Advance Version

COMPLIANCE COMMITTEE **CC/ERT/ARR/2015/34**
13 July 2015

Report on the individual review of the annual submission of the European Union in 2014

Note by the secretariat

The report on the individual review of the annual submission of the European Union submitted in 2014 was published on 10 July 2015. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decisions 4/CMP.4 and 8/CMP.9), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2014/EU, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

ADVANCE VERSION

United Nations

FCCC/ARR/2014/EU

Framework Convention on Climate Change

Distr.: General
10 July 2015

English only

Report on the individual review of the annual submission of the European Union submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

1. This report covers the review of the 2014 annual submission of the European Union, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 29 September to 4 October 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Paul Filliger (Switzerland) and Mr. Yuriy Pyrozhenko (Ukraine); energy – Ms. Duduzile Nhlengethwa-Masina (Swaziland), Mr. Peter Seizov (Bulgaria) and Mr. Nguyen Tran Hong (Viet Nam); industrial processes and solvent and other product use – Mr. Stanford Mwakasonda (United Republic of Tanzania) and Ms. Emilija Poposka (the former Yugoslav Republic of Macedonia); agriculture – Ms. Olga Gavrilova (Estonia) and Mr. Simon Wear (New Zealand); land use, land-use change and forestry (LULUCF) – Mr. Nagmeldin Elhassan (Sudan), Mr. Craig Elvidge (New Zealand), Mr. Sabin Guendehou (Benin) and Mr. Agustin Inthamoussu (Uruguay); and waste – Mr. Qingxian Gao (China) and Ms. Mayra Rocha (Brazil). Mr. Gao and Mr. Wear were the lead reviewers. The review was coordinated by Mr. Vitor Góis Ferreira (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the European Union, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. All recommendations and encouragements included in this report are based on the expert review team's (ERT's) assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties include in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" (hereinafter referred to as the UNFCCC Annex I inventory reporting guidelines) adopted through decision 24/CP.19. Therefore, when preparing the next annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by the European Union was carbon dioxide (CO_2), accounting for 82.5 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by methane (CH_4) (8.2 per cent) and nitrous oxide (N_2O) (7.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 2.2 per cent of the overall GHG emissions in the country. The energy sector accounted for 79.9 per cent of total GHG emissions, followed by the agriculture sector (10.3 per cent), the industrial processes sector (6.7 per cent), the waste sector (2.9 per cent) and the solvent and other product use sector (0.2 per cent). Total GHG emissions amounted to 3,622,921.98 Gg CO_2 eq and decreased by 15.4 per cent between the base year[2] and 2012. The ERT concluded that the description in

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O for all member States concerned, and for HFCs, PFCs and SF_6 the base year is 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland and 1990 for Austria, France

the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

5. Tables 1 and 2 show GHG emissions from source categories included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

and Italy. The base year emissions include emissions from source categories included in Annex A to the Kyoto Protocol only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq							*Change (%)*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources		CO_2	3 368 805.87	3 368 805.87	3 307 078.41	3 333 399.15	3 063 832.85	3 156 518.64	3 011 292.65	2 988 205.02	–11.3
		CH_4	444 467.94	444 467.94	424 595.11	319 262.30	312 078.42	306 737.39	299 764.55	296 415.41	–33.3
		N_2O	397 469.24	397 469.24	378 017.16	286 075.88	275 367.22	266 487.97	263 376.48	257 937.60	–35.1
		HFCs	41 451.87	27 832.00	40 196.62	62 721.78	65 761.81	68 963.02	70 304.10	71 540.37	72.6
		PFCs	15 635.45	17 275.06	11 729.50	3 959.23	2 531.39	2 986.92	3 227.70	2 781.37	–82.2
		SF_6	14 126.31	10 979.85	15 485.56	6 433.49	6 079.01	6 184.77	5 994.42	6 042.22	–57.2
KP-LULUCF	Article 3.3[b]	CO_2				–8 131.68	–13 986.04	–18 378.58	–16 633.55	–17 309.24	
		CH_4				285.12	270.69	252.25	245.90	339.18	
		N_2O				240.37	338.38	377.70	333.97	401.44	
	Article 3.4[c]	CO_2	8 788.51			–273 101.21	–272 102.20	–254 055.68	–255 748.38	–258 923.11	NA
		CH_4	15.92			760.27	892.54	902.54	898.18	1 319.32	NA
		N_2O	384.31			1 738.30	1 764.38	1 753.81	1 733.83	1 878.84	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is1990 for CO_2, CH_4 and N_2O for all member States concerned, and for HFCs, PFCs and SF_6 the base year is 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland and 1990 for Austria, France and Italy. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2012

		Gg CO_2 eq								*Change (%)*
	Sector	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources	Energy	3 281 281.63	3 281 281.63	3 214 923.24	3 200 879.14	2 968 048.11	3 048 343.87	2 906 240.13	2 893 365.61	–11.8
	Industrial processes	369 061.08	353 934.36	351 212.33	292 382.71	253 475.29	259 696.89	252 005.93	243 313.21	–34.1
	Solvent and other product use	13 240.75	13 240.75	11 769.37	8 816.42	8 108.78	8 261.18	7 986.72	7 551.99	–43.0
	Agriculture	442 675.57	442 675.57	421 070.99	387 781.42	379 214.88	378 890.73	378 871.21	374 231.69	–15.5
	Waste	175 697.64	175 697.64	178 126.43	121 992.13	116 803.63	112 686.04	108 855.89	104 459.48	–40.5
	LULUCF	NA	–136 989.05	–166 777.81	–205 350.47	–207 934.61	–194 441.70	–189 106.86	–187 705.98	NA
	Total (with LULUCF)	**NA**	**4 129 840.90**	**4 010 324.54**	**3 806 501.35**	**3 517 716.09**	**3 613 437.01**	**3 464 853.04**	**3 435 216.00**	**NA**
	Total (without LULUCF)	**4 281 956.67**	**4 266 829.95**	**4 177 102.36**	**4 011 851.82**	**3 725 650.69**	**3 807 878.71**	**3 653 959.89**	**3 622 921.98**	**–15.4**
	Other[b]	NA	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA
KP-LULUCF	Article 3.3[c] Afforestation and reforestation				–42 904.69	–45 493.23	–46 938.82	–46 595.99	–47 125.50	
	Article 3.3[c] Deforestation				35 298.50	32 116.26	29 190.19	30 542.31	30 556.88	
	Total (3.3)				**–7 606.19**	**–13 376.97**	**–17 748.63**	**–16 053.68**	**–16 568.61**	
	Article 3.4[d] Forest management				–273 853.92	–272 262.09	–254 385.92	–255 588.04	–258 057.88	
	Article 3.4[d] Cropland management	7 495.27			2 751.63	2 368.20	2 602.70	2 128.76	1 736.20	–76.8
	Article 3.4[d] Grazing land management	1 627.23			499.65	448.60	383.90	342.91	596.73	–63.3
	Article 3.4[d] Revegetation	NA			NA	NA	NA	NA	NA	NA
	Total (3.4)	**9 122.50**			**–270 602.63**	**–269 445.29**	**–251 399.32**	**–253 116.37**	**–255 724.95**	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O for all member States concerned, and for HFCs, PFCs and SF_6 the base year is 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland and 1990 for Austria, France and Italy. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. The European Union further submitted revised CRF tables and a revised NIR on 27 May 2014. The European Union also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. The European Union submitted revised emission estimates on 24 November 2014 for reporting under the Kyoto Protocol and as a result of submissions of revised estimates made by some member States (Belgium, France, Greece, Italy, Luxembourg, Portugal, Sweden and the United Kingdom of Great Britain and Northern Ireland) after their respective individual reviews in 2014. The values used in this report are those submitted by the European Union on 24 November 2014.

9. The list of other materials used during the review is provided in annex II to this report.

2. Questions of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of the European Union. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete	Mandatory: none Please see paragraphs 12–15 and 51 below for specific findings
		Non-mandatory: individual member States in the EU-15 reported "NE" for several non-mandatory categories and the European Union only presented the sum of the member States that did report an estimate. The NIR (table 1.20) presents a summary of the completeness

Issue	*Expert review team assessment*	*General findings and recommendations*
		for the EU-15 member States which submissions contribute to the European Union submission under the Kyoto Protocol (EU-15) Please see paragraph 13 below for additional findings The ERT encourages the Party to estimate and report emissions from all non-mandatory categories
Land use, land-use change and forestry[a]	Not complete	Mandatory: for the EU-15, individual member States reported "NE" for several mandatory categories in several pools and some categories, while the European Union presented the sum of the member States that did report an estimate. This means that the total presented could be incomplete (see paras. 95 and 105 below) The ERT recommends that the Party continue its efforts to improve the completeness of the reporting of emissions from all mandatory categories
		Non-mandatory: several categories and pools are reported as "NE" by individual member States of the EU-15 (see para. 95 below) The ERT encourages the Party to estimate and report emissions from all non-mandatory categories
KP-LULUCF	Complete	
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent, except for the energy and agriculture sectors	Please see paragraphs 39, 45, 81, and 99 below for specific findings
Time-series consistency	Sufficiently consistent	Please see paragraphs 16, 21, 44, 65, 90, 94, 96, 98, 102, 103, 104, 111 and 115 below for category-specific findings
The ERT's findings on QA/QC procedures	Sufficient	Party has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan Please see paragraphs 18, 19, 20, 35, 39, 48, 77, 85, 87, 91, 92, 97, 110 and 123 below for category-specific issues

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on transparency	Sufficiently transparent, except regarding some AD and IEFs for the energy, industrial processes and waste sectors	The NIR is sufficiently transparent with regard to the AD, assumptions and methodologies used to estimate emissions at member States level. However, the ERT noted that AD and IEFs for the European Union as a whole are not presented in the CRF tables for some categories and years (see paras. 15 and 16 for more details) Please see paragraphs 15–17, 20, 32, 33, 39, 40, 45, 46, 56, 57, 60, 63, 64–66, 68– 71, 73–77, 86, 90, 96– 99, 102– 105, 108, 111, 112, 115, 121, 125, 126, and 145 below for additional specific findings

Abbreviations: AD = activity data, Annex A sources = source categories included in Annex A to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IEF = implied emission factor, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

12. The GHG inventory of the European Union submitted under the Kyoto Protocol comprises the sum of the national inventories compiled by the 15 member States making up EU-15.[3] As the completeness of the Party's inventory is dependent on the completeness of the inventories of the member States, the European Union has in place a set of procedures to complement the submission of individual member States and improve the completeness regarding categories that are reported as "NE" (not estimated) in the inventories of member States, known as the gap-filling procedures, and these procedures are explained in the Party's NIR (chapter 1.8.2) (see para. 15 below).

13. Regarding emissions and removals, any category for which emissions are reported as "NE" by a member State and for which methodologies are available in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) are flagged by the European Commission (EC) during the compilation of the European Union inventory. The EC prepares estimates for missing data in close collaboration with the member State in question, in order to ensure the completeness of the European Union inventory. The NIR states that, since 2011, the inventory for all member States has been complete, and therefore no gap filling for emissions has been needed. Nevertheless, some member States still report "NE" for several mandatory LULUCF categories (see para. 95 below) and for non-

[3] The EU-15 includes the European Union's member States that agreed to fulfil their commitments under Article 3 of the Kyoto Protocol jointly, in accordance with Article 4 of the Kyoto Protocol. These Parties are: Austria, Belgium, Germany, Denmark, Finland, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland.

mandatory categories; therefore, the ERT recommends that the Party continue its efforts to improve the completeness of the reporting of emissions from all mandatory categories in the LULUCF sector, and also encourages the Party to improve the completeness of the reporting of emissions for non-mandatory categories.

14. For each category, the NIR presents lists of methods and emission factors (EFs) summarizing the individual annual submissions by member States. During the preparation of the European Union annual submission, these tables are circulated across the member States for checking and to ensure that methods and EFs are correctly and consistently classified in these NIR tables. All codes used in the tables are explained in the chapter "units and abbreviations" as recommended in the previous review report. For instance, while reporting under the Kyoto Protocol (EU-15) the notation key "NE" was used in CRF table 6.B to report CH_4 emissions from domestic and commercial wastewater (sludge) for Belgium. Although Belgium reports "NE" for these emissions in its CRF table, Belgium's NIR (chapter 8.3.2) states that sludge in the country is mostly treated aerobically and no CH_4 emissions occur. The ERT considers that that there are inconsistencies in the notation keys resulting from their use by Member States. The ERT therefore recommends that the Party work with member States in order to report consistent notation keys that transparently describe the completeness of the overall inventory, and encourages the Party to develop specific guidance to ensure consistency in the use of notation keys for these tables across member States.

15. The European Union applies a gap-filling procedure for activity data (AD) in the CRF tables for a limited number of categories and only for 2012 and for key categories. For the 2014 annual submission, gap filling was used to complete AD for a number of categories: clinker production in cement production; lime production; ammonia production; and protein consumption and nitrogen fraction for human sewage. The ERT noted that AD for a significant number of categories are still reported with the notation key "NE" in the CRF tables, particular in the following sectors: energy (fugitive emissions from oil, natural gas and other sources) (see para. 51 below); industrial processes (soda ash, asphalt roofing, road paving with asphalt, glass production, nitric acid production, adipic acid production, other chemical industry, metal production, other production, aluminium and magnesium production); and waste (other solid waste disposal, other waste incineration, wastewater handling). Information on AD by member State is provided in the NIR. The ERT notes that this creates a report that is not easily comparable to the other Annex I Parties: for example, implied emission factors (IEFs) are not reported and it is difficult to compare the Party's annual submission with those of other Parties and the IPCC defaults. In response to a question raised by the ERT during the review, the Party explained that reporting of AD from international data sources such as Eurostat (the statistical office of the European Union), the International Energy Agency (IEA), the Food and Agriculture Organization of the United Nations (FAO) might lead to inconsistency with data reported by member States. The ERT encourages the EU to periodically analyse other sources of AD at EU level that may allow the development of approaches to derive AD and IEFs in those cases where different choices of AD by member States currently do not permit an aggregation of AD and the calculation of IEFs at EU level. The ERT recommends that the Party provide justifications in the NIR as to why the use of international data sources to report AD at Party's level would lead to strongly inaccurate reporting (see paras. 52 and 56 below for sector-specific issues).

