demonstrating that the use of credits from Union-level projects issued pursuant to Article 24a of Directive 2003/87/EC did not result in double counting of emission reductions pursuant to Article 3(1)(n) of Decision (EU) No [X];

(h) results of verification activities pursuant to Article 3 (1) (q), (r) and (s).

~~**Article 3 - Reporting under Article 3(1)(d) of Decision No 280/2004/EC**~~

~~**Reporting on LULUCF activities under the Kyoto Protocol**~~

~~1. Member States shall, in accordance with Article 3(3) of the Kyoto Protocol and the relevant decisions adopted thereunder, for the purpose of Article 3(1)(d) of Decision No [X] report their greenhouse gas emissions by sources and removals by sinks from land-use change and forestry activities under Article 3(3) of the Kyoto Protocol for the years between 1990, and the year X-2 before last.~~

~~Member States that elect forest management, cropland management, grazing land management or revegetation under Article 3(4) of the Kyoto Protocol shall in addition report anthropogenic greenhouse gas emissions by sources and removals by sinks for each elected activity for the years between 20081990 and the year before last.~~

~~Member States shall clearly distinguish this information from estimates of anthropogenic emissions from the sources listed in Annex A to the Kyoto Protocol.~~

~~2. Member States shall provide the information in paragraph 1 in their reports submitted from 15 January 2010 onwards.~~

Article 3 - Reporting under Article 3(1)(f) of Decision (EU) No [X]

Non-CO_2 impacts of aviation

1. Member States shall monitor and report the non-CO_2 impacts of aviation for all years between 1990 and the year X-2 for all aircraft that departed from a Member State's airport.

2. For the monitoring of the emissions, the following methodologies shall apply:

(a) From the year 2014 onwards Member States shall determine the non-CO_2 effects of aviation on the climate including the effect of NOx emissions, water vapour, aerosols, linear contrails and aviation induced cirrus cloudiness based on actual flight movement data.

(b) For the years 2011 to 2013 Member States may use a multiplier of 2.0 to determine the non-CO_2 effects.

(c) Those Member States that reported less than 3 per cent of the total CO_2 emissions from aviation in the Union in the previous year may also use the multiplier based approach after 2013.

(d) The value for the multiplier in Article 3bis 2(b) may be revised by the committee established under Article 9 of Decision (EU) No [X].

3. The estimates of the non-CO_2 impacts of aviation and information on the methodologies used shall be reported in the national inventory report, part III, and provide information specific to Union reporting requirements.

Article 4 - Reporting under Article 3(1)(gj) of Decision (EU) No [X]

Indicators

The information on indicators referred to in Article 3(1)(f) of Decision (EU) No [X] shall include, by 15 January 2005 and each year thereafter, the values for the indicators listed in the table in Annex I;

Article 5 - Reporting under Article 3(1)(ig) of Decision (EU) No [X]

National registry

The information from the national registry referred to in Article 3(1)(ig) of Decision (EU) No [X] shall include the information required pursuant to the guidelines under Article 7 of the Kyoto Protocol.

Article 6 - Reporting under Article 3(1)(k) of Decision (EU) No [X]

Auctioning revenues

1. Member States' reporting of the use of revenues generated from the auctioning of

allowances pursuant to Article 10 (3) of Directive 2003/87/EC shall:

(a) refer to the specific purposes of use indicated in Directive 2003/87/EC;

(b) differentiate between revenues allocated and spent for the purposes indicated in Directive 2003/87/EC;

(c) differentiate between revenues used for national and European purposes and for support of developing countries in the areas indicated in Article 10 (3) of Directive 2003/87/EC;

2. Member States shall report the quantitative information on the use of revenues generated from the auctioning of allowances pursuant to Article 10 (3) of Directive 2003/87/EC for the previous year by using an electronic format on the basis of the format in Annex VII. The Commission shall prepare an electronic reporting format by [date to be specified]. The reporting format shall be adopted in accordance with the procedure referred to in Article 9(2) of Decision (EU) No [X].

3. Member States shall include a section on the use of revenues generated from the auctioning of allowances pursuant to Article 10 (3) of Directive 2003/87/EC in their national inventory report providing summarized information on the main areas on which revenues from auctioning are spent and the rationale for the allocation of auctioning revenues.

4. Member States shall provide relevant national documents together with the reported data in paragraph 1.

Article 7 - Reporting under Article 3(1)(tf) of Decision (EU) No [X]

National Inventory report ~~system~~

1. Member States shall for the purpose of Article 3(1)(tf) of Decision (EU) No [X] report the following elements of the national inventory report necessary for the preparation of the Union greenhouse gas inventory report:

(a) a description of the Member State's institutional arrangements for inventory preparation and the process of inventory preparation;

(b) a description of methodologies and data sources used, including information on methods used, and types of activity data and emission factors used for the Union ~~Community~~'s key sources as annually determined by the Commission ~~by 31 October~~ by 31 December in accordance with Chapter 7 of the IPCC good practice guidance and Chapter 5 of the IPCC good practice guidance for LULUCF. Member States shall provide this information by referring to sections of the national inventory report or in the tabular format provided in Annex I to this Decision;

(c) information on the Member State's quality assurance and quality control programme, including its quality objectives and inventory quality assurance and quality control plan;

(d) a general uncertainty assessment in an electronic format;

(e) a general assessment of completeness, addressing the geographical coverage of that Member State and any gaps in the inventory submission;

(f) the comparison of the sectoral approach with the reference approach;

(g) any responses to the UNFCCC review of previous national inventories received since the submission of the previous national inventory, as well as the ways in which recommendations were addressed using the format contained in Annex VIII and information on any recalculations performed;

(h) the description and interpretation of past emission trends;

(i) information on quality assurance activities that verified data consistency between inventories and verified emissions under the EU-ETS pursuant to Article 3(1)(q), (r) and (s) of Decision No [X].

3. Together with the final submission of the national inventory report Member States shall indicate the major changes to methodological descriptions in the updated report compared to the previous submission.

~~4. For the information to be provided pursuant to paragraphs (a) to (e) in paragraph 1, Member States may indicate that no changes occurred to those sections of the national inventory report.~~

Article 8 - Reporting under Article 3(1)(q) of Decision (EU) No [X]

Member States may use the additional guidance provided in Annex XII related to the allocation of NACE codes to CRF source categories for the purpose of allocating the verified emissions reported under Directive 2003/87/EC to the CRF source categories pursuant to Article 3(1)(q) of Decision (EU) No [X].

~~Article 6 - Reporting under Article 3(1)(h) of Decision No 280/2004/EC~~

~~Legal entities under Article 6, 12 and 17 of the Kyoto Protocol~~

~~The information on legal entities referred to in Article 3(1)(h) of Decision No 280/2004/EC shall include a list of legal entities authorised by the Member State to hold assigned amount units (AAUs), removal units (RMUs), emission reduction units (ERUs) and certified emission reductions (CERs), including temporary CERs (tCERS) and long-term CERs (lCERs).~~

Section 2 - Biennial reports

Article 9 - Reporting guidance

1. Member States shall report the information listed in Article 3bis of Decision (EU) No [X] in accordance with the guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications, hereinafter referred to as 'the UNFCCC reporting guidelines for national communications', and the guidelines under Article 7 of the Kyoto Protocol, as appropriate. If future decisions under the UNFCCC include the adoption of guidelines for biennial reports or revised UNFCCC reporting guidelines for national communications, such guidelines shall appliy to the reporting of information under Article 3bis of Decision (EU) No (X);

2. Member States shall report the information pursuant to Article 3bis (1)(a) of Decision No (EU) [X] to the Commission in accordance with the methodological guidance for ex-ante and ex-post quantification of the effects of policies and measures pursuant to Article 3bis (3) of that Decision.

3. Member States shall report the information pursuant to Article 3bis (1)(c) of Decision No (EU) [X] to the Commission in accordance with the methodological guidance for projections pursuant to Article 3bis (4) of that Decision.

Article 10 - Reporting under Article 3 bis(1)(a) of Decision (EU) No [X]

Policies and measures

1. In reporting on the implementation of common and coordinated policies and measures pursuant to Article 3(bis)(1)(a) Member States shall:

(a) use the electronic reporting format "Reporting template for information on policies and measures" included in Annex IX. This electronic format shall be revised in accordance with the procedure referred to in Article 9(2) of Decision (EU) No [X].

(b) Member States shall provide quantitative estimates for the ex-post and ex-ante effects and for the costs of policies and measures pursuant to Article 3 bis (1) (a) (vii) to (xi) for the common and coordinated policies and measures. The Commission shall publish the list of common and coordinated policies and measures to be used for the subsequent biennial report at least one year prior to the reporting date;

(c) provide a description of relevant national legislation in place before the start of the common and coordinated policy and measure;

(d) provide a description of expected additional effects resulting from the implementation of the common and coordinated measure, beyond the effects that would have resulted from the national legislation;

(e) provide a description of measures introduced to implement or support the policy;

(f) provide the date of implementation of the common and coordinated policy or measure into national legislation and a description of [compliance and enforcement] activities;

(g) provide a description of factors influencing the effectiveness of the policy in the national context, including local market factors and planning laws;

(h) a description of methodologies, data sources, assumptions and the counterfactual scenario, used in accordance with Article 9 against which the emissions reduction effects and costs were quantified in the estimation of ex-ante and ex-post effects of policies and measures on emissions by sources and removals by sinks of greenhouse gases;

(i) a description indicating how the interaction of different mitigation policies has been addressed and taken into account as well as the interactions of policies and measures related to air pollutants on greenhouse gas emissions.

~~1. The information on national policies and measures referred to in Article 3(2)(a) of Decision No 280/2004/EC shall include:~~

~~(a) a list of those policies and measures which expired or were repealed during the reporting period;~~

~~(b) a description of the actual and expected interaction with other relevant policies and measures and with relevant Community policies and measures~~

2. Member States shall report the information reported pursuant to Article 3bis(1)(b) using the questionnaire contained in Annex V. The Commission shall update the questionnaire depending on the outcomes of the negotiations on an international agreement for the period after 2012 under the UNFCCC, as appropriate.

3. Member States shall report information on their use of LULUCF activities to achieve their quantified emission limitation and reduction commitments in the first commitment period under the Kyoto Protocol by using the questionnaire in Annex VI. The Commission shall update the questionnaire depending on the outcomes of the negotiations on an international agreement for the period after 2012 under the UNFCCC, as appropriate.

Article 11 - Reporting under Article 3bis(1)(c) ~~(b)~~ of Decision (EU) No [X]

Projections

~~1. For the purpose of Article 3bis(2)(b) of Decision No 280/2004/EC Member States shall clearly identify their 'with measures', and 'with additional measures' and 'without measures' projections and the policies and measures included therein.~~

~~A 'with measures' projection shall include implemented and adopted policies and measures. A 'with additional measures' projection shall include planned policies and measures.~~

~~Member States may include information on 'without measures' projections as part of their 'with measures' and 'with additional measures' projections. A 'without measures' projection shall exclude all policies and measures implemented, adopted or planned after the year chosen as the starting year for this projection.~~

1. In the reporting estimates for greenhouse gas projections in the biennial report pursuant to Article 3(bis)(1)(c) of Decision (EU) No [X] Member States shall:

(a) provide estimates in the electronic reporting format "Reporting template for information on greenhouse gas emission projections" included in Annex XI. The reporting template shall be revised in accordance with the procedure referred to in Article 9(2) of Decision (EU) No [X];

(b) provide a description of methodologies, models, data sources and assumptions used for greenhouse gas emission projections and key input and output parameters for each sector;

(c) provide 'with existing measures' projections and in the 'with additional measures' projections which take into account agreed common and coordinated policies and measures. The Commission shall publish the list of common and coordinated policies and measures to be taken into account in the projections at least one year prior to the reporting due date;

(d) provide indicators for projections for the years 2005, 2010, 2015 and 2020 for the subsequent 20 years for the years ending with 0 or 5, for the actual reporting year and for the year X-5 as listed in Annex III;

(e) provide projected parameters indicated in Annex IV for the 'with existing measures' and the 'without measures' projection as part of the information provided in the reporting template under paragraph 1. These parameters shall be regularly reviewed and updated as appropriate using the procedure referred to in Article 9(2) of Decision (EU) No. [X].

2. The Commission shall propose and regularly update harmonized future assumptions on GDP growth in the EU on future fuel prices and on future carbon prices to be taken into account in the preparation of greenhouse gas emission projections by Member States as a minimum in a sensitivity analysis if Member States assumptions for these parameters deviate from those proposed by the Commission. Member States shall use consistent assumptions for the projections of greenhouse gas emissions and the projections of air pollutants under Directive 2001/81/EC[75]. The Commission shall also propose a harmonized reference year as a starting point for the preparation of greenhouse gas emission projections for each biennial report.

4. Member States and the Commission shall ensure consistency in scope, sectoral and source category disaggregation and geographical scope between the information provided in annual greenhouse gas inventories and the emission estimates of the projections as far as possible. In case of deviations in scope and sectoral coverage or source category coverage, such deviations shall be clearly indicated and explained.

[75] OJ L 309, 27.11.2001, p. 22

~~The descriptions of methodologies, models, underlying assumptions and key input and output parameters referred to in Article 3(2)(b)(iv) of Decision No 280/2004/EC, shall include, if used, the mandatory parameters set out in point 1 of Annex IV to this Decision.~~

~~Member States are encouraged to report the parameters on projections included in the list of recommended parameters set out in point 2 of Annex IV to this Decision.~~

5. Member States shall undertake a sensitivity analysis of their projections, focused on the key input variables in their projection models, including GDP, fuel prices and carbon prices. Member States [should define a high, central and low scenario for the key input variables and to quantify projected emissions for these scenarios. The sensitivity analysis should be performed for all sectors selecting relevant variables for each sector. In the energy sector, energy demand should be varied if this is an exogenous input variable in the models used.

~~Member States are furthermore encouraged to include a measure of robustness of their predictive model and its methods used for their assessments. Member States may consider the use of multi-variant scenarios, using combinations of input variables.~~

CHAPTER III

Section 1 - The Union ~~Community~~ inventory system

Article 12 - Quality and exchange of information and data in the Union ~~Community~~ inventory system under Article 4 of Decision (EU) No [X]

1. Member States shall ensure the quality of activity data, emission factors and other parameters used for their national greenhouse gas inventory in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

~~2. Member States shall submit their annual inventory in an electronic format to the Commission and send a copy to the European Environment Agency.~~

2. The annual submission of the common reporting format and the national inventory report shall be uploaded to the Central Data Repository at the European Environment Agency (CDR). Each Member State shall forthwith communicate to the Secretariat General of the Commission by a letter from the permanent representation upload performed detailing all the information and files included.

Section 2

Article 13 - Estimates for data missing from a national inventory pursuant to Article 4(2)of Decision (EU) No [X]

1. For the purposes of compiling the Union ~~Community~~ inventory and inventory report ~~If a Member State does not submit all data required~~ pursuant to Article ~~43~~(2) of Decision No [X] ~~by 15 March of a reporting year~~, the Commission shall circulate a draft Union ~~Community~~ inventory report by 28 February based on national inventories. The Commission shall publish and transmit the Union greenhouse gas inventory and report to the UNFCCC Secretariat by 15 April each year.

2. If a Member State does not submit updated data by 15 March of the reporting year, the Commission shall prepare estimates for the missing emission estimates based on the methodologies developed for the approximated greenhouse gas inventory for the year X-1. ~~for that Member State to be included in the Community greenhouse gas inventory for that reporting year and source category, in accordance with the UNFCCC reporting guidelines for annual inventories and the revised 1996 IPCC guidelines for national greenhouse gas inventories.~~

~~*Article 14*~~

~~1. The Commission estimates for missing data shall be based on the principles set out in paragraphs 2, 3 and 4.~~

~~2. If a consistent time series of reported estimates for the relevant source category is available from the Member State for previous years that has not been subject to adjustments under Article 5(2) of the Kyoto Protocol, extrapolation of that time series shall be used to obtain the emission estimate.~~

~~For carbon dioxide emissions from the energy sector, extrapolation of emissions should be based on the percentage change of Eurostat carbon dioxide emission estimates.~~

~~3. If the estimate for the relevant source category was subject to adjustments under Article 5(2) of the Kyoto Protocol in previous years and the Member State has not submitted a revised estimate, the basic adjustment method used by the expert review team as set out in the technical guidance on methodologies for adjustments under Article 5(2) of the Kyoto Protocol, hereinafter referred to as 'the technical guidance for adjustments', shall be used, without application of the conservativeness factor defined in that guidance.~~

~~4. If a consistent time series of reported estimates for the relevant source category is not available and if the estimate of the source category has not been subject to adjustments under Article 5(2) of the Kyoto Protocol, the estimation shall be based on the technical guidance for adjustments, without application of the conservativeness factor defined in that guidance.~~

Article 14

The Commission shall prepare the estimates referred to in Article 13 by 31 March of the reporting year, following consultation with the Member State concerned, and communicate those estimates to the other Member States.

