Advance Version

COMPLIANCE COMMITTEE **CC/ERT/ARR/2013/20**
14 June 2013

Report of the individual review of the annual submission of the European Union submitted in 2012

Note by the secretariat

The report of the individual review of the annual submission of the European Union submitted in 2012 was published on 14 June 2013. 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 decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2012/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.

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Report of the individual review of the annual submission of the European Union submitted in 2012*

* In the symbol for this document, 2012 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 centralized review of the 2012 annual submission of the European Union, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 24 to 29 September 2012 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Takeshi Enoki (Japan) and Mr. Dennis Rudov (Belarus); energy – Mr. Christo Christov (Bulgaria), Mr. Sangay Dorji (Bhutan), Mr. Constantin Harjeu (Romania) and Mr. Lawrence Kotoe (Ghana); industrial processes – Ms. Marisol Bacong (Philippines) and Ms. Yongsook Lyu (Republic of Korea); agriculture – Ms. Agita Gancone (Latvia) and Mr. B. Jacques Kouazounde (Benin); land use, land-use change and forestry (LULUCF) – Ms. Andrea Brandon (New Zealand) and Ms. Naoko Tsukada (Japan); and waste – Mr. Pavel Gavrilita (Republic of Moldova) and Mr. Kai Skoglund (Finland). Ms. Bacong and Mr. Enoki were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova and Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1), a draft version of this report was communicated to the European Union, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

3. In 2010, the main greenhouse gas (GHG) in the European Union was carbon dioxide (CO_2), accounting for 82.9 per cent of total GHG emissions[1] expressed in carbon dioxide equivalent (CO_2 eq), followed by methane (CH_4) (7.9 per cent) and nitrous oxide (N_2O) (7.0 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 European Union. The energy sector accounted for 80.1 per cent of total GHG emissions, followed by the agriculture sector (9.8 per cent), the industrial processes sector (7.0 per cent), the waste sector (2.8 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 3,797,613.01 Gg CO_2 eq and decreased by 10.9 per cent between the base year[2] and 2010.

4. Tables 1 and 2 show GHG emissions from 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, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector, and also do not include the emissions from deforestation that were included in the European Union's initial report under the Kyoto Protocol for the base year and subsequently used for the calculation of the assigned amount.

5. Tables 3–5 provide information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

[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 countries concerned, and for HFCs, PFCs and SF_6 is 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland and 1990 for Austria, France and Italy. The base year emissions include emissions from Annex A sources 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 2010

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year[a]*	*1990*	*1995*	*2000*	*2005*	*2008*	*2009*	*2010*	*Base year–2010 (%)*
Annex A sources		CO_2	3 362 196.99	3 362 196.99	3 292 631.06	3 367 644.96	3 480 433.42	3 327 566.25	3 062 316.56	3 147 470.71	–6.4
		CH_4	434 934.26	434 934.26	409 299.43	369 787.55	322 678.61	309 244.19	304 365.25	301 893.23	–30.6
		N_2O	396 256.73	396 256.73	379 222.63	337 974.60	307 507.47	285 670.80	275 121.42	265 840.35	–32.9
		HFCs	41 270.00	27 879.14	41 429.59	46 112.10	56 775.95	66 201.38	68 755.08	73 118.57	77.2
		PFCs	15 672.67	17 329.44	11 712.70	8 105.24	5 474.30	4 176.02	2 741.61	3 220.60	–79.5
		SF_6	13 857.46	10 748.00	15 006.93	9 614.55	7 467.62	6 195.13	5 854.12	6 069.54	–56.2
KP-LULUCF	Article 3.3[b]	CO_2						–10 584.64	–14 615.04	–17 715.70	
		CH_4						229.45	222.06	202.53	
		N_2O						128.40	150.34	165.25	
	Article 3.4[c]	CO_2	–1 674.17					–236 286.84	–237 856.28	–213 725.89	NA
		CH_4	617.17					1 020.48	1 183.09	1 309.52	NA
		N_2O	197.24					306.37	326.33	368.99	NA

Abbreviations: 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] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O for all countries concerned, and for HFCs, PFCs and SF_6 is 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland and 1990 for Austria, France and Italy. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 2

Greenhouse gas emissions by sector and activity, base year[a] to 2010

		Gg CO_2 eq								*Change*
	Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2005*	*2008*	*2009*	*2010*	*Base year–2010 (%)*
Annex A	Energy	3 278 147.15	3 278 147.15	3 205 172.08	3 257 580.36	3 347 896.53	3 198 355.02	2 968 907.40	3 041 584.75	–7.2
	Industrial processes	368 049.13	353 205.58	351 632.06	310 614.73	312 755.47	295 506.79	256 738.11	264 544.44	–28.1
	Solvent and other product use	13 482.42	13 482.42	12 346.11	11 787.43	10 483.47	9 728.49	9 195.18	9 568.02	–29.0
	Agriculture	433 695.82	433 695.82	414 055.45	414 377.60	389 025.49	383 248.22	374 666.13	373 808.43	–13.8
	Waste	170 813.59	170 813.59	166 096.65	144 878.89	120 176.41	112 215.26	109 647.22	108 107.37	–36.7
	LULUCF	NA	–166 467.83	–185 408.25	–197 951.40	–172 422.96	–185 928.59	–198 030.94	–177 986.03	NA
	Total (with LULUCF)	**NA**	**4 082 876.72**	**3 963 894.09**	**3 941 287.61**	**4 007 914.41**	**3 813 125.19**	**3 521 123.09**	**3 619 626.97**	**NA**
	Total (without LULUCF)	**4 264 188.11**	**4 249 344.56**	**4 149 302.34**	**4 139 239.00**	**4 180 337.37**	**3 999 053.77**	**3 719 154.03**	**3 797 613.01**	**–10.9**
	Other[b]	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA
KP-LULUCF	Article 3.3[c] Afforestation and reforestation						–37 697.40	–40 054.00	–40 439.61	
	Article 3.3[c] Deforestation						27 470.61	25 811.36	23 091.69	
	Total (3.3)						**–10 226.79**	**–14 242.64**	**–17 347.92**	
	Article 3.4[d] Forest management						–234 968.27	–235 899.00	–211 439.92	
	Article 3.4[d] Cropland management	4 488.96					215.52	–205.67	116.76	–97.4
	Article 3.4[d] Grazing land management	246.75					–207.23	–242.19	–724.21	–393.5
	Article 3.4[d] Revegetation	NA					NA	NA	NA	NA
	Total (3.4)	**NA**					**–234 959.98**	**–236 346.87**	**–212 047.37**	**NA**

Abbreviations: 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, NA = not applicable, NO = not occurring.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O for all countries concerned, and for HFCs, PFCs and SF_6 is 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland and 1990 for Austria, France and Italy. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[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 the European Union's totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 3
Information to be included in the compilation and accounting database in t CO_2 eq for the year 2010, 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 current inventory year				
CO_2	3 147 470 713			3 147 470 713
CH_4	301 893 225			301 893 225
N_2O	265 840 352			265 840 352
HFCs	73 118 574			73 118 574
PFCs	3 220 598			3 220 598
SF_6	6 069 542			6 069 542
Total Annex A sources	3 797 613 005			3 797 613 005
Activities under Article 3, paragraph 3, for current inventory year				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	–41 209 511			–41 209 511
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	769 900			769 900
3.3 Deforestation for current year of commitment period as reported	23 091 692			23 091 692
Activities under Article 3, paragraph 4, for current inventory year[c]				
3.4 Forest management for current year of commitment period	–211 439 923			–211 439 923
3.4 Cropland management for current year of commitment period	116 760			116 760
3.4 Cropland management for base year	4 488 956			4 488 956
3.4 Grazing land management for current year of commitment period	–724 211			–724 211
3.4 Grazing land management for base year	246 746			246 746
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 4
Information to be included in the compilation and accounting database in t CO_2 eq for the year 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	3 062 316 558			3 062 316 558
CH_4	304 365 248			304 365 248
N_2O	275 121 421			275 121 421
HFCs	68 755 077			68 755 077
PFCs	2 741 608			2 741 608
SF_6	5 854 117			5 854 117
Total Annex A sources	3 719 154 029			3 719 154 029
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009 as reported	–40 852 492			–40 852 492
3.3 Afforestation and reforestation on harvested land for 2009 as reported	798 491			798 491
3.3 Deforestation for 2009 as reported	25 811 364			25 811 364
Activities under Article 3, paragraph 4, for 2009[c]				
3.4 Forest management for 2009	–235 899 003			–235 899 003
3.4 Cropland management for 2009	–205 671			–205 671
3.4 Cropland management for base year	4 488 956			4 488 956
3.4 Grazing land management for 2009	–242 194			–242 194
3.4 Grazing land management for base year	246 746			246 746
3.4 Revegetation for 2009				
3.4 Revegetation in base year				

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 5
Information to be included in the compilation and accounting database in t CO_2 eq for the year 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	3 327 566 249			3 327 566 249
CH_4	309 244 190			309 244 190
N_2O	285 670 804			285 670 804
HFCs	66 201 381			66 201 381
PFCs	4 176 018			4 176 018
SF_6	6 195 132			6 195 132
Total Annex A sources	3 999 053 774			3 999 053 774
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008 as reported	–38 766 608			–38 766 608
3.3 Afforestation and reforestation on harvested land for 2008 as reported	1 069 208			1 069 208
3.3 Deforestation for 2008 as reported	27 470 606			27 470 606
Activities under Article 3, paragraph 4, for 2008[c]				
3.4 Forest management for 2008	–234 968 269			–234 968 269
3.4 Cropland management for 2008	215 519			215 519
3.4 Cropland management for base year	4 488 956			4 488 956
3.4 Grazing land management for 2008	–207 234			–207 234
3.4 Grazing land management for base year	246 746			246 746
3.4 Revegetation for 2008				
3.4 Revegetation in base year				

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2012 annual inventory submission was submitted on 13 April 2012 and resubmitted on 25 May 2012; it contains a complete set of common reporting format (CRF) tables for the period 1990–2010 and a national inventory report (NIR) (submitted on 14 April 2012). The European Union also submitted 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 13 April 2012 and resubmitted on 25 May 2012. The annual submission was submitted in accordance with decision 15/CMP.1.

7. The expert review team (ERT) also used the previous year's submission during the review. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[3]

8. During the review, the European Union provided the ERT with additional information. The documents concerned are not part of the annual submission but are in many cases referenced in the NIR. The full list of materials used during the review is provided in annex I to this report.

Completeness of inventory

9. The inventory covers all mandatory[4] source and sink categories for the period 1990–2010. The submission is complete in terms of years and CRF tables provided.

10. The NIR provides a table showing the geographical coverage of the inventories of the 15 member States that comprise the EU-15[5] inventory. The European Union's inventory covers the total area of most of its member States as reported under the Kyoto Protocol, with the following exceptions: Denmark (excludes Faroe Islands) and the United Kingdom of Great Britain and Northern Ireland (excludes the United Kingdom Crown Dependencies

[3] The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), and 6(c) and (k)), under the auspices of the international transaction log (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

[4] Mandatory source and sink categories under the Kyoto Protocol are all source and sink categories for which 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* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* provide methodologies and/or emission factors to estimate GHG emissions.

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

(Jersey, Guernsey and the Isle of Man) and the United Kingdom Overseas Territories (except Gibraltar)). The information in the European Union's annual submission does not allow for easy tracking of the information from the reports of Denmark and the United Kingdom. During the review, the European Union explained that these member States provide separate files that include the emissions of their European Union territory in order to distinguish them from each Party's own geographical coverage under the Kyoto Protocol reporting. The ERT recommends that the European Union provide further clarification of the difference from the national annual submissions of Denmark and the United Kingdom in the NIR of its next annual submission.