16. The European Union also has procedures in place to ensure the consistency of the time series. The EC identifies problems with the consistency of the time series of emissions and IEFs upon receiving the individual annual submissions from member States and all the outstanding issues are resolved in close collaboration with the member States via a web-based quality assurance/quality control (QA/QC) communication tool. However, the ERT identified that some substantial inter-annual changes in emissions and EFs are not

transparently described within the energy and agriculture sectors of the NIR. In particular, the decrease of emissions in the energy sector for 2009 (figure 3.2 in the NIR) as well as a peak for the IEF (6.02 t/TJ) for road transportation (gasoline – N_2O) for 1998 (figure 3.61 of the NIR), are not explained in the NIR. In addition, table 6.22 of the NIR does not include explanations for the trends of CH_4 emissions from livestock enteric fermentation for France, Greece and Luxembourg. The ERT recommends that the Party improve the transparency of its reporting for the cases mentioned above by ensuring that explanatory information regarding the emission and IEF trends is included in the NIR.

17. The 2012 review report identified that the European Union reports a number of country-specific subcategories under the category other (fuel combustion activities) at an aggregated level as "non-specified", without providing a specific description of the subcategories included in the CRF tables.[4] The same review report recommended that the Party make efforts to summarize the country-specific subcategories reported by the member States and report a list of the subcategories reported under the category other (fuel combustion activities) in the CRF tables, in order to improve the transparency of the reporting. The ERT noted that the Party has continued to implement this recommendation: data for major subcategories were included in the 2014 NIR or CRF tables for some other categories under: manufacturing industries and construction; fugitive emissions from solid fuels; fugitive emissions from oil and natural gas; and agricultural soils. The ERT commends the Party for this effort.

18. During the review, the Party provided the ERT with the document "Quality management system for GHG Inventory of the EU, Part I - Quality management manual, v.1.2 as of 2012", that further specifies and defines the QA/QC procedures implemented at the European Union level.

19. The quality assurance system was improved for the 2014 annual submission. For instance, between 15 April and 27 May 2014 the sector chapters were quality checked by independent experts. In addition, the QA activities also focused on the follow-up of the additional recommendations from the European Union internal review that took place in 2012. The ERT commends the Party for these improvements.

20. Member States, starting with the 2015 annual submission, will have to provide additional information relevant for the checking of the consistency of data between the GHG inventories and the European Union Emission Trading System (EU ETS).[5] The ERT welcomes the Party's efforts to strengthen QA/QC procedures and recommends that the Party continue with ensuring the consistency between EU ETS and inventory data across member States. Nevertheless, the ERT noted that mapping tables showing comparisons between the scope of EU ETS activities and the scope of corresponding IPCC categories are not included in the NIR. The ERT recommends that the Party, in order to improve transparency of reporting, include in the NIR a mapping table indicating the mapping between the EU ETS and the IPCC categories, with supporting comments.

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

21. The NIR and additional information provided by the Party during the review described the national system for the preparation of the inventory. There were changes to

[4] FCCC/ARR/2012/EU, paragraph 33.

[5] In accordance with the new Monitoring Mechanism Regulation (MMR) (see para. 26 below).

the national system for the 2014 annual submission, as identified by the Party in its NIR (chapter 13) (see para. 139 below).

22. The Directorate-General for Climate Action (DG CLIMA) of the European Commission has the overall responsibility for the European Union's inventory system, while each member State is responsible for the preparation of its own inventory which is the basic input for the inventory of the European Union.

23. DG CLIMA is supported in the establishment of the inventory by the following main institutions: the European Environment Agency (EEA) and its European Topic Centre on Air and Climate Change (ETC/ACM) as well as Eurostat and the Joint Research Centre (JRC). EEA and its ETC/ACM are responsible for the preparation and circulation of the European Union inventory among member States, initial QC checks and gap filling, as well as the maintenance of databases and archives. ETC/ACM also provides software tools for member States to compile their national inventories. The tasks of the ETC/ACM are facilitated by the European Environmental Information and Observation Network (EIONET),[6] which consists of the EEA as central node (supported by European Topic Centres) and national institutions in the EEA member countries that supply and/or analyse national data on the environment.

24. The ETC/ACM is a consortium of 14 European organizations with the Netherlands Institute for Public Health and the Environment (RIVM) as its lead organization. The new framework partnership agreement was signed by the EEA and RIVM in August 2013 for the period 2014–2018. The ETC/ACM retains the main partners involved in the inventory preparation work, namely Umweltbundesamt Vienna (Austria), Oeko Institute (Germany) and Emisia (Greece). Thus continuity between the old and new contract periods is ensured. All contracts and agreements are now in place, as recommended in the previous review report.

25. Eurostat compiles data used in the IPCC reference approach and quality checking of member States' sectoral approaches in the energy sector. In addition, EEA is leading a project aimed at improving the estimates of emissions from international aviation together with Eurocontrol (see paras. 44 and 49 below).[7] JRC assists in the improvement of methodologies in the agriculture and LULUCF sectors. The consultation between DG CLIMA and the member States takes place under the Climate Change Committee. In order to facilitate decision-making in the Committee, three working groups have been established: Working Group 1 "Annual inventories", Working Group 2 "Assessment of progress (effect of policies and measures, projections)" and Working Group 3 "Emissions trading". The main objective of Working Group 1 is the improvement of the quality of the inventories of the member States and the European Union.

26. The legal basis for the national inventories at the European Union level, which also establishes the European Union inventory system, was updated in 2013. The previous decision 280/2004/EC, which established a mechanism for monitoring GHGs has been repealed and replaced by Regulation 525/2013, which has established the Monitoring Mechanism Regulation (MMR). Article 6 of the MMR establishes the Party's national system, the main objective of which is to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of national inventories with regard to the European Union GHG inventory.

27. The substantive requirements for the inventory system of the European Union have been further set out in secondary legislation under the Commission Delegated Regulation

[6] See <http://eionet.eea.eu.int/>.

[7] The European organization for the safety of air navigation.

(Regulation 525/2013). Article 6(2) of this regulation empowers the EC to set in a delegated act the substantive requirements for a national system at the European Union level. This secondary act establishes provisions for the Party's QA/QC programme, the gap-filling procedures in cases of missing data from member States and the timescales for cooperation and coordination during the annual reporting process and the UNFCCC review process.

28. DG CLIMA is responsible for coordinating QA/QC activities for the European Union inventory and for ensuring that the objectives of the QA/QC programme are implemented. EEA is responsible for the annual implementation of QA/QC procedures.

Inventory preparation

29. Table 4 contains the ERT's assessment of the European Union's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by the European Union

Issue	*ERT assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF Please see paragraph 30 below for specific issues
Approach followed?	Both tier 1 and tier 2	Results of the tier 2 level assessment are similar to the results observed in the previous annual submission, whereas the tier 2 trend assessment has changed mainly owing to revised uncertainty estimates in the LULUCF sector for Austria and Finland
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Assessment of uncertainty analysis		
Approach followed?	Both tier 1 and tier 2	

Issue	*ERT assessment*	*ERT findings and recommendations*
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	The modified tier 1 approach that is used by the Party to derive uncertainties departs from the methodology proposed in the IPCC good practice guidance. (see para. 31 below) Considering that the tier 2 approach is still under development, the ERT recommends that the Party report only tier 1 uncertainties in the next NIR (see para. 32 below) Please see paragraphs 33 and 83 below for other recommendations
Quantitative uncertainty (including LULUCF)	Level = 8.9% Trend = 1.3%	
Quantitative uncertainty (excluding LULUCF)	Level = 8.3% Trend = 1.0%	

Abbreviations: ERT = expert review team, IPCC good practice guidance = the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

30. CRF table 7 (key category analysis) has not been filled in for 1991–2007. The ERT acknowledges that identification of key categories only for the base year and the latest reported inventory year is in line with the IPCC good practice guidance.

31. The previous review report noted that the European Union did not follow the IPCC good practice guidance on using aggregation to deal with correlations in the simple uncertainty analysis (tier 1 approach). The current ERT noted that the use of the modified tier 1 approach to estimate uncertainties was not justified in the NIR, as the Party had been encouraged to do in the previous review report. In response to a question raised by the ERT during the review, the European Union answered that member States provide their tier 1 results (IPCC table 6.1) at very different levels of aggregation and detail. For all EU-15 member States the European Union inventory team receive in total more than 1,500 categories with specific estimates for uncertainty. Therefore the Party decided to implement dependencies based on the sectoral methods, which are used by member States to calculate emissions, considering that for example, if one member State uses a default method then this uncertainty estimate correlates with the uncertainty estimates of the other countries that are also using default factors for this subsector; whereas if a country-specific method is used, then the data are considered to be fully independent. The advantage of this modified approach is that a change from a default method to a country-specific method by any member State is fully reflected in the uncertainties reported by the European Union. Considering the specific nature of the European Union inventory, the ERT concludes that the modified tier 1 approach used by the Party to derive uncertainties is in accordance with the IPCC good practice guidance.

32. The ERT noted discrepancies between uncertainty estimates using the tier 1 and tier 2 approaches for the agriculture sector (80.0 per cent and 32.9 per cent, respectively) and

for the industrial processes sector (8.8 per cent and 4.8 per cent, respectively) (NIR, chapter 1.7). In response to a question raised by the ERT during the review, the Party explained that the tier 2 approach delivers lower estimates for uncertainty for the total including all sectors compared with the tier 1 approach because the tier 2 uncertainty analysis is not yet complete and final. The ERT recommends that the Party report only tier 1 to report total uncertainty of the inventory. Meanwhile, the tier 2 uncertainty analysis should be used for reporting purposes only after completion of its development; the incomplete tier 2 uncertainty analysis may be used as a QC procedure. The ERT encourages the Party to report on any significant discrepancies found between tier 1 and tier 2 analyses in the NIR to improve transparency.

33. The ERT noted that the increase in the uncertainty of the overall inventory with and without the LULUCF sector in the 2014 annual submission compared with the previous 2013 annual submission[8] is not explained in the NIR. In response to a question raised by the ERT during the review, the Party stated that the slight increase of the overall uncertainty is mainly due to the agriculture sector. In particular, country-specific methods used by member States for the category agricultural soils in the previous submission were assumed to be statistically uncorrelated. After improving the model, it was noted by the European Union inventory team that just a small proportion of the total emissions are calculated using a country-specific method/EF. In defining the remaining categories to be correlated the overall uncertainty has increased. Moreover, the share of agricultural emissions (with the highest uncertainty among all sectors) increased in the last year, which raised total uncertainty. The ERT recommends that the European Union describe any changes in overall uncertainty estimates in the NIR to improve transparency.

Inventory management

34. There were no changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by the Party in its NIR. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Party submitted in 2013,[9] remains relevant.

35. During the review the Party provided the ERT with the document "Quality management system for GHG Inventory of the EU, Part I - Quality management manual, v.1.2 as of 2012", chapter ETC-12 of which describes the procedure for preparing documentation and archiving inventories. The submissions of member States and all correspondence are stored in the subdirectory "Archive". The central tool for documenting all the material received from member States (including correspondence) is the member States archive database, which includes references, short characterizations and links to e-mails for all submissions from member States. The member States archive database can be searched for documents or for e-mails. Each submission is numbered consecutively. All documents are confidential so only personnel directly involved with the inventory preparation and the ERT have access to the inventory documents. The ERT recommends that the Party include in the next NIR more details regarding archiving from the document "Quality management manual" with supporting references.

5. Follow-up to previous reviews

36. The ERT welcomes the improvements made by the European Union to address the recommendations made in the previous review report, including the following overarching improvements:

[8] In accordance with the 2013 NIR, total uncertainty excluding LULUCF was reported as 8.3 per cent for the level and 1.4 per cent for the trend.

[9] FCCC/ARR/2013/EU, paragraph 25.

(a) Implementation of a new QA step (see para. 19 above);

(b) Improvement of the completeness of inventories from member States, particularly for the LULUCF sector and KP-LULUCF activities;

(c) Improvement of AD reporting in the CRF tables of the Party's inventory, although further improvements can be made (see para. 15 above);

(d) Improvement of the internal consistency of the NIR and consistency between the NIR and the CRF tables.

37. The ERT commends the Party for addressing most of the issues from the previous review report. The ERT notes the improvement in AD reporting for KP-LULUCF activities and categories in the industrial processes sector for the 2014 annual submission compared with the previous annual submission. However, the ERT also notes that some of the recommendations made in previous review reports were not implemented fully; for example, there are still gaps in AD reporting for most of the categories across the sectors (see para. 15 above). Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

38. The energy sector is the main sector in the GHG inventory of the European Union. In 2012, emissions from the energy sector amounted to 2,893,365.61 Gg CO_2 eq, or 79.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 11.8 per cent. The key driver for the fall in emissions is the restructuring of manufacturing industries and construction in Germany and efficiency improvements following German reunification. Other notable drivers are the decline in coal mining and the decrease in CO_2 emissions from public electricity and heat production, mainly owing to improvements in energy efficiency and (fossil) fuel switching, which has resulted in a decline in the use of solid fuels and an increase in the use of gas and biomass fuels in most member States. Within the sector, 36.5 per cent of the emissions were from energy industries, followed by 26.4 per cent from transport, 19.8 per cent from other sectors and 15.5 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 1.3 per cent and fugitive emissions from solid fuels accounted for 0.3 per cent. The remaining 0.2 per cent were from other (fuel combustion).

39. The European Union has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by the Party between the 2013 and 2014 annual submissions were in the following categories: other sectors and manufacturing industries and construction. The recalculations were made following changes in AD mainly by Germany, Spain and the United Kingdom, which cite, inter alia, the availability of final data from their national energy balances. Compared with the 2013 annual submission, the recalculations increased emissions in the energy sector by 8,511.61 Gg CO_2 eq (0.3 per cent), and increased total national emissions by 0.2 per cent in 2011. The recalculations were mostly transparently explained. However, the ERT noted that some improvements which resulted in recalculations were not reported as such in the NIR: for example, during the review the European Union informed the ERT that Belgium had recalculated the emissions from transport for the entire time series using COPERT 4v10 but this is not transparently explained in the European Union NIR under recalculations. Therefore, the ERT recommends that the Party enhance transparency and consistency with reporting by member States in its reporting of the recalculations, by

working with its member States to achieve the enhancement of the European Union QA/QC system.