Article 15

The Member State concerned shall use the estimates referred to in Article 13 for its national submission to the UNFCCC to ensure consistency between the Union ~~Community~~ inventory and Member States' inventories

~~**CHAPTER IV - Reporting on the demonstration of progress by 2005 and the additional period for fulfilling commitments**~~

~~**Section 1 - Reports on the demonstration of progress by 2005**~~

~~**Article 17 - Member State reporting on the demonstration of progress achieved by 2005 under Article 5(4) of Decision No 280/2004/EC**~~

~~1. Member States shall prepare the report on the demonstration of progress achieved by 2005 in accordance with the UNFCCC reporting guidelines for national communications and the Guidelines under Article 7 of the Kyoto Protocol. The report shall include:~~

~~(a) a description of domestic measures, including any legal and institutional steps, adopted for the purpose of meeting that Member State's commitments pursuant to Article 2 of Decision 2002/358/EC and the Kyoto Protocol, and any programmes for domestic compliance and enforcement;~~

~~(b) information on trends in, and projections of, greenhouse gas emissions at national level, where the trends shall be based on the inventory data submitted by the Member States to the UNFCCC by 15 April 2005;~~

~~(c) an evaluation of how the domestic measures referred to in point (a), in the light of the trends and projections referred to in point (b), will contribute to the Member State meeting its commitments pursuant to Article 2 of Decision 2002/358/EC and the Kyoto Protocol;~~

~~(d) a description of the activities, actions and programmes undertaken by the Member State for the purpose of meeting its commitments under Articles 10 and 11 of the Kyoto Protocol.~~

~~2. Member States shall submit the report as a single document including four chapters containing the information listed in paragraph 1, points (a) to (d).~~

~~The information on projections referred to in paragraph 1(b) shall be consistent with the information submitted to the Commission by 15 June 2005 pursuant to Article 5(3) of Decision No 280/2004/EC.~~

Section 2 - Reports upon expiration of the additional period for fulfilling commitments

Article 16 - Member State reporting upon expiration of the additional period for fulfilling commitments under Article 5(4) of Decision (EU) No [X]

(1) Each Member State's report shall, in accordance with the modalities for the accounting of assigned amounts under Article 7(4) of the Kyoto Protocol, contain the following information:

(a) for the current calendar year until the end of the additional period for fulfilling commitments (defined according to Greenwich Mean Time), the total quantity of:

(i) ERUs, CERs (including lCERs and tCERs), AAUs and RMUs in each Member State holding, cancellation, replacement and retirement account and in all operator and person holding accounts on 1 January each year,

ii) AAUs issued on the basis of the assigned amount pursuant to Article 3(7) and 3(8) of the Kyoto Protocol,

(iv) ERUs, CERs (including lCERs and tCERs), AAUs and RMUs acquired from other registries and a separate list providing the identity of the transferring accounts and registries,

(v) RMUs issued on the basis of each activity under Article 3(3) and (4) of the Kyoto Protocol,

(vi) ERUs, CERs (including lCERs and tCERs), AAUs and RMUs transferred to other registries and a separate list providing the identity of the acquiring accounts and registries,

(vii) ERUs, CERs, AAUs and RMUs cancelled on the basis of activities under Article 3(3) and (4) of the Kyoto Protocol,

(viii) ERUs, CERs, AAUs and RMUs cancelled following determination by the Compliance Committee that the Member State is not in compliance with its commitment under Article 3(1) of the Kyoto Protocol,

(ix) other ERUs, CERs (including lCERs and tCERs), AAUs and RMUs cancelled,

(x) ERUs, CERs (including lCERs and tCERs), AAUs and RMUs retired,

(xi) AAUs, CERs, ERUs, RMUs and tCERs transferred into the tCER replacement account for the commitment period,

(xii) AAUs, CERs, ERUs, RMUs and lCERs transferred into the lCER replacement account for the first commitment period of the Kyoto Protocol;

(b) the total quantity and serial numbers of ERUs, AAUs, RMUs, CERs (including lCERs and tCERs) in the Member State's retirement account at the end of the reporting period;

(c) the total quantity and serial numbers of ERUs, CERs and AAUs which the Member State requests to be carried over to the subsequent commitment period.

That information shall only include ERUs, AAUs, RMUs, CERs (including lCERs and tCERs) valid for the commitment period in question. It shall be determined on the basis of the information made available pursuant to Article 9 of Commission Regulation (EC) No 2216/2004

2. The Member State and the Union reports upon expiration of the additional period for fulfilling commitments shall be submitted to the UNFCCC Secretariat and the Commission within one month after the expiration of the additional period for fulfilling commitments.

Article 17 ~~—~~ Union ~~Community~~ reporting upon expiration of the additional period for fulfilling commitments under Article 5(4) of Decision (EU) No [X]

The Union ~~Community~~ report shall contain the following information:

(a) the total quantities of the units listed in Article 18(a) reported by the Member States and the total quantities of those units held in the Union ~~Community~~ registry;

(b) the total quantity and serial numbers of ERUs, AAUs, RMUs, CERs (including lCERs and tCERs) in Member States' and in the Union~~Community~~'s retirement accounts at the end of the reporting period;

(c) the total quantity and serial numbers of ERUs, CERs and AAUs which each Member State and the Union ~~Community~~ request to be carried over to the subsequent commitment period in accordance with the modalities for the accounting of assigned amounts under Article 7(4) of the Kyoto Protocol.

CHAPTER V - Procedures and time scales for cooperation and coordination

Article 18 - The compilation of the EU ~~Community~~ greenhouse gas inventory and inventory report pursuant to Article 8(1)(a) of Decision (EU) No [X]

1. Member States shall use the ReportNet tools of the European Environment Agency, provided pursuant to Regulation (EC) No 1641/2003 of the European Parliament and of the Council ([2]), for the submission of annual information under Article 3(1) and biennial information under Article 3(bis) of Decision (EU) No [X]

2. Any updated data provided by Member States in accordance with Article 3(2) of Decision (EU) No [X] shall be limited to providing missing data and removing inconsistencies.

~~3. The procedures and timetable for the compilation of the Community inventory and the inventory report are set out in Annex VI.~~

Article 19 - The review, adjustment and compliance procedures under the UNFCCC and the Kyoto Protocol pursuant to Article 8(1)(b) and (c) of Decision (EU) No [X]

1. If a Member State has not submitted its annual inventory report to the UNFCCC by 27 May or if it has submitted empty tables for the CRF reporter software, it shall immediately notify the Commission.

2. Member States shall notify the Commission within one week of receiving any of the following information from the UNFCCC secretariat:

~~(a) indications by an expert review team of problems related to the Member State's inventory which cwould need an adjustment;~~

(b) a status report indicating a date of receipt of the common reporting format, the national inventory report, the common reporting format for LULUCF activities under the Kyoto Protocol or the standard electronic format for Kyoto units have not been submitted by 27th May;

(c) a 'Saturday paper' indicating potential problems of the greenhouse gas inventory;

(d) corrections to the inventory estimates applied in agreement between the Member State and the expert review team to the inventory submission concerned;

(e) adjusted estimates contained in a draft individual inventory review report applied where the Member State did not correct the problem to the satisfaction of the expert review team;

(f) questions of implementation in a final UNFCCC review report that have been submitted to the Compliance Committee under the Kyoto Protocol, the notification by the Compliance Committee to proceed with a question of implementation, and all

preliminary findings and decisions of the Compliance Committee and its branches concerning the Member State.

With regard to points (a), (b) and (c) the Member State shall notify the Commission on how it plans to address the problems identified by the expert review team.

With regard to point (d) the Member State shall notify the Commission whether it accepts or rejects the proposed adjustments.

The Commission shall inform the other Member States within one week of receipt of the information in points (a) to (d) from the Member State concerned.

3. The Commission shall inform all Member States within one week of the receipt of the following information from the UNFCCC secretariat:

(a) indications by an expert review team of problems related to the Union ~~Community~~'s inventory which would need an adjustment;

(b) a 'Saturday paper' indicating potential problems of the Union greenhouse gas inventory;

(c) corrections to the inventory estimates applied in agreement between the Union ~~Community~~ and the expert review team to the Union inventory submission concerned;

(d) adjusted estimates contained in a draft individual inventory review report applied where the Union ~~Community~~ did not correct the problem to the satisfaction of the expert review team;

(e) questions of implementation in a final UNFCCC review report that have been submitted to the Compliance Committee under the Kyoto Protocol, the notification by the Compliance Committee to proceed with a question of implementation, and all preliminary findings and decisions of the Compliance Committee and its branches concerning the Union ~~Community~~.

4. Member States shall coordinate their response to the review process in relation to obligations under Decision (EU) No [X] with the Commission:

(a) within the timeframes provided pursuant to the Kyoto Protocol, if the adjusted estimates in a single year or the cumulative adjustments in subsequent years of the commitment period for one or more Member States would imply adjustments of the Union ~~Community~~ inventory to an amount leading to a failure to meet the methodological and reporting requirements under Article 7(1) of the Kyoto Protocol for the purpose of the eligibility set out in the guidelines under Article 7 of the Kyoto Protocol;

(b) within two weeks prior to the submission to the relevant bodies under the Kyoto Protocol of the following:

(i) a request to revise an adjustment;

(ii) a request for reinstatement of eligibility;

(iii) a response to a decision to proceed with a question of implementation or to preliminary findings of the Compliance Committee.

5. ~~Member States shall inform the Commission and other Member States on adjustments calculated for their inventory estimates during the voluntary adjustment procedure applied pursuant to the technical guidance for adjustments.~~ [Upon receipt from the UNFCCC secretariat,] Member States shall forthwith communicate to the Commission the final review report of their greenhouse gas inventory].

~~Article 22 - The preparation of the reports on demonstration of progress pursuant to Article 8(1)(d) of Decision No 280/2004/EC~~

~~1. The Commission draft report on the demonstration of progress achieved by 2005 by the Community shall be circulated to Member States by 30 July 2005. Member States shall provide any comments by 31 August 2005 at the latest.~~

~~2. Member States shall submit their reports on the demonstration of progress achieved by 2005 to the UNFCCC secretariat by 1 January 2006 and shall on the same date provide the Commission with an electronic copy of that submission.~~

~~Article 23 - Reporting on the determination of the assigned amount pursuant to Article 8(1)(e) of Decision No 280/2004/EC~~

~~1. Each Member State shall, by 15 January 2006, submit the following information to the Commission:~~

~~(a) the complete time series of inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol as reported to the UNFCCC;~~

~~(b) the identification of its selected base year for hydrofluoro carbons, perfluorocarbons and sulphur hexafluoride as reported to the UNFCCC;~~

~~(c) its proposal for its emission level in terms of tonnes of carbon dioxide equivalent pursuant to Article 3 of Decision 2002/358/EC and Article 3(7) and (8) of the Kyoto Protocol, following the establishment of definitive base year emission figures and on the basis of the quantified emission limitation or reduction commitments set out in Annex II to Decision 2002/358/EC and the Kyoto Protocol, taking into account the methodologies for estimating anthropogenic emissions by sources and removals by sinks referred to in Article 5(2) of the Kyoto Protocol and the modalities for the calculation of assigned amount pursuant to Article 3(7) and (8) of the Kyoto Protocol.~~

~~(d) the calculation of its commitment period reserve as 90 % of its proposed assigned amount or 100% of five times its most recently reviewed inventory, whichever is the lowest;~~

~~(e) the identification of its selection of single minimum values for tree crown cover, land area and tree height for use in accounting for its activities under Article 3(3) and (4) of the Kyoto Protocol, together with a justification of the consistency of those values with the information that has been historically re-~~

ported to the Food and Agriculture Organisation of the United Nations or other international bodies, and in the case of difference, an explanation of why and how such values were chosen, in accordance with definitions, modalities, rules and guidelines relating to land use, land use change and forestry activities under the Kyoto Protocol;

(f) the identification of its election of activities under Article 3(4) for inclusion in its accounting for the first commitment period, together with information on how its national system under Article 5(1) of the Kyoto Protocol will identify land areas associated with the activities, in accordance with definitions, modalities, rules and guidelines relating to land use, land use change and forestry activities under the Kyoto Protocol;

(g) the identification of whether, for each activity under Article 3(3) and (4) of the Kyoto Protocol it intends to account annually or for the entire commitment period;

(h) a description of its national system in accordance with Article 5(1) of the Kyoto Protocol, in accordance with the guidelines under Article 7 of the Kyoto Protocol;

(i) a description of its national registry, in accordance with the guidelines under Article 7 of the Kyoto Protocol.

Member States not listed in Annex II to Decision 2002/358/EC shall submit this information by 15 June 2006.

2. The timetable for the preparation and submission of the reports referred to in Article 7(1) of Decision No 280/2004/EC and submitted in accordance with the modalities for the accounting of assigned amounts under Article 7(4) of the Kyoto Protocol is set out in Annex VII.

CHAPTER VI - Final provisions

Article 20 - Entry into force

This Decision shall enter into force on the day following its publication in the Official Journal of the European Union.

Article 21 - Addressees

This Decision is addressed to the Member States.

Annex I Tables for methodologies, data sources and emission factors used by Member States for EU key categories for the purpose of Article 3(1)(t) of Decision (EU) No [X]

Table for methodologies, data sources and emission factors used by Member States for EC key sources for the purpose of Article 3(1)(t)

Information on methods used could be the tier method, the model or a country-specific approach. Activity data could be from national statistics or plant-specific. Emission factors could be the IPCC default emission factors as outlined in the revised 1996 IPCC guidelines for national greenhouse gas inventories and in the IPCC good practice guidance, country-specific emission factors, plant-specific emission factors or CORINAIR emission factor developed under the 1979 Convention on Longe-Range Transboundary Air Pollution.

Table I -1: Community summary report for methods, activity data and emission factors used (Energy)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
1. Energy											
A. Fuel Combustion											
1. Energy Industries											
a. Public Electricity and Heat Production											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		
Other fuels	Yes				No				No		
b. Petroleum Refining											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		
c. Manufacture of Solid Fuels and Other Energy Industries											
Solid fuels	Yes				No				No		

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
Gaseous fuels	Yes				No				No		
2. Manufacturing Industries and Construction											
a. Iron and Steel											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		
b. Non-Ferrous Metals											
Solid fuels	Yes				No				No		
Gaseous fuels	No				No				No		
c. Chemicals											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		
Other fuels	Yes				No				No		
d. Pulp, Paper and Print											
Liquid fuels	Yes				No				No		
Solid fuels	Yes										
Gaseous fuels	Yes				No				No		
e. Food Processing, Beverages and Tobacco											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		
f. Other *(as specified in table 1.A(a)s2)*											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
Other fuels	Yes				No				No		
3. Transport											
a. Civil Aviation											
Jet kerosene	Yes				No				No		
b. Road Transportation											
Gasoline	Yes				Yes				No		
Diesel oil	Yes				No				Yes		
LPG	Yes				No				No		
Other fuels	No				No				No		
c. Railways											
Liquid fuels	Yes				No				No		
d. Navigation											
Gas/Diesel oil	Yes				No				No		
Residual Oil	Yes				No				No		
e. Other Transportation *(as specified in table 1.A(a)s3)*											
Gaseous Fuels	No				No				No		
4. Other Sectors											
a. Commercial/Institutional											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		
Other fuels	Yes										
b. Residential											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
c. Agriculture/Forestry /Fisheries											
Liquid fuels	Yes				No				No		
Solid fuels	Yes				No				No		
Gaseous fuels	Yes				No				No		
5. Other											
a. Stationary											
Solid fuels	Yes				No				No		
b. Mobile											
Liquid fuels	Yes				No				No		
B. Fugitive Emissions from Fuels											
1. Solid Fuels											
a. Coal Mining	No				Yes				No		
b. Solid Fuel Transformation	No				No				No		
c. Other *(as specified in table 1.B.1)*	No				No				No		
2. Oil and Natural Gas											
a. Oil	Yes				No				No		
b. Natural Gas	No				Yes				No		
c. Venting and Flaring	Yes				No				No		
d. Other *(as specified in table 1.B.2)*	No				No				No		

Table I -2: Community summary report for methods, activity data and emission factors used (industrial processes)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
2. Industrial Processes											
A. Mineral Products											
1. Cement Production	Yes				No				No		
2. Lime Production	Yes				No				No		
3. Limestone and Dolomite Use	Yes				No				No		
4. Soda Ash Production and Use	No				No				No		
5. Asphalt Roofing	No				No				No		
6. Road Paving with Asphalt	No				No				No		
7. Other *(as specified in table 2(I)A-G)*	No				No				No		
B. Chemical Industry											
1. Ammonia Production	Yes				No				No		
2. Nitric Acid Production	No				No				Yes		
3. Adipic Acid Production	No				No				Yes		
4. Carbide Production	No				No				No		
5. Other *(as specified in table 2(I)A-G)*	Yes				No				Yes		
C. Metal Production											
1. Iron and Steel Production	Yes				No				No		
2. Ferroalloys Production	No				No				No		
3. Aluminium Production	No				No				No		
4. SF_6 Used in Aluminium and Magnesium Foundries	No				No				No		
5. Other *(as specified in table 2(I)A-G)*	No				No				No		
D. Other Production											
1. Pulp and Paper	No										
2. Food and Drink	No										
E. Production of Halocarbons and SF_6											
1. By-product Emissions											

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O			
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	
2. Fugitive Emissions												
3. Other *(as specified in table 2(II)*												
F. Consumption of Halocarbons and SF_6												
1. Refrigeration and Air Conditioning Equipment												
2. Foam Blowing												
3. Fire Extinguishers												
4. Aerosols/ Metered Dose Inhalers												
5. Solvents												
6. Other applications using ODS substitutes												
7. Semiconductor Manufacture												
8. Electrical Equipment												
9. Other *(as specified in table 2(II)*												
G. Other												