11. An action plan was implemented in 2011 to improve the completeness of the European Union's inventory. As the inventory is compiled on the basis of the inventories of the European Union member States, its completeness depends on the completeness of the member States' annual submissions. A software program was created by the European Environment Agency (EEA) so that, upon submission of the relevant inventory files by the member States, a report is generated containing a list of all non-estimated categories per member State, specifying which of these categories have been identified as potential problems and for which ones estimation methods 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) or in the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). The experts in the European Union inventory team then consult and discuss issues with member States' experts, and the completeness of each member State's national annual submission with regard to individual CRF tables is documented in the status report sent to each member State. Each member State can then fill any gaps and resubmit its inventory to the European Union. In cases where, even after the two preceding steps, a member State's GHG inventory as submitted to the European Commission contains the notation key not estimated ("NE") for categories for which IPCC estimation methods exist, and/or if such reporting has been identified as a problem in previous reviews, then the European Union inventory experts, in close cooperation with the member State concerned, prepares emission estimates for the non-estimated categories in accordance with the gap-filling provisions in European Commission decision 2005/166/EC. According to the NIR, no gap-filling procedure was applied for the European Union's 2012 annual submission.

12. In 2012, the completeness checks were extended to include the use of the notation keys not occurring ("NO") and not applicable ("NA"). The results of these checks, as well as the main findings of the sector-specific checks, are documented in the web-based quality assurance/quality control (QA/QC) communication tool. This tool assisted in clarifying potential issues of completeness and underestimation for the 2010 inventory. The ERT commends the European Union for the implemented measures addressing the completeness of the inventory and recommends that the Party continue its efforts to enhance the usage of the notation keys and report on the results of actions undertaken and progress achieved in relation to these issues in future annual submissions. The ERT reiterates the recommendation made in the previous review report that the European Union continue its efforts to encourage all of its member States to improve the completeness of their inventories, particularly for the LULUCF sector and KP-LULUCF activities (see paras. 86 and 111 below).

13. CRF table 9(a) provides a list of categories reported as "NE". However, this table only enumerates the categories and Parties for which "NE" still appears (e.g. for fugitive CH_4 from other leakages, for some fluorinated gas (F-gas) emissions and for some categories/subcategories and carbon pools in the LULUCF sector), without providing an explanation, as actually requested in the CRF table. In addition, the list of categories reported as included elsewhere ("IE") was not filled out in CRF table 9(a). During the

review, the Party provided a detailed CRF table 9(a), including explanations for the use of the notation keys "IE" and "NE" at the member State level. The European Union also informed the ERT that the 2011 annual submission included CRF table 9(a) as an annex to the NIR and that this would be included again in the 2013 annual submission. The ERT agrees that this information would be useful and would improve the completeness and transparency of the European Union's annual submission. However, the ERT noted that the CRF table 9(a) provided by the Party contained more than 42,000 individual rows and therefore encourages the European Union to provide a more concise summary table, including explanations for the use of the notation keys "NE" and "IE" by member States. The summary table could, for example, focus on the use of "NE" and "IE" in relation to the Party's key categories.

2. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Overview

14. The ERT concluded that the national system continued to perform its required functions in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). The European Union has not made any changes to its national system since the previous annual submission.

Inventory planning

15. The NIR described the national system for the preparation of the inventory. The Directorate-General for Climate Action (DG Climate Action) of the European Commission has overall responsibility for the national inventory. Each member State is responsible for the preparation of its own inventory, which is the basic input to the inventory of the European Union. EEA and its European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM) conduct initial checks of member States' annual submissions and prepare the final European Union inventory and NIR. Eurostat compiles the reference approach under the energy sector, while the Joint Research Centre (JRC) is responsible for the improvement of methodologies for the agriculture and LULUCF sectors.

16. The legal basis for the compilation of the Party's inventory is decision 280/2004/EC concerning a mechanism for monitoring European Community GHG emissions and for implementing the Kyoto Protocol. Under that decision, the member States submit their GHG inventories to the European Commission by 15 January of each year. EEA and its ETC/ACM, Eurostat and JRC perform initial checks on the submitted data and the draft European Union GHG inventory and NIR are circulated to the member States for review. If necessary, member States send updates and review the European Union's NIR by 15 March, and EEA and its ETC/ACM then prepare the final European Union GHG inventory and NIR for submission on 15 April. The ERT noted that ETC/ACM was established by a contract between the Institute for Public Health and the Environment in the Netherlands and EEA for the years 2011–2013. The ERT recommends that the Party report in its next annual submission on how it plans to sustain the inventory preparation activities in the years after 2013.

Inventory preparation

Key categories

17. The Party has reported a tier 1 key category analysis, both level and trend assessment, as part of its 2012 annual submission. The key category analysis performed by

the Party and that performed by the secretariat[6] produced different results, owing to the different category disaggregation levels used. The European Union has included the LULUCF sector in its tier 1 key category analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

18. The NIR states that the annex to the NIR includes details related to the key category analysis and the results of the tier 2 key category analysis, but actually the annex only provides the results of the tier 1 key category analysis without LULUCF. The ERT recommends that the European Union improve its QC check of the NIR and provide the necessary information on the tier 1 key category analysis with LULUCF and the tier 2 analysis in its next annual submission. During the previous review, the European Union indicated its intention to include the LULUCF sector in the tier 2 key category analysis to be prepared for the 2012 annual submission; however, this was not carried out. The ERT encourages the Party to proceed with the planned improvement for its next annual submission.

19. In its NIR, the European Union explains that the key category analysis at the EU-15 level is carried out to prioritize the categories that will be explained in more detail in the NIR. Specifically, the overviews of member States' methodologies, emission factors (EFs), quality estimates and emission trends are provided for key categories, and a shorter description for non-key categories is included. In addition, the key categories receive special attention with regard to QA/QC at the European Union level.

20. The key categories for KP-LULUCF activities for member States are provided in the NIR and in table NIR-3, but are not calculated at the European Union level. The ERT noted that not all member States provided data on KP-LULUCF key categories. The ERT recommends that the Party complete the information and include the results of the analysis at the European Union level in its next annual submission.

Uncertainties

21. The Party carried out an uncertainty analysis on the basis of the tier 1 uncertainty estimates of the member States. The NIR states that most member States provided uncertainty information for nearly every category; however, two countries submitted data for their key categories only, resulting in an incomplete analysis of uncertainty. The cumulative uncertainty of the total GHG emissions according to the level assessment for 2010 is 9.0 per cent excluding LULUCF and 9.4 per cent including LULUCF, higher than the uncertainties reported in the previous inventory (7.0 and 7.3 per cent, respectively). The change seems to be due to an increase in uncertainty in relation to the agriculture sector (from 67.2 to 90.1 per cent). The trend uncertainty is 1.0 per cent excluding LULUCF and 1.4 per cent including LULUCF. The ERT commends the European Union for the inclusion of the LULUCF sector in the trend uncertainty analysis. The ERT recommends that the Party make efforts to collect all data for all categories and conduct a full uncertainty analysis for its next annual submission. The ERT also recommends that the European Union provide a short discussion of the cause of the increase in uncertainty in its next annual submission.

[6] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

22. The European Union conducted a tier 2 (Monte Carlo simulation) uncertainty analysis for each sector (including the LULUCF sector) for the first time for its 2012 annual submission. The analysis includes all uncertainty data reported by the member States, consisting of nearly 1,500 individual rows of data at category and gas level. The results of the analysis are similar to those of the tier 1 uncertainty analysis, with the lowest level uncertainty estimates for fuel combustion activities (1 per cent) and the highest estimates for agriculture (of 42.7 per cent). The ERT commends the European Union for carrying out the tier 2 uncertainty analysis.

23. In response to recommendations in previous review reports that the Party focus the description of the uncertainty analyses on the overall analyses at the European Union level rather than on those performed by the member States, the European Union has included in the NIR additional explanation of the methods used. The ERT commends the Party for this improvement. It recommends that the European Union continue to improve the description of the overall uncertainty analyses that it performs and encourages the Party to report more details on its tier 2 uncertainty analysis in future annual submissions.

24. There was no uncertainty analysis for the KP-LULUCF activities. The ERT encourages the Party to develop such an analysis for the next annual submission.

Recalculations and time-series consistency

25. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. They resulted in a decrease in the estimated total GHG emissions for 1990 (0.4 per cent) and a decrease for 2009 (0.1 per cent). Information on recalculations by each member State at the category level is provided in the NIR and an overview of recalculations is included in CRF table 8(b). The major recalculations at the European Union level and the member State(s) contributing to them are provided at a summary level in the NIR for all sectors except the LULUCF sector. The ERT commends the European Union for this transparent reporting and recommends that the Party expand the explanations of recalculations for the LULUCF sector. The recalculations reported by the Party for the period 1990–2009 were performed for all sectors and were undertaken to take into account changes in activity data (AD) and EFs, revisions of methodologies and the reallocation of emissions, as well as to address recommendations made in previous review reports. The major recalculations for 2009 include:

(a) An update of CO_2 EFs in the energy sector in the United Kingdom and Italy;

(b) A change in the model for estimating F-gas emissions from refrigeration and air conditioning in the United Kingdom;

(c) A revision to the estimation methodology for enteric fermentation, manure management and agricultural soils in France;

(d) An update of AD on solid waste disposal in Germany.

Verification and quality assurance/quality control approaches

26. DG Climate Action is responsible for coordinating QA/QC activities for the Party's inventory and ensures that the objectives of the QA/QC programme are implemented and that the QA/QC plan is developed. EEA is responsible for the annual implementation of QA/QC procedures.

27. QC procedures are performed at three stages of the inventory preparation process. Firstly, a range of checks are used to determine the consistency and completeness of member States' data so that they may be compiled in a transparent manner at the European Union level. Secondly, checks are carried out to ensure that the data are compiled correctly at the European Union level to meet the overall reporting requirements. Thirdly, a number

of checks are conducted with regard to data archiving and documentation to meet various other data quality objectives. However, the ERT has still detected some QA/QC issues (see paras. 46, 47, 60, 63, 75, 87, 101 and 114 below) and recommends that the European Union further enhance the implementation of its QA/QC procedures for its next annual submission.

28. The Party informed the ERT that, in 2012, there were two major improvements related to QA/QC: (a) the introduction of the web-based communication tool to enhance communication between the inventory compilers and the member States; and (b) a new check on the completeness of the use of the notations keys by member States (see paras. 11 and 12 above). The ERT commends the European Union for the continuous improvement of its QA/QC procedures. The ERT noted that the Party provided information in the NIR on additional QA/QC activities, such as workshops and expert meetings, as well as on annual changes and improvements in the usage and verification of European Union emissions trading scheme (EU ETS) data, as recommended in the previous review report.

29. A comprehensive internal review[7] is being carried out in 2012 by an independent review team, in order to determine the emission allocations for the period 2013–2020 for the Party's internal GHG emission reduction target in 2020. The European Union informed the ERT that, although having a different overall goal, the key objective of this internal review is to improve the quality of the GHG inventories of the member States in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The European Union also informed the ERT that it expects that the improvement plans developed by member States will reflect to some extent the findings and recommendations from the review. The ERT commends the European Union for this QA activity and encourages the Party to follow up on the relevant recommendations made.

Transparency

30. The NIR of the Party's 2012 annual submission provides, in general, highly transparent information on the inventory, and a number of annexes provide additional data and information both at the European Union level and also for each member State. The ERT noted some minor transparency issues, such as not updated (see paras. 47, 87 and 114 below) or missing (see para. 73 below) member States' information, incorrect references (e.g. to non-existent tables (see para. 75 below)) and lack of justification of emission trends (see para. 54 below). The ERT recommends that the European Union further improve the transparency of its NIR and address the transparency issues raised in the sectoral chapters of this report in its next annual submission.