40. The ERT noted that the transparency of reporting varies between categories and it is not consistent. The European Union provided in the NIR a good summary of the methodology for fugitive emissions from solid fuels (table 3.93), oil and gas (table 3.98) and for feedstocks and non-energy use of fuels (table 3.120). However, methodology summaries for the other categories were not included. In response to a question raised by the ERT during the review, the European Union indicated that the methodologies were presented in the NIRs of the individual member States, which are provided as annexes to the European Union NIR. The ERT notes that this manner of reporting is not transparent and does not support the review process, because the NIRs of member States, in total, consist of several thousands of pages. Therefore, the ERT recommends that the European Union present methodological summaries that are consistent among member States and categories, at least for key categories, in order to improve the transparency of the NIR.

2. Reference and sectoral approaches

41. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 42–47 below.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross references*
Difference between the reference approach and the sectoral approach	Energy consumption: 586.90 PJ, 1.52% CO_2 emissions: –27 262.79 Gg CO_2, –0.97%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	
Are differences with international statistics adequately explained?	Yes	43
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	44
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	45–47

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

42. No problems were identified by the ERT. The European Union bases its reference approach, reported in CRF table 1.A(b), on the Eurostat energy statistics.

43. No problems were identified by the ERT. The IEA does not compile data for the European Union, therefore, it is not possible to provide any comparison of the Party's data

with international data. The European Union has indicated that it compares energy statistics reported by member States to Eurostat under the European Union Energy Statistics Regulation: the AD are reported by member States to the EC as required by the MMR. As part of the QA/QC, member States make a comparison of their own submissions with Eurostat data. On an annual basis member States provide results of these initial QA/QC checks.

International bunker fuels

44. Consistent with 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" (hereinafter referred to as the UNFCCC reporting guidelines) and the Revised 1996 IPCC Guidelines, the European Union regards international travel as movements being between countries, including trips between member States, which are also regarded as international. The European Union reported in the NIR on the collaboration with Eurocontrol on a project aiming to improve the accuracy of estimates of domestic and international aviation across member States. The NIR reported that a tier 3 methodology was developed and results were available in November 2013. Although this effort is highly commended, it was not clear in the NIR what the impact of this higher-tier method was on the split between domestic and international aviation for the European Union as a whole or for individual member States. In response to a question raised by the ERT during the review, the European Union explained that results released in 2013 were only for 2011 and 2012, with the full time series results were only released in July 2014. The use of the results of the collaboration with Eurocontrol in the 2014 annual submission, which was prepared before July 2014, would therefore have resulted in time-series inconsistency; hence the results were only used for QA purposes. The ERT recommends that the European Union use and report on the most recent results to improve the accuracy of emission estimates for the European Union and for the member States, ensuring the consistency in the time series in accordance with the IPCC good practice guidance.

Feedstocks and non-energy use of fuels

45. The European Union made some recalculations for its reporting of feedstocks and non-energy use of fuels in CRF table 1.A(d), which resulted in a reduction of the 2011 AD between the 2013 and 2014 annual submission. In aggregate, the AD were reduced by 24.6 per cent (–951,251.78 TJ), with naphtha having the largest reduction (–435,092.25 TJ). In response to questions raised by the ERT during the review, the European Union indicated that this is as a result of revisions in the AD of two of its member States (Austria and France), who are the main users of naphtha. Austria collects refinery data, a process completed after the submission of the national inventory; while France used provisional data and these were validated after submission. The ERT recommends that the Party provide transparent information on recalculations for CRF table 1.A(d) in the NIR.

46. Previous review reports recommended that the European Union use weighted averages of carbon stored for all fuels in a consistent manner.[10] The ERT commends the Party for implementing this recommendation. However, the ERT noted that some of the weighted averages of carbon stored reported in CRF table 1.A(d) were significantly higher than IPCC default values in the Revised IPCC Guidelines. For example, for lubricants, the weighted average is 0.77 compared with the IPCC default value of 0.5. In response to questions raised by the ERT during the review, the European Union indicated that some Parties used 1.0 as the fraction of carbon stored in order to remove fuel emissions that are reported under other sectors (industrial processes) and avoid double counting. The ERT

[10] FCCC/ARR/2012/EU, paragraph 53.

recommends that the European Union clearly explain this in its annual submission and make efforts to enhance the consistency of reporting among member States.

47. The previous review report noted that the allocation of emissions between the energy and industrial processes sectors is not entirely consistent among member States. The ERT commends the European Union for reporting some reallocation of emissions from the energy sector (category public electricity and heat production) to the industrial processes sector (limestone and dolomite use) by Portugal. The ERT recommends that the Party continue with efforts to ensure the consistency of reporting among member States, in particular with regards to the allocation of emissions between the energy and industrial processes sectors.

3. Key categories

Stationary combustion: all fuels – CO_2

48. In the NIR (page 310), the European Union reports that it has performed additional checks in the NIR in order to improve consistency between the NIR and the CRF tables, and consistency between NIR tables and the text in the NIR for the category energy industries. The ERT commends the Party for performing these checks to improve the consistency between the NIR and CRF tables. However, in table 3.1 of the NIR the European Union reports that the CO_2 emissions from energy industries are 1,062,307 Gg CO_2, which is different from the value reported in the CRF table 1A(a) (1,044,332.97 Gg CO_2) in its submission of 15 April 2015.[11] The ERT recommends that the European Union continue to improve its QA/QC to ensure consistency between the CRF tables and the NIR.

Civil aviation: liquid fuels – CO_2

49. The ERT noted the late release of the results of the collaboration between the European Union and Eurocontrol, which had been set up, inter alia, to improve the split of AD between international and domestic aviation (see para. 44 above). The ERT commends the European Union for this collaboration. The ERT recommends that the Party promote the use of the results of this collaboration to improve the accuracy of the inventory and report on these results in the NIR.

Oil and natural gas: all fuels– CO_2, CH_4 and N_2O[12]

50. The European Union reported some emissions for this subsector using the notation keys "NE" and "IE" (included elsewhere) in some subcategories for some member States (e.g. CO_2 and CH_4 emissions from distribution of oil products for the Netherlands; CO_2 and CH_4 emissions from other leakage for Spain; and N_2O emissions from flaring for Spain). In addition to the explanations found in CRF table 9(a), the European Union also explains the use of notation keys in annex 1.4 of the NIR, table 9. However, the ERT noted that only 9 out of 19 instances of "IE" were explained and 2 out of 3 uses of "NE". In response to questions raised by the ERT, the Party indicated that it was impossible for its inventory team to check and follow up with member States on every single "IE" and "NE" for non-mandatory categories, although the inventory is not underestimated taking in consideration the gap-filling procedures. The ERT encourages the European Union to ensure that proper mechanisms are in place to obtain information from member States on the use of the notation keys "NE" and "IE," in accordance with the UNFCCC reporting guidelines, in order to ensure the completeness of its reporting.

[11] The values referred to in this paragraph refer to the submission of 27 May 2014, for both the NIR and CRF tables.

[12] CH_4 and N_2O emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

51. The European Union reports "NE" for all AD and IEFs in CRF table 1.B.2. and some parts of CRF table 1.B.1. During the review, in response to a question raised by the ERT, the Party attributed this to the fact that member States report their AD and IEFs in different units (e.g. TJ, Tg, 10^6 m^3, 10^6 bbl/year, km, number of wells and so on), which cannot easily be converted into common units (e.g. pipeline length, gas consumed or gas transmitted) (see para. 15 above).

4. Non-key categories

Other (fugitive emissions from solid fuels) – CH_4

52. Member States of the European Union, in particular Spain, report "NE" for CH_4 recovery and flaring in coal mines (mining and post-mining), and the ERT noted to the European Union during the review week that the inventory could be overestimated. In response to a question raised by the ERT during the review, the European Union indicated that Spain lacks reliable information on this activity and therefore assumes that is has neither recovery nor flaring. The European Union stated that this approach is conservative. The ERT encourages the European Union to work with member States to verify whether or not there is recovery and/or flaring and use the appropriate notation keys. The ERT encourages the European Union to work with member States, if there is recovery and/or flaring, to collect AD and estimate the reduction of emissions resulting from this category, to improve the completeness of the inventory.

C. Industrial processes and solvent and other product use

1. Sector overview

53. In 2012, emissions from the industrial processes sector amounted to 243,313.21 Gg CO_2 eq, or 6.7 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 7,551.99 Gg CO_2 eq, or 0.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 34.1 per cent in the industrial processes sector, and decreased by 43.0 per cent in the solvent and other product use sector. The key drivers for the fall included low economic activity and decreased cement production in the region in recent years, as well as emission reduction measures in adipic acid production in Germany, France and the United Kingdom. In addition, a large reduction in the production of hydrochlorofluorocarbons (HCFCs) in the United Kingdom contributed to the decrease in overall emissions from the sector. Within the industrial processes sector, 34.9 per cent of the emissions were from mineral products, followed by 31.7 per cent from consumption of halocarbons and SF_6, 16.2 per cent from chemical industry and 16.1 per cent from metal production. Production of halocarbons and SF_6 accounted for 0.9 per cent and other (industrial processes) accounted for 0.2 per cent. The remaining 0.05 per cent were from other production.

54. The European Union has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The two most significant recalculations made by the European Union between the 2013 and 2014 annual submissions were in the following categories: consumption of halocarbons and SF_6 and metal production. The recalculations were made following changes in AD and EFs. Compared with the 2013 annual submission, the recalculations for 2011 decreased emissions in the industrial processes sector by 1,228.14 Gg CO_2 eq (0.5 per cent), and decreased total national emissions by 0.03 per cent. The recalculations were adequately explained in the NIR.

55. The ERT noted that the European Union has continued to make improvements in the transparency of the NIR, in response to recommendations made in previous review reports. In particular, the ERT commends the Party for the inclusion in the NIR of a table showing

the status of member States responses to recommendations made in previous review reports, where it was observed that most of the recommendations included in the table had been resolved. The ERT also commends the Party for all the issues that have been resolved as recommended by previous review reports, and recommends that previous recommendations which are still unresolved be implemented, as indicated in the relevant sections of this report.

56. The ERT noted in the CRF tables (2(I).A–G) that the European Union does not provide AD and IEFs for most of the subcategories, using the notation key "NE" to indicate that these AD and corresponding IEFs have not been estimated. Recognizing the challenge of including such data from member States with diverse AD units, the ERT encourages the EU to periodically analyse other sources of AD at EU level that may allow the development of approaches to derive AD and IEFs in those cases where different choices of AD by member States currently do not permit an aggregation of AD and the calculation of IEFs at EU level. The ERT recommends that the Party provide justifications in the NIR as to why the use of international data sources to report AD at European Union's level would lead to strongly inaccurate reporting.

57. The ERT noted that the Party, in response to recommendations made in previous review reports, has enhanced the descriptions of the methodologies used for this sector, and the ERT commends the Party for such improvements. However, the ERT noted significant disparities among the description of methods for individual member States in the summary tables presented in the Party's NIR, whereby there are no sufficient subcategory descriptions of methods for some member States, for example there is a lack of methodology descriptions in NIR table 4.4 and 4.22 (see also paras. 61, 64, 65, 67, 69, 72, 74, 75 and 80 below). The ERT recommends that the European Union improves the summary descriptions of methodologies in the NIR for all member States.

58. The European Union informed the ERT during the review that, starting from the next annual submission, the following additional production activities are planned to be accounted for under the EU ETS: primary and secondary aluminium, carbon black, nitric acid, adipic acid, glyoxal and glyoxylic acid, ammonia, bulk chemicals, hydrogen and synthesis gas, soda ash and sodium bicarbonate. Under directive 2009/31/EC capture, transport and storage of GHGs are planned to be included in the EU ETS. The ERT welcomes the inclusion of additional activities to the EU ETS as this measure will increase the accuracy of the Party's inventory and encourages the European Union to include information on these changes in the NIR.

2. Key categories

Cement production – CO_2

59. The ERT noted in the NIR that Germany uses an EF of 0.53 t CO_2/t clinker and uses this EF for the whole time series. In response to a question raised by the ERT, the European Union stated that Germany explained that this EF is based on an average clinker composition of 64 per cent calcium oxide (CaO) and 2 per cent magnesium oxide (MgO) as well as a dust recirculation rate of approximately 100 per cent. The Party also stated that Germany further confirmed that the same EF is used for the whole time series and that it was determined for the first time in preparation of the reporting in the 2004 annual submission, and it is the same factor as that used for EU ETS monitoring and reporting. The Party further stated that Germany has performed period checks using plant specific data reported under the EU ETS and that these did not indicate the need to revise EFs. The ERT notes this information and recommends that the European Union include this information in the NIR.

60. The ERT observed in the NIR that the European Union did not provide a sufficient overview of the methodology used by the United Kingdom to estimate cement production emissions. The methodology summary for the United Kingdom essentially mentions the source of data, without giving details on AD, EFs and other methodological information. The ERT recommends that the European Union improve the information on the methodology used by the United Kingdom in the NIR to enhance transparency and to enable the ERT to make a thorough review of the AD and EF used in the estimate of emissions from cement production.

61. On the basis of the status report provided by the European Union in table 4.5 of the NIR (on the implementation of previous recommendations), the ERT reiterates the recommendation made in previous review reports that the European Union continue to work with Spain in order that Spain implement a qualitative assessment of the range of IEFs and their trend, on the basis of the composition of the raw material used in the country.

62. The ERT noted in the NIR, regarding the reporting under the Convention (EU-28),[13] that Latvia reports the use of a tier 1 approach to estimate cement production emissions, based on final cement production rather than clinker data. Latvia did not provide details on how this approach takes into consideration imports of clinker, if there are any, and use of non-carbonate raw materials. In response to a question raised by the ERT during the review, the European Union informed the ERT that Latvia had explained that clinker AD are plant-specific and are reported from the cement clinker plants. It was further explained to the ERT that final clinker data are known, based on a mass balance approach (clinker used, produced and stocks). The ERT recommends that the European Union work with Latvia to ensure that it uses a tier 2 rather than a tier 1 approach when estimating cement production emissions, given that it is possible to obtain clinker data from the plants.