Continuation Table I-II

GREENHOUSE GAS SOURCE AND SINK	HFCs				PFCs				SF_6			
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	E f
2. Industrial Processes												
A. Mineral Products												
1. Cement Production												
2. Lime Production												
3. Limestone and Dolomite Use												
4. Soda Ash Production and Use												
5. Asphalt Roofing												

GREENHOUSE GAS SOURCE AND SINK	HFCs				PFCs				SF_6			
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	E fa
6. Road Paving with Asphalt												
7. Other *(as specified in table 2(I)A-G)*												
B. Chemical Industry												
1. Ammonia Production	No				No				No			
2. Nitric Acid Production	No				No				No			
3. Adipic Acid Production	No				No				No			
4. Carbide Production	No				No				No			
5. Other *(as specified in table 2(I)A-G)*	No				No				No			
C. Metal Production												
1. Iron and Steel Production					No				No			
2. Ferroalloys Production					No				No			
3. Aluminium Production					Yes				No			
4. SF_6 Used in Aluminium and Magnesium Foundries					No				No			
5. Other *(as specified in table 2(I)A-G)*					No				No			
D. Other Production												
1. Pulp and Paper												
2. Food and Drink												
E. Production of Halocarbons and SF_6												
1. By-product Emissions	Yes				No				Yes			
2. Fugitive Emissions	No				No				No			
3. Other *(as specified in table 2(II)*	No				No				No			
F. Consumption of Halocarbons and SF_6												
1. Refrigeration and Air Conditioning Equipment	Yes				No				No			
2. Foam Blowing	Yes				No				No			
3. Fire Extinguishers	Yes				No				No			
4. Aerosols/ Metered Dose Inhalers	Yes				No				No			

GREENHOUSE GAS SOURCE AND SINK	HFCs				PFCs				SF_6			
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	E fa
5. Solvents	No				No				No			
6. Other applications using ODS substitutes	No				No				No			
7. Semiconductor Manufacture	No				No				No			
8. Electrical Equipment	No				No				No			
9. Other *(as specified in table 2(II)*	No				No				No			
G. Other									Yes			

Table I -3: Community summary report for methods, activity data and emission factors used (solvent and other product use, agriculture)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method ap-plied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
3. Solvent and Other Product Use											
A. Paint Application	No								No		
B. Degreasing and Dry Cleaning	No								No		
C. Chemical Products, Manufacture and Processing	No								No		
D. Other	No								No		
4. Agriculture											
A. Enteric Fermentation											
1. Cattle					Yes						
2. Buffalo					No						
3. Sheep					Yes						
4. Other					No						
B. Manure Management											
1. Cattle					Yes				No		
2. Buffalo					No				No		

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
3. Sheep					No				No		
4. Other					No				No		
8. Swine					Yes				No		
13. Solid Storage and Dry Lot					No				Yes		
C. Rice Cultivation											
D. Agricultural Soils											
1. Direct Soil Emissions	No				No				Yes		
2. Pasture, range and paddock manure	No				No				Yes		
3. Indirect Emissions	No				**No**				Yes		
4. Other *(as specified in table 4.D)*	No				No				No		
E. Prescribed Burning of Savannas					No				No		
F. Field Burning of Agricultural Residues					No				No		
G. Other					No				No		

Table I -4: Community summary report for methods, activity data and emission factors used (land-use change and forestry, waste, other)

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
5. Land-Use, Land-Use Change and Forestry											
A. Forest Land											
1. Forest Land remaining Forest Lands	Yes				No				No		
2. Land converted to Forest Lands	Yes				No				No		
B. Cropland											
1. Cropland remaining Cropland	Yes				No				No		
2. Land converted to Cropland	Yes				No				No		

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
C. Grassland											
1. Grassland remaining Grassland	Yes				No				No		
2. Land converted to Grassland	Yes				No				No		
D. Wetlands											
1. Wetlands remaining Wetlands	No				No				No		
2. Land converted to Wetlands	No				No				No		
E. Settlements											
1. Settlements remaining Settlements	No				No				No		
2. Land converted to Settlements	Yes				No				No		
F. Other Land											
1. Other Land remaining Other Land					No				No		
2. Land converted to Other Land	Yes				No				No		
G. Other (please specify)											
Harvested Wood Products	No				No				No		
6. Waste											
A. Solid Waste Disposal on Land											
1. Managed Waste Disposal on Land	No				Yes						
2. Unmanaged Waste Disposal Sites	No				Yes						
3. Other *(as specified in table 6.A)*	No				No						
B. Wastewater Handling											
1. Industrial Wastewater					No				No		
2. Domestic and Commercial Wastewater					Yes				Yes		
3. Other *(as specified in table 6.B)*					No				No		
C. Waste Incineration											
D. Other	No				No				No		
7. Other (as specified in Summary 1.A)											

GREENHOUSE GAS SOURCE AND SINK	CO_2				CH_4				N_2O		
CATEGORIES	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)	Emission factor (4)	Key source (1)	Method applied (2)	Activity data (3)
Memo Items: (8)											
International Bunkers											
Aviation	No				No				No		
Marine	No				No				No		
CO_2 Emissions from Biomass	No				No				No		

Legend for tables I -1 to I -4

(1) Key sources of the Community. To be completed by Commission/EEA with results from key category analysis from previous inventory submission.

(2) Use the following notation keys to specify the method applied:

D (IPCC default), **T1a, T1b, T1c** (IPCC Tier 1a, Tier 1b and Tier 1c, respectively), **C** (CORINAIR), **COPERT X** (Coper
RA (Reference Approach), **T2** (IPCC Tier 2), **CS** (Country Specific).
T1 (IPCC Tier 1), **T3** (IPCC Tier 3), **M** (Model)

If using more than one method within one source category, enumerate the relevant methods. Explanations regarding country-specific methods or any modifications to the default IPCC methods, as well as inform
of
Different methods per source category where more than one method is indicated, should be provided in the documentation box.

(3) Use the following notation keys to specify the sources of activity data used :

NS (national statistics), **IS** (International statistics), **AS** (associations, business organizations)
RS (regional statistics), **PS** (Plant Specific data). **Q** (specific questionnaires, surveys)

If keys above are not appropriate for national circumstances, use additional keys and explain those in the documentation box.
Where a mix of AD sources has been used, use different notations in one and the same cells with further explanations in the documentation box.

(4) Use the following notation keys to specify the emission factor used:

D (IPCC default), **CS** (Country Specific),
C (CORINAIR), **PS** (Plant Specific).

Where a mix of emission factors has been used, use different notations in one and the same cells with further explanations in the documentation box.

Documentation box:

* The full information on methodological issues, such as methods, activity data and emission factors used, can be found in the relevant sector sections of chapter 5 of the NIR. If any additional information is ne
To understand the content of this table, use this documentation box to provide references to the relevant section of the NIR where further details can be found.
* Where a mix of methods/ emission factors has been used within one source category, use this documentation box to specify those methods/emission factors for the various sub-sources where they have been ap
(see also footnotes 2 to 4 to this table).

Annex II Annual indicators

Table 34 List of annual indicators

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
1	MACRO	Total CO2 intensity of GDP, t/Mio Euro	Total CO2 emissions, kt	Total CO2 emissions (excluding LUCF) as reported in the CRF	Do not report this data, it will be taken from the latest CRF					
			GDP, Bio Euro (EC95)	Gross domestic product at constant 1995 prices (source: National Accounts)	Please check with Eurostat or Odyssee, if no national statistics are available.	Note that Eurostat does no longer apply the fixed base year correction (e.g. 1995, 2000). Instead Eurostat now uses the chain linking correction, where every year is corrected on the basis of the previous one. The chain linked corrected GDP data (unit: MIO_EUR_CLV2000) are available in new Cronos.	pibxx/txchg€(2000) pibxx: GDP at constant prices in national currency txchg€(2000)): coefficient to convert constant prices in national currency in ECU of 2000			
2	MACRO B0	Energy related CO2 intensity of GDP, t/Mio Euro	CO2 emissions from energy consumption, kt	CO2 emissions from combustion of fossil fuels (IPCC source category 1A, sectoral approach)	Do not report this data, it will be taken from the latest CRF					
			GDP, Bio Euro (EC95)	Gross domestic product at constant 1995 prices (source: National Accounts)	Same denominator as Table II-1 priority indi-				0	

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
					cator 1. Please fill in this line only if not yet reported under Table II-1 priority indicator 1 (this sheet, line 9).					
3	TRANSPORT C0	CO2 emissions from passenger cars, kt		CO2 emissions from the combustion of fossil fuels for all transport activity with passenger cars (automobiles designated primarily for transport of persons and having capacity of 12 persons or fewer; gross vehicle weight rating of 3900 kg or less - IPCC source category 1A3bi).						
		Number of kilometres by passenger cars, Mkm		Number of vehicle kilometres by passenger cars. (source: transport statistics). Note: Activity data should be consistent with the emission data, if possible.	Please check with Eurostat or Odyssee, if no national statistics are available. Please indicate in column AA if activity data		pkmvpc pkmvpc:traffic of cars in pkm			

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
					are consistent with the emission data.					
4	INDUSTRY A1	Energy related CO2 intensity of industry, t/Mio Euro	CO2 emissions from industry, kt	Emissions from combustion of fossil fuels in manufacturing industries, construction and mining and quarrying (except coal mines and oil and gas extraction) including combustion for the generation of electricity and heat (IPCC source category 1A2). Energy used for transport by industry should not be included here but in the transport indicators. Emissions arising from off-road and other mobile machinery in industry should be included in this sector.	Do not report this data, it will be taken from the latest CRF					
			Gross value-added total industry, Bio Euro (EC95)	Gross value added at constant 1995 prices in manufacturing industries (NACE 15-22, 24-37), construction (NACE 45) and mining and quarrying (except coal mines and oil and gas extraction) (NACE 13-14) (source: National Accounts)	Please check with Eurostat or Odyssee, if no national statistics are available.	NACE Codes of branches available on Eurostat homepage (NACE A17 and NACE A31): CB (Mining and quarrying except energy producing materials), D (Manufacturing), F (Construction) Note that Eurostat does	vadimaxx./txchg€(2000) vadimaxx: value added of manufacturing industry at constant prices in national currency ttxchg€(2000)): coefficient to con-			

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
						no longer apply the fixed base year correction (see comment on priority indicator 1)	vert constant prices in national currency in ECU of 2000			
5	HOUSEHOLDS A.1	Specific CO2 emissions of households, t/dwelling	CO2 emissions from fossil fuel consumption households, kt	CO2 emissions from fossil fuel combustion in households (IPCC source category 1A4b).	Do not report this data, it will be taken from the latest CRF					
			Stock of permanently occupied dwellings, 1000	Stock of permanently occupied dwellings	Please check with Eurostat or Odyssee, if no national statistics are available.		nbrlpr nbrlpr: :number of permanently occupied dwellings			
6	SERVICES A0	CO2 intensity of the commercial and institutional sector, t/Mio Euro	CO2 emissions from fossil fuel consumption in commercial and institutional sector, kt	CO2 emissions from fossil fuel combustion in commercial and institutional buildings in the public and private sectors (IPCC source category 1A4a). Energy used for transport by services should not be included here but in the transport indicators.	Do not report this data, it will be taken from the latest CRF					

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
			Gross value-added services, Bio Euro (EC95)	Gross value added at constant 1995 prices in services (NACE 41, 50, 51, 52, 55, 63, 64, 65, 66, 67, 70, 71, 72, 73, 74, 75, 80, 85, 90, 91, 92, 93, 99) (source: National Accounts)	Please check with Eurostat or Odyssee, if no national statistics are available.	NACE Codes of branches available on Eurostat homepage (NACE A6): 4 (Wholesale and retail trade; repair of motor vehicles and household goods, hotels and restaurants; transport and communications), 5 (Financial, real-estate, renting and business activities), 6 (Other service activities) Note that Eurostat does no longer apply the fixed base year correction (see comment on priority indicator 1)	vadterxx./txchg€(2000) vadterxx: value added of services at constant prices in national currency txchg€(2000): coefficient to convert constant prices in national currency in ECU of 2000			
7	TRANSFORMATION B0	Specific CO2 emissions of public and autoproducer power plants, t/TJ	CO2 emissions from public and autoproducer thermal power stations, kt	CO2 emissions from all fossil fuel combustion for gross electricity and heat production by public and autoproducer thermal power and combined heat and power plants. Emissions from heat only plants are not included.						

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
			All products – output by public and autoproducer thermal power stations, PJ	Gross electricity produced and any heat sold to third parties (combined heat and power plants - CHP) by public and autoproducer thermal power and combined heat and power plants. Output from heat only plants is not included. Public thermal plants generate electricity (and heat) for sale to third parties, as their primary activity. They may be privately or publicly owned. Autoproducer thermal power stations generate electricity (and heat) wholly or partly for their use as an activity, which supports their primary activity. The gross electricity generation is measured at the outlet of the main transformers, i.e. the consumption of electricity in the plant auxiliaries and in transformers is included. (source: energy balance)	Please check with Eurostat or Odyssee, if no national statistics are available.	All products (Code 0000) from Output from conventional thermal power stations (Code 101101)				

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
1	TRANSPORT D0	CO2 emissions from freight transport on road, kt		CO2 emissions from the combustion of fossil fuel for all transport activity with light duty trucks (vehicles with a gross vehicle weight of 3900 kg or less designated primarily for transportation of light-weight cargo or which are equipped with special features such as four-wheel drive for off-road operation - IPCC source category 1A3bii) and heavy duty trucks (any vehicle rated at more than 3900 kg gross vehicle weight designated primarily for transportation of heavy-weight cargo - IPCC source category 1A3biii excluding buses).						
		Freight transport on road, Mtkm		Number of tonne-kilometres transported in light and heavy duty trucks on road; one tonne-kilometre represents the transport of one tonne by road over one kilometre. (source: transport statistics). Note: Activity data should be	Please check with Eurostat or Odyssee, if no national statistics are available. Please indicate in column AA if activity data are con-		km for trucks, light trucks, busses			

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
				consistent with the emission data, if possible.	sistent with the emission data.					
2	INDUSTRY A1.1	Total CO2 intensity - iron and steel industry, t/Mio Euro	Total CO2 emissions from iron and steel, kt	CO2 emissions from combustion of fossil fuels in manufacture of iron and steel including combustion for the generation of electricity and heat (IPCC source category 1A2a), from the iron and steel production process (IPCC source category 2C1) and from ferroalloys production process (IPCC source category 2C2).	Do not report this data, it will be taken from the latest CRF					
			Gross value-added - iron and steel industry, Bio Euro (EC95)	Gross value added at constant 1995 prices in manufacture of basic iron and steel and of ferro-alloys (NACE 27.1), manufacture of tubes (NACE 27.2), other first processing of iron and steel (NACE (27.3), casting of iron (NACE 27.51) and casting of steel (NACE 27.52). (source:	Please check with Eurostat or Odyssee, if no national statistics are available.	Note that Eurostat does no longer apply the fixed base year correction (see comment on priority indicator 1)	vadsidxx/txchg€(2000) vaindxx: value added of industry at constant prices in national currency txchg€(2000)):			

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
				National Accounts)			coefficient to convert constant prices in national currency in ECU of 2000			
3	INDUSTRY A1.2	Energy related CO2 intensity - chemical industry, t/Mio Euro	Energy related CO2 emissions chemical industries, kt	CO2 emissions from combustion of fossil fuels in manufacture of chemicals and chemical products including combustion for the generation of electricity and heat (IPCC source category 1A2c).	Do not report this data, it will be taken from the latest CRF					
			Gross value-added chemical industry, Bio Euro (EC95)	Gross value added at constant 1995 prices in manufacture of chemicals and chemical products (NACE 24) (source: National Accounts)	Please check with Eurostat or Odyssee, if no national statistics are available.	NACE Codes of branches available on Eurostat homepage (NACE A31): DG (Manufacture of chemicals, chemical products and man-made fibres) Note that Eurostat does no longer apply the fixed base year correction (see comment on priority indicator 1)	vadchixx./txchg€(2000) vaindxx: value added of industry at constant prices in national currency txchg€(2000)): coefficient to convert constant prices in national currency in ECU			

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
							of 2000			
4	INDUSTRY A1.3	Energy related CO2 intensity - glass, pottery and building materials industry, t/Mio Euro	Energy related CO2 emissions glass, pottery and building materials, kt	CO2 emissions from combustion of **fossil** fuels in manufacture of non-metallic mineral products (NACE 26) including combustion for the generation of electricity and heat.						
			Gross value-added - glass, pottery and buildings materials industry, Bio Euro (EC95)	Gross value added at constant 1995 prices in manufacture of non-metallic mineral products (NACE 26) (source: National Accounts)	Please check with Eurostat or Odyssee, if no national statistics are available.	NACE Codes of branches available on Eurostat homepage (NACE A31): DI (Manufacture of other non-metallic mineral products) Note that Eurostat does no longer apply the fixed base year correction (see comment on priority indicator 1)	(non metallic minerals) vadmnmxx./txchg€(2000) vaindxx: value added of industry at constant prices in national currency txchg€(2000)): coefficient to convert constant			

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
							prices in national currency in ECU of 2000			
5	INDUSTRY C0.1	Specific CO2 emissions of iron and steel industry, t/t	Total CO2 emissions from iron and steel, kt	CO2 emissions from combustion of fossil fuels in manufacture of iron and steel including combustion for the generation of electricity and heat (IPCC source category 1A2a), from the iron and steel production process (IPCC source category 2C1) and from ferroalloys production process (IPCC source category 2C2).	Same numerator as Table II-2 additional priority indicator 2. Do not report this data, it will be taken from the latest CRF					
			Production of oxygen steel, kt	Production of oxygen steel (NACE 27) (source: production statistics)	Please check with Eurostat or Odyssee, if no national statistics are available.		prdacb: production of crude steel (t)			