31. The ERT appreciates that, in order to ensure transparent reporting, the Party includes the emission estimates and/or notation keys reported by member States for each cell of the CRF tables. The ERT noted that when the notation keys "IE" or "NE" are used by a member State, there is no explanation for why the notation key was used included in the cell of the table (owing to technical limitations) or in the documentation box. The ERT also noted that annexes 1.4–1.10 to the NIR include the CRF tables for the sectors for each EU-15 member State with the relevant explanations and the member States' tables include additional information. However, the ERT encourages the European Union to provide better summary information and explanations of the use of the notation keys "IE" and "NE" by member States in the CRF tables (e.g. listing the notation keys with the member States using each of them) in its next annual submission (see para. 13 above).

[7] The review follows the European Commission internal document "Guidelines for the 2012 technical review of greenhouse gas emission inventories to support the determination of Member States' annual emission allocations under Decision 406/2009/EC".

32. The ERT noted that the use of the notation key "IE" has decreased in the 2012 annual submission, owing to the efforts made by the European Union, as well as member States' efforts, to reduce the frequency of the use of the notation key "IE" and to harmonize the use of the notation keys (in particular for the LULUCF sector). The ERT commends the European Union for this action and encourages the Party to continue this practice.

33. The Party reports a number of country-specific subcategories under the category other. However, they are reported at an aggregated level as "non-specified", without providing a specific description of the subcategories included in the CRF tables (see paras. 45, 56 and 82 below). The ERT recommends that the European Union 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 in the CRF tables, in order to improve the transparency of the reporting in its next annual submission.

Inventory management

34. The European Union has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. The archived information is maintained by EEA and its ETC/ACM.

3. Follow-up to previous reviews

35. The previous annual review report for the European Union was published after the submission of the Party's 2012 annual submission. Nevertheless, the Party was able to resolve some issues identified in the previous review report, such as:

(a) Further improving the consistent use of the notation keys (the completeness checks were extended to the notation keys "NO" and "NA");

(b) Including the LULUCF sector in the tier 2 uncertainty analysis;

(c) Improving transparency in describing QA/QC practices.

36. The ERT commends the Party for making improvements to its inventory and for its efforts to implement the recommendations made in previous review reports. It welcomes the provision of an overview of the improvements made in the 2012 annual submission, including responses to findings from the 2008–2010 reviews. However, the ERT noted that some recommendations made in previous review reports are still pending, such as:

(a) To improve the tier 2 key category analysis through the inclusion of the LULUCF sector and the determination of key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;

(b) To implement a QA/QC plan for the solvent and other product use sector;

(c) To improve the transparency of the reporting by improving the description of the key category analysis, ensuring that tables containing information per member State include information for all member States (e.g. for manure management) and consistent use of the notation keys (e.g. for waste incineration);

(d) To strengthen efforts to achieve comparable reporting by member States (e.g. for limestone and dolomite use);

(e) To make efforts to achieve consistent reporting of the classification by climate region and to include each member State's climate data in the NIR;

(f) To work with member States to improve the completeness and accuracy of the reporting for the LULUCF sector and for the KP-LULUCF activities.

37. The recommendations made in the previous review report addressing specific sectors are reiterated in the sector-specific paragraphs below.

4. Areas for further improvement identified by the expert review team

38. During the review, the ERT identified a number of areas for improvement. These are listed in table 6 below.

39. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report and in table 6 below.

B. Energy

1. Sector overview

40. The energy sector is the main sector in the GHG inventory of the European Union. In 2010, emissions from the energy sector amounted to 3,041,584.75 Gg CO_2 eq, or 80.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 7.2 per cent. CO_2 emissions from road transportation had the highest increase in absolute terms of all energy-related emissions, while CO_2 emissions from manufacturing industries and construction decreased substantially between 1990 and 2010. The increase in emissions from road transportation occurred in almost all member States, whereas the reduction in emissions from manufacturing industries and construction occurred mainly in Germany after the reunification. In 2010, emissions increased by 2.5 per cent compared with in 2009, mainly as a consequence of the economic recovery after the economic downturn in 2009. Within the sector, 35.2 per cent of the emissions were from energy industries, followed by 26.5 per cent from transport, 20.5 per cent from other sectors and 16.1 per cent from manufacturing industries and construction. Fugitive emissions from solid fuels and oil and natural gas accounted for 0.3 and 1.3 per cent, respectively. The remaining 0.2 per cent was from other (fuel combustion).

41. The Party has made recalculations for the energy sector between the 2011 and 2012 annual submissions following changes and reallocation of AD and changes to EFs and methodologies, and in order to rectify identified errors. In the energy sector, the largest recalculations in absolute terms for 1990 and 2009 were made for CO_2. In relative terms, the largest recalculations for 2009 were for CH_4 emissions (decrease of 3.2 per cent). Among the EU-15, Germany and the United Kingdom had the most influence on the CO_2 recalculations for 2009. Their recalculations were due to a variety of changes, including revised energy balance data. The overall impact of the recalculations on the energy sector is a decrease in the estimated emissions of 0.1 per cent for 2009. The main recalculations for 2009 took place in the following categories:

(a) Other sectors: a decrease in the estimated emissions of 0.5 per cent (2,788.80 Gg CO_2 eq), owing mainly to updated AD used for the German inventory;

(b) Manufacturing industries and construction: a decrease in the estimated emissions of 0.4 per cent (1,823.78 Gg CO_2 eq), owing mainly to updates to EFs and the reallocation of emissions across categories by Italy;

(c) Energy industries: an increase in the estimated emissions of 0.1 per cent (1,405.84 Gg CO_2 eq), owing mainly to methodological changes and updates to AD (e.g. gas oil) and the EF for solid fuels by the United Kingdom;

(d) Fugitive emissions from solid fuels: a decrease in the estimated emissions of 10.4 per cent (886.64 Gg CO_2 eq), owing mainly to new data used on mine closure and an update of AD by the United Kingdom.

42. The recalculations were performed for the entire time series and are well documented in the NIR and CRF table 8(b).

43. The reporting of the energy sector is generally complete in terms of years, gases and categories and is produced as the sum of the individual member States' inventories. However, there were still some categories reported as "NE" in the CRF tables at the level of the member States. For example, fugitive CH_4 emissions from other leakages were reported as "NE" by Spain. During the review, the Party explained that Spain reported these emissions as "NE" because there were no default EFs in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance that applied to them. The ERT noted that the Revised 1996 IPCC Guidelines provide default EFs for certain regions of the world and also an EF for the rest of the world. Spain claimed that the EF for the rest of the world was inappropriate for Spain and therefore the emissions were reported as "NE". The ERT recommends that the European Union improve the explanations of the actions taken to handle specific not reported categories and further justify in the NIR the instances where "NE" is reported for categories with existing methodologies and default EFs.

44. Methodologies, uncertainty analysis, recalculations and planned improvements are reported transparently for this sector. However, the ERT noted that, while explaining the trend in the emissions per category, the Party indicates the member States with the main responsibility for the observed trend, but does not always provide information on the reasons for the trend in the emissions and the implied emission factor (IEF) (see para. 54 below). In some cases there are explanations, such as deviations of the IEFs due to the misallocation of a fuel (e.g. chemical gases under liquid fuels for the Netherlands), the inclusion of the non-energy use of fuels in the AD (e.g. Greece), or the different allocation of fuels across subcategories (e.g. for blast furnace gas). The ERT recommends that the European Union further encourage the consistency of reporting of fuels across member States and, where relevant (where there are deviations of the IEFs due to the misallocation of a fuel by different member States), include a table summarizing the allocation of fuels across subcategories and sectors among member States (e.g. allocation across the energy and industrial processes sectors, and allocation of biomass across member States), in order to improve the transparency of the reporting.

45. For the category other (manufacturing industries and construction), the Party reports AD and estimates of CO_2, CH_4 and N_2O emissions, but neither the CRF tables nor the NIR explain which industries are included. The ERT recommends that, in its next annual submission, the European Union clearly specify in the NIR and CRF table 1.A(a) which industries are included in this category.

46. The ERT commends the Party for strengthening its well-developed QA/QC system for the energy sector. However, the ERT identified improper use of the "NE", "NO" and "IE" notations keys and zero values (refinery feedstock) in CRF table 1.A(b). During the review, the Party provided a copy of a revised table to the ERT with the correct use of the notation keys. The Party also reported to the ERT that refinery feedstocks had been omitted from CRF table 1.A(b). The ERT recommends that the European Union use the correct notation keys and include the missing values for refinery feedstock in the next annual submission.

47. The ERT noted an issue in the NIR regarding the documentation of the member States' information. For example, in the table explaining the methods/models used for estimating emissions from road transportation, the NIR states that Sweden uses ARTEMIS, but Sweden actually began to use HBEFA 3.1 in 2012. The ERT recommends that the European Union strengthen the QA/QC procedures to ensure that the member States' information is updated and correctly represented in the NIR.

2. Reference and sectoral approaches

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

48. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2010, the CO_2 emission estimates calculated using the sectoral approach were 0.8 per cent higher than the emissions estimated in accordance with the reference approach. The IPCC reference approach for estimating CO_2 emissions from fossil fuels for the European Union is based on Eurostat energy data. In the NIR, the European Union provides information on the comparison between Eurostat data and the national reference approach apparent consumption per gas per member State for 2010 and provides an overall explanation for the differences.

49. The ERT noted the use of the notation key "IE" for orimulsion without further explanation. During the review, the Party informed the ERT that orimulsion is included in the Eurostat fuel category other hydrocarbons. Other hydrocarbons are included in the CRF fuel category other liquid fuels under other non-specified. The European Union informed the ERT that it will include a mapping of the fuels for the reference approach in the NIR of its next annual submission. The ERT welcomes this plan.

International bunker fuels

50. The international bunker fuel emissions in the European Union's inventory are the sum of the international bunker fuel emissions of the member States. GHG emissions from international bunkers between 1990 and 2010 increased by 58.8 per cent. CO_2 emissions from marine bunkers and aviation bunkers accounted for 53.4 and 46.6 per cent, respectively, of the total GHG emissions from international bunkers in 2010.

51. The NIR includes a brief summary of a study on bunker fuel emissions conducted in 2007 by the ETC/ACM comparing the aviation emissions reported by member States with modelling results provided by the European Organisation for the Safety of Air Navigation (Eurocontrol). The study shows that, in general, the European countries tend to overestimate domestic emissions: domestic emissions from aviation in 2005 were overestimated by 6.2 Mt CO_2 compared with the Eurocontrol data.

52. The ERT noted that the consumption of jet kerosene for civil aviation reported to the International Energy Agency (IEA) for 2010 is 16.6 per cent higher than the value reported in the CRF tables. The Party indicated to the ERT during the review that this could be the result of a different split between domestic and international aviation. However, this seems to contradict the results of the study conducted by ETC/ACM described in paragraph 51 above. The European Union also informed the ERT that there is ongoing work in collaboration with Eurocontrol which aims to improve the accuracy of the estimates across member States and that the results will be reported in the 2013 annual submission. The ERT recommends that the Party continue to verify member States' data with Eurocontrol data and that the European Union also investigate potential significant discrepancies between the Eurostat data and the data reported in the CRF tables during that QA exercise.

Feedstocks and non-energy use of fuels

53. Following a recommendation made in the previous review report, the Party used a weighted average of the carbon stored fractions of the member States to estimate carbon stored, in order to potentially reduce the differences in the estimated apparent fuel consumption between the reference and the sectoral approaches. However, the weighted average value was used only for the fuels for which the IPCC default values are far from the weighted averages of the member States (i.e. for natural gas and lubricants) and only for 2009 onwards. The ERT recommends that the European Union explain why the weighted

average of the carbon stored fractions of the member States is not used for all fuels and also recommends that the Party use a consistent methodology for the entire time series or further justify its current approach.