63. The ERT noted in the NIR, under the Convention, that Poland does not provide adequate information on AD collection and EF determination. The methodology summary for Poland essentially mentions that emissions are from clinker production, without giving details on AD, EFs and other methodological information. In response to a question raised by the ERT during the review, the European Union stated that Poland had explained that methodological descriptions are available in its own NIRs, and that the submissions of member States are also part of the European Union's submission. The ERT considers that referring to the NIRs of member States does not ensure sufficient transparency within the NIR of the European Union, and therefore recommends that the Party include the relevant information from the Polish NIR in the European Union's NIR.

Lime production – CO_2

64. On the basis of the status report provided by the European Union in table 4.9 of the NIR (on the implementation of previous recommendations), the ERT reiterates the recommendation made in previous review reports that the European Union provide more information for Italy about the methods used to estimate emissions from lime production for the entire time series; in particular there should be transparent documentation on whether the method is based on the amount of calcium carbonate from raw material or on the amount of calcium and magnesium oxides in the lime produced for each of the periods. The ERT also recommends that the European Union provide more information for Italy about the underlying drivers for the changes in IEF since 2005 and on how time-series consistency has been maintained.

[13] The EU-28 includes all the current member States of the European Union. In addition to the Parties listed as EU-15, the following Parties are also included: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

Limestone and dolomite use – CO_2

65. The ERT observed in the NIR that Croatia reports on approaches for the collection of AD (mainly surveys), for an overall period of 1990–1996, without explaining what data collection methods have been used from 1997 to 2012. In response to a question raised by the ERT during the review, the European Union stated that Croatia explained that more detailed AD have been collected from individual plants for the period 2008–2012, and that all data regarding this category are currently being further investigated in order to ensure accurate CO_2 emission calculations for the whole time series in a consistent manner. The ERT recommends that the European Union include this information for Croatia in the NIR in order to enhance the transparency of the description of methods and also recommends that the European Union work with Croatia to ensure the consistency of the full time series.

Ammonia production – CO_2

66. The ERT noted in the NIR that the European Union did not provide adequate methodology overviews for emissions from ammonia production for France and Germany. The methodology summary for France essentially mentions four ammonia production plants in France, without giving details on AD, EFs and other methodological information. The methodology summary for Germany essentially mentions a tier 3 approach being used without giving any further details. The ERT recommends that the European Union provide in its NIR adequate and transparent methodology overviews for France and Germany to enable the ERT to make a thorough review of the AD and EFs used in the ammonia production emission estimations of these countries.

67. On the basis of the status report provided by the European Union in table 4.23 of the NIR (on the implementation of previous recommendations), the ERT reiterates the recommendation made in previous review reports that the European Union make efforts to ensure that Greece complete the on-going work to obtain more accurate data on the amount of liquid fuel used as feedstock and the updated AD in the emission estimates.

Nitric acid production – N_2O

68. The ERT noted that the European Union did not provide adequate methodology overviews in its NIR for emissions from nitric acid production for France, Germany and Greece. The methodology summary for Germany essentially mentions a tier 3 approach being used without giving any further details. The methodology summary for Greece essentially mentions the source of data and use of average IPCC default factors for the single production unit in the country, without giving details on AD, rationale for the EFs used and other methodological information. The ERT recommends that the European Union provide in its NIR adequate methodology overviews for France, Germany and Greece to enable the ERT make a thorough review of the AD and EFs used in the nitric acid production emission estimations of those member States.

69. On the basis of the status report provided by the European Union in table 4.27 of the NIR (on the implementation of previous recommendations), the ERT reiterates the recommendation made in the previous review report that the European Union improve the transparency of information provided in the NIR for Spain by finding alternative ways of reporting the necessary information without violating the existing rules on confidentiality.

Other (chemical industry) – CO_2

70. On the basis of the status report provided by the European Union in table 4.37 of the NIR (on the implementation of previous recommendations), the ERT reiterates the recommendation made in previous review reports that the European Union work with Finland in order to develop a way of reporting indirect CO_2 emissions which will allow CO_2 emissions from biomass to be distinguished from the fossil fuel component and use

this in the CRF tables of its annual inventory submission, and provide an appropriate methodology description in the NIR.

71. On the basis of the status report provided by the European Union in table 4.37 of the NIR (on the implementation of previous recommendations), the ERT reiterates the recommendation made in previous review reports that the European Union include in the NIR the methodological description of France for this subcategory .

72. The ERT noted in the NIR (table 4.37) that Germany includes refinery catalyst coke burn off emissions in the industrial processes sector rather than in the energy sector. In response to a question raised by the ERT during the review week, the European Union stated that Germany explained that such reporting was due to lack of detailed knowledge on these emissions. Germany further explained that there has been an intensive discussion with the petroleum industry about some details of the statistics for petroleum products and it is clear that the heat generated during the catalyst regeneration process is fully used for energy purposes. The ERT welcomes the clarification provided by the European Union regarding Germany's effort to better understand the nature of emissions and recommends that the European Union work with Germany to report follow-up information on the appropriate allocation of catalyst coke burn off emissions.

Aluminium production – CO_2, PFCs[14]

73. The ERT observed in the NIR that the European Union did not provide adequate methodology overviews for aluminium production emissions for Greece, the Netherlands and Sweden. The reported information on Greece mentions emission estimates based on the anode effect without giving specific methodological details. The reported information on the Netherlands reports use of a tier 2 approach based on measured data, and does not provide any further details. The reported information on Sweden only mentions the number of ovens and production statistics provided by the company. The ERT found that the information provided is not transparent enough for it to conduct a thorough methodology review. The ERT recommends that the European Union provide in the NIR adequate methodology overviews to enable the ERT to make a thorough review of the AD and EF used in the aluminium production emission estimations provided by Greece, the Netherlands and Sweden.

Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6[15]

74. The ERT noted that the Party's inventory includes explanations on the methodologies used to estimate emissions from consumption of halocarbons and SF_6 for the member States belonging to the EU-15 only (i.e. the submission does not include this type of information for member States that only report under the Convention). In response to a question raised by the ERT, the European Union explained that only the methodologies for the EU-15 were included in the NIR to facilitate the review by the ERT by making the submission under the Kyoto Protocol more transparent and efficient. The European Union further explained that all the methodological descriptions by all 28 European Union member States are available in the NIRs of each Party. Noting that the Party's reference to the NIRs from member States, which are included as annexes and, in total, cover thousands of pages, does not ensure the transparency of reporting, the ERT recommends that the European Union endeavour to provide in the NIR summary overviews of methodology descriptions for key categories based on the relevant methodological descriptions reported in the NIRs of its member States.

[14] CO_2 emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

[15] PFC and SF_6 emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

75. The ERT noted in the NIR (table 4.71) that a number of recommendations made in the 2012 review report on the use of notation keys have not been resolved. The unresolved issues on notation keys include the following: "NE" reported by Denmark for amount of gas remaining in products at decommissioning; "NO" (not occurring) reported by Finland for SF_6 emissions from aluminium and magnesium foundries; "IE" and "NA" (not applicable) by Ireland regarding AD and emission estimates for HFC emissions from refrigeration and air-conditioning equipment (except mobile air conditioning); "NO" by Luxembourg for reporting potential emissions of PFCs from refrigeration and air-conditioning equipment; "NA" and "NA and NO" by the Netherlands for AD and IEFs of emissions from stocks in industrial refrigeration and mobile equipment, whereas the emissions are actually estimated; and empty cells in the CRF tables for Spain as a replacement of "NA" and "NE" notation keys in reporting emissions from semiconductor manufacturing. Recognizing that the issues identified do not indicate that the European Union inventory is underestimated, the ERT reiterates the recommendation made in the 2012 review report that the European Union make the necessary corrections in the use of notation keys to ensure the transparency of its reporting.

76. On the basis of the status report provided by the European Union in table 4.71 of the NIR (on the implementation of previous recommendations), the ERT reiterates the recommendation made in previous review reports that the European Union improve the transparency of its reporting regarding Luxembourg by providing background tables of consumption of halocarbons and SF_6. Further, the ERT reiterates the recommendation made in the previous review report that the European Union work with Luxembourg in order to enhance the transparency of its reporting of fluorinated gases (F-gases) by providing all the relevant background information used for the calculations in both the NIR and CRF tables.

77. The ERT noted in the NIR of the European Union that the Netherlands explains that many processes related to the use of HFCs and SF_6 take place in only one or two companies, and that because of the sensitivities of the data from these companies only certain emissions are reported. In response to a question raised by the ERT during the review, the European Union stated that the Netherlands explained that there was a misunderstanding in the way the information was portrayed in the NIR of the European Union, and that the information was clearer in the NIR of the Netherlands. The Netherlands had further informed the Party that the correct version was: "The consumption data of aerosols, fire extinguishers, foams and solvents originate from only one or two companies and because of the sensitivity of data from these companies, the HFC emissions from categories 2F2-2F5 are reported together in 2F9. In addition, processes related to the use of PFCs and SF_6 in semiconductor manufacture and electrical equipment take place in only one or two companies. Because of the sensitivity of data from these companies, only the sum of the PFC and SF_6 emissions of 2F7 and 2F8 is reported (included in 2F9)". The ERT accepted this clarification and recommends that the European Union include this explanation in the annual submission when reporting emissions for the Netherlands and enhance the QC procedures to ensure that the information in the Party's NIR accurately reflects the information in the NIR of member States.

78. The ERT observed that the NIR of the European Union reports that Greece uses AD from neighbouring countries (Italy, Spain and Portugal) to estimate emissions from consumption of halocarbons and SF_6. In response to a question raised by the ERT during the review, the European Union informed the ERT that Greece stated that it had explained in its NIR 2014 for Greece (p. 207) that this approach has been used for estimating HFC-227ea emissions from "fire protection equipment" only, which accounted for about 0.9 per cent of total F-gas emissions from the use of ozone-depleting substances (ODS) substitutes in 2012. Greece explained that this was due to a lack of information to implement the methodology suggested in the IPCC good practice guidance, but a country-specific estimation of the emissions has been used, based on the assumption that the use of HFCs in

fire equipment in Greece is similar to the use in other Mediterranean countries (Italy, Portugal, Spain) and taking into consideration each country's population. Greece also stated that, in the framework of the 2011 improvement plan, the Greek Fire Service-Fire Safety Division has been contacted in order to determine the availability of information for the use of HFCs and/or PFCs in fire equipment. The ERT recommends that the European Union work with Greece in order to implement appropriate country-specific methodologies to estimate these emissions in accordance with the IPCC good practice guidance.

3. Non-key categories

SF_6 used in aluminium and magnesium foundries – SF_6

79. The ERT noted in the NIR that the European Union did not provide an adequate methodology overview of the SF_6 emission trend from aluminium and magnesium foundries for Denmark. In response to a question raised by the ERT during the review on why the SF_6 emissions have been decreasing while activities under magnesium foundries no longer exits (which could imply there should be not occurring rather than decreasing SF_6 emissions), the European Union stated that Denmark explained that the total emissions of SF_6 decreased in Denmark because of the closure of the magnesium production foundries, and that SF_6 used in aluminium and magnesium foundries has been reported as "NO" since 2001. The ERT encourages the European Union to improve the transparency of information in its NIR by providing information on the SF_6 emissions trend in Denmark from aluminium and magnesium foundries only.

D. Agriculture

1. Sector overview

80. In 2012, emissions from the agriculture sector amounted to 374,231.69 Gg CO_2 eq, or 10.3 per cent of total GHG emissions. Since 1990, emissions have decreased by 15.5 per cent. The key driver for the fall in emissions is the decrease in the number of cattle and the amount of nitrogen applied by synthetic fertilizer and manure to agricultural soils. Within the sector, 50.3 per cent of the emissions were from agricultural soils, followed by 32.2 per cent from enteric fermentation. Manure management accounted for 16.7 per cent and rice cultivation accounted for 0.6 per cent. The remaining 0.2 per cent were from field burning of agricultural residues.

81. The European Union has made recalculations between the 2013 and 2014 annual submissions for this sector for the entire time series. The two most significant recalculations made by the European Union between the 2013 and 2014 annual submissions were in the following categories: CH_4 and N_2O emissions from manure management and N_2O emissions from agricultural soils. The recalculations were made following changes in AD, EFs and in order to rectify identified errors by individual member States. Compared with the 2013 annual submission, the recalculations increased emissions in the agriculture sector in 2011 by 9,086.56 Gg CO_2 eq (2.5 per cent), and increased total national emissions by 0.2 per cent. The recalculations were mostly reported in the NIR for individual member States but not all (see para. 82 below for further details).

82. Previous review reports have recommended that the European Union include in the NIR information on recalculations for all member States that conducted recalculations, including numerical information per member State, and that the Party include the rationale and impact of the recalculations on the category. The ERT noted that the European Union has made significant improvements to the explanation of recalculations for individual member States and the impact of recalculations by member States on each category in the NIR. A section has been included in the NIR that quantifies the effect of recalculations by

member State and the total contribution by each member State to the overall recalculation of the category within the European Union. The European Union also reports the average annual absolute change across all member States for each category. However, explanations are not provided yet for all member States. For example, NIR figure 6.84 (contribution of recalculations in each member State to overall recalculations in agricultural soils for the European Union) reports that Germany has conducted recalculations in agricultural soils, but no explanation is provided in table 6.113 ("Member State's background information for recalculations of emissions in category agricultural soils"). Further, the European Union calculates an average recalculation across the entire time series and does not provide the individual effect of recalculation (by year) for each of the individual member States at the category level. Without the recalculations on each category by member State for 1990 and the most recent year, the ERT cannot assess how the recalculations have affected the emissions trend and which member States dominate the trend. The ERT commends the European Union for the progress made to improve the explanation of recalculations and encourages the European Union to continue to work with member States to improve the presentation of the recalculation explanations and summarize the changes by category across member States for 1990 and the most recent year for all categories and by individual member State.