No	Nomenclature in Eurostat energy efficiency indicators	Indicator	Numerator / denominator	Guidance / definitions[2] [3]	Additional remarks	Potential data sources		2010	X	Comments Member State Please indicate in this column if you cannot follow exactly the guidance or if numerator and denominator are not entirely consistent.
						Eurostat	Odyssee			
6	INDUSTRY C0.2	Specific energy related CO2 emissions of cement industry, t/t	Energy related CO2 emissions from glass, pottery and building materials, kt	CO2 emissions from combustion of **fossil** fuels in manufacture of non-metallic mineral products (NACE 26) including combustion for the generation of electricity and heat.	Same numerator as Table II-2 additional priority indicator 4. Please fill in this line only if not yet reported under Table II-2 additional priority indicator 4 (this sheet, line 14).				0	
			Cement production, kt	Cement production (NACE 26) (source: production statistics)	Please check with Eurostat or Odyssee, if no national statistics are available.		prdcim: production of cement (t)			

Annex III Indicators for projections to monitor and evaluate progress

No	Nomenclature in Eurostat energy efficiency indicators	Indicator / numerator / denominator		Unit	Guidance / definitions[1]	Guidance / source
1	MACRO	**Indicator**	**CO2 intensity of GDP**	**t CO2 / EUR million**		
		Numerator	Total CO2 emissions	kt CO2	Total CO2 emissions (excluding LULUCF) as reported in the CRF (as reported in EmissionProjections sheet)	National GHG inventory
		Denominator	GDP	billion EUR (EC95) or (2000)	Gross domestic product at constant 1995 prices	National accounts
2	TRANSPORT C0	**Indicator**	**Passenger car CO2**	**kt CO2 / M pkm**		
		Numerator	CO2 emissions from passenger cars	kt CO2	CO2 emissions from the combustion of fossil fuels for all transport activity with passenger cars (automobiles designated primarily for transport of persons and having capacity of 12 persons or fewer; gross vehicle weight rating of 3900 kg or less).	IPCC source category 1A3bi
		Denominator	Number of kilometres by passenger cars	million passenger km	Number of vehicle kilometres by passenger cars. Note: Activity data should be consistent with the emission data, if possible.	Transport statistics
3	TRANSPORT D0	**Indicator**	**Freight transport CO2**	**kt CO2 / M tkm**		

		Numerator	CO2 emissions from freight transport (all modes)	kt CO2	CO2 emissions from the combustion of fossil fuel for all transport activity including light duty trucks (vehicles with a gross vehicle weight of 3900 kg or less designated primarily for transportation of light-weight cargo or which are equipped with special features such as four-wheel drive for off-road operation) and heavy duty trucks (any vehicle rated at more than 3900 kg gross vehicle weight designated primarily for transportation of heavy-weight cargo). Includes rail and domestic air and marine transport.	IPCC source categories 1A3bii and 1A3biii (excluding buses)
		Denominator	Freight transport (all modes)	million tonnes km	Number of tonne-kilometres transported Note: Activity data should be consistent with the emission data, if possible.	
4	INDUSTRY A1	**Indicator**	**Energy-related CO2 intensity of industry**	**t CO2 / million EUR**		
		Numerator	CO2 emissions from fossil fuel consumption industry	kt CO2	Emissions from combustion of fossil fuels in manufacturing industries, construction and mining and quarrying (except coal mines and oil and gas extraction) including combustion for the generation of electricity and heat. Energy used for transport by industry should not be included here but in the transport indicators. Emissions arising from off-road and other mobile machinery in industry should be included in this sector.	IPCC source category 1A2
		Denominator	Gross value-added total industry	billion EUR (EC95) or (2000)	Gross value added at constant 1995 prices in manufacturing industries (NACE 15-22, 24-37), construction (NACE 45) and mining and quarrying (except coal mines and oil and gas extraction) (NACE 13-14)	National accounts
5	HOUSEHOLDS A.1	**Indicator**	**Specific CO2 emissions of households**	**t CO2 / dwelling**		

		Numerator	CO2 emissions from fossil fuel consumption households, kt	kt CO2	CO2 emissions from fossil fuel combustion in households.	IPCC source category 1A4b
		Denominator	Stock of permanently occupied dwellings	1000 dwellings	Stock of permanently occupied dwellings	
6	SERVICES A0	**Indicator**	**CO2 intensity of the services sector**	**t / million EUR**		
		Numerator	CO2 emissions from fossil fuel consumption in services	kt CO2	CO2 emissions from fossil fuel combustion in commercial and institutional buildings in the public and private sectors (IPCC source category 1A4a). Energy used for transport by services should not be included here but in the transport indicators.	IPCC source category 1A4a
		Denominator	Gross value-added services	billion EUR (EC95) or (2000)	Gross value added at constant 1995 prices in services (NACE 41, 50, 51, 52, 55, 63, 64, 65, 66, 67, 70, 71, 72, 73, 74, 75, 80, 85, 90, 91, 92, 93, 99)	National accounts
7	TRANSFORMATION B0	**Indicator**	**Specific CO2 emissions of public and autoproducer power plants**	**t CO2 / TJ**		
		Numerator	CO2 emissions from public and autoproducer thermal power stations	kt CO2	CO2 emissions from all fossil fuel combustion for gross electricity and heat production by public and autoproducer thermal power and combined heat and power plants. Emissions from heat only plants are not included.	

		Denominator	All products –output by public and autoproducer thermal power stations	PJ	Gross electricity produced and any heat sold to third parties (combined heat and power plants - CHP) by public and autoproducer thermal power and combined heat and power plants. Output from heat only plants is not included. Public thermal plants generate electricity (and heat) for sale to third parties, as their primary activity. They may be privately or publicly owned. Autoproducer thermal power stations generate electricity (and heat) wholly or partly for their use as an activity, which supports their primary activity. The gross electricity generation is measured at the outlet of the main transformers, i.e. the consumption of electricity in the plant auxiliaries and in transformers is included.	Energy balance
8	AGRICULTURE	**Indicator**	**Specific N2O emissions of fertiliser and manure use**	**kg N2O / kg N**		
		Numerator	N2O emissions from synthetic fertiliser and manure use	kt N2O	Direct N2O-emissions from synthetic fertilizer use and manure applied to soils	
		Denominator	Use of synthetic fertiliser and manure	kt nitrogen		
9	AGRICULTURE	**Indicator**	**Specific CH4 emissions of cattle production**	**kg CH4 / head**		
		Numerator	CH4 emissions from cattle	kt CH4	CH4 emissions from enteric fermentation cattle	
		Denominator	Cattle population	1000 head		
10	WASTE	**Indicator**	**Specific CH4 emissions from landfills**	**kt CH4 / kt**		
		Numerator	CH4 emissions from landfills	kt CH4	Specific CH4 emissions from managed landfills	
		Denominator	Municipal solid waste going to landfills	kt	Solid waste going to managed landfills	

Annex IV List of parameters for projection

As requested in current template

1a. Gross Domestic Product	Value (€)
1b. Gross Domestic Product growth Rate	Annual growth rate (%)
2a Population	Thousand people
2b Population Growt Rate and Base Year Value	% of value
3. International coal prices	€ per GJ (Gigajoule)
4. International oil prices	€ per GJ (Gigajoule)
5. International gas prices	€ per GJ (Gigajoule)
6. CO2 price	€/ tonne CO2
Assumptions for the energy sector:	
7. Total gross inland consumption	Petajoule (PJ)
7a. - Oil (fossil)	Petajoule (PJ)
7b. - Gas (fossil)	Petajoule (PJ)
7c. – solid fuels	Petajoule (PJ)
7d. – Renewables	Petajoule (PJ)
7e. - Nuclear (IEA definition for energy calc.)	Petajoule (PJ)
7f. Net Electricity import (-+)	Petajoule (PJ)
7g. - Other Please Specify in Column I	Petajoule (PJ)
8. Total gross electricity generation by fuel type	GWhe
8a.. - Oil (fossil)	GWhe
8b. - Gas (fossil)	GWhe
8c. – soild fuels	GWhe
8d. – Renewable	GWhe
8e. Nuclear (IEA definition for energy calc.)	GWhe
8f. - Other Please Specify in Column I	GWhe
9. Final Energy Consumption by Sector	ktoe
9a.. Industry	ktoe
9b. Commercial (Tertiary)	ktoe
9c. Residential	ktoe
9d. Transport	ktoe
9e. Agriculture, forestry, fisheries'	ktoe
9f. Other sectors	ktoe
. Assumptions for the Industry Sector (for industrial sectors contributing significantly to the national total for the base or target year)	
10. Gross value-added total industry, Bio Euro (EC95) 2000	Value (€)
. Assumptions for the transport sector	
11. Volume of passenger transport relative to GDP	passenger-km/€
12. Volume of freight transport relative to GDP	freight-km/€
13. Passenger person kilometres (all modes)	Million passenger km
14. Freight transport (all modes), Mtkm	Million tonne km
15. Number of kilometres by passenger cars, Mkm	Mtkm
16. Final energy consumption in transport by transport mode	ktoe
16a. road transport	ktoe
16b. railways	ktoe
16c. inland waterways	ktoe
16d. air	ktoe
17. Final energy consumption in transport by fuel	ktoe
17a. gasoline	ktoe
17b. kerosenes	ktoe
17c. gas/ dieseloil	ktoe
17d. biofuels	ktoe
. Assumptions for buildings (in residential and commercial or tertiary sector)	
18. number of households	1000 households
. Assumptions in the agriculture sector	
19. The share of the agriculture sector in GDP and relative growth	Value (€)
.20.The livestock numbers by animal type	
20a.. Total Cattle	
20a,i. Dairy cattle	1000 heads
20a,ii. Non-dairy cattle	1000 heads
20b.. sheep	1000 heads
20c. swine	1000 heads
20d. poultry	1000 heads
20e.. Other, please specify	1000 heads
21. N input from application of synthetic fertilizers	kt Nitrogen
22. N input from manure applied tosoils	kg N per year
23. N fixed by N-fixing crops	kg N per year
24. N in crop residues returned to soils	kg N per year
25. Area of cultivated organic soils	ha per year
. Assumptions in the waste sector	
26. Municipal solid waste generation	kt
27. Municipal solid waste disposed to landfills	%
28. Municipal solid waste disposed incinerated	%
29. Municipal solid waste disposed composted	%
30. Municipal solid waste disposed to landfills	kt
31. CH4 recovery as percentage of total CH4 generation	%

Annex V Questionnaire on the use of the Kyoto Protocol mechanisms in meeting the 2008-2012 targets

#see comments in text, to be discussed whether necessary#

Annex VI Questionnaire on the use of units from LULUCF activities under the Kyoto Protocol mechanisms in meeting the 2008-2012 targets

Comment: seems superfluous due to accounting table available since 2010

Annex VII Reporting format for auctioning revenues

	Unit	Reporting year 2013
Auctioning revenues generated		
Total amount of allowances auctioned	Mio. tonnes	
Total revenue earned from auctioning of allowances	1000 EURO	

	Unit	Reporting year 2013	
Use of auctioning revenues		**revenue allocated/ provided[1]**	**revenue spent[2]**
for national and European activities	**Subtotal**		
of which			
Reduction of greenhouse gas emissions	1000 EURO		
Adaptation to the impacts of climate change	1000 EURO		
Funding of research and development	1000 EURO		
Demonstration projects for reducing emissions and for adaptation	1000 EURO		
Initiatives within the framework of the European Strategic Energy Technology Plan	1000 EURO		
European Technology Platforms	1000 EURO		
Development of renewable energies	1000 EURO		
Development of technologies for low-carbon economy	1000 EURO		
Development of energy efficiency measures	1000 EURO		
Forest sequestration in the EU	1000 EURO		
Carbon capture and storage	1000 EURO		
Shift to low-emission and public forms of transport	1000 EURO		
Research and and development in energy efficiency and clean technologies in the ETS sectors	1000 EURO		
Measures to increase energy efficiency and insulation in the building sector or financial support to address social aspects related to energy efficiency in the building sector	1000 EURO		
Coverage of administrative expenses of the management of the EU ETS	1000 EURO		
Other national and European climate related activities (please specify)	1000 EURO		
for other purposes (please specify)	**Subtotal**		
1.	1000 EURO		

	Unit	Reporting year 2013	
Use of auctioning revenues		**revenue allocated/ provided[1]**	**revenue spent[2]**
2.	1000 EURO		
for support activities to developing countries	**Subtotal**		
of which			
Contribution to the Global Energy Efficiency and Renewable Energy Fund (GEEREF)	1000 EURO		
Contribution to the Adaptation Fund under the UNFCCC	1000 EURO		
Reduction of greenhouse gas emissions	1000 EURO		
Adaptation to the impacts of climate change	1000 EURO		
Funding of research and development	1000 EURO		
Demonstration projects for reducing emissions and for adaptation	1000 EURO		
Measures to avoid deforestation (REDD)	1000 EURO		
Measures to increase afforestation and reforestation	1000 EURO		
Technology transfer activities	1000 EURO		
Carbon capture and storage	1000 EURO		
Support to other climate-related multilateral funds	1000 EURO		
Other climate related activities in developing countries (please specify)	1000 EURO		
1.			
2.			

Annex VIII Reporting format for responses to the UNFCCC

CRF category	Comment from UNFCCC review report	Country response	Location in NIR

Annex IX Reporting template for information on policies and measures

As in current Excel template

Annex X List of Common and Coordinated policies and measures

Cross-cutting: EU ETS directive 2003/87/EC as amended by Directive 2008/101/EC and Directive 2009/29/EC	WEM
Cross-cutting: Kyoto Protocol project mechanisms (Directive 2004/101/EC)	WEM
Cross-cutting: Integrated pollution prevention and control (IPPC) (Directive 96/61/EC) and recast (Directive 2008/1/EC)	WEM
Cross-cutting: Effort Sharing Decision (Decision No 406/2009/EC)	Either
Cross-cutting: National Emission Ceilings for certain pollutants (Directive 2001/81/EC)	WEM
Energy supply: RES directive (Directive 2009/28/EC)	Either
Energy supply: Electricity production from renewable energy sources (Directive 2001/77/EC)	WEM
Energy supply: Promotion of cogeneration (Directive 2004/8/EC)	WEM
Energy supply: Taxation of energy products and electricity (Directive 2003/96/EC)	WEM
Energy supply: Internal electricity market (Directive 2003/54/EC) including provision of the third package	WEM
Energy supply: Internal market in natural gas (Directive 98/30/EC) including provision of the third package	WEM
Energy supply: Emissions from large combustion plants (Directives 88/609/EEC and 2001/80/EC)	WEM
Energy supply: Geological storage of CO2 (Directive 2009/31/EC)	WEM
Energy supply: European Energy programme for Recovery (Regulation 2009/663/EC)	WEM
Energy supply: Completion of the internal energy market (including provisions of the 3rd package)	WEM
Energy consumption: Energy performance of buildings (Directive 2002/91/EC)	WEM
Energy consumption: Recast of the Energy performance of buildings (Directive 2010/31/EC)	WAM
Energy consumption: End-use efficiency and energy services (Directive 2006/32/EC)	WEM
Energy consumption: Ecodesign requirements for energy-using products (Directive 2005/32/EC) and its implementing regulations: 1275/2008 (stand-by), 107/2009 (simple set-to boxes), 245/2009 (office/street lighting), 244/2009 (household lighting), 278/2009 (external power supplies), 642/2009 (TVs (+labelling)), 640/2009 (electric motors), 641/2009 (circulators), 643/2009 (freezers/refrigerators (+labelling)), 1222/2009 (labelling for tyres)	WEM
Energy Consumption: Recast of the Ecodesign requirements for energy-using products (Directive 2009/125/EC)	WAM
Energy. consumption: Energy labelling of household appliances (Directive 2003/66/EC (refrigerators - freezers), 2002/40/EC (electric ovens), 2002/31/EC (air-conditioners), 99/9/EC (dishwashers), 98/11/EC (lamps), 96/89/EC (washing maschines), 96/60/EC (washer-driers)	WEM
Energy consumption: Efficiency fluorescent lighting (Directive 2000/55/EC)	WEM
Energy consumption: Motor challenge programme	WEM