3. Key categories

Stationary combustion: all fuels – CO_2 and CH_4[8]

54. The ERT noted that additional descriptions of trends at the category level are included in the NIR following recommendations made in previous review reports. However, there are still large inter-annual variations in the IEFs reported by the Party (for CO_2 from petroleum refining (solid fuels), manufacturing of solid fuels and other energy industries (gas and liquid fuels), CH_4 from commercial/institutional (solid fuels), agriculture/forestry/fisheries (gas), and so on) and the explanations mainly attribute the emission trend to one or other of the member States. There is still no clear discussion on the IEFs and their deviations across member States and there is no information on the fuel mixes under each fuel type, and the inconsistencies in fuel allocations across member States are sometimes noted for the categories mentioned. The ERT reiterates the encouragement made in the previous review report that, in cases where the distinct decoupling of emissions from fuel use occurs, the Party include a discussion on the influence of changing fuel mixes in the NIR, so that trends are explained. In addition, the ERT recommends that the European Union include in the NIR not only information on the type of EF used per category/fuel (e.g. country-specific, default or plant-specific), but also provide more relevant explanations for the outlying IEFs and changes in member States' IEFs across years that have an impact on the IEF at the European Union level.

4. Non-key categories

Fugitive emissions from solid fuels – CO_2 and CH_4

55. The ERT observed that the quantity of coal mined in 2010 as reported to IEA (278.4 Mt) is higher than the value reported in CRF table 1.B.1 (267.7 Mt). In response to a question raised by the ERT during the review, the European Union clarified that the main reason for the difference is that the coal mining data reported to IEA include also peat extraction, which is not included in the CRF table. Three member States that are part of the EU-15 have peat extraction but no coal mining. The ERT commends the European Union for clarifying this issue and recommends that the Party include this information in the NIR of its next annual submission.

Fugitive emissions from oil and natural gas – CO_2 and CH_4

56. For the category other, CH_4 and CO_2 emissions are reported in CRF table 1.B.2 without specifying which subcategories are responsible for the emissions (indicated only as other non-specified) in either the table or its documentation box. In response to the previous stage of the review, the European Union explained that there are only two member States reporting under this subcategory: Germany (abandoned mines) and Sweden (flaring of gas). The ERT recommends that the Party increase the transparency of the reporting (e.g. by including separate lines in order to clearly report the individual emission categories and the relevant AD for them) in CRF table 1.B.2 in its next annual submission.

[8] Not all emissions related to all gases and fuels under this category are key categories. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases and fuels are not assessed in separate sections.

C. Industrial processes and solvent and other product use

1. Sector overview

57. In 2010, emissions from the industrial processes sector amounted to 265,544.44 Gg CO_2 eq, or 7.0 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 9,568.02 Gg CO_2 eq, or 0.3 per cent of total GHG emissions. Since the base year, emissions have decreased by 28.1 per cent in the industrial processes sector and by 29.0 per cent in the solvent and other product use sector. The key factors driving the decline in emissions in the early 1990s were low economic activity and cement imports from eastern European countries. Between 1997 and 1999 the emission trend is dominated by abatement technologies in adipic acid production (France, Germany and United Kingdom) and in hydrochlorofluorocarbon production (United Kingdom). The large emission decrease in 2009 was driven by a reduction in cement production and a significant drop in iron and steel production as a consequence of the economic crisis. From 2009 to 2010, the recovery from the 2009 economic crisis and the rise in industrial output reflecting the economic recovery and stronger growth of industrial gross value added in many member States led to an increase in emissions. Within the industrial processes sector, 34.9 per cent of the emissions were from mineral products, followed by 29.4 per cent from consumption of halocarbons and SF_6, 17.5 per cent from chemical industry and 16.7 per cent from metal production. The remaining 1.5 per cent were from production of halocarbons and SF_6, other (industrial process) and other production.

58. The Party has made recalculations for the industrial process sector between the 2011 and 2012 annual submissions in response to various factors, depending on the member States' circumstances. The impact on these recalculations on the industrial process sector is an increase in the estimated emissions of 1.6 per cent for CO_2, 1.1 per cent for CH_4, 0.9 per cent for N_2O, 4.9 per cent for HFCs and 40.8 per cent for PFCs for 2009. On the other hand, estimated emissions of SF_6 decreased by 3.6 per cent for 2009. The overall impact of these recalculations on the industrial processes sector is an increase in the estimated sectoral emissions of 6,445.71 Gg CO_2 eq, or 2.6 per cent, for 2009. The main recalculations for 2009 took place in the following categories:

(a) Metal production: an increase in the estimated emissions of 3.7 per cent (1,224.96 Gg), owing mainly to updates of AD by Germany and the United Kingdom;

(b) Consumption of halocarbons and SF_6: an increase in the estimated emissions of 4.4 per cent (3.077.94 Gg CO_2 eq), owing mainly to the improvement of the refrigeration and air-conditioning model to utilize bottom-up data and revised parameters by the United Kingdom;

(c) Chemical industry: an increase in the estimated emissions of 2.2 per cent (1,199.05 Gg CO_2 eq), owing to error corrections by Belgium and an addition of omitted emissions from the Flemish region.

59. The Party has made recalculations for the solvent and other product use sector between the 2011 and 2012 annual submissions following changes in AD and in order to rectify identified errors. The impact of these recalculations on the solvent and other product use sector is a decrease in the estimated emissions of 1.6 per cent for 2009.

60. Explanations of the major reasons underlying the largest recalculations are provided in the NIR in tables but some information has been cut off for some member States, for example: the explanation of the recalculations for mineral products for Greece and Spain; explanations for Belgium, Finland, Greece, Sweden and United Kingdom for chemical industries; and for metal industries, the explanations for Spain and Sweden have been cut short due to editing. During the review, the Party provided the complete explanations

regarding recalculations by member States to the ERT. The ERT encourages the European Union to enhance its QA/QC procedures with regard to the final editing of the NIR.

61. The ERT noted that the Party reports emissions for the other non-specified categories for mineral industry, chemical industry, metal industry, production of halocarbons and SF_6, consumption of halocarbons and SF_6, and other subcategories, and that the specific activities included in the other non-specified categories are clearly described in the NIR but not in the CRF tables. The ERT encourages the Party to improve transparency and report the main activities for these categories in the CRF tables in its next annual submission. In addition, for consumption of halocarbons and SF_6, emissions are reported under the category other (consumption of halocarbons and SF_6) in the CRF sectoral report tables 2(I) and 2(II)), but nothing is reported in the CRF background data table 2(II).F. The ERT recommends that the European Union explore the possibility of improving the information in the background data table for this category, in order to improve the transparency and consistency of the reporting in its next annual submission.

62. The NIR for the industrial processes sector and for the solvent and other product use sector is transparent, with explanations of the methods to estimate emissions used by each member State, descriptions of trends and IEF fluctuations, recalculation information and information on inventory reviews for each member State. The ERT commends the European Union for the information reported in the NIR and encourages the Party to continue this practice.

63. The previous review report indicated that the Party planned to implement a QA/QC plan for the solvent and other product use sector. However, this plan was not implemented for the Party's 2012 annual submission. During the review, the Party informed the ERT that it will endeavour to develop and implement QA/QC procedures for the solvent and other product use sector for its next annual submission, focusing resources as appropriate on improvements in line with the IPCC good practice guidance. The ERT welcomes this plan and recommends that the European Union describe any QA/QC procedures implemented in its next annual submission.

2. Key categories

Limestone and dolomite use – CO_2

64. The ERT noted that the European Union has made improvements to the completeness of the reported CO_2 emissions from desulphurization within the category limestone and dolomite use compared with its 2011 annual submission, specifically for Belgium (newly added to its inventory) and Spain (dolomite used in desulphurization newly added to its inventory). The ERT commends the Party for improving the completeness of the inventory. However, there is still a lack of comparability of the reporting (e.g. Germany reports the related emissions in several subcategories of the energy and industrial processes sectors). The ERT reiterates the recommendation made in the previous review report and encourages the European Union to continue its efforts to achieve a comparable allocation of emissions from limestone and dolomite use reported by member States in line with the proposed allocation for this category provided in the Revised 1996 IPCC Guidelines.

Adipic acid production – N_2O

65. The ERT noted a substantial decrease in N_2O emissions from adipic acid production (by 9.2 Mt CO_2 eq or 85.3 per cent) between 2009 and 2010, owing mainly to a decrease in the emissions reported by Germany, from 8,570 Gg CO_2 in 2009 to 716 Gg CO_2 in 2010. The ERT strongly recommends that the European Union add a short description of the reason for this decrease in emissions between 2009 and 2010 in its next annual submission.

Consumption of halocarbons and SF_6 – HFCs and SF_6

66. The Party has made improvements to the use of the notation keys in the category consumption of halocarbons and SF_6. The ERT commends the European Union in particular for correcting the use of the notation keys "NO" and "NA" in CRF table 2(II).F as was recommended in the previous review report. The ERT noted that the notation keys "NE" and "NO" are used to report disposal (e.g. for domestic refrigeration (HFC-125 and HFC-143a) and commercial refrigeration (HFC-134)), even though there are emissions reported for manufacturing and stocks. The ERT strongly recommends that the Party investigate these categories to justify, in the next annual submission, whether the emissions are "NO" or whether they have been underestimated.

67. The ERT also noted that some member States report potential emissions as "NE" and actual emissions as "NO". During the review, the ERT was informed that the issue of potential emissions not being estimated by some member States has been discussed at meetings between the European Commission and the member States. The conclusion of the discussion was that the member States do not need to prioritize the reporting of potential emissions as long as they report actual emissions. The ERT encourages the European Union to continue to encourage member States to report estimations of both actual and potential emissions of HFCs and to use the appropriate notation keys, in order to improve the transparency of its next annual submission.

3. Non-key categories

Solvent and other product use – CO_2 and N_2O

68. The European Union reported some emissions from solvent and other product use as "NE": CO_2 emissions from paint application, degreasing and dry cleaning, chemical product manufacturing and other (United Kingdom); and N_2O emissions (Ireland and United Kingdom). During the review, the European Union explained that since default methodologies for solvent and other product use are not provided in either the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, the United Kingdom and Ireland do not report emissions for that sector. The ERT reiterates the encouragement made in the previous review report for both countries to report on their plans to achieve complete reporting of their inventories. Informing the United Kingdom and Ireland of the methods used by other member States may initiate a process for the inclusion of such estimates from them in future annual submissions.

D. Agriculture

1. Sector overview

69. In 2010, emissions from the agriculture sector amounted to 373,808.43 Gg CO_2 eq, or 9.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 13.8 per cent. The key drivers for the fall in emissions are the reduction in emissions from agricultural soils resulting from the decreasing use of fertilizer and manure and the decrease in CH_4 emissions from enteric fermentation as a result of the declining cattle numbers in most member States. Within the sector, 50.2 per cent of the emissions were from agricultural soils, followed by 32.7 per cent from enteric fermentation, 16.2 per cent from manure management and 0.7 per cent from rice cultivation. The remaining 0.1 per cent was from field burning of agricultural residues. N_2O accounted for 55.7 per cent and CH_4 accounted for 44.3 per cent of the emissions from the sector.

70. The Party has made recalculations for the agriculture sector between the 2011 and 2012 annual submissions following changes in AD and EFs and in order to rectify identified errors. The impact of these recalculations on the agriculture sector is a decrease

in the estimated emissions of 1.1 per cent for 2009. The main recalculations for 2009 took place in the following categories:

(a) Manure management: a decrease in the estimated emissions of 2.9 per cent (1,836.49 Gg CO_2 eq), owing mainly to methodological changes and the update of the nitrogen excretion values for France;

(b) Enteric fermentation: a decrease in the estimated emissions of 0.9 per cent (1,090.64 Gg CO_2 eq), owing mainly to methodological changes made by France;

(c) Agricultural soils: a decrease in the estimated emissions of 0.7 per cent (1,338.30 Gg CO_2 eq), owing mainly to methodological changes applied by France and Germany.