83. The previous review report noted that background information regarding emissions calculations was not always complete, for example: for CH_4 and N_2O emissions from the field burning of agricultural residues, the activity has not been explained for Belgium, Germany, Ireland, Luxemburg, Netherlands, Sweden and the United Kingdom (i.e. the rows are blank); and in NIR table 6.85 on the methodologies used to estimate CH_4 and N_2O emissions from this category, no methodological element but a general description was included for Austria, while for Greece, except for the fraction of residues burned on field, no AD, EFs or estimation method were presented. The ERT commends the European Union for including more background information regarding emissions from field burning of agricultural residues but notes that the European Union has not fully implemented the recommendation made in the previous review report to improve the reporting of methodologies used to estimate emissions from field burning of agricultural residues. Furthermore, during this review the ERT noted that other such background information on all member States is not always provided. Some examples include: in NIR table 6.22 the trend is not provided for CH_4 emissions from enteric fermentation for France, Greece and Luxembourg; NIR table 6.25, uncertainty estimates for enteric fermentation, does not report any information on uncertainty for France and Ireland; and in NIR table 6.54 available background information on the trend for N_2O emissions is missing. The ERT encourages the European Union to continue to work with individual member States to ensure complete and transparent reporting of background information used in the inventories for member States.

84. The previous review report noted the increased use of higher-tier approaches in comparison with the 2012 annual submission (e.g. for manure management, the percentage of emissions estimated based on a country-specific methodology increased from approximately 63 per cent in the 2012 annual submission to 86 per cent in 2013). The percentage of emissions estimated by country-specific methodologies for the EU-15 remains around 85 per cent in the 2014 annual submission. In response to a question raised by the ERT during the review, the European Union indicated it had organized an in-depth workshop to improve agricultural GHG inventories. The ERT encourages the European Union to further support member States to develop country-specific AD and EFs in order to allow for increased use of higher-tier approaches and recommends that the European Union report in the NIR on the outcome of the workshop, including any planned improvements arising from the workshop.

85. The ERT noted that in CRF table 4.B(a) the total allocation of manure from swine, expressed as a percentage, only summed to 94.4 per cent for 2012. In response to a question raised by the ERT during the review, the European Union explained that for 2012 only, one member State (Belgium) did not report the allocation of manure by climate region for swine for 2012, but the error did not affect the estimate of emissions. Furthermore, the ERT noted that table 21.16 of the NIR stated that Hungary was planning to develop country-specific EFs and implement these by 2007, and table 21.12 stated that Latvia used a tier 1 methodology for all livestock, whereas Latvia uses a tier 2 methodology for dairy and non-dairy cattle. In response to questions raised by the ERT during the review regarding these errors, the European Union explained that the information on Hungary was out of date and that the information on Latvian methods for livestock emission calculations was not correct. Also during the review the ERT noted that the absolute value of the recalculation changes in the NIR did not reconcile with the recalculation estimates reported in the CRF tables. In response to a question raised by the ERT during the review, the European Union indicated that there was an error in the NIR recalculations and these had not been multiplied by 100. The ERT recommends that the Party correct the errors and update the information on the EU-15 member States and improve the implementation of QC procedures in order to prevent such errors.

86. During the review the ERT noted that there were references to European-based institutions and programmes, sometimes only by their acronyms, and their functions were not described in the NIR. Some examples included JRC, CAPRI and NUTS. In response to questions raised by the ERT during the review, the European Union provided some good background summaries on the roles and functions of these institutions or programmes. To improve transparency for audiences less familiar with the European Union systems, the ERT recommends that the European Union provide such summary information in the annual submission.

2. Key categories

Enteric fermentation – CH_4

87. The ERT noted that cattle (dairy and non-dairy), sheep and swine population numbers reported in the CRF tables are below the values included in FAOSTAT (0.4 per cent, 1.3 per cent and 3.5 per cent difference, respectively) for 2012. The previous review report encouraged the European Union, in the context of implementing its verification activities, to include in the NIR the results of the comparison of livestock population data used in the inventory with similar data reported to the FAO and Eurostat, together with the description of the potential reasons for differences. The ERT commends the European Union for reporting in its NIR a comprehensive comparison between livestock numbers, nitrogen excretion, fertilizer application, area of rice cultivation, other sources of nitrogen and estimates of emissions as reported by the FAO and the European Union.

88. The NIR does not, however, explain the potential reasons for the differences; for example, in the case of swine the European Union indicates that the biggest source of difference is the swine population in Germany whereas the FAO livestock data report 20 per cent more swine than the CRF tables. In response to a question raised by the ERT during the review regarding the differences in swine numbers in Germany, the European Union explained that the FAO data are for 30 September every year while the German statistics are for November and piglets under 8 kg are included with sow numbers (i.e. the total German swine population excludes the number of piglets under 8 kg). The ERT reiterates the encouragement in the previous review report that the European Union investigate differences between AD reported in the CRF tables and FAO data as a QA/QC and verification procedure and report such reasons for the differences in livestock numbers.

89. The previous review report noted that in table 6.21 of the NIR some additional background information on milk production (kg milk/head/day) associated with the CH_4 emissions from dairy cattle are reported as "NA" for the Netherlands, while data which allow their derivation (milk production expressed as kg milk/head/year) are available in this member State's NIR. The European Union's NIR, table 10.7 (Improvements in 2013 including in response to UNFCCC review findings) reports that this recommendation has been implemented. The ERT further noted from the NIR of the Netherlands that the country reports data on milk production per mature dairy cow, but the notation key has been changed from "NA" to "NE". The ERT encourages the European Union to report correct additional background information on milk production for the Netherlands in the NIR and encourages the Party to continue its efforts to achieve transparency and comparability of reported data.

Manure management – N_2O

90. The ERT noted that the trend of nitrogen excretion rates for swine in Sweden (NIR, figure 6.27) showed a stepwise increase in nitrogen excretion rates from 7.7 kg N/year to 9.0 kg N/year between 2001 and 2002, and the explanation in the text of the NIR showed that the estimate of the nitrogen excretion rate had been updated only from 2002 and possibly may have resulted in a time-series consistency problem. In response to a question raised by the ERT during the review, the European Union indicated that Sweden increased the intensification of production systems from 2.5 to 3.0 production cycles in 2002 for swine for meat production and this resulted in a 16 per cent increase in the rate of nitrogen excretion. The ERT considered that the explanation provided by the European Union was reasonable and recommends that the European Union include this explanation in the NIR.

Agricultural soils – N_2O

91. The European Union has reported in CRF table 4.D that the fraction of livestock nitrogen excreted and deposited onto soil during grazing ($Frac_{GRAZ}$) is 0.34; however, the proportion of manure excreted during animal grazing, calculated based on the data reported in CRF table 4.B(b), equals 0.36. In response to a question raised by the ERT during the review, the European Union indicated that the value for $Frac_{GRAZ}$ is based on an average of $Frac_{GRAZ}$ values across all member States. Although the identified difference does not cause any errors in the calculation of emissions, in order to improve the transparency and comparability of the annual submission the ERT recommends that the European Union report the fraction so that $Frac_{GRAZ}$ is consistent between CRF table 4.D and CRF table 4.B(b) for the total for the European Union. The ERT also recommends that the European Union improve the QA/QC system to ensure that the AD reported in the CRF tables are internally consistent.

92. The ERT observed that there was a discrepancy in the total area of organic cultivated soils, which is reported in CRF table 4.D as 2,360.99 kha and is reported as the area of organic soils in CRF tables 5.B and 5.C as 2,855.31 kha for 2012. In response to a question raised by the ERT during the review, the European Union explained that some member States use country-specific definitions of cultivation and some use different sources of data for the agriculture and LULUCF sectors. The European Union also explained that it had previously identified this in its 2013 QA/QC. The ERT recommends that the European Union continue to work with member States to ensure more consistent reporting of the area of organic soils between the agriculture and LULUCF sectors.

E. Land use, land-use change and forestry

1. Sector overview

93. In 2012, net removals from the LULUCF sector amounted to 187,705.98 Gg CO_2 eq. Since 1990, net removals have increased by 37.0 per cent. The key drivers for the rise in removals are the European Union's environmental and agricultural policies, including the incentives for the use of less-intensive agriculture practices and a general decrease of the total area of used arable land and the increase of forest and woodland area under conservation regimes. Within the sector, 315,929.70 Gg CO_2 eq of net removals were from forest land, followed by 4,685.80 Gg CO_2 eq from grassland, 984.87 Gg CO_2 eq from other land and 535.02 Gg CO_2 eq from other (LULUCF). Net emissions were reported from cropland (87,852.73 Gg CO_2 eq) and settlements (43,495.71 Gg CO_2 eq). The remaining 3,080.96 Gg CO_2 eq of net emissions were from wetlands.

94. The European Union has made recalculations between the 2013 and 2014 annual submissions for all categories. The most significant recalculations made between the 2013 and 2014 annual submissions were in forest land by Germany, Italy, Portugal, and, of lesser significance, Spain and the United Kingdom. Compared with the 2013 annual submission, the recalculations increased removals in the LULUCF sector by 15,114.40 Gg CO_2 eq (8.7 per cent). The recalculations were generally adequately explained in the NIR. (see para. 99 below).

95. Although the quality of reporting for the European Union as a whole depends on the quality of reporting by each member State, the ERT has noticed improvements in the inventory for the LULUCF sector in 2014, which was confirmed by the fact that in the 2014 annual submission only minor inconsistencies in the time series of AD and land allocation in land subcategories were identified. The ERT noticed that the European Union, and its member States, have continued to make improvements regarding the completeness and transparency of reporting for categories, in accordance with information provided in the NIR. For example, Spain has reported emissions in land converted to cropland, land converted to wetlands and land converted to other lands for the first time (table 7.5 in NIR). The ERT commends the Party for these improvements. However, the ERT identified that the European Union reported "NE" for emissions in CRF tables pertaining to the LULUCF sector. Indeed, the ERT found multiple instances of "NE" in CRT tables 5, 5.A to 5.F, 5(I) to 5(III) and 5(V), affecting both mandatory categories/pools and non-mandatory categories/pools.[16] The ERT reiterates the recommendations made in previous review reports that the Party continue to work with member States with a view to reporting mandatory pools and categories which are currently not estimated in order to increase the completeness of the inventory. The ERT also encourages the European Union to do the same for non-mandatory categories and pools.

2. Key categories

Forest land remaining forest land – CO_2

96. The area and net CO_2 removals have increased between 1990 and 2012; in 2012 the area under this category was 120,457.84 kha and the net CO_2 removals amounted to 279,340.14 Gg CO_2 which are 1.0 per cent and 14.8 per cent higher than the values for 1990, respectively. The trend is mostly affected by the trend in the pools living biomass and soil organic carbon. Previous stages of the review identified significant inter-annual variations for the IEFs for some of the pools: for living biomass, the 2012 value (0.59 Mg

[16] Given the number of pools/categories reported as "NE" for individual member States, it is not possible to list all cases in this report.

C/ha) is 13.0 per cent higher than the 1990 value (0.52 Mg C/ha). Also, the following inter-annual changes have been identified as statistical outliers: 1990–1991 (13.3 per cent); 1998–1999 (–22.6 per cent); 1999–2000 (29.5 per cent); 2001–2002 (–13.2 per cent); 2006–2007 (–9.4 per cent); and 2007–2008 (23.2 per cent). For dead organic matter, the trend of IEFs is very unstable and the following inter-annual changes are outstanding: 1998–1999 (1,653.1 per cent); 1999–2000 (–101.2 per cent); 2007–2009 (1,676.1 per cent); and 2009–2010 (–105.7 per cent). For organic soils, the overall trend of the carbon stock change IEF is decreasing and the 2012 value (–0.39 Mg C/ha) represents a 26.7 per cent decrease in emissions per unit area compared with the 1990 value (–0.53 Mg C/ha). In response to a question raised by the ERT during the review, the European Union explained that inter-annual variations are the result of the aggregation of data (AD and emissions) by member States and that any change of values reported by member States also affects the values the member States provide to the European Union. The ERT understands the particular situation for the European Union, which arises because the inventory is based on a compilation of member States' inventories, but, given the importance of this key category, reiterates the recommendation made in the previous review report that the Party improve the transparency in the NIR. In particular, the ERT recommends that the main drivers leading to inter-annual variations be discussed in detail, in particular for the most recent years.

Land converted to forest land – CO_2

97. The area of land converted to forest land in 2012 is 6,267.67 kha, which is 4.9 per cent of the total forest area in the EU-15 and represents an increase of 80.5 per cent compared with 1990. Net removals are 42,497.18 Gg CO_2, with the major contributions from Spain (–8,511.03 Gg CO_2) and France (–7,958.81 Gg CO_2). In the previous annual review report, a problem was identified regarding the report of Italy: Italy calculates the emissions for the entire forest land and then splits the sink proportional to the areas of forest land remaining forest land and land converted to forest land. The previous review report concluded that this approach may not be satisfactory since it is not reasonable to consider emissions/removals from land converted to forest land and forest land remaining forest land to be the same because the increment and harvest values are likely to be very different in newly established forests and because the assumption of an equal sink between lands remaining forest land and lands converted to forest land was not justified in the NIR. The previous review report recommended that the Party work with Italy to improve the methodology. However, the ERT noted that there is no information in the NIR to confirm whether the European Union made progress with Italy on this methodological issue. In response to a question raised by the ERT during the review, the European Union explained that Italy is still verifying the calculations and that reported emissions are not underestimated or removals overestimated. The ERT reiterates the recommendation made in the previous review report that the European Union continue to improve the transparency of reporting, including the provision of updated information from member States and internal QA/QC checks in order to ensure that the aggregated reporting is complete and consistent among member States.

Cropland remaining cropland – CO_2

98. The area of cropland remaining cropland constantly decreased by 5.0 per cent between 1990 (79,407.21 kha) and 2012 (75,454.18 kha). Net emissions have increased from 35,401.24 Gg CO_2 in 1990 to 38,874.97 Gg CO_2 in 2012 (i.e. by 9.8 per cent). The pools dead organic matter and soil organic carbon show the same overall tendency; while for living biomass, net removals were reported in the period 1990–2010 and net emissions in 2011 and 2012. In response to a question raised by the ERT during the review, the European Union explained that the change for living biomass is the result of a significant increase of emissions from woody crops in Italy for 2011 and 2012 in accordance with the

methodology used by Italy. Given that the value reported by Italy represents a significant change in the trend and that this increase is the maximum reported for any European Union member State for the period 1985–2012, the ERT recommends that the European Union provide justifications for the overall trends.