Energy consumption: Eco-management and audit scheme (EMAS) (Regulation No 761/2001)	WEM
Energy consumption: Energy-efficiency labelling for office equipment (Reg No. 2422/2001) and recast (Regulation No. 106/2008)	WEM
Energy consumption: Energy Star Program	WEM
Transport: Promotion of clean and energy efficient road transport vehicles (Directive 2009/33/EC)	WEM
Transport: Voluntary agreement with car manufacturers to reduce specific CO2 emissions (ACEA, KAMA, JAMA)	WEM
Transport: Fuel Quality Directive (Directive 2009/30/EC)	WEM
Transport: Strategy for cars CO2 (Regulation 443/2009)	WEM
Transport: Labelling of new passenger cars (Directive 1999/94/EC)	WEM
Transport: Biofuels Directive (Directive 2003/30/EC)	WEM
Transport: Shifting the balance between modes of transport, in particular towards rail (2001/12/EC, 2001/13/EC, 2001/14/EC of 15/03/01 Regulation 881/2004 of 29/04/2004, 2001/49/EC, 2001/50/EC, 2001/51/EC of 29/04/2004)	WEM
Transport: Eurovignette Directive (2006/38/EC)	WEM
Transport: Planned limit values for vans Directive	WAM
Transport: Integrated European railway area (2nd + 3rd Railway package) (COM(2002)18 final)	WEM
Transport: Environmental performace freight transport (Marco Polo Programme)	WEM
Transport: Labelling of tyres (Regulation 1222/2009)	WAM
Transport: Regulation EURO 5 and 6 2007/715/EC	WEM
Transport: Regulation Euro VI for heavy duty vehicles 2009/595/EC	WEM
Transport: Motor Vehicles Directive (2006/40/EC)	WEM
Industrial Process: F-gas regulation (Regulation No 842/2006)	WEM
Industrial Process: HFC emissions from air conditioning in motor vehicles (Directive 2006/40/EC)	WEM
Agriculture: Nitrates Directive (Directive 91/676/EEC)	WEM
Agriculture: Common rules for direct support schemes under CAP (Regulation (EC) No 1782/2003)	WEM
Agriculture: Support for rural development (Regulation (EC) No 1783/2003 amending a number of other Regulations)	WEM
Agriculture: Transition to rural development support (Regulation (EC) No 2603/1999)	WEM
Agriculture: Agricultural production methods compatible with environment (Regulation (EEC) No 2078/92)	WEM
Agriculture: Aid scheme for forestry measures in agriculture (Regulation (EEC) No 2080/92)	WEM
Agriculture: Emission by engines to power agricultural or forestry (Directive 2000/25/EC)	WEM
Agriculture: Pre-accession measures for agriculture and rural development (Regulation (EC) No 1268/1999)	WEM
Agriculture: Water Framework Directive 2000/60/EC	WEM
Agriculture: Common Agricultural Policy (CAP) Reform(2006/144/EC)	WEM

Agriculture: CAP "Health Check" 2008 and the "Set aside" regulation (73/2009)	WEM
Waste: Packaging and packaging waste (Directive 94/62/EC, 2004/12/EC, 2005/20/EC)	WEM
Waste: Landfill Directive (Directive 1999/31/EC)	WEM
Waste: Waste Framework Directive (Directive 2006/12/EC)	WEM
Waste: Waste electrical and electronic equipment Directive (Directive 2002/95/EC)	WEM
Waste: Waste Management Framework Directive (2008/98/EC)	WEM

Annex XI Reporting template for information on greenhouse gas emission projections

As in current Excel template

Annex XII Guidance for the allocation of NACE codes to CRF source categories

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
1.A.1	**Energy industries**	**1.A.1**	**Energy industries**		
1.A.1.a	Public electricity and heat production	1.A.1.a	Main activity electricity and heat production	35.1	Electric power generation, transmission and distribution
				35.3	Steam and air conditioning supply
1.A.1.b	Petroleum refining	1.A.1.b	Petroleum refining	19.2	Manufacture of refined petroleum products
1.A.1.c	Manufacture of solid fuels and other energy industries	1.A.1.c	Manufacture of solid fuels and other energy industries	5	Mining of coal and lignite
				6	Extraction of crude petroleum and natural gas
				9.1	Support activities for petroleum and natural gas extraction
				19.1	Manufacture of coke oven products
				35.2	Manufacture of gas; distribution of gaseous fuels through mains
				24.46	Processing of nuclear fuel
				7.21	Mining of uranium and thorium ores
				8.92	Extraction of peat
1.A.2	**Manufacturing industries and construction**	**1.A.2**	**Manufacturing industries and construction**		
1.A.2.a	Iron and steel	1.A.2.a	Iron and steel	24.1	Manufacture of basic iron and steel and of ferro-alloys
				24.2	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel
				24.3	Manufacture of other products of first processing of steel
				24.51	Casting of iron
				24.52	Casting of steel
1.A.2.b	Non-ferrous metals	1.A.2.b	Non-ferrous metals	24.4	Manufacture of basic precious and other non-ferrous metals
				24.53	Casting of light metals
				24.54	Casting of other non-ferrous metals

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
1.A.2.c	Chemicals	1.A.2.c	Chemicals	20	Manufacture of chemicals and chemical products
				21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
1.A.2.d	Pulp, paper and print	1.A.2.d	Pulp, paper and print	17	Manufacture of paper and paper products
				18	Printing and reproduction of recorded media
1.A.2.e	Food processing, beverages and tobacco	1.A.2.e	Food processing, beverages and tobacco	10	Manufacture of food products
				11	Manufacture of beverages
				12	Manufacture of tobacco products
1.A.2.f	Other	1.A.2.f	Non-metallic minerals	23	Manufacture of other non-metallic mineral products
		1.A.2.g	Transport equipment	29	Manufacture of motor vehicles, trailers and semi-trailers
				30	Manufacture of other transport equipment
		1.A.2.h	Machinery	25	Manufacture of fabricated metal products, except machinery and equipment
				26	Manufacture of computer, electronic and optical products
				27	Manufacture of electrical equipment
				28	Manufacture of machinery and equipment n.e.c.
		1.A.2.i	Mining (excluding fuels) and quarrying	7	Mining of metal ores
				8	Other mining and quarrying
				9.9	Support activities for other mining and quarrying
		1.A.2.j	Wood and wood products	16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
		1.A.2.k	Construction	41	Construction of buildings
				42	Civil engineering
				43	Specialised construction activities
		1.A.2.l	Textile and Leather	13	Manufacture of textiles
				14	Manufacture of wearing apparel
				15	Manufacture of leather and related products
		1.A.2.m	Non-specified industry	22	Manufacture of rubber and plastic products
				31	Manufacture of furniture

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
				32	Other manufacturing
1.A.3	**Transport**	**1.A.3**	**Transport**		
1.A.3.a	Civil aviation	1.A.3.a	Civil aviation	51	Air transport
1.A.3.b	Road transport	1.A.3.b	Road transport	49.3	Other passenger land transport
				49.4	Freight transport by road and removal services
1.A.3.c	Railways	1.A.3.c	Railways	49.1	Passenger rail transport, interurban
				49.2	Freight rail transport
				49.3	Other passenger land transport
1.A.3.d	Navigation	1.A.3.d	Water borne navigation	50	Water transport
1.A.3.e	Other transportation	1.A.3.e	Other transportation	49.5	Transport via pipeline
1.A.4	**Other sectors**	**1.A.4**	**Other sectors**		
1.A.4.a	Commercial / institutional	1.A.4.a	Commercial / institutional	33	Repair and installation of machinery and equipment
				36	Water collection, treatment and supply
				37	Sewerage
				38	Waste collection, treatment and disposal activities; materials recovery
				39	Remediation activities and other waste management services
				45	Wholesale and retail trade and repair of motor vehicles and motorcycles
				46	Wholesale trade, except of motor vehicles and motorcycles
				47	Retail trade, except of motor vehicles and motorcycles
				52	Warehousing and support activities for transportation
				53	Postal and courier activities
				55	Accommodation
				56	Food and beverage service activities

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
				58	Publishing activities
				59	Motion picture, video and television programme production, sound recording and music publishing activities
				60	Programming and broadcasting activities
				61	Telecommunications
				62	Computer programming, consultancy and related activities
				63	Information service activities
				64	Financial service activities, except insurance and pension funding
				65	Insurance, reinsurance and pension funding, except compulsory social security
				66	Activities auxiliary to financial services and insurance activities
				68	Real estate activities
				69	Legal and accounting activities
				70	Activities of head offices; management consultancy activities
				71	Architectural and engineering activities; technical testing and analysis
				72	Scientific research and development
				73	Advertising and market research
				74	Other professional, scientific and technical activities
				75	Veterinary activities
				77	Rental and leasing activities
				78	Employment activities
				79	Travel agency, tour operator and other reservation service and related activities
				80	Security and investigation activities
				81	Services to buildings and landscape activities
				82	Office administrative, office support and other business support activities
				84.1	Administration of the State and the economic and social policy of the community
				84.21	Foreign affairs
				84.23	Justice and judicial activities

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
				84.24	Public order and safety activities
				84.25	Fire service activities
				84.3	Compulsory social security activities
				85	Education
				86	Human health activities
				87	Residential care activities
				88	Social work activities without accommodation
				89	Other social work activities without accommodation n.e.c.
				90	Creative, arts and entertainment activities
				91	Libraries, archives, museums and other cultural activities
				92	Gambling and betting activities
				93	Sports activities and amusement and recreation activities
				94	Activities of membership organisations
				95	Repair of computers and personal and household goods
				96	Other personal service activities
				99	Activities of extraterritorial organisations and bodies
1.A.4.b	Residential	1.A.4.b	Residential		
1.A.4.c	Agriculture / Forestry / Fishing	1.A.4.c	Agriculture / Forestry / Fishing / Fish farms	1	Crop and animal production, hunting and related service activities
				2	Forestry and logging
				3	Fishing and aquaculture
1.A.5	**Other**	**1.A.5**	**Other**		
1.A.5.a	Other, stationary	1.A.5.a	Other, stationary	84.22	Defence activities
1.A.5.b	Other, mobile	1.A.5.b	Other, mobile		
1.B.1	**Solid fuels**	**1.B.1**	**Solid fuels**		
1.B.1.a	Coal mining and handling	1.B.1.a	Coal mining and handling	5	Mining of coal and lignite

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
1.B.1.b	Solid fuel transformation	1.B.1.c	Solid fuel transformation	19.1	Manufacture of coke oven products
1.B.1.c	Other	1.B.1.b	Uncontrolled combustion and burning coal dumps		
1.B.2	**Oil and natural gas**	**1.B.2**	**Oil and natural gas**		
1.B.2.a	Oil	1.B.2.a	Oil (including venting and flaring)	6.1	Extraction of crude petroleum
				19.2	Manufacture of refined petroleum products
				9.1	Support activities for petroleum and natural gas extraction
1.B.2.b	Natural gas	1.B.2.b	Natural gas (including venting and flaring)	6.2	Extraction of natural gas
				9.1	Support activities for petroleum and natural gas extraction
				35.2	Manufacture of gas; distribution of gaseous fuels through mains
1.B.2.c	Venting and flaring		*included in 1.B.2.a and 1.B.2.b in IPCC 2006 GL*		
	not foreseen in IPCC 1996 GL	1.C	Carbon dioxide transport and storage		
2.A	**Mineral products**	**2.A**	**Mineral industry**		
2.A.1	Cement production	2.A.1	Cement production	23.51	Manufacture of cement
				23.6	Manufacture of articles of concrete, cement and plaster
2.A.2	Lime production	2.A.2	Lime production	23.52	Manufacture of lime and plaster
2.A.3	Limestone and dolomite use	2.A.4	Other process uses of carbonates	23.2	Manufacture of refractory products *(several MS report these emissions und CRF 2A7 'Other)*
				23.3	Manufacture of clay building materials *(several MS report these emissions und CRF 2A7 'Other)*
				23.4	Manufacture of other porcelain and ceramic products *(several MS report these emissions und CRF 2A7 'Other)*
2.A.4	Soda ash production and use	2.A.4	Other process uses of carbonates *(soda ash production in 2.B.7 in IPCC 2006 GL)*	20	Manufacture of chemicals and chemical products
2.A.5	Asphalt roofing		*included in 2.D.4 in IPCC 2006 GL*	43.91	Roofing activities
2.A.6	Road paving with asphalt		*included in 2.D.4 in IPCC 2006 GL*	42.11	Construction of roads and motorways

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
2.A.7	Other	2.A.5	Other	23	Manufacture of other non-metallic mineral products *(not included above)*
2.A.7.i	Glas production	2.A.3	Glas production	23.1	Manufacture of glass and glass products
2.B	**Chemical industry**	**2.B**	**Chemical industry**		
2.B.1	Ammonia production	2.B.1	Ammonia production	20	Manufacture of chemicals and chemical products
2.B.2	Nitric acid production	2.B.2	Nitric acid production		
2.B.3	Adipic acid production	2.B.3	Adipic acid production		
2.B.4	Carbide production	2.B.5	Carbide production		
2.B.5	Other	2.B.4	Caprolactam, glyoxal and glyoxylic acid production		
2.B.5	Other	2.B.6	Titanium dioxide production		
2.B.5	Other	2.B.8	Petrochemical and carbon black production		
2.B.5	Other	2.B.10	Other		
	2A4 in IPCC 1996 GL	2.B.7	Soda ash production		
	2E in IPCC 1996 GL	2.B.9	Fluorochemical production		
2.C	**Metal production**	**2.C**	**Metal industry**		
2.C.1	Iron and steel production	2.C.1	Iron and steel production	24.1	Manufacture of basic iron and steel and of ferro-alloys
				24.51	Casting of iron
				24.52	Casting of steel
2.C.2	Ferroalloys production	2.C.2	Ferroalloys production	24.1	Manufacture of basic iron and steel and of ferro-alloys
2.C.3	Aluminium production	2.C.3	Aluminium production	24.42	Aluminium production
				24.53	Casting of light metals
2.C.4	SF6 used in aluminium and magnesium foundries	2.C.4	Magnesium production	24.45	Other non-ferrous metal production
				24.53	Casting of light metals

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
2.C.5	Other	2.C.5	Lead production	24.43	Lead, zinc and tin production
				24.54	Casting of other non-ferrous metals
		2.C.6	Zinc production	24.43	Lead, zinc and tin production
				24.54	Casting of other non-ferrous metals
		2.C.7	Other	24	Manufacture of basic metals
2.D	**Other production**				
2.D.1	Pulp and paper		*included in 2.H.1 in IPCC 2006 GL*	17	Manufacture of paper and paper products
2.D.2	Food and drink		*included in 2.H.2 in IPCC 2006 GL*	10	Manufacture of food products
				11	Manufacture of beverages
		2.D	Non-energy products from fuels and solvent use		
	1 and 3 in IPCC 1996 GL	2.D.1	Lubricant use		*many applications*
	1 and 3 in IPCC 1996 GL	2.D.2	Paraffin wax use		
	3A and 3B in IPCC 1996 GL	2.D.3	Solvent use		
	2A5, 2A6 and 3D in IPCC 1996 GL	2.D.4	Other		
2.E	**Production of halocarbons and SF6**				
2.E.1	By-product emissions		*included in 2.B.9 in IPCC 2006 GL*	20	Manufacture of chemicals and chemical products
2.E.2	Fugitive emissions		*included in 2.B.9 in IPCC 2006 GL*		
2.E.3	Other		*included in 2.B.9 in IPCC 2006 GL*		
		2.E	**Electronics industry**		
	2F7 in IPCC 1996 GL	2.E.1	Integrated Circuit or Semiconductor	26.1	Manufacture of electronic components and boards
	2F9 in IPCC 1996 GL	2.E.2	TFT flat panel display		
	2F9 in IPCC 1996 GL	2.E.3	Photovoltaics		
	2F9 in IPCC 1996 GL	2.E.4	Heat transfer fluid	26	Manufacture of computer, electronic and optical products

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
	2F9 in IPCC 1996 GL	2.E.5	Other		
2.F	**Consumption of halocarbons and SF6**	**2.F**	**Product uses as substitutes for ozone depleting substances**		
2.F.1	Refrigeration and air conditioning equipment	2.F.1	Refrigeration and air conditioning		*many applications*
2.F.2	Foam blowing	2.F.2	Foam blowing agents		
2.F.3	Fire extingusihers	2.F.3	Fire protection		
2.F.4	Aerosols	2.F.4	Aerosols		
2.F.5	Solvents	2.F.5	Solvents		
2.F.6	Other applications using ODS substitutes	2.F.6	Other applications		
2.F.7	Semiconductor manufacture		*included in 2.E.1 in IPCC 2006 GL*	26.1	Manufacture of electronic components and boards
2.F.8	Electrical equipment		*included in 2.G.1 in IPCC 2006 GL*	27.1	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus
				35.1	Electric power generation, transmission and distribution
2.F.9	Other		*included in 2.G.2 in IPCC 2006 GL*		
2.G	**Other**	**2.G**	**Other product manufacture and use**		
	2F8 in IPCC 1996 GL	2.G.1	Electrical equipment	27	Manufacture of electrical equipment
				35.1	Electric power generation, transmission and distribution
	2F9 in IPCC 1996 GL	2.G.2	SF6 and PFCs from other product uses		*several applications*
	3D in IPCC 1996 GL	2.G.3	N2O from product uses		*several applications*
	2F9 and 3D in IPCC 1996 GL	2.G.4	Other		
		2.H	Other		
	2D1 in IPCC 1996 GL	2.H.1	Pulp and paper industry	17	Manufacture of paper and paper products
	2D2 in IPCC 1996 GL	2.H.2	Food and beverages industry	10	Manufacture of food products
				11	Manufacture of beverages

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
	2G in IPCC 1996 GL	2.H.3	Other		
3.A	**Paint application**		*included in 2.D.3 in IPCC 2006 GL*		*many applications*
3.B	**Degreasing & Dry cleaning**		*included in 2.D.3 in IPCC 2006 GL*		*many applications*
3.C	**Chemical products, manufacture and processing**		*included in 2.B and 2.D in IPCC 2006 GL*		*many applications*
3.D	**Other**		*included in 2.D.4 and 2.G in IPCC 2006 GL*		*many applications*
4.A	**Enteric fermentation**	**3.A**	**Livestock**	**1**	**Crop and animal production, hunting and related service activities**
4.B	**Manure management**			**2**	**Forestry and logging**
4.B	**Manure management**	**3.C.6**	**Indirect N2O emissions from manure management**		
4.C	**Rice cultivation**	**3.C.7**	**Rice cultivations**		
4.D	**Agriculture soils**		*included in 3.C.4 and 3.C.5 in IPCC 2006 GL*		
4.E	**Prescribed burning of savannas**		*included in 3.C.1 in IPCC 2006 GL*		
4.F	**Field burning of agricultural wastes**		*included in 3.C.1 in IPCC 2006 GL*		
4.G	**Other**				
5.A	**Forest land**	**3.B.1**	**Forest land**		
5.B	**Cropland**	**3.B.2**	**Cropland**		
5.C	**Grassland**	**3.B.3**	**Grassland**		
5.D	**Wetlands**	**3.B.4**	**Wetlands**		

IPCC 1996 / CRF Source category code	IPCC 1996 / CRF Source category name	IPCC 2006 Source category code	IPCC 2006 Source category name	NACE_Rev.2	NACE_Rev. 2_DESCRPTION
5.E	Settlements	3.B.5	Settlements		
5.F	Other land	3.B.6	Other land		
5.G	Other				
	4E, 4F and 5 in CRF	3.C.1	Emissions from biomass burning		
	5B, 5C and 5G in CRF	3.C.2	Liming		
	not foreseen in CRF	3.C.3	Urea application		
	4D, 5A and 5G in CRF	3.C.4	Direct N2O emissions from managed soils		
	4D in CRF	3.C.5	Indirect N2O emissions from managed soils		
		3.C.8	Other		
	4G and 5G in IPCC 1996 GL	3.D	Other		
6.A	Solid waste disposal on land	4.A	Solid waste disposal	38	Waste collection, treatment and disposal activities; materials recovery
	6A3 in IPCC 1996 GL	4.B	Biological treatment of solid waste	38	Waste collection, treatment and disposal activities; materials recovery
6.B	Waste-water handling	4.D	Waste water treatment and discharge	37	Sewerage
6.C	Waste incineration	4.C	Waste incineration	38	Waste collection, treatment and disposal activities; materials recovery
6.D	Other	4.E	Other		
7	Other	5	Other		

13 References

Anderson, B. et al. 2003 The New York, Northern New Jersey, Long Island Nonattainment Area Commercial Marine Vessel Emissions Inventory. Prepared by Starcrest Consulting Group. The Port Authority of New York/New Jersey and the United States Army Corps of Engineers, New York District.