71. The recalculations were performed for the entire time series. These are documented in the NIR at the category level. However, since no information for each member State is included in the relevant tables, it is not clear whether the reasons for all the recalculations are included. In addition, the impacts of the recalculation per category and the main member States contributing to the revisions have not been reported. CRF table 8(b) provides only a reference to the member State which performed the recalculation and the relevant information should be checked in the member States' CRF tables. The ERT recommends that the information on recalculations include numerical information per member State, followed by explanations of the rationale for the recalculations and the impact of the recalculations on the sector.

72. The inventory is complete in terms of categories, gases and years. Emissions from prescribed burning of savannas do not occur in any of the member States. Field burning of crop residues is forbidden in Europe. However, CH_4 and N_2O emissions for that category are reported by eight member States. Five member States report CH_4 emissions from rice cultivation.

73. In general, the Party's report is transparent in terms of background information on data sources, methods, EFs and emission parameters, which are provided by category and per member State. The ERT commends the European Union for including in the NIR a discussion on the deviations in the IEFs across member States. However, the ERT noted some issues relating to a lack of transparency, as background information related to data and methods is not provided for all member States (e.g. tables of background information on AD and EFs related to CH_4 from manure management covered 11 and 14 member States, respectively; background information on methods and EFs related to N_2O from manure management was provided for nine and six members States, respectively; and the background information on agricultural soils, including methods, data and parameters, such as $Frac_{GRAZ}$, $Frac_{GASF,}$ $Frac_{GASM}$ and $Frac_{LEACH}$, also did not cover all member States). The ERT reiterates the recommendation made in the previous review report that the European Union provide complete background tables with information for all member States in its next annual submission.

74. In addition, the ERT identified some transparency issues linked to the reporting of the tier method used to estimate CH_4 emissions from enteric fermentation in tables 6.2, 6.14 and 6.15 of the NIR for sheep and cattle for some member States. During the review, the Party explained that the aforementioned three tables have different sources: table 6.2 was obtained from the officially submitted CRF tables of the European Union member States; table 6.15 comprises quotations from the member States' NIRs, with the level of detail and nature of the information depending on each NIR; and table 6.14 provides a quantification

of the tier level according to the approach from Leip (2010).[9] The ERT recommends that, in the next annual submission, the Party improve the transparency of the reported information. The ERT welcomes the information provided by the Party on the thorough update of the tables on the basis of the data in the NIRs for the next annual submission.

75. The ERT noted some inconsistencies within the NIR, within the CRF tables and between the CRF tables and the NIR concerning the reporting of some data and methods. For example: a tier 1 method for estimating emissions from enteric fermentation is reported for France in table 6.15 for sheep, whereas a tier 2 method is reported in table 6.14 and a tier 3 method in table 6.3; the summation of the allocation per animal waste management system for swine is lower than 100 per cent in table 6.29 (74 per cent) and table 6.30 (80 per cent) of the NIR; and reference is made to a non-existent CRF table 7s2 in section 6.3 of the NIR. The ERT also noted that data on the weight reported for different livestock differ from CRF table 4.A to CRF table 4.B(a); and that the numbers of dairy cattle and non-dairy cattle are reported as 17,525,000 and 58,515,000, respectively, in table 6.13 of the NIR and CRF table 4.A, and these values are different from those reported in table 6.16 of the NIR for dairy cattle (19,045,000) and non-dairy cattle (61,169,000). In response to questions raised by the ERT during the review, the Party attributed the inconsistencies related to the population size of dairy cattle and non-dairy cattle within the NIR and between the NIR and the CRF tables to unintentional double counting of the number of cattle that were reported using option B. The ERT recommends that, in the next annual submission, the European Union improve its QC activities to ensure the consistency of the reporting within the NIR, within the CRF tables and between the CRF tables and the NIR.

2. Key categories

Enteric fermentation – CH_4

76. The member States used the tier 2 method to estimate CH_4 emissions from cattle and six of them used a tier 2 method for sheep. For the remaining livestock, tier 1 or tier 2 methods were used, depending on the member State. The ERT considered the overall approach to be in line with the IPCC good practice guidance.

77. The ERT noted that the population sizes for sheep and swine reported in the CRF tables are below the values of the Food and Agriculture Organization of the United Nations (FAO) (1.3 and 3.8 per cent difference, respectively). In response to questions raised by the ERT during the review, the Party identified which member States were mainly responsible for the differences in the population sizes for sheep and swine between the CRF tables and the FAO data and provided the rationale for the differences. The ERT encourages the Party, for its next annual submission, to improve its verification activities by comparing in the NIR the population sizes for sheep and swine to those from FAO.

78. As noted in the previous review report, in tables 6.20 and 6.21 of the NIR some additional background information on performance data and feed digestibility for calculating CH_4 emissions for dairy cattle and non-dairy cattle are reported as "NE" or "NA" for some member States (such as Netherlands, Portugal and Sweden), while such data are available in their respective NIRs. The ERT reiterates the recommendation made in the previous review report that the European Union continue its efforts, with the member States, to deliver complete background data in these tables in the next annual submission.

[9] Leip A. 2010. Quantitative quality assessment of the greenhouse gas inventory for agriculture in Europe. *Climatic Change*. 103(1 and 2): pp.245–261. Available at <http://dx.doi.org/10.1007/s10584-010-9915-5>.

Manure management – CH_4

79. The methods used to estimate CH_4 emissions from manure management depend on the member State and the livestock type. Some member States, such as Denmark, Finland, Netherlands, Portugal and United Kingdom, used a tier 2 method for all animal types. The remaining countries used, in general, a tier 2 method for cattle and swine and a tier 1 method for other animal groups. It was noted that Greece and Luxembourg used a tier 1 method for swine. Some of the members States still use a tier 1 method for sheep, which is among the important livestock groups. At the European Union level, 63.0 per cent of CH_4 emissions from manure management were calculated using a tier 2 method and 37.0 per cent using a tier 1 method. The ERT concluded that the applied methodologies are in line with the IPCC good practice guidance.

80. The Party reported that the quality of the estimates of CH_4 emissions from manure management is poor because of the lack of country-specific values for parameters, such as the amount of volatile solids (VS), maximum methane-producing capacity for manure (Bo) and manure management system characteristics (types of system used to manage manure and a system-specific methane conversion factor). In response to a question raised by the ERT during the review, the European Union explained that the collection of farm-level data is very expensive and that an intensive discussion at the European Union level is on-going. The ERT recommends that the Party encourage the member States to try to further develop and implement country-specific parameters, such as VS, Bo and manure management system characteristics, and use them for future estimates. The ERT recommends that the Party report on any plans to collect missing farm-level data, taking into account the priority and feasibility of their implementation.

81. As noted in the previous review report, there are inconsistencies in the allocation of animal livestock per climate region across member States. Most of the member States fall into the cool climate region, but some member States allocate a part of their livestock population to the temperate climate region, which sometimes appears inconsistent considering the reports of neighbouring member States. For example, France allocates all of its livestock population to the temperate climate region, while Portugal and Spain consider part of their livestock under the cool climate region (the allocation of the swine population to the temperate climate region, for 2010, is 83 per cent for Portugal, 29 per cent for Spain and 3 per cent for Italy). The ERT reiterates the recommendation made in the previous review report that the European Union make efforts to achieve consistent reporting, in order to improve the consistency and accuracy of the inventory. Meanwhile, and for the sake of transparency, the ERT also reiterates the recommendation made in the previous review report that the European Union include each member State's climate data in the next annual submission.

Agricultural soils – N_2O

82. At the European Union level, 58.0 per cent of the N_2O emissions from agricultural soils were estimated using a tier 1 method and 42.0 per cent using a country-specific tier 2 method. At the member State level, the countries used a combination of tier 1 methods (tier 1, tier 1a and tier 1b) with default and country-specific EFs, the core inventory of air emissions (CORINAIR) method and country-specific tier 2 methods. The Party reported N_2O emissions under the category other (agricultural soils) without specifying the subcategories in either CRF table 4.D or the documentation box to the table, and AD were reported as "NA". In response to the question raised during the previous stages of the review, the European Union explained that N_2O emissions under the category other is a very inhomogeneous category, because different member States report different emissions, summarized in tables 6.75 and 6.76 of the NIR. The ERT noted that emissions from sewage sludge and compost are reported at the European Union level in table 6.75 of the NIR. The

ERT recommends that the European Union explore the possibility of improving the transparency of the CRF tables by, for example, including sewage sludge and compost in CRF table 4.D rather than using other non-specified, and/or by providing a relevant explanation in the documentation box to the table of the coverage of the subcategory other (agricultural soils).

E. Land use, land-use change and forestry

1. Sector overview

83. In 2010, net removals from the LULUCF sector amounted to 177,986.03 Gg CO_2 eq. Since the base year, net removals have increased by 6.9 per cent. The key drivers for the rise in removals stem from the European Union's environmental and agricultural policies, which have encouraged less-intensive agricultural practices and stimulated increased areas of forest and woodland. The greatest increases in net removals were from land converted to forest land and land converted to grassland. A significant impact on net removals from the LULUCF sector was also observed in the reduced net emissions occurring from land converted to cropland and grassland remaining grassland. Within the sector, 256,375.68 Gg net removals were from forest land, followed by 11,510.31 Gg from grassland, 3,419.46 Gg from other (LULUCF) and 255.46 Gg from other land. Cropland accounted for 55,868.28 Gg net emissions and settlements accounted for 35,638.48 Gg net emissions. The remaining net emissions of 2,068.11 Gg were from wetlands.

84. The European Union has made recalculations for the LULUCF sector between the 2011 and 2012 annual submissions following changes in AD, the use of new EFs and the reallocation of emissions and in order to correct identified errors. The general trend of increasing removals over time was maintained. The impact of these recalculations on the LULUCF sector is a decrease in the estimated net removals of 95,294.59 Gg CO_2 eq, or 32.5 per cent, for 2009. The main recalculations for 2009 took place in the following categories:

(a) Forest land: a decrease in the estimate of net removals by 67,116.98 Gg CO_2 eq (19.1 per cent), owing to major recalculations and decreases of the sinks for Austria, France, Italy and Sweden;

(b) Settlements: an increase in the estimate of net emissions by 14,643.93 Gg CO_2 eq (68.2 per cent);

(c) Grassland: a decrease in the estimate of net removals by 9,442.73 Gg CO_2 eq (48.2 per cent).

85. The recalculations were performed for the entire time series. They are quantitatively documented in the NIR and are referenced to the member States in CRF table 8(b), but reasons for recalculations are not provided in CRF table 8(b) and no information on the recalculations per member State and for all categories is included in the NIR. The ERT recommends that the Party improve its documentation at the category level of the specific rationale for and effect of each recalculation in the NIR of the next annual submission.

86. In response to recommendations made in previous review reports, the 2012 NIR of the European Union showed improvements in the completeness of the reporting of emissions and removals for all categories and subcategories and of the reporting of all carbon pools. For example, Germany has reported the dead organic matter pool for grassland remaining grassland for the first time, and both Ireland and the United Kingdom have reported soil organic matter for grassland remaining grassland for the first time. The ERT commends the European Union for the progress made. Some categories, subcategories and carbon pools are still reported as "NE" by member States, such as carbon stock changes in mineral soils (e.g. Italy and the Netherlands for forest land remaining forest land) and emissions due to

biomass burning for several land-use categories (e.g. wildfires on grassland are reported as "NE" by the Netherlands, Spain and Sweden; and wildfires on wetlands are not estimated by Ireland and the Netherlands). The European Union explained to the ERT that the use of the notation key "NE" is carefully monitored and followed up where necessary with the relevant member State. The ERT reiterates the recommendation made in the previous review report that the European Union continue its efforts to encourage all member States to improve the completeness of their inventories.