Land converted to cropland – CO_2

99. The area of land converted to cropland has increased by 30.4 per cent between 1990 (6,597.60 kha) and 2012 (8,603.09 kha) for the EU-15. This is an important shift in the trend compared with the values reported in the 2013 annual submission, when the area of land converted to cropland in 2011 was 22.2 per cent lower than 1990. Recalculations have also affected emissions/removals: the differences in net emissions/removals reported for land converted to cropland for 2011 between the 2014 and 2013 annual submissions represents an increase of emissions of 12,696.11 Gg CO_2 (59.5 per cent). The NIR does not explain this significant recalculation, but explanations were provided in response to a question raised by the ERT during the review: the European Union informed the ERT of the factors affecting the inventories of France, Germany and Spain that justified the changes. The ERT recommends that the Party provide transparent explanations in its annual submission, indicating the key drivers for the changes in the trend and recalculations.

100. The ERT noted that the European Union continues to report carbon stock changes in pools for this category using the notation key "NE" for some member States (e.g. soil organic carbon on organic soils in the Netherlands). In addition, the ERT noted that the methods used by member States are mostly tier 2 or enhanced default methods using country-specific data combined with default methods for some categories, while some other member States reported emissions and removals for pools using only a lower-tier method (e.g. Ireland, Italy and Luxemburg). The ERT reiterates the recommendation made in the previous review report that the Party continue to work with the member States to improve the completeness of their reporting and use higher-tier methods in order to enhance accuracy.

101. The previous review report noted that there might be an underestimation of emissions in agricultural lime application in cropland and/or grassland, because Spain does not account for CO_2 emissions from lime production in sugar mills that are captured in a by-product used for soil improvement. The previous review report recommended that the European Union work with Spain to ensure that these emissions from lime application are reported transparently under the LULUCF sector and the KP-LULUCF activities. In response to a question raised by the ERT during the review, the European Union acknowledged that this issue had been identified during the QA/QC carried out in the context of the requirements under the MMR and, for the first time, Spain has reported emissions from lime application in CRF table 5(IV) and KP-LULUCF CRF table 5(KP-II) under the categories cropland and cropland management activities, respectively. Specific information concerning this has been provided in section 11.2.3.2.4 of the 2014 NIR for the European Union. The ERT commends the Party for the improvement in transparency completed for this year's annual submission.

Grassland remaining grassland – CO_2

102. The previous review report indicated that there was a large inter-annual variability in the net carbon stock change in living biomass for several years, which was related to the inventory of Italy. In response to questions raised by the current ERT during the review, the European Union explained that Italy has provided information clarifying that the main driver for the inter-annual variance is the biomass burned as a result of fires. The European Union acknowledged that more information should have been added to its NIR. The ERT recommends that the Party continue to progress efforts with Italy (main contributor to the

inter-annual change) on its reporting of carbon stock change in living biomass and document the reasons for inter-annual variations in the NIR.

103. The ERT noted other significant inter-annual variations for some pools, such as: a decreasing trend for living biomass and dead organic matter (the overall trend of the carbon stock change IEF is decreasing and the 2012 value (0.0018 Mg C/ha) is 6.1 per cent lower than the 1990 value (0.0019 Mg C/ha)); an unstable trend for living biomass (inter-annual variations are high for the entire period, such as 1990–1991 (217.2 per cent), 1992–1993 (–695.6 per cent), 1998–1999 (332.4 per cent), 2007–2008 (146.2 per cent), 2008–2009 (–52.4 per cent), 2010–2011 (–49.1 per cent) and 2011–2012 (45.9 per cent)); an increasing trend for soil organic carbon in mineral soils (the 2012 value (0.023 Mg C/ha) is 430.4 per cent higher than the 1990 value (0.004 Mg C/ha)). During the review, in response to questions raised by the ERT, the European Union explained that inter-annual variations of its values are the result of the aggregation of data by member States. The ERT acknowledges that the changes in trends will vary with every member State in every year; nevertheless, the ERT recommends that the Party provide general information about the key drivers that explain the variations in each member State when significantly affecting the European Union aggregate estimates.

Land converted to other land – CO_2

104. The area under the category land converted to other land represents 639.47 kha in 2012, which is 0.2 per cent of the total area of the European Union (this category is a key category according to the trend). The category changed from being a net source of CO_2 emissions in 1990 (1,405.78 Gg CO_2) to a net sink in 2012 (–984.87 Gg CO_2). In the previous review report it is explained that the European Union said that the reason was Portugal and the development of its national system: the area reported by Portugal increased from 69.58 kha in 1990 to 1,033.85 kha in 2011. The previous review report also recommended that the European Union explain significant inter-annual variances to improve transparency and also work with member States to improve the consistency of their reporting. The ERT noted that the explanations, reiterated by the European Union during the current review, were not included in the NIR. The ERT reiterates the recommendation made in the previous review report that the European Union include transparent explanations in the NIR for the inter-annual variations and also work with the member States to improve the consistency of their reporting.

3. Non-key categories

Biomass burning – CO_2, CH_4 and N_2O

105. For CO_2, some member States report emission estimates or report using the notation keys "NO" or "IE" for emissions from burning biomass, while CH_4 and N_2O emissions are often reported as "NE". Although the Party comments in the NIR about the use of notation keys, nothing is provided regarding these "NEs". Therefore, the ERT recommends that the Party include the reasons for the use of the notation key "NE" when applicable and make efforts to increase the completeness of reporting.

F. Waste

1. Sector overview

106. In 2012, emissions from the waste sector amounted to 104,459.48 Gg CO_2 eq, or 2.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 40.5 per cent. The key drivers for the fall in emissions are reductions in solid waste disposal on land and the increasing CH_4 recovery in the waste sector. Within the sector, 75.6 per cent of the emissions were from solid waste disposal on land, followed by 19.8 per cent from

wastewater handling. Waste incineration accounted for 2.4 per cent. The remaining 2.2 per cent were from other (waste), specifically from biological treatment of waste.

107. The European Union has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by the European Union between the 2013 and 2014 annual submissions was in the category solid waste disposal on land, based on recalculations made for the United Kingdom and Spain. The largest recalculations reported for the United Kingdom are due to a methodological change in the estimation of CH_4 recovery. The next largest recalculation was CH_4 emissions in Spain in 2011, owing to changes to the amount of waste burned and the application of changes in waste composition in solid waste disposal on land. The United Kingdom's large recalculations are the result of the use of CH_4 recovery data for landfills that are now taken from monitored data and changes in the solid waste disposal on land category. Compared with the 2013 annual submission, the recalculations increased emissions in the waste sector in 2011 by 6,914.51 Gg CO_2 eq (6.8 per cent) and increased total national emissions by 0.2 per cent. The recalculations were adequately described in the NIR.

108. The information provided on the waste sector is generally transparent. However, the major driver for the decrease in emissions from 1990 to 2012 was not well documented in the NIR, and the ERT observed that there is not enough information in the NIR on the AD and EFs regarding CH_4 emissions from the categories other (solid waste disposal) and other (wastewater handling) (see paras. 112 and 114 below). The ERT also observed that the European Union reported declines in the total quantity of municipal waste disposal on land between 1990 and 2012 in the NIR, but there is not enough information about these AD in the NIR (see para. 111 below). The ERT recommends that the European Union continue to improve the transparency of reporting for the waste sector.

109. The previous annual review report recommended that the European Union improve its reporting of AD by including European Union-level AD in the CRF tables and provide detailed information on AD at the member State level in the NIR. The ERT noticed that there were some improvements to the information on AD at the member State level in the 2014 annual submission in CRF table 6.A. The ERT commends the Party for the improvements made.

110. The ERT observed some apparent errors in figure 8.2 of the NIR (page 819): the key category CH_4 from industrial wastewater is missing. The ERT also observed an error in table 8.1 of the NIR (page 820), specifically an inconsistency between the table title and the contents of the table, since no information is provided in this table on methods applied and EFs. The ERT recommends that the European Union enhance its QA/QC procedures in order to ensure consistency between the NIR and the CRF tables.

2. Key categories

Solid waste disposal on land – CH_4

111. The EU-15 member States all used the IPCC tier 2 first-order decay (FOD) method or a tier 2-equivalent method with a combination of default and country-specific EFs for estimating CH_4 emissions (e.g. Belgium uses a country-specific method which is in line with the tier 2 method). These approaches are in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. CH_4 emissions from this category have decreased by around 46 per cent between 1990 and 2012 because total municipal waste disposal on land has decreased over this period. The ERT noticed that the European Union reported that the total municipal waste disposal on land declined by around 52 per cent between 1990 and 2012, but there is no information about these AD in the NIR. The ERT recommends that the European Union provide relevant AD in the NIR.

112. The ERT noted that the description in the NIR of the methodologies used to estimate CH_4 emissions was not fully updated: for example, the information on CH_4 emissions in Spain still refers to 2002 and 2004. The ERT recommends that the European Union update this description in a transparent manner in the NIR.

113. The ERT noted that in CRF table 6 values of 182.93 Gg CH_4 and 6.78 Gg CH_4 recovered are reported for the subcategory other not-specified (solid waste disposal), but the NIR contains no description about these emissions and recoveries. Therefore, the ERT encourages the European Union to provide relevant information for this category in its NIR.

Wastewater handling – CH_4 and N_2O

114. The ERT noted that in CRF table 6 the Party reported emissions of 1.16 Gg CH_4 and 0.08 Gg N_2O for the subcategory other (wastewater handling), but there are no descriptions about these emissions in the NIR. The ERT encourages the European Union to provide relevant descriptions in its NIR.

115. The ERT noted in the NIR large decreases in CH_4 emissions from industrial wastewater for the United Kingdom and Italy, while emissions from Portugal were significantly increasing, but there are insufficient explanations for the reasons behind these divergent trends reported in the NIR. The ERT recommends that the European Union include additional information on trends in emissions from industrial wastewater from those member States that significantly affect the trend of emissions of this category at European Union's level.

116. The ERT noted that, in CRF table 6.B, the total organic products (AD) and the IEF of CH_4 and N_2O were reported using the notation key "NE", and further noted that there is insufficient information about the AD for these sub-categories in NIR. The ERT encourages the European Union to enhance the description of AD in the NIR.

3. Non-key categories

Waste incineration – CO_2, N_2O and CH_4

117. The European Union included in the NIR an overview of GHG emissions from waste incineration by member States. The ERT observed that there is some duplication between NIR table 8.12 and table 8.13, and there is no description about CH_4 and N_2O emissions in the NIR. The ERT recommends that the European Union combine NIR table 8.12 and table 8.13.

Other (waste) – CO_2, N_2O and CH_4

118. To estimate emissions from this category, 11 member States used methods which are in line with *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) or country-specific methods, which mainly pertain to composting, sludge spreading, biogas production and accidental fires. The ERT commends the European Union for providing emission estimates for these sources, that way improving the completeness of the inventory.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

119. Table 6 provides an overview of the information reported and parameters selected by the European Union under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of the Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	Activities elected: forest management, cropland management and grazing land management Years reported: 1990, 2008, 2009, 2010, 2011, 2012	
Period of accounting	Commitment period accounting	France and Denmark elected annual accounting and all remaining EU-15 member States elected end of commitment period accounting
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	

120. Section G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities, and the change from the first commitment period to the second commitment period, paragraphs 121–132 below contain the ERT's assessment of the Party's adherence to the current guidelines for reporting and do not provide specific recommendations for reporting of these activities for the 2015 annual submission.

121. The European Union's annual submission for the year 2012 is generally transparent except for some pools and activities where the Party has reported using notation keys and for which either insufficient or no verifiable information has been provided in the NIR. In CRF table 5(KP-I)A.1.3, the European Union reports units of lands otherwise subject to elected activities under Article 3, paragraph 4, of the Kyoto Protocol using different notation keys "NA", "NO", or "NE" for different member States, although it appears that the information conveyed is the same. In response to questions raised by the ERT during the review, the European Union acknowledged that more efforts are needed to increase the harmonization (among individual member States) of the use of notation keys. The European Union also stated that this issue was tracked during the QA/QC carried out in the context of the requirements under the MMR as well as during the LULUCF workshops organized by the JRC (during which a decision tree on the use of the notation key was created and discussed with several national experts for agreement among member States). The ERT

recommends that the European Union continue to work with and support member States to improve consistency in the use of notation keys and further improve the transparency of its future submissions.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

122. Methods, AD and EFs used by the European Union are in accordance with the IPCC good practice guidance for LULUCF. The European Union reported that higher-tier methods (tier 2 and 3) are used by its member States mainly for estimating carbon stock change in living biomass pools and notation keys and IPCC default values are mostly used for estimating and reporting other pools. With regard to AD, the European Union provided information, in response to a question raised by the ERT during the review, that member States mainly used national sources of data when deriving estimates of emissions/removal from afforestation and reforestation activities.

123. The information provided on afforestation and reforestation activities is generally complete with some pools reported using the notation key "NE", such as dead wood, and litter reported by the Netherlands. In table 11.13 of the NIR the European Union provided justification for the reporting of these two pools as "NE" with verifiable information that these pools are not net sources for the Netherlands. However, the ERT noted that the information provided seems to be explaining a situation in Luxembourg not in the Netherlands. In response to a question raised by the ERT during the review, the European Union explained that the text for Netherlands is mainly correct, except the last two sentences that make reference to Luxembourg and which were added by mistake. The ERT also noted that in CRF table 5(KP-II)5, biomass burning is reported for the Netherlands for all GHGs from wildfires on areas under afforestation/reforestation (harvested) using the notation key "NE". The European Union also indicated to the ERT during the review that the use of the notation key "NE" under afforestation/reforestation (harvested) is an error since such areas do not exist in the Netherlands. The ERT welcomed the clarification and recommends that the European Union improve its QA/QC procedures to ensure that these errors do not occur.

Deforestation – CO_2

124. The methods, AD and EFs used are the same as in the reporting under the Convention and are in accordance with the IPCC good practice guidance for LULUCF.