Anderson, B. et al. 2004 Port of Long Beach Baseline Emission Inventory 2002. Prepared by Starcrest Consulting Group. Long Beach 2004.

BIMCO 2006 Study of recent cases involving the international practice of using criminal sanctions towards seafarers. The Baltic and International Maritime Council, 10 March 2006. Singapore.

BMT 2000 Murray, Fenton Edon Liddiard Vince Limited, Study on the economic, legal, environmental and practical implications of a European Union System to reduce ship emissions of SO2 and NOx. Annex IV, Legal Analysis: Prescription, Enforcement and Observance, http://ec.europa.eu/environment/enveco/taxation/ship_emissions/pdf/app4final.pdf

Buhaug et al. 2008 Buhaug, Ø.; Corbett, J. J.; Endresen, Ø.; Eyring, V.; Faber, J.; Hanayama, S.; Lee, D. S.; Lee, D.; Lindstad, H.; Mjelde, A.; Pålsson, C.; Wanquing, W.; Winebrake, J. J.; Yoshida, K. Updated Study on Greenhouse Gas Emissions from Ships: Phase I Report; International Maritime Organization (IMO) London, UK, 1 September, 2008.

CARB 2006 Emission Estimation Methodology for Ocean Going Vessels. Draft. OGV Working Group 10/4/05, California Air Resources Board.

CE Delft 2009 Technical support for European action to reducing Greenhouse Gas Emissions from international maritime transport. Report to DG ENV of the European Commission, December 2009.

COM Dev 2009 COM DEV establishes Subsidiary exactEarth to offer space-based AIS services beginning in 2010. http://micro.newswire.ca/release.cgi?rkey=1706104804&view=28380-0&Start=0

Containershipinfo 2008 List of technical data of container vessels: www.containership-info.com (the Excel data sheet is no longer available at this site)

Corbett J. 2004 Verification of ship emission estimates with monitoring measurements to improve inventory and modelling. Final Report submitted to the California Air Resources Board, 23 November 2004.

DEHSt 2010 The auctioning of emission allowances in Germany. Periodical Report May 2010, released July 2010. http://www.dehst.de/cln_153/SharedDocs/Downloads/EN/Auctioning/Auctioning__report__05,templateId=raw,property=publicationFile.pdf/Auctioning_report_05.pdf

DLR 2010 Climate optimized flight planning (draft final report of 1 March 2010) S. Matthes, K. Gierens, V. Grewe, H. Mannstein, R. Sausen, V. Mollwitz, M. Schaefer, M. Weiss, Berlin (forthcoming)

Doelle 2005 Climate change and the use of the dispute settlement regime of the Law of the Sea Convention. Meinhard Doelle, Faculty of Law, Dalhousie University, Halifax, Canada. 20 October 2005.

EC 2002 Advice on the costs to fuel producers and price premia likely to result from a reduction in level of sulphur in marine fuels marketed in the EU. Final Report, April 2002. European Commission, DG Environment Study/C.1/01/2002

EC 2010 About the Common Fisheries Policy – Vessel Monitoring System. Information of the EC on the Common Fisheries Web-Site, accessed February 2010.

EMSA 2009 SafeSeaNet Data Quality Report, First Quarterly (April, May, June 2009). C.2.2/QR1/2009. Lisbon, 15 July 2009.

EMSA 2009b The EU Long Range Identification and Tracking of Ships Data Centre. The EU LRIT DC. EMSA 2009.

EMSA 2010 Using satellites to improve maritime safety and combat marine pollution. Prepared for Gallileo Application Day on 3-5 March 2010. European Maritime Safety Agency.

ENTEC 2002 Quantification of emissions from ships associated with movements between ports in the European Community. Final Report issued for the European Commission. July 2002. London.

ENTEC 2005 European Commission DG Environment: Service Contract on Ship Emissions: Assignment, abatement and market-based instruments. Preliminary assignment of ship emissions to European Countries. Final Report. August 2005. ENTEC UK limited.

EPA 2009 Current Methodologies and Best Practices in preparing Mobile Source Port-Related Emission Inventories. Prepared by ICF Consultants. Final Report. April 2009.

EU 2002 Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC. Official Journal of the EC, L 208/10, 5.8.2002.

EU 2008 Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community. Official Journal of the European Union L008, 13/01/2009 P. 0003 - 0021

EU 2009 Council Regulation (EC) No. 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy. Official Journal of the European Union L343/1, 22.12.2009.

Faber et al. 2008 Faber, J., Greenwood, D., Lee, D. et al.: Lower NOx at Higher Altitudes - Policies to Reduce the Climate Impact of Aviation NOx Emission, CE Delft, October 2008

Graichen et al. 2006 Graichen, J. and Gugele, B. Greenhouse Gas Emissions from Aviation. ETC/ACC Technical Paper 2006/3, December 2006.

Green 2003 Green, J.E. 2003. Civil aviation and the environmental challenge. Aeronaut. J. 107 (1072), 281-299

Høye, G.K.; Eriksen, T.; Meland, B.J.; Narheim, B.T. 2006 Space-based AIS for global maritime traffic control. Norwegian Research Defense Establishment.

EA 2010 Key World Energy Statistics. International Energy Agency. Paris.

IMO 2009 Second IMO GHG Study 2009: International Maritime Organization (IMO) London, UK, April 2009; Buhaug, Ø.; Corbett, J.J.; Endresen, Ø.; Eyring, V.; Faber, J.; Hanayama, S.; Lee, D.S.; Lee, D.; Lindstad, H.; Markowska, A.Z.; Mjelde, A.; Nelissen, D.; Nilsen, J.; Pålsson, C.; Winebrake, J.J.; Wu, W.–Q.; Yoshida, K..

Inmarsat 2009 Information on Inmarsat Internet site. Accessed in December 2009. http://www.inmarsat.com/Maritimesafety/Irti.html

Intertanko et al. 2009 Best Management Practices to Deter Piracy in the Gulf of Aden and off the Coast of Somalia. Version 2, August 2009. Supported by INTERTANKO, ICS, OCIMF, BIMCO, SIGTTO, INTERCARGO, IGP&I, CLIA, IUMI, JWC & JHC, IMB, ITF, MSCHOA, UKMTO Dubai and MARLO.

IPCC 1996 Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.

IPCC 1996b Special Report on Aviation and the Global Atmosphere

IPCC 2000 Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories

IPCC 2003: Good Practice Guidance for Land Use, Land-Use Change and Forestry: http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_contents.html

IPCC 2006 2006 IPCC Guidelines for National Greenhouse Gas Inventories: http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

IPCC 2007 Policies, Instruments and Co-operative Arrangements. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

IPCC 2008 Climate Change 2007. The Physical Science Basis. The Working Group I contribution to the IPCC Fourth Assessment Report. Errata, Table 2.14, Update published at 31. July 2008

Jenkins, J. 2008 UK Auctions first carbon permits; Government Hoarding Revenue. http://www.thebreakthrough.org/blog/2008/11/uk_auctions_first_carbon_permi.shtml.

Jokioinen, Esa 2009 Test and Trials of the EEDI as developed by the IMO. Presentation at EMSA Workshop on GHG emissions, 10 November 2009, Lisbon.

JRC-IPTS 2008 EXTREMIS - EXploring non road TRansport EMISsions in Europe. Development of a Reference System on Emission Factors for Rail, Maritime and Air Transport. Final Report Transporti e Territorio Srl, Milan 19 June 2008.

Kågeson, P 2007 Linking CO_2 Emissions from International Shipping to the EU ETS. Commissioned by the German Environmental Protection Agency.

Lee et al. 2009a D.S. Lee, G. Pitari, V. Grewe, K. Gierens, J.E. Penner, A. Petzold, M.J. Prather, U. Schumann, A. Bais, T. Berntsen, D. Iachetti, L.L. Lim, R. Sausen, Transport im-

pacts on atmosphere and climate: Aviation, Atmospheric Environment, In Press, Corrected Proof, Available online 12 June 2009, ISSN 1352-2310.

Lee et al. 2009b David S. Lee, David W. Fahey, Piers M. Forster, Peter J. Newton, Ron C.N. Wit, Ling L. Lim, Bethan Owen, Robert Sausen, Aviation and global climate change in the 21st century, Atmospheric Environment, Volume 43, Issues 22-23, July 2009, Pages 3520-3537, ISSN 1352-2310.

Lloyds 2009 Lloyds register of ships 2009/2010. Lloyds Register Fairplay. London 2009. Volume 1 – 4.

Lloyds Register 1999 Marine Exhaust Emissions Quantification Study – Mediterranean Sea. Final Report for the European Commission, DG XI, Environment, Nuclear Safety and Civil Protection, prepared by Lloyds Register Environmental Engineering Department. December 1999.

MEPC 2009a Guidelines for voluntary use of the Ship Energy Efficiency Operational Indicator (EEOI). MEPC.1/Circ.684. 17 August 2009.

MEPC 2009b Interim guidelines for voluntary verification of the Energy Efficiency Design Index (EEDI). MEPC.1/Circ.682. 17 August 2009.

MEPC 2009c Guidance for the development of a Ship Energy Efficiency Management Plan (SEEMP). Marine Environmental Protection Committee (MEPC) 17. August 2009. MEPC.1/Circ.683.

MSC 2004 Guidance to masters, companies and duly authorized officers on the requirements relating to the submission of security-related information prior to the entry of a ship into port. Marine Safety Committee (MSC) London; MSC/Circ.1130, 14 December 2004.

MSC 2006a Draft Report of the Maritime Safety Committee on its Eighty First Session, IMO, Maritime Sarety Committee, MSC 81/WP.10. 15 May 2006.

MSC 2006b Annex 2, Resolution MSC.202(81): Adoption of Amendments to the International Convention for the Safety of Life at Sea, 1974, as amended. Adopted on May 19, 2006.

MSC 2007 Resolution MSC.242(83): Use of the Long-Range Identification and Tracking Information for Maritime Safety and Marine Environmental Protection Purposes. MSC/83/28/Add.2; adopted on 12 October 2007.

Narheim, B.T. 2006 NCUBE-1 and 2 AIS Detection Probability. Norwegian Defense Research Establishment. Presentation.

Öko-Institut 2010 Integration of Marine Transport into the European Emissions Trading Scheme. Environmental, legal and economic analysis of different options. Final report for the German Environmental Agency (UBA). Bäuerle, T., Graichen, J.; Kulessa, M.; Meyer, K.; Oschinki, M. und Seum, S. Dessau. (forthcoming)

Port of Los Angeles 2005 Port of Los Angeles Baseline Air Emission Inventory – 2001. Prepared by Starcrest Consulting Group LLC.

Sausen et al. 2005: R. Sausen, Isaksen I., Grewe V., Hauglustaine D., Lee D. S., Myhre G., Köhler M. O., Pitari G., Schumann U., Stordal F. and Zerefos C. Aviation radiative

forcing in 2000: an update on IPCC. Meteorologische Zeitschrift Vol. 14, No.4, 555 – 561 (2005)

UNCLOS 1982 United Nations Convention on the Law of the Sea of 10 December 1982.

US Coast Guard 2004 Code of Federal Regulations (CFR), Title 33: Navigation and Navigable Waters.Subpart C – Ballast Water Management for Control of Nonindigenous Species in the Great Lakes and Hudson River. CFR § 151.1510 ff: Ballast Water Management, of November 21, 2001 and CFR 33 § 1511516 Compliance Monitoring, of June 14, 2004.

UNFCCC 2010: Compilation of technical information on the new greenhouse gases and groups of gases included in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Published at: http://unfccc.int/national_reports/annex_i_ghg_inventories/items/4624.php#Nitrogen

UNFCCC 2010b: Views on the revision of the UNFCCC Annex I reporting guidelines Submissions from Parties, FCCC/SBSTA/2010/MISC.7.

Vranes 2003 World Trade Law, European Law and Environmental Protection. A comprehensive legal study exemplified, inter alia, by the Kyoto Climate Regime.

Weiss et al 2008 Weiss R.F., Mühle, J., Salameh, P.K., Harth, C.,M. 2008: nitrogen trifluoride in the global atmosphere. Geophysical Research Letters 35, L20821, doi:10.1029/2008GL035913.

Wilkins 2010 Personal communication Paul Wilkins, EMSA, February 2010

Zapfel, Peter 2008: Hearing by the Select Committee on Energy Independence and Global Warming U.S. House of Representatives on "Cap, Auction and Trade: Auctions and Revenue Recycling under Carbon Cap. Written statement.

14 Annex 1– Reporting guidelines for maritime emissions

Commission Decision

of XXX

establishing guidelines for the monitoring and reporting of greenhouse gas emissions from marine vessels pursuant to revised Decision No 280/2004/EC

THE COMMISSION OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Union, an in particular Article xx thereof,

Having regard to Decision XX/XXX/EC concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol and in particular Article 2 and 3 thereof,

Whereas:

Recitals …

Has adopted this decision:

HAS ADOPTED THIS DECISION:

Article 1

The guidelines for the monitoring and reporting of greenhouse gas emissions from for the monitoring and reporting of greenhouse gas emissions from marine vessels are set out in the Annexes to this Decision.

Article 2

This Decision shall apply from XXX.

Article 3

This Decision is addressed to the Member States.

Annex I

1. Definitions

1. “administering Member State” means the Member State responsible for administering the emissions of all vessels registered in that state in accordance with the guidelines for the purpose of reporting greenhouse gas emissions from cross-boundary travelling marine vessels;

2. “auxiliary engines” are the engines that provide electrical power, heat and cooling during any navigational activity listed in Annex II;

3. “calendar year” starts on the 1st of January of one year and ends the on 31st of December of that same year;

4. “central administrator” is a person that controls the emissions reporting by administering Member States by controlling and verifying the data entries for individual vessels in the central registry;

5. “central registry” is a European Union organized registry for receiving, storing and exchanging data from the Member States for the purpose of reporting emissions from cross-boundary travelling marine vessels;

6. “cross-boundary” means crossing boundaries of territorial waters;

7. “distance” is the real travelled distance on a voyages in nautical miles;

8. “emissions” means the release of carbon dioxide into the atmosphere from a marine vessel performing a marine navigation activity listed in Annex II of the guidelines;

9. “Flag State” means a country that has a vessels registered in a national or international shipping registry under their authority and that has certain rights with regard to the UN Convention on the Law of the Sea (UNCLOS);

10. “flagged” means the link between the vessel and the Flag State where the vessel is registered for the purpose of carrying out any navigational activity listed in Annex II;

11. “liner service” means marine navigational activities that are performed on fixed, predefined schedules, calling regularly at the same ports and operating on a circular pattern, more than once, for a period of time;

12. “main engines” are the engines that provide propulsion power to the marine vessel;

13. “marine registry” are the national registries for marine vessels for the purpose of reporting operational and emissions information from cross-boundary travelling vessels to the central registry and the Commission;

14. “Port State” means a country that operates a port facility and has certain rights with regard to the UN Convention on the Law of the Sea (UNCLOS);

15. “port visit” is the berthing of a marine vessel at a port or offshore pier, quary or jetty within the territory of a Member State;

16. “vessel master” is the legal person who is in charge of the vessel when it performs a marine navigation activity listed in Annex I and who represents the vessel operator or owner;

17. “vessel operator” means the person who operates a vessel at the time it performs a marine navigation activity listed in Annex II or, where that person is not known or is not identified by the owner of the vessel, the owner of the vessel;

18. “vessels” are all marine vehicles according to Article 1(1) and are represented by the vessel master on behalf of the vessel operator or owne;

19. “voyage” is the trip between two ports for the purpose of carrying cargo or passengers or for repositioning the marine vessel for the uptake of new cargo or passengers.