87. Following a recommendation made in the previous review report, the description of QA/QC procedures has been improved in the 2012 NIR. However, the ERT noted that in many cases (e.g. tables 7.10, 7.20 and 7.24 of the NIR and the corresponding text) the data presented in the NIR and commentary regarding the data and trends are not what are reported in the CRF tables. The ERT recommends that the Party update the text and tables for each annual submission and provide updated explanations for the relevant year's data in its future annual submissions. The ERT also recommends that, to increase transparency, the Party report in its NIR specific examples of the performed QA/QC activities and report specifically that the text and tables have been updated and contain information on the current year's CRF data, in order to provide evidence of the improvements made to the QA/QC process for the inventory.

2. Key categories

Forest land remaining forest land – CO_2

88. The area of forest land remaining forest land has slightly increased by 2.5 per cent at the EU-15 level since 1990. About half of the member States reflect the overall trend showing little change since 1990, while others show large differences in trends (e.g. Ireland's area has increased by 54.7 per cent, the United Kingdom's by 29.9 per cent and Italy's by 20.7 per cent, while the Netherlands' area has decreased by 10.3 per cent). The ERT noted that the text in the Party's NIR describing the overall sink trend, the reasons for it and the direction of the trend is not consistent with the data provided in the CRF tables. The ERT recommends that the European Union accurately describe the data that it reports in subsequent NIRs.

89. At the EU-15 level, this category was a sink of about 226,716.98 Gg CO_2 eq in 2010, which represents a decrease of 0.4 per cent from 1990 levels and a 10.0 per cent decrease from 2009. Austria, Belgium, Denmark, Germany, Ireland, Italy, Luxembourg, Portugal and Spain show fluctuating trends in net CO_2 emissions and removals, while the remainder show more steady trends. However, these fluctuations mask each other when the European Union in total is observed, showing a relatively stable and constant removals profile. In response to a recommendation made in previous review reports, the Party has continued to work with the countries exhibiting large annual fluctuations in carbon stock change, to ensure time-series consistency, and has reported on the results obtained in the 2012 annual submission. The ERT commends the European Union for providing more information on this in the 2012 NIR and recommends that the Party continue to detect deviations in the trend or in the member States' values for carbon stock change per area per given pool and report on the analysis and planned improvements in its next annual submission.

90. The ERT noted that the issue identified in previous review reports in relation to Italy's approach to soils – the assumption that soils build up their carbon in one year and the method used to estimate the corresponding carbon stock changes – has been solved in the 2012 annual submission. The ERT commends the European Union for working with Italy on this.

Land converted to forest land – CO_2

91. The Party reports that the area of land converted to forest land in 2010 was around 5.0 per cent of the total forest land area, which represents an increase of 42.7 per cent since 1990. Italy reports the largest land area under this subcategory (1,559.28 kha), while Luxembourg reports the smallest land area under this subcategory. At the EU-15 level, for 2010, land converted to forest land is reported as a sink of 30,916.71 Gg CO_2 eq, an increase of 26.6 per cent since 1990 (24,426.64 Gg CO_2 eq). Greece, Netherlands and Spain are still not providing complete reporting on this category. The ERT reiterates recommendations made in previous review reports that the European Union continue to work with member States to improve the accuracy of the methods used and to increase the consistency of the reporting approaches among member States.

Land converted to cropland – CO_2

92. The area of land converted to cropland has decreased by 20.0 per cent since 1990 for the EU-15. The area under conversion in 2010 was 7.7 per cent of the total cropland area, originating largely from non-forest land uses (only 5.0 per cent results from deforestation). Most of the conversions are reported to be from grassland (88.8 per cent of the area). The ERT noted that some member States report estimates using only a lower-tier method for this category (e.g. Ireland, Italy, Luxembourg, Netherlands and United Kingdom). Given the importance of this key category for the European Union, the ERT reiterates the recommendation made in previous review reports that the Party continue to encourage the member States that contribute the greatest share of the emissions reported for this subcategory (i.e. Finland, Germany and United Kingdom) to improve their reporting in this area by using higher-tier methods where possible, as well as by improving the completeness of the reporting (i.e. Netherlands).

Grassland remaining grassland – CO_2

93. The 2012 NIR states that several member States reported "NO" for this category. There is wide variation across the member States in the way that they report the pools within this category and the way that their methods are presented in the European Union's NIR. For example, the NIR states that France reports "NO" for all pools using tier 2 methods (section 7.4.2.1), although France assumes all pools other than living biomass are in equilibrium (table 7.33). The Netherlands reports estimates calculated under the tier 2 methodology for the soils pool, but reports no carbon stock changes for the soils pool, while applying tier 1 methods to the living biomass and dead organic matter pools in assuming a steady state. Some member States report changes in the soil carbon pool but assume no change in living biomass or dead organic matter, while others report "NO" as all pools are considered neutral. Carbon stock change in mineral soils on grassland was reported as "NE" by Spain. Therefore, the ERT noted that the reporting is not complete across all member States. It reiterates the recommendation made in previous review reports that the European Union support its member States in improving the completeness of the reporting of this category, and ensure, in its next NIR, a transparent description of the main assumptions and methods used by the member States.

Land converted to grassland – CO_2

94. The ERT noted the improved completeness of this category, in particular that the number of occurrences of the notation key "NE" (reported by several member States in the 2011 annual submission) has decreased and that only Spain reported "NE" for the living biomass and dead organic matter pools and the Netherlands reported "NE" for the soils pool. The ERT recommends that the European Union continue to support its member States

in improving the consistency of their assumptions and methods and the completeness of the reporting of this category, whenever appropriate.

3. Non-key categories

N_2O emissions from disturbance associated with conversion to cropland – N_2O

95. The Netherlands has reported N_2O emissions from disturbance associated with conversion to cropland as "NE" but reports AD for land converted to cropland. By comparison, Denmark has reported a smaller area of land converted to cropland but has also reported emissions. The ERT recommends that the Party work with the Netherlands to enhance its reporting on this category, in order to improve completeness and consistency across member States.

F. Waste

1. Sector overview

96. In 2010, emissions from the waste sector in the European Union amounted to 108,107.37 Gg CO_2 eq, or 2.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 36.7 per cent. The key drivers for the fall in emissions are the waste management practices implemented in the European Union, namely the 1999 European Union landfill waste directive, the reduction in the amount of solid waste disposal on land, the decline in the amount of biodegradable waste going to landfills and the increase in landfill gas recovery. Within the sector, 76.3 per cent of the emissions were from solid waste disposal on land, followed by 19.3 per cent from wastewater handling, 2.5 per cent from waste incineration and 1.9 per cent from other (waste). Emissions from solid waste disposal on land decreased by 42.2 per cent between 1990 and 2010.

97. Recalculations have been performed for the waste sector between the 2011 and 2012 annual submissions in response to the 2011 annual review report and to reflect updated data, methodological changes and changes in reporting among the member States. The impact of the recalculations conducted by the member States on the waste sector is a decrease in the estimate of emissions for 2009 of 2.5 per cent, or 2,828.25 Gg CO_2 eq. The main recalculations for 2009 took place in the following categories:

(a) Solid waste disposal on land: a 1.7 per cent decrease in estimated CH_4 emissions, owing mainly to methodological updates made for the French inventory and a correction to the emission estimation model made by the United Kingdom, as well as an update of data on CH_4 recovery for other member States;

(b) Wastewater handling: a decrease in estimated N_2O emissions by 4.9 per cent, owing mainly to an update by member States of the AD on total population, the proportion of the population connected to wastewater treatment plants and protein consumption.

98. The recalculations are explained in the NIR, which provides explanation at the level of each member State. However, the ERT encourages the Party to further improve the transparency of the reporting by including information on the reasons behind the recalculations which have the greatest impact on the estimated emissions from the sector at the European Union level in the NIR. The ERT noticed inconsistencies in the recalculation values for CH_4 emissions reported in the NIR and the CRF tables. According to the NIR, the decrease in CH_4 emissions due to the recalculations was 12,761 Gg CO_2 eq for 1990 and 1,951 Gg CO_2 eq for 2009. In CRF table 8(a) the corresponding values were –12,800.86 and –2,015.25 Gg CO_2 eq. The ERT recommends that the Party further improve the consistency of the inventory by ensuring consistency between the NIR and the CRF tables.

99. The waste sector inventory is complete. The CRF tables include estimates for all gases and categories in the waste sector in accordance with the Revised 1996 IPCC Guidelines. The notation key "NE" is used at the member State level (e.g. to report CH_4 and N_2O emissions from industrial wastewater and domestic and commercial wastewater (sludge) by Belgium (see para. 105 below)).

100. The information provided on the waste sector is generally transparent. However, the notation key "NE" was reported in the CRF tables for some of the parameters (e.g. methane correction factor (MCF) and degradable organic carbon (DOC) degraded for solid waste disposal on land) and AD (for wastewater handling) and for some additional information (e.g. CH_4 oxidation factor and fraction of DOC in solid waste disposal sites). In response to a question raised by the ERT, the Party explained that the reason for this is the heterogeneity of the AD reported by the member States, which cannot easily be compared. To improve the transparency of the reporting, the ERT recommends that the European Union include this explanation in the NIR and provide relevant information at the member State level in the NIR (e.g. summary tables with IEF, MCF and DOC values per member State, and differences in the waste generation rate between the member States).

101. The estimates are generally transparently documented. However, the ERT noticed some inconsistencies in the reporting. On page 678 of the NIR CO_2 emissions from waste incineration was reported as a key category, but this information conflicts with the information provided on page 659 of the NIR and in the CRF tables. To improve the consistency of the reporting, the ERT recommends that the Party further improve its QA/QC procedures. In addition, the European Union did not include any information on recalculations undertaken for the waste incineration category in the NIR. To improve the transparency of the reporting, the ERT recommends that the Party include information on all recalculations in its next annual submission.

102. In addition, the waste generation rate (kg/person/day) reported in the NIR was not in line with the values reported in the CRF tables. The European Union explained that, for the waste generation rate (kg/capita/day), Eurostat values were reported in the NIR because of the lack of comparability of the values reported by the member States. To improve the transparency of the reporting, the ERT recommends that the Party try to collect information on the differences between the values reported by the member States and include information on the reasons behind the differences in the NIR.

2. Key categories

Solid waste disposal on land – CH_4

103. All European Union member States used the IPCC tier 2 first order decay method with a combination of default and country-specific EFs for estimating emissions from solid waste disposal on land, in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The category covers solid waste disposal on land both to managed and unmanaged waste disposal sites. Between 1990 and 2010 11 member States reduced their emissions from solid waste disposal on land. Emissions increased only in France, Greece, Portugal and Spain. The ERT commends the European Union for improving the transparency of the reporting by including more information about the reasons behind the emission trends of the member States in the NIR.

Wastewater handling – CH_4 and N_2O[10]

104. In the European Union, CH_4 and N_2O emissions from domestic and commercial wastewater treatment are a significant category and these have been identified as key categories for the Party. Nevertheless, the ERT noted that, according to the NIR, only 8 per cent of the N_2O emissions and 16 per cent of the CH_4 emissions where estimated using higher-tier methodologies. Therefore, the ERT reiterates the recommendation made in the previous review report that the Party continue to encourage member States to move to a higher-tier method to estimate emissions for the next annual submission, in order to improve the accuracy of the emission estimation for this key category.

105. Nine member States reported CH_4 emissions from industrial wastewater treatment and six member States used notation keys (Austria and Germany: "NA"; Belgium: "NE"; Luxemburg: "NO"; United Kingdom: "IE"; and Denmark: "IE", "NA", "NE" and "NO"). The ERT noted that, in the NIRs of the member States, reasons for using notation keys in the reporting were provided. The ERT concluded that the reasons for using notation keys were appropriate, except for that of Belgium. The ERT recommends that the notation key used by Belgium be changed from "NE" to "NO" or "IE", because industrial wastewater is treated in centralized wastewater plants or in plants with methane recovery for energy purposes, as explained in the NIR. The ERT encourages the European Union to encourage the member States to be consistent in using the notation keys "NO", "NA", "NE" and "IE" for this category and to revise the information provided in the next annual submission.