125. In CRF table 5(KP-I)A.2, the European Union used notation keys to report carbon stock changes: "IE" and "NO" for litter for Finland; below-ground biomass and litter reported as "IE" for Luxembourg; below-ground biomass for Spain is reported as "IE"; and for the United Kingdom below-ground biomass and dead wood is reported as "IE". In response to a question raised by the ERT during the review, the European Union stated that individual member States were questioned on these issues during the European Union's QA/QC process. Member States were requested to provide adequate explanations in their NIRs and CRF tables. The "IE" notation key is used when, owing to the methods used to estimate emissions, individual pools cannot be separated. "NO" and "NA" are used for organic soils in countries that do not report organic soils areas. Finland used the YASSO07 soil carbon model,[17] which aggregates estimates for litter/dead wood and solid organic matter. The use of "NO" for litter under deforestation for Finland was noted during QA/QC and Finland replied it was an error ("NO" should be "IE"). The ERT welcomed the

[17] Available at <http://www.syke.fi/en-US/Research__Development/Research_and_development_projects/Projects/Soil_carbon_model_Yasso/Description>

explanation provided on the use of notation keys and recommends that the European Union work with member States so that they use the appropriate notation keys and also recommends that the European Union provide a synthesis in its NIR of the explanations and justifications provided by member States.

126. Information reported on deforestation is complete, with some sources reported using notation keys. For biomass burning, as reported in CRF table 5(KP-II)5, "NE, NO" was reported for Finland for wildfires and "IE, NO" for control burning under deforestation and "NE" was reported for Spain for controlled burning and wildfires in areas under deforestation. No explanation for the use of these notation keys has been provided in the NIR of the European Union. In response to a question raised by the ERT during the review, the European Union stated that, in the case of Finland, the notation key "NE" is used for wildfires under deforested areas and that this issue was raised with Finland during the European Union's QA/QC process. Finland had replied that, according to statistical information, the potential share of wildfires on land converted from forest land is close to zero. Regarding the notation key "IE" for areas under deforestation for Finland, the European Union explained that controlled burning in land uses other than forest land are uncommon in Finland; however, possible GHG emissions from controlled burning in cropland and grazing land are reported in the agriculture sector. The ERT welcomes the explanation provided on the use of notation keys and recommends that the Party improve further the consistent use of notation keys and the transparency of their use.

127. Regarding the use of "NE" for reporting controlled burning and wildfires under deforestation for Spain, the European Union reported in its NIR that deforested areas include forest land in transition (or converted) to cropland, grassland (herbaceous), wetlands and other lands. Under controlled burning, emissions from cropland areas are included in the agriculture sector; in the case of wetlands and other lands this controlled burning does not occur; and in the case of forest converted to grassland (herbaceous), controlled burning only takes place in grassland already converted from forest land (not in grassland in transition) and therefore CO_2 emissions are considered in balance and therefore only CH_4 and N_2O are reported (see para. 132 below).

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO_2

128. Methodologies, AD and EFs used are appropriate and in line with IPCC good practice guidance for LULUCF. Methods used for the estimation of emissions/removals related to forest management activities are consistent with those used for reporting the corresponding land-use subcategories in the LULUCF sector and are described in the 2014 NIR in a complete and transparent manner. National data, mainly from national forest inventory (NFI) information sources from member States, and higher-tier methodologies are used, particularly for key categories and QA/QC procedures were implemented at the country and European Union level to ensure the appropriateness of methods and data used.

129. The previous review report recommended that the European Union work with France and Greece to ensure that emissions from the activity forest management are not underestimated, given the fact that part of the forest land considered by these two member States is reported as unmanaged. In response to a question raised by the ERT during the review, the European Union explained that this problem has been tracked this year as part of the requirements under the MMR and that, for Greece, carbon stock changes are only reported for those forests identified by forest management plans which were started in 1990 or later (Greece, NIR, page 394). In addition, the European Union informed the ERT that a project launched between DG CLIMA and JRC entitled "Analysis and proposals for enhancing monitoring, reporting and verification of LULUCF in EU", selected Greece as

one of the member States to be supported to increase completeness and prepare consistent reporting under the Convention and the Kyoto Protocol.

130. For France, concerning unmanaged forests, it is stated in page 271 of the French NIR for 2014 that areas reported under forest management are those that have been forest land since 1990, and which are subject to forest management. This includes almost all forests with the exception of a few inoperable woodlands (inaccessibility, steep protective role exclusive, recreational, aesthetic, cultural or military areas). France stated that that these latter areas are unmanaged forests and are not subject to any anthropogenic emissions/removals. This issue was tracked during the European Union QA/QC procedures to ensure that there is no underestimation of emissions. Following a question raised by the ERT during the review, France explained that afforested areas which have been excluded from its reporting under Article 3, paragraph 3, of the Kyoto Protocol because they did not result from direct human-induced measures have not been included in its reporting under Article 3 paragraph 4, of the Kyoto Protocol, although it should have been the case because some of this forest is managed. As a consequence, France considers that removals reported under forest management may have been slightly underestimated. The ERT reiterates the recommendation made in the previous review report that the European Union work with its member States to ensure that future reporting on forest management is complete and accurate.

Cropland management – CO_2

131. The previous review report recommended that the European Union work with Spain to determine whether there are CO_2 emissions from lime application and, if so, under which KP-LULUCF activity (or activities) or sector these should be allocated. In response to a question raised by the ERT during the review the European Union explained that this issue was tracked this year during the QA/QC carried out in the context of the requirements under the MMR and, for first time, Spain reports emissions from lime application in CRF table 5(IV) and KP-LULUCF CRF table 5(KP-II) under cropland remaining cropland and cropland management activities, respectively. In addition, specific information concerning this issue has been provided in section 11.2.3.2.4 of the European Union's NIR. The ERT welcomes the efforts by the European Union to clarify the reporting of lime application for Spain and commends the European Union for the improvements made in the completeness of its reporting.

132. The ERT noted that for Spain the notation key "IE" has been used for reporting emissions of all gases from controlled burning and the notation key "NE" has been used for reporting emissions of all gases from wildfires, under cropland management. No information could be found in the NIR to clarify the reporting of these emissions using notation keys. In response to a question raised by the ERT during the review, the European Union explained that, under cropland management for Spain "IE" is used to report emissions from controlled burning because these emissions are included in the agriculture sector. The notation key "NE" is used for wildfires under cropland management because CO_2 emissions under annual crops are assumed to be in balance and wildfires in woody crops are negligible. The ERT welcomes the clarifications and encourages the European Union to ensure transparency of reporting using notation keys.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

133. The European Union has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The

ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[18] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

134. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

135. The European Union has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

136. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

	2014 annual submission[a]		
	As reported	*Revised estimates*	*Final accounting quantity*[b]
Afforestation and reforestation			
Non-harvested land	–237 173 295	–231 202 133	–231 202 133
Harvested land	–210 745		–210 745
Deforestation	157 079 813	157 704 139	157 704 139
Forest management	0		0
Article 3.3 offset[c]	0		0
Forest management cap[d]	0		0
Cropland management	–25 960 753	–25 888 851	–25 888 851
Grazing land management	–4 928 881	–5 864 373	–5 864 373
Revegetation	NA		NA

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[18] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The "final accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

[c] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[d] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

137. The European Union states in its NIR (chapter 2.7, page. 1015, chapter 2.7) that each member State will account for net emissions and removals for each activity under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by issuing removal units (RMUs) or by cancelling assigned amount units, emission reduction units, certified emission reduction units and/or RMUs based on the corresponding reported emissions and removals from these activities in the national registry of each member State. The European Union will neither issue nor cancel units based on the reported emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The European Union also clarified in the NIR (chapter 11, page 964) that the values reported in the CRF accounting table, representing the sum of member States' cumulative accounting quantities (excluding forest management) for these activities, were for information purposes only.

Calculation of the commitment period reserve

138. The European Union has reported its commitment period reserve in its 2014 annual submission. The European Union reported that its commitment period reserve has not changed since the initial report review (17,659,243,358 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

139. Party reported that there are changes to its national system since the previous annual submission. The Party described the following changes in its NIR: accession of Croatia to the European Union from 1 July 2013; adoption of the MMR, replacing the monitoring mechanism decision (see para. 26 above); the Commission Delegated Regulation (see para. 27 above); and a new agreement between the EEA and its ETC/ACM (see para. 24 above). The Party explained in the NIR that these changes did not affect the core structure and functioning of the national system. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

140. The European Union reported that there are changes in its national registry since the previous annual submission. The Party described the changes in its NIR: the changes are related to the description of the database structure and the capacity of the national registry in order to address recommendations made in the previous review report. As indicated in chapter 14 of the NIR, these changes were limited and only affected EU ETS functionality.

141. The ERT noted that there were recommendations in the SIAR that had not been addressed regarding the inclusion in the NIR of the website address (URL) with a link to the public information required under the annex to decision 13/CMP.1, paragraphs 45–48. The ERT further noted that in response to the findings in the SIAR the URL had been provided but no date stamp was found on the reports, leaving the assessor unable to verify whether or not the data were updated at least monthly. The ERT recommends that the European Union include in its NIR all information in response to the findings in the SIAR in accordance with decision 15/CMP.1, annex, chapter I.G.

142. The ERT concluded that, taking into account the confirmed changes in the national registry, including additional information provided to the ERT during the review, the European Union's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) decisions.

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

143. Consistent with paragraph 23 of the annex to decision 15/CMP.1, the European Union provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

144. The European Union reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. The Party described in its NIR the changes related to the transport sector, biofuels and international aviation, as well as the setting of more ambitious emission reduction targets and the share of renewable energy for 2030 at the European Union level. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete.

145. However, the ERT noted that information on changes in the Party's reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14 from previous submissions is reported together with updated data in the current submission. This leads to a decrease in the transparency of reporting, given the extensive information provided on this matter. During the review, in response to a question raised by the ERT, the Party provided the ERT with the revised text of chapter 15 of its NIR with updated data highlighted. The ERT encourages the Party to either report old and new data in separate subsections or report only changes in the policies regarding the minimization of adverse impacts in the NIR in order to ensure transparency. Among the most prominent policies that are established in the European Union are: a wide-ranging impact assessment system accompanying all new policy initiatives; the adoption of a directive on the promotion of biomass and biofuels use; the inclusion of aviation in the EU ETS; the approval of a road map for moving to a low-carbon economy in 2050; and the publication of a Communication on a policy framework for climate and energy in the period from 2020 to 2030.

146. In January 2014, the EC published a Communication on a policy framework for climate and energy in the period from 2020 to 2030. This Communication develops a framework for the future European Union climate and energy policy and proposes to set an emission reduction target for European Union emissions of 40 per cent by 2030 compared with 1990 and a share of renewable energy of at least 27 per cent by 2030. The priority expressed in the Communication is the focus of policy development towards improving the efficiency of the transport system, and the further development and deployment of electric

vehicles, second and third generation biofuels and other alternative, sustainable fuels as part of a more holistic and integrated approach.

147. In October 2013, the International Civil Aviation Organization (ICAO) Assembly agreed to develop by 2016 a global market-based mechanism (MBM) addressing international aviation emissions and apply it by 2020. Until then countries or groups of countries, such as the European Union, can implement interim measures. In March 2014, the Council of the European Union and the European Parliament reached an informal agreement on the changes to aviation in the EU ETS. The regulation in preparation will limit the aviation coverage of the EU ETS to emissions from flights within the European Economic Area for the period from 2013 to 2016.

III. Conclusions and recommendations

A. Conclusions

148. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of the European Union, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of the European Union

Issue	*Expert review team assessment*	*Paragraph cross references for identified problems*
The ERT concludes that the inventory submission of the European Union is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete	Table 3
LULUCF[a]	Not complete	Table 3
KP-LULUCF	Complete	Tables 3, 6
The ERT concludes that the inventory submission of the European Union has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Generally	78
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
The European Union has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	

Issue	*Expert review team assessment*	*Paragraph cross references for identified problems*
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	141
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	145

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF.

B. Recommendations

149. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified. The ERT notes that this review report of the 2014 annual submission will be published after 15 April 2015. Where recommendations cannot be fully implemented in time for the 2015 annual submission, the ERT recommends that the Party provide an update on progress of implementation in the NIR.

Table 9
Recommendations identified by the expert review team

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
Cross-cutting	Consistency and completeness	Work with member States in order to report consistent notation keys that transparently describe the completeness of the overall inventory	No	14
	Transparency	Improve the transparency of the reporting by ensuring that explanatory information regarding the emission and IEF trends for the cases identified is included in the NIR	No	16
		Continue ensuring consistency between EU ETS and inventory data across member States	No	20
		Include in the NIR a mapping table indicating the mapping between the EU ETS and the IPCC categories, with supporting comments	No	20

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
	Uncertainty analysis	Report only tier 1 uncertainty in the next NIR	No	32, table 4
		Transparently describe any changes in overall uncertainty estimates in the NIR on an annual basis	No	33
		Include in the next NIR more details regarding archiving from the document "Quality management manual" with supporting references	No	35
Energy	Overview	Enhance the transparency and consistency in the reporting of recalculations, by working with the member States to achieve the enhancement of the European Union QA/QC system	No	39
		Present methodological summaries that are consistent among member States and categories, at least for key categories, in order to improve the transparency of the NIR	No	40
	International bunker fuels	Use most recent results of the collaboration with Eurocontrol to improve the accuracy of emission estimates for the European Union and for the member States, ensuring the consistency in the time series in accordance with the IPCC good practice guidance and report on the results of the collaboration in the NIR	No	44
	Feedstocks and non-energy use of fuels	Provide transparent information on recalculations for CRF table 1A(d) in the NIR	No	45
		Explain clearly the reporting of the use of weighted averages of carbon stored reported in CRF table 1.A(d) in the annual submission and make efforts to enhance the consistency of reporting among member States	No	46
		Continue with efforts to ensure consistency of the reporting among member States, in particular with regards to the allocation of emissions between the energy and industrial processes sectors	No	47
	Stationary combustion: all fuels – CO_2	Continue to improve the QA/QC to ensure consistency between the CRF tables and the NIR	No	48
	Civil aviation: liquid fuels – CO_2	Promote the use of the results of the collaboration between the European Union and Eurocontrol to improve the accuracy of the inventory and report on the results of the collaboration in the NIR	No	49