2. Emission registries; Registration of vessels; Administering Member State;

1. Each vessel engaged in traffic to and from countries of the European Union must register for the purpose of estimating emissions from cross-boundary travelling marine vessels according to Article 3.

2. Member States that have Flag State and/or Port State authority under UNCLOS shall open a marine registry for the purpose of reporting emissions from marine vessels.

3. The Member State where the vessel is registered on the first day of each year is the administering Member State for that vessel.

4. A central registry shall be open by the Commission, to which all Members States have access to and where each vessel according to Article 1(1) that calls at a Member State port is one installation. The central registry may be designed following the template of the Community Independent Transaction Log (CITL).

5. Option 1: For the purpose of carrying out Article 2(4) of this Decision the Commission may request the assistance of the European Maritime Safety Agency (EMSA) or delegate to other relevant organizations, solicit assistance from other organizations or may operate jointly the central registry and may conclude to that effect any appropriate agreements with those organizations.

Integrating marine emission data into the European network of the EMSA:

Option 2: In accordance with Regulation (EC) No 1406/2002[76] of the European Parliament and of the Council establishing a European Maritime Safety Agency as last amended by Regulation (EC) No 1891/2006[77], in particular Article 2(f), the European Maritime Safety Agency (EMSA) shall establish and maintain a central registry containing a complete list of registered vessel under this reporting requirement. Data collected by the administering Member States according to Article 5 to 6 of this Decision shall be exchanged with and stored in the database. Each Member State shall have access to data stored in the data base and ship operators may refer to already reported data. EMSA shall give guidance to the Member States on implementing necessary measures to collect and exchange relevant data as well as facilitate cooperation between the Member States and the Commission on reporting obligations under Article 7 of this Decision.

6. Each administering Member State must submit the data for its registered vessels by January 15 of the year following the monitoring period.

3. Provisions for the registration of marine vessels

1. Vessels flagged in one Member State country may register in their corresponding Flag State, or at an EU Port State at their discretion.

2. Vessels flagged elsewhere shall select a European Port State at their discretion as the administering State.

4. Monitoring period and geographic scope for reporting vessel emissions

1. The monitoring period for reporting emissions from vessels as defined in Article 1 is one calendar year.

2. The first year of the monitoring requirement is # 2012 #.

3. The administering Member State shall collect emissions and other relevant data from all administered vessels that call at least twice at a Member State port in the monitoring period.

4. The administering Member State shall collect from the vessels according to Article 4(3) above all emissions within the monitoring period and other information pursuant to Article 5 (6), regardless of the location where they occurred, regardless when in the

[76] OJ L 208, 5.8.2002, p. 1

[77] OJ L 394, 30.12.2006, p. 1

reporting period they may be reported and regardless whether the administered vessel called at a port of the administering Member State.

5. Monitoring requirement for all Member States

1. Member States shall authorize their competent national authorities or port authorities to collect information pursuant to the guidelines.

2. Member States shall collect from every vessel calling at its ports within the monitoring period in addition to the information already required under Directive 2002/59/EC[78] (establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC[79]) the information on the active administering Member State for that vessel.

3. Member States shall inform the central registry of each port visit of vessels according to Article 1(1).

4. For ships in regular liner service, on a fixed schedule, serving a dedicated number of ports and calling at least once per week at a Member State port, Member States may submit the port visits of the vessel once within three months.

6. Monitoring and reporting requirement for administering Member States to the central registry

1. Administering Member States shall report to the central registry the following information immediately after a vessel has registered with their national marine registry:

   (a) Vessel identification (name, call sign, IMO identification number or MMSI number)

   (b) Allocation of the vessel to one of the following vessel types listed in Table 35. The Lloyds Marine Intelligent Unit (LMIU) Code for the vessel shall be used.

[78] OJ L 208, 5.8.2002, p. 10

[79] OJ L 247 5.10.1993, p. 19

Table 35: Vessel type categories, description and the respective LMIU code.

Vessel Type	Vessel Sub-types included	LMIU Code
Tanker	Liquefied gas, LNG carriers, LPG carriers	A 11
Tanker	Chemical, chemical/oil products tanker	A 12
Tanker	Oil, crude oil tanker	A 13
Tanker	Other liquids tanker	A 14
Bulk Carrier	Bulk dry carrier	A 21
Bulk Carrier	Bulk dry/oil carrier	A 22
Bulk Carrier	Self-discharging bulk, LoLo bulk dry cargo, LoLo general dry cargo carrier	A 23
Bulk Carrier	Other dry bulk, wood chips, forest products carrier	A 24
General Cargo Carrier	Heavy load carrier	A 30
General Cargo Carrier	General cargo and cargo ship, icebreaker	A 31
General Cargo Carrier	Passenger/general cargo vessel	A 32
Container Carrier	Container vessel, container vessel with fixed guides	A 33
Refrigerated Vessel	Refrigerated cargo ship, fully refrigerated ship	A 34
RoRo	Roll-on-Roll-off cargo vessel	A 35
Passenger	Passenger vessel combined with Roll-on-Roll-off cargo, car carrier, vehicle carrier, ferry capabilities[80]	A 36
Passenger	Passenger vessels, cruise ships	A 37
Other General Cargo Carrier	Other dry cargo vessels	A 38
Fish Catching	Fishing vessels	B 11
Other Fishing	Other Fishing vessels	B 12
Offshore Supply	Offshore supply vessels	B 21
Other Offshore	Other off-shore vessels	B 22
Research	Research vessels	B 31
Towing / Pushing	Tow and push boats	B 32

[80] For ferries see section under road and rail transport.

2. Administering Member States shall report to the central registry the following information in accordance with Article 2(6) with regard to each administered vessel:

   (a) A list of all ports, Member States ports and non-Member States ports, visited within the monitoring period (name, latitude and longitude, date of departure);

   (b) A list of voyages, defined as the period between a departure from one port to the departure from the next port;

   (c) The distances sailed for each voyage (in nautical miles);

   (d) The type and amount of fuel burned at sea and in ports for each voyage (product name, quantity [metric tons], density at 15°C [kg/m^3] and the sulphur content [% m/m]), differentiated for main and auxiliary engines and according to the fuel types listed in Table 36.;

Table 36: Type of marine fuels

Abbreviation	**Name**	**Grades according to ISO 8217**	**CO_2 Emission Factors [t-CO_2/t-fuel]**
MDO, MGO	Marine Diesel Oil, Marine Gas Oil	Grades DMX through DMC	3.206000
LFO	Light Fuel Oil	Grades RMA through RMD	3.151040
HFO	Heavy Fuel Oil	Grades RME through RMK	3.114400
LPG	Liquified Petroleum Gas	Propane: Butane:	3.000000 3.030000
LNG	Liquified Natural Gas		2.750000

   (e) The type and amount of fuel deliveries (Date, location and amount of fuel, product name, quantity [metric tons], density at 15°C [kg/m^3] and the sulphur content [% m/m], in line with the Bunker Fuel Delivery Notes stored onboard vessels in accordance with IMO regulation MEPC.1/Circ.508);

   (f) The administering Member States may use the table formats in Appendix X for reporting fuel consumption and fuel deliveries to the central registry.

7. Reporting obligations of the administering Member States to the central registry and the Commission

1. Administering Member States shall report by January 15th of the year following the monitoring period to the central registry and the Commission for each vessel adminis-

tered by the administering State the vessel IMO number, the total distance sailed, and, differentiated according to main and auxiliary engines and fuel types according to Table 36, the total amount of fuel used and the total CO_2 emitted for the monitoring period.

8. Calculation of CO_2 emissions by the administering Member States

1. Administering Member States are responsible for calculating the emissions from vessels under their administration.

2. The calculation of emissions follows the formula:

$$CO_2 \text{ Marine} = \text{amount fuel main engine (i) x EF fuel type (i)} + \text{amount fuel auxiliary engine (j) x EF fuel type (j)}$$

$$CO_2 \text{ Marine} = \Sigma_{iME}\Sigma_{jME} (FC_{ijME} \times C_{Fj}) + \Sigma_{iAU}\Sigma_{jAU} (FC_{ijAU} \times C_{Fj})$$

With:

i = the voyage number;

j = the fuel type;

ME = main engine(s);

AU = auxiliary engine(s);

FC_{ijME} = is the mass consumed of fuel *j* at voyage *i* for the main engine(s);

FC_{ijAU} = is the mass consumed of fuel *j* at voyage *i* for the auxiliary engine(s);

C_{Fj} = is the CO_2 emission factor for the fuel of type *j*.

3. For calculating the CO_2 emissions for marine vessels the emission factors, in reference to MEPC.1/Circ.684, in Table 36 apply.

4. Administering Member States are responsible for verifying of the data and calculations by using the information on voyages and port of calls by the administered vessel.

9. Central administer

1. The Commission shall designate a central administrator to maintain an independent transaction log on each vessel reporting emissions to a Member State.

2. The central administrator shall verify the total figures for each marine vessels according to Article 7(1) by occasionally counter checking the plausibility of data entries to the central registry.

3. If irregularities are identified through the occasional checks, the central administrator shall inform the administering Member State or Member States concerned who may implement enforcement measures until the irregularities are corrected.

10. Non-Compliance

1. Member States shall ensure that the vessels calling at their ports are informed of the reporting requirements and shall ensure that their relevant authorities receive the information transmitted.

2. In case of non-compliance with the reporting requirements stipulated through this guidance, the administering Member Sates shall give official notice to the vessel operator or vessel master of the non-complying vessel.

3. In case of repeated non-compliance, the Member States may deny entry into port for the vessel until proper reporting has occurred.

4. The Member States may inform other Member States of non-complying vessels.

5. Member States may also use their prescriptive rights under Port State Control regime to foster compliance with the reporting requirements.

Appendix I: Sample Tables for Reporting

1. Table for reporting fuel consumption by marine vessels from the administering Member States to the central registry

Vessel IMO Number	Voyage Number	Departure Date from Port A	Port Pair				Fuel Consumption Main Engine(s)				Fuel Consumption Auxiliary Engine(s)			
			Departure Port A	Latitude / Longitude Port A	Departure Port B	Latitude / Longitude Port B	Fuel Type	Fuel Amount [t]	Fuel Density [kg/m3]	Sulphur Content [%]	Fuel Type	Fuel Amount [t]	Fuel Density [kg/m3]	Sulphur Content [%]

2. Table for reporting fuel deliveries to marine vessels from the administering Member States to the central registry

Vessel IMO Number	Fuel Delivery Date	Fuel Deliver Location	Fuel Delivery Amount	Fuel Deliver Type	Fuel Density [kg/m3]	Fuel Sulphur Content [%]

Appendix II Navigational Activities

Navigational activities for which fuel consumption must be collected by member states are:

1) Voyages between two ports, piers and / or berthing points.

2) Operating auxiliary engines for the purpose of providing power, heat and cooling.

3) Maneuvering operations.

4) Hoteling operations.

15 Annex 2 – Project Workshop

15.1 Workshop Agenda

Project Workshop

"Review of Decision No 280/2004/EC (Monitoring Mechanism Decision) in view of the agreed Climate Change and Energy package"

Center Albert Borchette

36 Rue Froissart, Brussels

Room 4C

27 October 2010

Time: 10:00 a.m. – 5:30 p.m.

DRAFT AGENDA

MORNING SESSION

10:00-10:15	**Welcome and introduction** DG CLIMA
10:15-10:35	**Setting Member State targets in tonnes of CO_2 eq. under the Effort Sharing Decision** *Update of presentation given at WG2 meeting of 28.09* *Jürgen Salay and Eduardas Kazakevicius*
10:35-10:45	**Overview of reporting requirements arising from the Effort Sharing Decision** *Short presentation of the key reporting requirements* *Julia Busche, Öko-Institut*
10:45-11:00	*Questions & Discussion*

11:00-11:20	**The annual reporting, review and compliance cycle: timelines and procedures** *Anke Herold, Öko-Institut*
11:20-11:30	*Questions & Discussion*
11:30-11:50	**Compliance assessment and corrective action** *Anke Herold, Öko-Institut*
11:50-12:10	**Inventory recalculations** *Anke Herold, Öko-Institut*
12:10-12:30	*Questions & Discussion*
12:30-13:30	LUNCH

AFTERNOON SESSION

13:30-15:00	**Joint work session: Issues and options for the implementation of an EU inventory review procedure** *Interactive discussion: Project team and all participants*
15:00-15:15	***Coffee/ Tea break***
15:15-15:35	**Monitoring and reporting of the use of flexibilities under the Effort Sharing Decision** *Katrin Seuss, Umweltbundesamt*
15:35-15:45	*Questions & Discussion*
15:45-16:05	**Implications of future agreements under the UNFCCC: How to keep consistency between the reporting in the EU and under the UN** *Jakob Graichen, Öko-Institut*
16:05-16:15	*Questions & Discussion*
16:15 - 16:35	**Monitoring of emissions from maritime shipping** *Stefan Seum, Öko-Institut*
16:35 - 16:45	*Questions & Discussion*
16:45 –17:00	**Reporting on the use of auctioning revenues** *Hauske Hermann, Öko-Institut*
17:00 –17:15	*Questions & Discussion*
17:15 - 17:30	**Summary and Conclusions**

15.2 Workshop report

Welcome and introduction

DG CLIMA welcomed the participants to the workshop for the project 'Review of Decision No 280/2004/EC (Monitoring Mechanism Decision, MMD) in view of the agreed Climate Change and Energy package'. The Commission provided a brief overview about previous projects on the revision of the MMD and introduced the timelines. Timing of the work ahead is ambitious; a proposal for a revised MMD should be finalised by September 2011. The impact assessment that will accompany the proposal for amendment of Decision No 280/2004/EC and its Implementing Provisions Commission Decision 2005/166/EC is still ongoing.

This workshop intended to inform Member States about the work already done and aimed on providing a platform for discussions of different aspects and also new elements arising from the project.

Thus additional input to this project was expected which will be included in the projects' final draft report. The Commission underlined that different options for the revision of the MMD still exist and that decisions are still outstanding; a couple of working group meetings (WG 1, WG 2, WG 3) will be held in the near future with opportunities for further discussions. Nine presentations were held during the workshop as well as a joint work session.

Setting Member State targets in tonnes of CO_2 eq. under the Effort Sharing Decision

DG CLIMA provided an update of the presentation already given at WG 2 meeting on 28 September 2010, and explained the target setting under the Effort Sharing Decision (ESD). The legal basis was introduced, as the content of the presentation is legally separated from the MMD. Following issues were highlighted: i) there is a 2020 target (Articles 3.1 and 3.2), ii) the starting point is 2013 (Article 3.2), iii) change in scope from 2013 onwards will be taken into account, iv) opt/ins and projects that reduce emissions will also be taken into account, and v) any change in scope of the European Union Emissions Trading Scheme (EU ETS) should be reflected by a change of the quantity of allowances under the Effort Sharing Decision (Recital 25, Article 10). An illustrative example was provided of an initial linear trajectory adjustment for Member States with a negative limit under Annex II.

Following steps are intended for setting ESD targets:

i) Commitology decision on the methodology for determining Member State annual allocations in tonnes of CO2 equivalent to be adopted by mid 2011,

ii) Commission decision on the actual determination of Member State annual allocations in tonnes of CO2 equivalent by the end of 2012.

The methodologies that need to be established should include 2012 greenhouse gas inventories submitted under the UNFCCC and an EU internal review of the submitted

GHG emissions until August, coordinated by EEA. Targets calculated on this basis should be published in September / October. Steps to be taken in 2012 are expected to build on the UNFCCC inventory and review system, allowing for comparison and a quite simple and transparent approach. By 10 November 2010 a non-paper will be presented during WG 2 meeting containing the main elements of a draft decision. The latter will then be presented by 15 December 2010. A vote of the Climate Change Committee is expected for March 2011.

During discussions after the presentation, Finland highlighted that the EU ETS system has lived its own life; thus some ETS issues need to be discussed further in order to harmonize ETS reporting with greenhouse gas inventory reporting. Austria noted that targets have to be published two months before allocation of allowances under the ESD. When asked for the reason for choosing a period of 2 months, as review data will not be available before October, the Commission explained that the choice of this period was based on expert judgement.

Overview of reporting requirements arising from the Effort Sharing Decision

The Öko-Institut gave a brief presentation of the key reporting requirements arising from the climate and energy package. Besides existing reporting obligations under the MMD, additional requirements arise from i) findings from previous projects on the revision of the MMD, ii) the ESD and iii) future EU legislation under the climate and energy package.

During discussions after the presentation Finland questioned the improvement of the consistency of reporting of ETS and greenhouse gas inventories; The Commission underlined that the need for the improvement of consistency is based on discussions on how to incorporate ETS emissions into greenhouse gas inventories. Öko-Institut noted that in the revised MMD there is a proposal for an improved description of the use of ETS data for greenhouse gas inventories in the national inventory report (NIR) and a requirement to implement QA/QC procedures that check the consistency of ETS and inventory emissions.