3. Non-key categories

Waste incineration – CO_2, CH_4 and N_2O

106. The member States used the method from the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, CORINAIR or country-specific methods with both country-specific and default EFs for estimating emissions from waste incineration. Emissions from waste incineration were reported by nine member States (Austria, Belgium, France, Greece, Italy, Portugal, Spain, Sweden and United Kingdom), while four member States (Denmark, Finland, Luxemburg and Netherlands) reported such emissions as "IE" and two member States (Germany and Ireland) reported them as "NO". The ERT reiterates the recommendation made in the previous review report that the Party encourage the member States to be consistent in using the notation keys "IE" and "NO" for this category and to revise the information provided in the next annual submission.

Other (waste) – CH_4 and N_2O

107. The member States used the default method from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* or country-specific methods with both country-specific and default EFs for estimating emissions from the biological treatment of waste. Emissions from the biological treatment of waste were reported by nine member States (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxemburg and Netherlands). The other subcategories considered under other are biogas production (Denmark, France and Spain), sludge spreading (Italy and Spain), accidental fires and other combustion of waste, including burning of yard waste and wildfires (Denmark) and mechanical–biological waste treatment plants (Germany). The ERT commends the European Union for reporting emissions for these subcategories. However, there is no specification as to what is included under this category in CRF table 6. The ERT recommends that, in its next annual submission, the Party increase the transparency of the

[10] Not all emissions under this category are key categories, particularly emissions from industrial wastewater treatment. However, since the calculation procedures for issues related to this category are discussed as whole, the individual subcategories are not assessed in separate sections.

reporting by including information on the subcategories covered under other in CRF table 6 (e.g. in the documentation box to the table).

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

108. The European Union has accounted for mandatory activities under Article 3, paragraph 3, of the Kyoto Protocol (afforestation and reforestation, and deforestation). For elected activities under Article 3, paragraph 4, of the Kyoto Protocol, the Party's reporting is a compilation of the reporting of the different elected activities by the 15 member States that comprise the EU-15. Five countries (Austria, Belgium, Ireland, Luxembourg and Netherlands) did not elect any activity; seven countries (Finland, France, Germany, Greece, Italy, Sweden and United Kingdom) elected only forest management; one country (Spain) elected forest management and cropland management; and two countries (Denmark and Portugal) elected forest management, cropland management and grazing land management. All of the member States have chosen to account for their activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol at the end of the commitment period, except for two (Denmark and France). The European Union has provided information that is generally in accordance with the mandatory requirements outlined in decision 15/CMP.1, annex, paragraphs 5–9 (see paras. 112, 113, 119 and 121 below for the exceptions).

109. The Party has made recalculations for the KP-LULUCF activities between the 2011 and 2012 annual submissions in response to the 2010 and 2011 annual review reports, following changes in AD and EFs and in order to rectify identified errors. The impact of these recalculations on each KP-LULUCF activity for 2009 is as follows:

(a) Afforestation and reforestation: a small increase (by 5.9 per cent) in the estimated net removals, from 38,063.27 to 40,054.00 Gg CO_2 eq, owing to updated data;

(b) Deforestation: a small increase (by 10.5 per cent) in the estimated emissions, from 23,365.24 to 25,811.36 Gg CO_2 eq;

(c) Forest management: a decrease (by 15.0 per cent) in the estimated net removals, from 277,633.54 to 235,899.00 Gg CO_2 eq, owing mainly to the use of revised data by France and the exclusion of soils by Italy;

(d) Cropland management: a decrease (by 89.0 per cent) in the estimated net removals, from 1,872.82 Gg CO_2 eq to 205.67 Gg CO_2 eq;

(e) Grazing land management: a decrease in the estimated net removals (by 68.9 per cent) from 777.92 to 242.19 Gg CO_2 eq.

110. The recalculations were performed for 1990, 2008 and 2009. They are mentioned at the summary level, but there is no information on the recalculations per activity and per member State, clearly documenting the reasons for them. The ERT recommends that the European Union improve transparency by enhancing the documentation of the specific reasons for and effects of the recalculations for each member State in the NIR of its next annual submission.

111. The reporting is generally complete. However, table NIR-1 indicates instances for certain member States of not reported pools and emissions reported as "NE", such as emissions from liming and biomass burning under deforestation, cropland management and grazing land management, CH_4 emissions from biomass burning under afforestation and reforestation, and CH_4 and N_2O emissions from biomass burning under forest management.

The European Union explained that the justification for the not reported pools is provided in the NIR and that individual member States were contacted regarding the issue of using the notation key "NE" and requested to provide adequate explanations in their NIRs and to make efforts to provide these estimates in future annual submissions. However, regarding some omitted pools, the ERT concluded that more documentation should be provided on the pools omitted under cropland management and grazing land management. The ERT recommends that the European Union report transparently, for each incidence of a non-reported required pool, verifiable information to demonstrate that it is not a net source of emissions, in line with decision 15/CMP.1, and, in cases where there is not sufficient justification, report on what is being done to ensure the Kyoto Protocol reporting requirements are being met, in its next annual submission. The ERT also recommends that the European Union continue to work with its member States to report emissions for these activities, even when emissions are negligible, or at least to provide evidence that any omitted pool is not a net source. For pools that are reported as "IE", where there are AD and methods, the ERT encourages the Party to report emissions/removals under the required pools.

112. The Party has reported information on anthropogenic GHG emissions by sources and removals by sinks from LULUCF activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, of the Kyoto Protocol, as set out in decision 15/CMP.1, annex, chapter I.D. Specifically, the European Union has reported all supplementary information required, except for "the year of the onset of an activity, if after 2008" (decision 15/CMP.1, annex, paragraph 6(d)). The Party explained that this information is implicitly included in table NIR-2. The ERT recommends that the Party include this explanation in its next annual submission.

113. The status report for the EU-15 2012[11] indicates that the Party did not provide the information required in decision 15/CMP.1, annex, paragraph 9(c), in particular information that demonstrates that emissions by sources and removals by sinks resulting from activities elected under Article 3, paragraph 4,of the Kyoto Protocol are not accounted for under activities under Article 3, paragraph 3, of the Kyoto Protocol. The Party explained that this information is implicitly included in CRF table NIR-2 (i.e. if the total area reported in table NIR-2 is correct and constant over time, no double counting of lands (and thus no double counting of emissions) may occur). The ERT recommends that the European Union include this explanation in its next annual submission.

114. The estimates for the KP-LULUCF activities are not documented in a transparent manner in the NIR text. Some tables and the text relating to them do not correspond with the CRF tables. The NIR text is therefore not fully transparent and consistent. The ERT recommends that the European Union improve transparency by reporting updated values and tables in the NIR of its next annual submission. The ERT could not find sufficient documentation in the NIR on the use of the notation keys "IE" and "NE" and recommends that the Party improve its reporting of the explanations for using "IE" and "NE" for pools required to be reported under KP-LULUCF activities.

115. The key category analysis for KP-LULUCF activities summarizes the information provided by the member States. The ERT encourages the European Union to make efforts to provide a complete list of the key category analyses of all member States as well as a key category analysis for the KP-LULUCF activities at the European Union level.

116. The ERT found a general inconsistency between the areas reported in table NIR-2 and those reported in the supplementary background data tables per activity (relevant to all activities). According to CRF table NIR-2, in 2010 the area of afforestation/reforestation at the beginning of the current inventory year was 5,910.00 kha, while at the end of the

[11] FCCC/ASR/2012/EU.

current inventory year the area was 6,056.96 kha. However, according to CRF table 5(KP-I)A.1.1 the total area subject to afforestation/reforestation was 5,980.37 kha and in CRF table 5(KP-I)A.1.2 the total area is reported as 19.16 kha (= 5,999.53 kha). The ERT found small differences (generally smaller than 0.1 per cent) between the areas reported (CRF table NIR-2) for each activity for the end of 2009 and the areas for the same activity reported for the beginning of 2010 (e.g. for grazing land management, the area reported for the end of 2009 was 2,053.83 kha compared with 2,050.22 kha reported for the beginning of 2010). A similar problem was identified in the 2010 annual review report and the Party's response at the time was that it would be corrected in its next annual submission. In response to questions raised by the ERT during the 2012 review, the Party agreed that the total reported in CRF table NIR-2 is incorrect for afforestation/reforestation and deforestation, confirmed that all CRF sectoral tables (with the exception of table 5(KP-I)A.2) and data reported in the NIR text are correct and indicated that relevant checks will be applied for the next annual submission. The ERT recommends that the Party continue to work with the member States to report the correct and consistent areas of activities in CRF table NIR-2 in its next annual submission.

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

Afforestation and reforestation – CO_2

117. Most of the area reported as afforestation/reforestation land (5,980.37 kha) in 2010 is located in Italy (1,636.93 kha), France (1,216.69 kha) and Spain (1,077.81 kha). Together, those three member States account for 65.5 per cent of the total area reported by the EU-15. They also reported the highest levels of removals, all three achieving more than half (51.3 per cent) of the total net sink of the EU-15 from afforestation/reforestation activities in 2010. Only two of the 15 member States (Denmark and Finland) reported net emissions from afforestation/reforestation (362.97 and 0.37 Gg CO_2 eq, respectively), which can be attributed to emissions from soils, both mineral and organic, for Finland and from the dead wood pool for Denmark, in 2008, 2009 and 2010.

Deforestation – CO_2

118. The majority of the deforested area was reported by three member States: Finland, France and Sweden. France is responsible for the largest share (41.4 per cent) of the deforestation area and the largest share of the total emissions (48.7 per cent) from deforestation in the EU-15. Following France are Finland and Sweden, responsible for 16.0 and 12.3 per cent of the net emissions from deforestation, respectively. Net emissions were reported by all member States for this activity.

119. For 2010, the notation key "NE" was used to report carbon stock change in litter (Finland and Greece) and in mineral soils and dead wood (Greece). The European Union responded that Finland does not report the carbon stock change because the IPCC good practice guidance for LULUCF does not provide an estimation method under deforestation associated with forest land converted to settlements. At the same time, the European Union recognized that this approach may not be in line with the annex to decision 16/CMP.1, which requires all pools to be reported for any relevant activity (and deforestation is a mandatory activity). The ERT confirms that this approach is contrary to the annex to decision 16/CMP.1 and strongly recommends that the European Union continue to work with its member States to improve the completeness of their reporting and their use of the correct notations keys.

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

Forest management – CO_2.

120. Carbon stock change was reported for all pools, except for Spain, which reported "NE" for carbon stock change in litter, dead wood and mineral soils, and Italy, which reported "NE" for mineral soils. The European Union responded that "NE" is used as long as the pool is not a net source and that is demonstrated by the member State. The justifications for each member State that has omitted carbon pools from its reporting are provided in the European Union's NIR. The justification of Spain in the NIR is that the reasoning is based on system functioning (assumed tier 1). The ERT recommends that the European Union work with these member States to prepare more complete information for the next annual submission on the justifications for "not a net source" provided by each individual member State.

Cropland management – CO_2

121. Three member States elected this activity: Denmark, Portugal and Spain. Each has reported CO_2 emissions from this activity in 1990, 2008, 2009 and 2010. Portugal has reported "NO" for carbon stock changes in dead wood and Spain has reported "NE" for carbon stock changes in litter and dead wood. The ERT recommends that the European Union work with Portugal and Spain to prepare complete information for the next annual submission or at least to provide more transparent and verifiable information showing that these pools are not a net source of emissions.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

122. 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 included in the SIAR on the SEF tables and the SEF comparison report.[12] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

123. 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.