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
Industrial processes and solvent and other product use	Overview	Implement recommendations which are still unresolved as indicated in the relevant sections of this report	Yes	55
		Improve the summary descriptions of methodologies in the NIR for all member States	No	57
	Cement production – CO_2	Include in the NIR the information provided by Germany to the European Union, clarifying that it had performed period checks using plant specific data and that these indicate that the used EF do not need revision	No	59
		Improve information on the methodology used by the United Kingdom in the NIR to enhance transparency and to enable the ERT to make a thorough review of the AD and EF used in the estimate of emissions from cement production	No	60
		Continue working with Spain in order that Spain implement a qualitative assessment of the range of IEFs and their trend, on the basis of the composition of the raw material used in the country	Yes	61
		Work with Latvia to ensure that it uses a tier 2 rather than a tier 1 approach when estimating cement production emission	No	62
		Include the relevant information from the Polish NIR in the European Union's NIR	No	63
	Lime production – CO_2	Provide more information for Italy about the methods used to estimate emissions from lime production for the entire time series, in particular there should be transparent documentation on whether the method is based on the amount of calcium carbonate from raw material or on the amount of calcium and magnesium oxides in the lime produced for each of the periods	Yes	64
		Provide more information for Italy about the underlying drivers for the changes in IEF since 2005 and on how time-series consistency has been maintained	No	64
	Limestone and dolomite use – CO_2	Include information on the reporting of the approaches for the collection of AD in the NIR for Croatia in order to enhance the transparency of the description of methods	No	65

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Work with Croatia to ensure the consistency of the time series	No	65
	Ammonia production – CO_2	Provide in the NIR adequate and transparent methodology overviews for France and Germany to enable the ERT to make a thorough review of the AD and EFs used in the ammonia production emission estimations of these countries	No	66
		Make efforts to ensure that Greece complete the on-going work to obtain more accurate data on the amount of liquid fuel used as feedstock and the updated AD in the emission estimates	Yes	67
	Nitric acid production – N_2O	Provide in the NIR adequate methodology overviews for France, Germany and Greece to enable the ERT make a thorough review of the AD and EFs used in the nitric acid production emission estimations of those member States	No	68
		Improve the transparency of information provided in the NIR for Spain by finding alternative ways of reporting the necessary information without violating the existing rules on confidentiality	Yes	69
	Other (chemical industry) – CO_2	Work with Finland in order to develop a way of reporting indirect CO_2 emissions which will allow CO_2 emissions from biomass to be distinguished from the fossil fuel component and use this in the CRF tables of its annual inventory submission, and provide an appropriate methodology description in the NIR	Yes	70
		Include in the NIR the methodological description of France for this subcategory in the next annual submission	Yes	71
		Work with Germany to report follow-up information on the appropriate allocation of catalyst coke burn off emissions	No	72
	Aluminium production – CO_2, PFCs	Provide in the NIR adequate methodology overviews to enable the ERT to make a thorough review of the AD and EF used in the aluminium production emission estimations provided by Greece, the Netherlands and Sweden	No	73
	Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6	Endeavour to provide in the NIR summary overviews of methodology descriptions for key categories based on the relevant methodological descriptions reported in the NIRs of its member States	No	74

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Make the necessary corrections in the use of notation keys to ensure the transparency of its reporting	Yes	75
		Improve the transparency of the reporting regarding Luxembourg by providing background tables of consumption of halocarbons and SF_6 by providing all the relevant background information used for the calculations for F-gases in both the NIR and CRF tables	Yes	76
		Include an explanation in the annual submission on the reporting of the emissions in the processes related to the use of HFCs and SF_6 in the Netherlands and enhance the QC procedures to ensure that the information in the European Union's NIR accurately reflects the information in the NIR of member States	No	77
		Work with Greece in order to implement appropriate country-specific methodologies to estimate HFCs and/or PFCs emissions in accordance with the IPCC good practice guidance	No	78
Agriculture	Transparency	Report in the NIR on the outcome of the workshop to improve agricultural GHG inventories, including any planned improvements arising from the workshop	No	84
		Correct the detected errors in CRF table 4B(a) on the allocation of manure for swine and update the information on the EU-15 member States and improve the implementation of QC procedures	No	85
		Provide summary information on the roles and functions of references to European-based institutions and programmes in the annual submission	No	86
	Manure management – N_2O	Elaborate an explanation for the increase in nitrogen excretion rate for swine for Sweden in the NIR	No	90
	Agricultural soils – N_2O	Report the fraction so that $Frac_{GRAZ}$ is consistent between CRF table 4.D and CRF table 4.B(b) for the total for the European Union and improve the QA/QC system to ensure that the AD reported in the CRF tables are internally consistent	No	91
	N_2O	Work with member States to ensure more consistent reporting of the area of organic soils between the agriculture and LULUCF sectors	No	92

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
LULUCF	Completeness	Continue its efforts to improve the completeness of the reporting of emissions from all mandatory source categories in the LULUCF sector	No	Table 3, para. 13
		Work with member States with a view to reporting mandatory pools and categories which are currently not estimated in order to increase the completeness of the inventory	Yes	95, table 3
	Forest land remaining forest land – CO_2	Improve the transparency in the NIR, in particular, to discuss in detail the main drivers leading to inter-annual variations, in particular for the most recent years	Yes	96
	Land converted to forest land – CO_2	Improve the transparency of reporting, including the provision of updated information from member States and internal QA/QC checks in order to ensure that the aggregated reporting is complete and consistent among member States	Yes	97
	Cropland remaining cropland – CO_2	Provide justifications for the overall trends on the area of cropland remaining cropland, the pools dead organic matter and soil organic carbon and living biomass	No	98
	Land converted to cropland – CO_2	Provide transparent explanations in the annual submission, indicating the key drivers for the changes in the trend and recalculations	No	99
		Work with the member States to improve the completeness of their reporting and use higher-tier methods in order to enhance accuracy	Yes	100
	Grassland remaining grassland – CO_2	Continue progress efforts with Italy on the reporting of carbon stock change in living biomass and document the reasons for inter-annual variations in the NIR	No	102
		Provide general information about the key drivers that explain the variations in each member State when significantly affecting the European Union aggregate estimates	No	103
	Land converted to other land – CO_2	Include transparent explanations in the NIR for the inter-annual variations and also work with the member States to improve the consistency of their reporting	Yes	104
	Biomass burning – CO_2, CH_4 and N_2O	Include the reasons for the use of the notation key “NE” when applicable and make efforts to increase the completeness of reporting	No	105

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
Waste	Transparency	Improve the transparency of reporting for the waste sector	No	108
	QA/QC	Enhance the QA/QC procedures in order to ensure consistency between the NIR and the CRF tables	No	110
	Solid waste disposal on land – CH_4	Provide relevant AD in the NIR	No	111
		Update the description of the methodologies used to estimate CH_4 emissions in a transparent manner in the NIR	No	112
	Wastewater handling – CH_4 and N_2O	Include information on trends in emissions from industrial wastewater from those member States that significantly affect the trend of emissions of this category at European Union's level	No	115
		Combine NIR table 8.12 and table 8.13	No	117
Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Transparency	Work with and support member States to improve consistency in the use of notation keys and further improve the transparency of its future submissions	No	121
	Afforestation and reforestation – CO_2	Improve QA/QC procedures to ensure that identified reporting errors do not occur	No	123
	Deforestation – CO_2	Work with member States so that they use the appropriate notation keys and provide a synthesis in the NIR of the explanations and justifications provided by member States	No	125
		Improve further the consistent use of notation keys and the transparency of their use	No	126
	Forest management – CO_2	Work with the member States to ensure future reporting on forest management is complete and accurate	Yes	130
National registry		Include in the NIR all information in response to the findings in the SIAR in accordance with decision 15/CMP.1, annex, chapter I.G	No	141
General		Provide an update on the progress of implementation of all recommendations in the NIR	No	149

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, F-gas = fluorinated gas, $Frac_{GRAZ}$ = fraction of livestock nitrogen excreted and

deposited onto soil during grazing¸ GHG = greenhouse gas, IEF = implied emission factors, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, LULUCF = land use, land-use change and forestry, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control, SIAR = standard independent assessment report.

IV. Questions of implementation

150. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	17 659 243 358			17 659 243 358
Annex A emissions for 2012				
CO_2	2 987 926 016	2 988 205 015		2 988 205 015
CH_4	293 039 142	296 415 409		296 415 409
N_2O	258 141 749	257 937 595		257 937 595
HFCs	71 540 367			71 540 367
PFCs	2 781 375			2 781 375
SF_6	6 042 221			6 042 221
Total Annex A sources[c]	**3 619 470 871**	**3 622 921 983**		**3 622 921 983**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	–48 618 983	–47 322 435		–47 322 435
3.3 Afforestation and reforestation on harvested land for 2012	181 678	196 938		196 938
3.3 Deforestation for 2012	30 478 586	30 556 884		30 556 884
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012	–259 177 105	–258 057 879		–258 057 879
3.4 Cropland management for 2012	1 716 241	1 736 204		1 736 204
3.4 Cropland management for the base year	7 494 907	7 495 271		7 495 271
3.4 Grazing land management for 2012	491 390	596 730		596 730
3.4 Grazing land management for the base year	1 351 195	1 627 234		1 627 234
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values of the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	3 011 200 787	3 011 292 646		3 011 292 646
CH_4	295 747 795	299 764 549		299 764 549
N_2O	263 492 669	263 376 476		263 376 476
HFCs	70 304 100			70 304 100
PFCs	3 227 695			3 227 695
SF_6	5 994 424			5 994 424
Total Annex A sources[c]	**3 649 967 470**	**3 653 959 891**		**3 653 959 891**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–48 087 898	–46 928 693		–46 928 693
3.3 Afforestation and reforestation on harvested land for 2011	320 497	332 702		332 702
3.3 Deforestation for 2011	30 438 072	30 542 309		30 542 309
Activities under Article 3, paragraph 4, for 2011[d]				
3.4 Forest management for 2011	–256 422 982	–255 588 040		–255 588 040
3.4 Cropland management for 2011	2 111 407	2 128 761		2 128 761
3.4 Cropland management for the base year	7 494 907	7 495 271		7 495 271
3.4 Grazing land management for 2011	245 837	342 914		342 914
3.4 Grazing land management for the base year	1 351 195	1 627 234		1 627 234
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	3 156 418 150	3 156 518 640		3 156 518 640
CH_4	302 086 023	306 737 391		306 737 391
N_2O	266 561 028	266 487 969		266 487 969
HFCs	68 963 016			68 963 016
PFCs	2 986 924			2 986 924
SF_6	6 184 768			6 184 768
Total Annex A sources[c]	**3 803 199 909**	**3 807 878 709**		**3 807 878 709**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–48 634 152	–47 380 855		–47 380 855
3.3 Afforestation and reforestation on harvested land for 2010	432 888	442 038		442 038
3.3 Deforestation for 2010	29 060 014	29 190 190		29 190 190
Activities under Article 3, paragraph 4, for 2010[d]				
3.4 Forest management for 2010	–255 386 632	–254 385 918		–254 385 918
3.4 Cropland management for 2010	2 587 956	2 602 700		2 602 700
3.4 Cropland management for the base year	7 494 907	7 495 271		7 495 271
3.4 Grazing land management for 2010	294 958	383 896		383 896
3.4 Grazing land management for the base year	1 351 195	1 627 234		1 627 234
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	3 063 732 873	3 063 832 850		3 063 832 850
CH_4	308 174 859	312 078 416		312 078 416
N_2O	275 422 421	275 367 222		275 367 222
HFCs	65 761 810			65 761 810
PFCs	2 531 387			2 531 387
SF_6	6 079 007			6 079 007
Total Annex A sources[c]	**3 721 702 358**	**3 725 650 693**		**3 725 650 693**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–47 218 606	–46 068 045		–46 068 045
3.3 Afforestation and reforestation on harvested land for 2009	568 717	574 815		574 815
3.3 Deforestation for 2009	31 960 143	32 116 259		32 116 259
Activities under Article 3, paragraph 4, for 2009[d]				
3.4 Forest management for 2009	–272 902 268	–272 262 094		–272 262 094
3.4 Cropland management for 2009	2 356 068	2 368 203		2 368 203
3.4 Cropland management for the base year	7 494 907	7 495 271		7 495 271
3.4 Grazing land management for 2009	367 828	448 604		448 604
3.4 Grazing land management for the base year	1 351 195	1 627 234		1 627 234
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	3 333 282 304	3 333 399 152		3 333 399 152
CH_4	314 319 676	319 262 296		319 262 296
N_2O	286 151 956	286 075 876		286 075 876
HFCs	62 721 777			62 721 777
PFCs	3 959 226			3 959 226
SF_6	6 433 286	6 433 491		6 433 491
Total Annex A sources[c]	**4 006 868 225**	**4 011 851 819**		**4 011 851 819**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–44 613 656	–43 502 105		–43 502 105
3.3 Afforestation and reforestation on harvested land for 2008	594 367	597 416		597 416
3.3 Deforestation for 2008	35 142 998	35 298 498		35 298 498
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008	–274 588 690	–273 853 918		–273 853 918
3.4 Cropland management for 2008	2 742 110	2 751 635		2 751 635
3.4 Cropland management for the base year	7 494 907	7 495 271		7 495 271
3.4 Grazing land management for 2008	427 079	499 651		499 651
3.4 Grazing land management for the base year	1 351 195	1 627 234		1 627 234
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team (ERT) has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for EU 2014. Available at <http://unfccc.int/resource/docs/2014/asr/eu.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/EU. Report of the individual review of the annual submission of EU submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/eu.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Velina Pendolovska (European Commission, Directorate-General for Climate Action), including additional material on the methodology and assumptions used. The following document[1] was also provided by the European Union:

European Union Greenhouse Gas Inventory, European Environment Agency, European Topic Centre on Air Pollution and Climate Change Mitigation. *Part I – Quality management manual*.

[1] Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
C	carbon
CaO	calcium oxide
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
EPRTR	European Pollutant Release and Transfer Register
ERT	expert review team
EU	European Union
EU ETS	European Union Emissions Trading System
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
$Frac_{GRAZ}$	fraction of livestock nitrogen excreted and deposited onto soil during grazing
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HCFC	hydrochlorofluorocarbon
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kha	kilohectare
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
m^3	cubic metre
Mg	megagram (1 Mg = 1 tonne)
MgO	magnesium oxide
N_2O	nitrous oxide
NA	not applicable
NACE code	Code according to Commission Regulation 29/2002/EC of 19 December 2001 amending Council Regulation (EEC) No 3037/90 on the statistical classification of economic activities in the European Community
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report

Tg	teragram (1 Tg = 1 million tonnes)
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change