Lithuania wanted to know if this project evaluated also the capacity of Member States to fulfil the identified reporting requirements. The Commission explained that such an analysis was not part of the project but that the commitment to implement the legislation arising from the Climate Change and Energy package exists for all Member States despite different capacities to do so.

Spain brought forward the possible lack of consistency between different data sources for information on greenhouse gas emissions (Eurostat, International Energy Agency (IEA), national energy balances). The Öko-Institut underlined that, during the course of the overall project, it has been careful in not establishing new and additional guidance and that the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC GPG 2000) clearly says that the best available data should be used for inventory purposes. A comparison of different data sources should be done by Member States within quality assurance and quality control (QA/QC) procedures. Austria underlined that consistency is to be addressed at national level and

that compilers of energy balances should use ETS data. The Öko-Institut affirmed that the proposal elaborated during the project includes a provision that stresses the access to ETS data for the purposes of the inventory compilation. Sweden raised the work of DG ENV and DG Enterprise related to methodologies for carbon footprinting and a related CEN standard.

The annual reporting, review and compliance cycle: timelines and procedures/ Compliance assessment and corrective action

The Öko-Institut, presented the outcomes of the project with respect to the annual reporting, review and compliance cycle. With regard to timelines for annual reporting it was proposed to keep the reporting system like it is now (inventory submissions to EC by 15 January and 15 March of each year). A proposal was also introduced for a professional review at EU level. Based on this presentation a more detailed discussion on the institutional arrangements, timing and procedures of the review was announced for the interactive afternoon session. For the use of flexibilities in an annual compliance cycle a balance period of one month was introduced which should – similar to the true up period under the Kyoto Protocol – balance out the purchase of credits with the final inventory data. Then a proposal was presented of a compliance assessment in the annual compliance cycle and it was underlined, that final agreement on the proposal by the Commission has not yet been provided.

Finland argued that the main task of the revision of the MMD should be a simplification of the reporting and the compliance cycle. FI underlined that the frequency of the communication between Member States and the Commission should be kept to a minimum. France expressed its concerns with the review process: A process parallel to the UNFCCC review process might be problematic. By now, France already submits two inventories (UNFCCC and Kyoto Protocol). France was concerned that it may need to publish four greenhouse gas inventories in case an additional review process would exist. Furthermore FR wanted to know how different results of the UNFCCC review and the EU review could be avoided. The Öko-Institut pointed out that the ESD is based on verified emissions and thus it is not possible to rely on the international review but an internal EU review instead. It was underlined that nevertheless the results of both reviews should be as similar as possible and that consistency among Member States needs to be secured as part of the process. Member States might benefit from an EU internal review if findings from the UNFCCC review are found to be inconsistent among Member States. Furthermore the uncertain future of the inventory review under the Kyoto Protocol was highlighted along with the pros for an additional review process which are prevailing at this point of time. The issue is to organize the review process in a practical and viable manner.

Austria asked for consequences in case of different results of the two review processes during the balance period. AT wanted to know whether an initial review at EU level might be an option, since this might be more cost-effective. The Commission emphasized that a review is urgently needed and that the ESD need to be implemented by Member States. A one-step exercise in 2012 might provide a possibility for fine-tuning of the process later on. The Commission added that MS upon agreeing on the Climate

Change and Energy package in essence agreed on establishing an EU level MRV system of GHG emissions. The Netherlands stressed that the new 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006 GL) and new methodologies shall be used by Member States for reporting after 2012. According to the Dutch experiences, recalculations are currently done not only for the current inventory year but also for several years backwards, and that recalculations will be done also in the future. This is especially the case if the IPCC 2006 GL are used for estimating greenhouse gas emissions and as the EU has chosen annual accounting. The costs for conducting reviews and the date for a corrective action plan were also questioned. The Öko-Institut explained that a first corrective action plan is expected for 2016 and that issues concerning resources and funding have not been considered for the presentation. With respect to resources and funding Italy questioned the professional review and how consistency could be guaranteed. Lithuania supported the need for coordination and consistency as expressed by the Netherlands and Italy. LT underlined that especially for small Member States a resource-demanding and expensive system should be avoided. LT questioned the qualification of the deadline for the submission of greenhouse gas inventories (15 March each year) as the EU ETS data is submitted only by end of March.

With regard to resources and funding, Member States were informed that an impact assessment will be done and that EU ETS data are in any case reported for the inventory year X-1, compared to inventory data which are reported for year (X-2). Finland noted that a harmonization of the review process under the UN and the EU should be the aim to the extent possible. If an international agreement could be reached, both systems should then be merged in order to avoid any additional burden for inventory compilers. FI asked for the implications of the use of the IPCC 2006 GL as Member States will not have the capacity to be ready by 2012. The Commission pointed out that the application of the IPCC 2006 GL still is an open issue and that a decision is not yet taken. The United Kingdom requested that Member States should be involved as far as possible in the establishment of the review system. The UK indicated that the reasons why an EU review could not completely rely on the UNFCCC review system are timing and lack of consistency in review findings among Member States. Sweden supported Lithuania with respect to the additional burden and costs due to the implementation of the ESD. It was noted that the issue of additional burden will be analysed with an impact assessment within this project. Furthermore the Öko-Institut underlined that, until the implementation of an annual reporting, review and compliance cycle starts, four more years of reporting and review under the Kyoto Protocol will take place and thus inconsistencies among review findings are expected to be smaller in the future and reviews themselves will be less intensive.

Inventory recalculations

The Öko-Institut gave a presentation about options for recalculations in an annual cycle. Options were presented for methodological revisions due to future methodological changes in the UNFCCC reporting and results were shown of an assessment of the

status of the implementation of IPCC 2006 GL and the impact of recalculations due to the use of the IPCC 2006 GL.

During discussions after the presentation, Germany, supported by France, expressed its consensus with a balanced approach that assures accuracy and legal certainty. DE favoured option three (implementation of revisions in MMD after adoption of UNFCCC decisions and introduction of a general review clause) but proposed establishing a fourth option that would be a fusion of options two and three. This fourth option would mean that recalculations of the previous year(s) would be taken into account in the compliance assessment of the actual year. All changes of previous years due to recalculations or due to corrections/ adjustments during the UNFCCC inventory review would be added/ subtracted from the actual GHG inventory under review. Compliance assessment would take place on the basis of the corrected inventory that incorporates effects from previous years.

The Netherlands also welcomed the options presented but wanted to know how the general review clause is related to the target setting and if absolute target numbers could be changed. NL underlined the legal need for having a thorough review.

With regard to recalculations due to methodological changes, Luxembourg supported option three. LU underlined that option two (MMD keeps current methodologies) will remain only a few years and that more time is needed for an analysis of the recalculation in an annual cycle.

Joint work session: Issues and options for the implementation of an EU inventory review procedure

After a brief introduction by the Öko-Institut, the participants were asked to elaborate their views on the general requirements of the EU review process, timelines, consistent and comparable results, interpretation of the IPCC 2006 GL, transparency and additional reporting requirements.

Germany, supported by Finland, asked for a shorter timeframe for the review process. The Öko-Institut pointed out that strict timelines after inventory submissions and a completion of the review within seven months are crucial but that it might not be possible to work in a consistent way across Member States as they are complying differently with timelines under the UNFCCC. The Netherlands stressed that it would be good to take into account UNFCCC review reports as these review consider the different capabilities of parties. This issue was not reflected in the presentation and thus he wanted to know how the EU inventory review would reflect progress in reviewed countries.

Finland requested to have a more automatic review rather than conducting reviews by expert review teams. Supported by Austria, FI indicated that results of the initial checks under the UNFCCC (a status report whose main purpose is to provide a brief check of completeness of the inventory submission) given within seven weeks of the date of receipt of the submission are rather useful and that they identify the areas for which further review is needed. Doing the same work twice should be avoided. Slovenia noted that every legal aspect with respect to adjustments should be considered. The

Commission pointed out that the Commission is aware of the strength but also about the weaknesses of the existing system and that an enhanced QA/QC EU system is planned. All problems as raised by the Member States will be considered.

The Öko-Institut presented some thoughts on the meaning of a professional review, possible institutional arrangement and clear contractual arrangements that should ensure strong quality management of the review process and consistency that is continued over yeas. In regards to the role of Member States in an EU review process four options were presented:

- System similar to UN system, Member States nominate review experts and pay;
- Core team of contracted reviewers (JRC, EEA, plus some Member States experts);
- Core team of contracted reviewers, plus advisory committee with Member States' experts for difficult questions;
- Core team of contracted experts (no involvement of Member States at all).

Finland stressed that reviewers have to be independent and raised the issue of who will be financially supporting this process. Sweden noted that it will be difficult to devote the reviewers provided to the UNFCCC reviews also for the EU reviews. The Commission pointed out that the maintenance of capacity and the kind of the review (centralized, desk or in-country) to be conducted need to be discussed.

To Spain, professionalism refers to a 100% dedication to a specific task which in practice is hardly to achieve with experts from Member States and thus wondered how such a level could be assured. Ireland expressed its concerns about off-loading review tasks to another group of 'experts'.

The Commission pointed out that the UNFCCC review process creates a 'black box'. Finland noted that in regards to quality management a core team might be the right way to go forward. FI noted that an EU review would need to rely on previous UNFCCC reviews and that the European Topic Centre is already doing a good work; comparisons, e.g. with respect to international data could additionally be done. France supported Finland by underlining that it is crucial not to duplicate the work done and that it might be problematic having different reviews. A core team of contracted experts should have flexibilities which would limit the costs of reviews.

On this basis a new option for the organization of the EU review was introduced:

- An enhanced initial review at EU level with mostly automated checking routines supplemented by an analysis of the previous UNFCCC review reports and an analysis of how problems addressed in the review report were resolved conducted by a core team at EEA.

The Netherlands emphasized that the review should be implemented based on the availability of initial checks, last year's review reports as well as improvements made by Member States. A clear view is needed about what reviewers should do. According to the Commission, an EU procedure for adjustments would be needed, following initial

checks, and findings. Nevertheless it also needs to be clarified what to do if Member States are not happy with the UN review findings.

Finland wanted to know which institution would hold the role of the compliance body. The Commission replied that this would be its responsibility. The ESD is structured in such a way as to avoid that a Member States will end in non-compliance.

The Öko-Institut summarized the outcomes of the discussions during the joint work session: The thoroughness of an EU review depends on the development of the UN review process in the future. It was noted that most statements assume a further Kyoto Protocol-type review process under the UN. A strong UNFCCC review would enable the implementation of a lighter EU review process. In the absence of a thorough UN inventory review process, a core team with some involvement of Member States' experts, e.g. in form of an advisory group seemed to be the preferred option.

The Commission added that time is limited and that a point in time needs to be fixed at which the Commission and the Member States will have to make a decision on the review system to be applied taking into consideration the existence or not of a. UNFCCC review process.

Overall,

- No supporters were found for the option: review team consisting of only experts from Member States or without any contribution of Member States.
- A core team with an involvement of review experts from Member States was supported only by a few participants.
- The option 'core team of contracted reviewers, plus advisory committee with Member States' experts' was welcomed by a larger number of participants.
- The preferred option by most participants was the option that had not been put forward before and that was proposed by Finland: an enhanced initial review and the use of previous UNFCCC reviews by a core team (enhanced QA&QC checks).

These options will be reflected in the final report to the project.

Andreas Barkman, EEA, pointed out that option 4 is not really a single option but an input to other options. Any output from UNFCCC reviews and a QA&QC check can only be seen as inputs to the EU review process.

Monitoring and reporting of the use of flexibilities under the Effort Sharing Decision

Umweltbundesamt Austria, gave a presentation about the improvement of reporting of the use of flexibilities by using the registries. The reports generated by the registry and the different types of transactions and processes in the registry that will be involved when Member States use the flexibilities were introduced along with how the relevant information could be provided. During the discussion, Finland wanted to know if inventory compilers will have access to the registry ETS data for the purpose of inventory compilation and was informed that there will be a reporting tool to access the verified emissions reported under the ETS in the registry, however other background data or

activity data reported under the ETS are not included in the Union registry and are reported by operators via different channels that are not affected by the implementation of the Effort Sharing Decision.

Spain asked if background information is only available at the regional level or if it is planned to include more detailed data (e.g. type of coal); Belgium wanted to know how the trading of credit rights per Member State is organised. Spain and Belgium were informed that the level of background information that the Union registry will only include verified emissions and that the trading of credit rights which is possible under the ESD is organized like a new unit and is tracked by the registries.

Implications of future agreements under the UNFCCC: How to keep consistency between the reporting in the EU and under the UN

The Öko-Institut presented the implications on the implementation of the ESD of a possible future agreement under the UNFCCC and focused on the difference in sectors that are included in an EU target and in an international target. Within the post-2012 international negotiations, a decision about including international aviation and maritime shipping in a reduction commitment is not expected before 2012, whereas an inclusion on the EU level might be more likely. It was stressed that the ESD requires an internal EU review before a UNFCCC review and that international monitoring and reporting rules need to be adopted before an international agreement will be reached. Options on how to deal with such differences were presented.

With regard to sectors not yet included in reduction commitments the Netherlands asked if the LULUCF sector and emissions from national aviation are assumed to be included in the ESD targets. The Öko-Institut informed that emissions from national aviation are part of the ESD but will be deducted from the national total when greenhouse gas emissions covered under the ESD were calculated (as national aviation is part of the EU ETS). With respect to LULUCF, Article 8 of the ESD stipulates that the Commission should compile a report assessing the modalities for the inclusion of emissions and removals from activities related to LULUCF in the Community reduction commitment after the conclusion of an international agreement.

The Commission informed that LULUCF experts are currently elaborating proposals on how to include LULUCF activities in the Community reduction commitment. The Öko-Institut added that the experts identified two options: 1. to rely on UNFCCC reporting, 2. to keep consistency with current and future KP reporting. None of the experts was eager in establishing a third option. It was stressed that reporting under the UNFCCC is already covered under MMD. The proposed review clause in the revised MMD aimed at including future revisions of methodologies. Thus future LULUCF decisions can be made consistent with current reporting under ESD.

Monitoring of emissions from maritime shipping

The Öko-Institut, presented the outcomes of the project with respect to the feasibility of introducing a monitoring mechanism for internationally travelling marine vessels. A

vessel reporting scheme was introduced for every vessel that calls at an EU port. The reporting scheme should be based on the fuel consumed in the reporting period.

During discussions after the presentation, Spain asked how policies and measures in the maritime sector could be tracked in the future given the high uncertainties in the current emission inventories. Spain is striving for getting data about types of ships and fuel used from national harbours and thus wanted to know if Member States would have access to the data collected by ESMA for the inventory preparation.

The Öko-Institut stressed that the European vessel monitoring does not capture greenhouse gas emissions or fuel consumed but that only activity data is provided by the European vessel monitoring. Constraints are given, as not all vessels calling to a port are considered. It was underlined that modelling procedures do have their uncertainties.

The United Kingdom informed that fuel sale statistics are used for UK-based modelling. The UK encouraged that modelling procedures be reflected in the inventory guidelines. The Öko-Institut noted that fuel sale statistics show large discrepancies in the past but are expected to improve in the future. On a national level it might be problematic as large vessels do not need to buy fuels in the EU, thus these vessels are not reflected in the statistics. On an international level it is not clear whether fuel sales statistics for internationally operating vessels will become more reliable. Member States were informed about a recent greenhouse gas emissions study by the International Maritime Organization (IMO) showing that modelling greenhouse gas emissions from maritime shipping based on activity data is more reliable than estimating emissions based on fuel sale statistics. Finland added that fuel sale data is accurate enough for inventory purposes, but that fuel sales statistics do not provide data applicable for an 'EU ETS' like scheme.

Reporting on the use of auctioning revenues

The Öko-Institut, gave a presentation about reporting on the use of auctioning revenues. The reporting requirements arise on the one hand from the review of the ETS Directive (recital 18 and Article 10(3) and Directive 2008/101/EC3 (recitals 22, 23, Article 3d(4)). On the other hand additional requirements need to be considered as part of a future reporting scheme. A reporting format for the use of auctioning revenues was introduced.

With respect to the question of possible double counting of financial support, raised by Belgium, it was explained that the elaboration of reporting of revenues from auctioning implements the earmarking provisions under the ETS Directive. It was underlined that this reporting requirement should be used to support the reporting on financial support to developing countries at the international level, e.g. by compiling the support to developing countries or by the differentiation between revenues that have been spent and allocated/provided resulting from international discussions.

The Netherlands wanted to know if the reporting of auctioning revenues is expected to follow the current reporting obligations (by 15 March each year for X-2) and if received

money have to be traced as well. The Öko-Institut pointed out that the ETS Directive is only specific in terms of a starting point and sectors rather than with respect to reporting requirements. Therefore the reporting on the use of auctioning revenues needs to be implemented in the revised MMD. Information should be provided differentiating between allocation and money spent. Additionally, the Öko-Institut proposed that the amounts reported in the reporting format should be referred to national documents containing relevant information on how the money was used. Member States need to show how they use the revenues and should show if the use is in line with the 50 % rule (recital 18 and Article 10(3)). As it may take a while to complete previous budget reports at national level, the reported information could also be for the year X-2.

Summary and Conclusions

The Commission informed that all presentations held during the workshop will be published at CIRCA. As a next step within the project an impact assessment will be undertaken. The Öko-Institut will get in contact with Member States to distribute the relevant questionnaires. A first legal draft will be ready after finalization of the impact assessment by mid 2011.