National registry

124. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its findings that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and

[12] The SEF comparison report is prepared by the 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.

the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

Calculation of the commitment period reserve

125. The European Union has reported its commitment period reserve in its 2012 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 on the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

126. The European Union reported that there have been no changes in its national system since the previous annual submission. 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

127. The European Union reported that there has been a change in its national registry since the previous annual submission. The Party described the change regarding the amendment to the national registry in its NIR as being linked to software upgrades and changes in the compliance management process and user interface. The core of the required changes was limited to EU ETS processes and did not affect existing Kyoto Protocol operations. The ERT concluded that, taking into account the confirmed change in the national registry, the European Union's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

128. The European Union reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, since the previous annual submission and reported information on how the Party assigns priority in implementing the specific activities under that article. The ERT concluded that the information provided continues to be complete and transparent.

129. The NIR covers the major European Union policies, such as the directive on the promotion of the use of renewable energy (directive 2009/28/EC) and the extension of the EU ETS to the aviation sector (directive 2008/101/EC), which have potential impacts on third countries, and the updates of the European Union policies, which should lead to a low-carbon and energy-efficient economy. The new activities described in the NIR include:

(a) The publishing in 2011 of the results of a study[13] linked to the Party's policy for the promotion of biomass and biofuels, which assessed a range of sustainability impacts

[13] Hamelinck C, Koper M, Berndes G, Englund O, Diaz-Chavez R, Kunen E and Walden D. 2011. *Biofuels Baseline 2008*. Report from Ecofys, Winrock International, Chalmers University, Centre for Climate Science and Policy Research, Linköping University,ICRISAT, Potsdam-Institute for Climate Impact Research and Stockholm Environment Institute for DG TREN. Available at <http://ec.europa.eu/energy/renewables/studies/doc/biofuels/2011_biofuels_baseline_2008.pdf>.

resulting from the use of biofuels in the European Union, as well as the environmental and social impacts of the policy on third countries, such as land-use changes and employment;

(b) Seven voluntary schemes recognized by the European Commission (until July 2011): International Sustainability and Carbon Certification, Bonsucro EU, the Roundtable on Responsible Soy, the Roundtable of Sustainable Biofuels, the Biomass Biofuels voluntary scheme, Abengoa RED Bioenergy Sustainability Assurance and the Greenergy Brazilian Bioethanol verification programme;

(c) The communication entitled "A roadmap for moving to a competitive low carbon economy in 2050" (COM(2011) 112 final), outlining a strategy to meet the long-term target of reducing domestic emissions by 80–95 per cent by 2050 as agreed by European Heads of State and Government;

(d) The new initiative "Resource-efficient Europe – Flagship initiative of the Europe 2020 Strategy", which was launched in 2011 as part of the overall Europe 2020 Strategy for smart, sustainable and inclusive growth.

III. Conclusions and recommendations

A. Conclusions

130. The European Union made its annual submission on 13 April 2012. The annual submission contains the GHG inventory (comprising the CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, changes to the national system and the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

131. The ERT concludes that the inventory submission of the European Union has been prepared and reported in accordance 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". The inventory submission is complete and the European Union has submitted a complete set of CRF tables for the years 1990–2010 and an NIR; these are complete in terms of geographical coverage, years, sectors, mandatory categories and gases. The ERT commends the efforts undertaken by the Party to ensure the completeness of its inventory.

132. 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.

133. The Party's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. There are some inconsistencies linked to the allocation of emissions for some member States. The ERT noted the efforts made by the European Union to ensure consistency in the methodological approaches applied by the member States.

134. The Party has made recalculations for the inventory between the 2011 and 2012 annual submissions in response to the 2011 annual review report. The European Union has made improvements to applied methods, made changes to AD, EFs and parameters, reallocated categories and rectified identified errors. The impact of these recalculations on the emission totals is a decrease in the estimated emissions of 0.1 per cent for 2009. The main recalculations in absolute terms took place in the following sectors/categories:

(a) LULUCF (forest land, settlements and grassland);

(b) Industrial processes (consumption of halocarbons and SF6);

(c) Agriculture (enteric fermentation, manure management and agricultural soils);

(d) Energy (other sectors and manufacturing industries and construction);

(e) Waste (solid waste disposal on land).

135. The Party has reported emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in its NIR and the CRF tables. The information provided by the Party is a compilation of the information provided by the member States. With regard to activities under Article 3, paragraph 4, of the Kyoto Protocol, the member States have elected different activities. Forest management has been elected by 10 member States, cropland management by three and grazing land management by two member States. All member States except two (Denmark and France) have chosen to account for all activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol at the end of the commitment period. The ERT concluded that the Party's submission on KP-LULUCF is generally in accordance with the requirements of decision 15/CMP.1, annex, paragraphs 5–9. However, the Party did not provide complete, verifiable information in the NIR to justify that some of the omitted pools under cropland management and grazing land management are not net sources of emissions..

136. The European Union has made recalculations for the KP-LULUCF activities between the 2011 and 2012 annual submissions in response to the 2010 and 2011 annual review reports, following changes in AD and EFs and in order to rectify identified errors. The impact of these recalculations on each KP-LULUCF activity for 2009 is as follows.

(a) Afforestation/reforestation (units of land not harvested since the beginning of the commitment period): an increase in the estimate of net removals by 2,280.40 Gg CO_2 eq (5.9 per cent);

(b) Deforestation: an increase in the estimate of net emissions by 2,446.13 Gg CO_2 eq (10.5 per cent);

(c) Forest management: a decrease in the estimate of net removals by 41.734.53 Gg CO_2 eq (15.0 per cent);

(d) Cropland management: a decrease in the estimate of net removals by 1,667.15 Gg CO_2 eq (89.0 per cent);

(e) Grazing land management: a decrease in the estimate of net removals by 535.73 Gg CO_2 eq (68.9 per cent).

137. 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.

138. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

139. 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 decisions of the CMP.

140. The European Union has reported information under decision 15/CMP.1, annex, chapter I.H, "Minimization of adverse impacts in accordance with Article 3, paragraph 14", as part of its 2012 annual submission. The ERT concluded that the information provided continues to be complete and transparent.

B. Recommendations

141. The ERT identifies issues for improvement as listed in table 6 below.

Table 6
Recommendations identified by the expert review team

Sector	*Category*	*Recommendation*	*Paragraph reference*
Cross-cutting	Completeness	Provide further clarification on the difference in the data presented by Denmark and the United Kingdom of Great Britain and Northern Ireland under the Kyoto Protocol and the data for those member States included in the European Union's compilation	10
	Completeness	Continue efforts to enhance the usage of the notation keys and report on the results of actions undertaken	12
	Transparency	Improve the transparency of the reporting (e.g. make efforts to summarize the country-specific subcategories reported by the member States and report a list of the subcategories reported under other in the CRF tables)	30, 33, 45, 56, 82 and 107
	Inventory planning	Report on plans for sustaining the inventory preparation activities after 2013	16
	Key category analysis	Provide information on tier 1 and tier 2 key category analyses with LULUCF in annex I to the NIR and include complete information on KP-LULUCF at the member State level and the results of the key category analysis at the European Union level	18, 20 and 115
	Uncertainty analysis	Continue to improve the uncertainty analysis (i.e. conduct a full uncertainty analysis; provide a short discussion of the cause of the change in the overall uncertainty; and improve the description of the overall uncertainty analyses)	21 and 23
	Recalculations	Expand the explanations of recalculations for the LULUCF sector	25
	QA/QC	Further enhance quality checks to ensure consistency in the NIR and between the NIR and the CRF tables; explanation for the categories reported as "NE"; annual update of member States' information; etc.	27, 46, 47, 63, 75, 87, 101 and 114
Energy	Completeness	Improve the justification for the	43

Sector	*Category*	*Recommendation*	*Paragraph reference*
		instances where "NE" is reported for categories with existing methodologies and default EFs	
	Transparency	Ensure the consistency of the reporting of fuels across member States and summarize the allocation of fuels across subcategories and sectors among member States	44
	Reference approach	Correct the reporting of the notation keys and refinery feedstock in CRF table 1.A(b) and include further analysis of the differences between the approaches in the NIR	46 and 53
	International bunker fuels	Continue to verify member States' data against Eurocontrol and Eurostat data	52
	Feedstocks and non-energy use of fuels	Further clarify and ensure time-series consistency in the application of weighted averages for carbon stored fractions used since 2009 for some fuels	53
	Stationary combustion	Improve transparency by including an analysis of member States' outlying IEFs (values and trends) that have an impact on the IEF at the European Union level	54
	Fugitive emissions	Improve transparency by clarifying the inclusion of peat extraction for solid fuels	55
Industrial processes	Transparency	Explore the possibility of improving the information in CRF table 2(II).F	61
	Adipic acid production	Explain the drop in emissions in 2010	65
	Consumption of halocarbons and SF_6	Justify why the emissions from disposal are not estimated	66
Solvent and other product use	General	Develop and implement QA/QC procedures for the sector	63
Agriculture	Transparency	Improve the reporting of the recalculations by including numerical information and explanations at the member State level and improve the reporting on uncertainties	71
		Provide complete background tables with information from all member States	73 and 78
	Manure management	Encourage the member States to develop and use more country-specific parameters (e.g. VS and Bo) and report on any plans to collect missing farm-level data	80
		Achieve consistent reporting of the allocation per climate region across	81

Sector	*Category*	*Recommendation*	*Paragraph reference*
		member States and include climate data for each country	
LULUCF	Transparency	Improve the documentation of the rationale for and effect of each recalculation at the category level	85
	Completeness	Encourage member States to improve the consistency and completeness of their reporting on the sector and ensure a transparent description of the main assumptions and methods used by member States	86, 93, 94 and 95
	QA/QC	Improve QA/QC to ensure updated data are used in the NIR and provide evidence of QC activities	87 and 88
	Time-series consistency	Continue to detect deviations in the trend or in the member States' values for carbon stock change per area per given pool and report on the analysis and planned improvements	89
	Land converted to forest land	Continue to work with member States to improve the accuracy of their methods and increase the consistency of the reporting approaches among member States	91
	Land converted to cropland	Assist in improving the reporting of member States by using higher-tier methods and by improving the completeness of the reporting	92
Waste	Transparency	Include data on AD, IEFs and DOC at the member State level in the NIR when, owing to the heterogeneity of the AD, it is not provided in the CRF tables	100
		Include information on all recalculations performed for the sector	101
		Collect information on and analysis of the differences between the waste generation rate values reported by the member States	102
	Wastewater handling	Continue to encourage member States to move to a higher-tier method in estimating CH_4 and N_2O emissions from domestic and commercial wastewater treatment	104
	Waste incinerataion	Ensure consistent use of the notation keys across member States	106
KP-LULUCF	Transparency	Enhance the documentation of the specific reasons for and effects of the recalculations for each member State in the NIR	110
	Completeness	Report transparently, for each incidence of non-reported required	111 and 119–121

Sector	*Category*	*Recommendation*	*Paragraph reference*
		pools, verifiable information to demonstrate that these unaccounted pools are not net sources of emissions, and continue to work with member States to improve the completeness of their reporting and the use of the correct notations keys	
	Transparency	Include clarification of "the year of the onset of an activity, if after 2008"	112
		Include further explanation demonstrating that emissions from sources and removals by sinks resulting from elected activities under Article 3, paragraph 4, of the Kyoto Protocol are not accounted for under activities under Article 3, paragraph 3	113
		Improve the explanations when "IE" and "NE" have been used to report a pool	114
		Continue to work with member States to report correct areas in CRF table NIR-2 consistent with the background data tables	116

Abbreviations: AD = activity data, Bo = maximum methane-producing capacity for manure, CRF = common reporting format, DOC = degradable organic carbon, EF = emission factor, IE = included elsewhere, 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, LULUCF = land use, land-use change and forestry, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control, VS = volatile solids.

IV. Questions of implementation

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

Annex I

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>.

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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 methodologies and assumptions used.

Annex II

Acronyms and abbreviations

AD	activity data
Bo	maximum methane-producing capacity for manure
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
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
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
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
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
MCF	methane correction factor
Mt	million tonnes
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
UNFCCC	United Nations Framework Convention on Climate Change
VS	volatile solids