Advance Version

COMPLIANCE COMMITTEE

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Report of the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2010

Note by the secretariat

The report of the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2010 was published on 13 April 2011. 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/2010/GBR, 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.

United Nations FCCC/ARR/2010/GBR

Framework Convention on Climate Change

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Report of the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2010*

* In the symbol for this document, 2010 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2010 annual submission of the United Kingdom of Great Britain and Northern Ireland, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 13 to 18 September 2010 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Penelope Reyenga (Australia) and Mr. Klaus Radunsky (Austria); energy – Ms. Maria Liden (Sweden), Ms. Veronika Ginzburg (Russian Federation), Mr. Ricardo Fernandez (European Union (EU)) and Mr. Daniel Tutu Benefoh (Ghana); industrial processes – Mr. Jos Olivier (Netherlands), Mr. Samir Tantawi (Egypt) and Mr. Predrag Novosel (Montenegro); agriculture – Mr. Jacquest Bamikole Kouazounde (Benin) and Ms. Rocio Danica Condor (Italy); land use, land-use change and forestry (LULUCF) – Ms. Thelma Krug (Brazil) and Mr. Ravi Nijavalli (India); and waste – Mr. Davor Vesligaj (Croatia) and Mr. Juraj Farkas (Slovakia). Ms. Reyenga and Ms. Krug were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova and Mr. Harald Diaz-Bone (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of the United Kingdom, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. In accordance with these guidelines, the expert review team (ERT) officially notified the Government of the United Kingdom of the recommended adjustments to its 2010 greenhouse gas (GHG) inventory in accordance with the technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol, contained in the annex to decision 20/CMP.1. The Government of the United Kingdom notified the secretariat of its intention to accept the recommended adjustments within the time frame set out in the aforementioned guidelines.

B. Emission profiles and trends

3. In 2008, the main GHG in the United Kingdom was carbon dioxide (CO_2), accounting for 85.0 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (7.7 per cent) and nitrous oxide (N_2O) (5.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.9 per cent of the overall GHG emissions in the country. The energy sector accounted for 84.9 per cent of total GHG emissions, followed by agriculture (6.9 per cent), industrial processes (4.6 per cent) and waste (3.6 per cent). Total GHG emissions amounted to 631,774.50 Gg CO_2 eq and decreased by 18.8 cent between the base year[2] and 2008,[3] according to the estimates reported by the United Kingdom in its 2010 GHG annual submission.

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

[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, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

[3] The adjusted estimates of the GHG inventory for 2008 are not reflected in the values presented in this report, unless otherwise specified.

activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector, 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 United Kingdom's initial report under the Kyoto Protocol for the base year and subsequently used for the calculation of the assigned amount. Data shown in these tables do not include estimates adjusted by the ERT in line with procedures set out in the annex to decision 20/CMP.1 for a number of categories in the energy, industrial processes and agriculture sectors (see section II.G). These tables are based on data submitted by the Party on 7 May 2010; however, final adjusted estimates and the difference when compared to values included in the 7 May 2010 submission are provided in the footnotes.

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

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 to 2008[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*[b]	*Base year–2008 (%)*
Annex A sources		CO_2	591 170.84	591 170.84	553 196.00	553 080.23	557 649.29	555 123.42	547 521.00	536 745.81	–9.2
		CH_4	104 584.60	104 584.60	91 365.75	69 669.11	51 692.76	50 689.74	49 452.37	48 897.71	–53.2
		N_2O	65 136.32	65 136.32	53 578.01	42 320.54	36 908.61	35 285.36	34 767.98	33 960.70	–47.9
		HFCs	15 479.79	11 385.60	15 479.79	8 680.19	10 482.92	10 839.05	11 008.17	11 249.44	–27.3
		PFCs	462.04	1 401.60	462.04	466.47	261.45	305.88	221.04	208.97	–54.8
		SF_6	1 239.30	1 029.95	1 239.30	1 798.48	1 110.38	874.54	793.28	711.87	–42.6
KP-LULUCF	Article 3.3[c]	CO_2								–2 096.05	
		CH_4								13.54	
		N_2O								2.34	
	Article 3.4[d]	CO_2	NA							–10 714.36	NA
		CH_4	NA							14.50	NA
		N_2O	NA							1.47	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, and 1995 for HFCs, PFCs and SF_6. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] The table does not reflect the adjusted estimates for a number of categories in the energy, industrial processes and agriculture sectors (see section II.G) after adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the 7 May 2010 submission that was subject to these adjustments. The adjustments lead to an increase of total greenhouse gas (GHG) emissions for 2008 by 1,431.71 Gg CO_2 eq.

[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 2
Greenhouse gas emissions by sector and activity, base year to 2008

			Gg CO_2 eq								*Change*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008[b]*	*Base year–2008 (%)*
Annex A		Energy	612 122.89	612 122.89	568 504.49	560 516.11	559 697.87	557 050.85	546 929.34	536 276.47	–12.3
		Industrial processes	57 355.97	53 991.99	46 390.77	30 897.46	28 707.77	27 907.18	29 562.41	28 845.20	–49.8
		Solvent and other product use	NE, NO	NE, NO	NE NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NA
		Agriculture	55 645.68	55 645.68	53 359.25	50 373.09	46 723.28	45 194.69	44 335.82	43 831.22	–21.2
		Waste	52 948.35	52 948.35	47 066.38	34 228.36	22 976.50	22 965.26	22 936.28	22 821.61	–56.9
		Other	–28.83	–28.83	–45.04	–33.58	–17.69	–41.16	–41.16	–41.16	42.8
		LULUCF	2 953.90	2 953.90	1 278.82	–309.18	–1 913.88	–1 787.29	–1 851.80	–1 941.92	–165.8
		Total (with LULUCF)	**NA**	**777 633.98**	**716 554.67**	**675 672.26**	**656 173.86**	**651 289.53**	**641 870.88**	**629 791.43**	**NA**
		Total (without LULUCF)[c]	**778 072.89**	**774 708.91**	**715 320.89**	**676 015.02**	**658 105.42**	**653 117.99**	**643 763.85**	**631 774.50**	**–18.8**
KP-LULUCF	Article 3.3[d]	Afforestation & reforestation								–2 695.03	
		Deforestation								614.86	
		Total (3.3)								–2 080.17	
	Article 3.4[e]	Forest management	NA							–10 698.39	NA
		Cropland management	NA							NA	NA
		Grazing land management	NA							NA	NA
		Revegetation	NA							NA	NA
		Total (3.4)	NA							–10 698.39	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, NE = not estimated, 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, and 1995 for HFCs, PFCs and SF_6. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] The table does not reflect the adjusted estimates for a number of categories in the energy, industrial processes and agriculture sectors (see section II.G) after adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the 7 May 2010 submission that was subject to these adjustments. The adjustments lead to an increase of total greenhouse gas (GHG) emissions for 2008 by 1,431.71 Gg CO_2 eq.

[c] The United Kingdom has reported LULUCF emissions/removals in sector 7 "other". These emissions/removals are not included in the national totals.

[d] 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.

[e] 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 tonnes of carbon dioxide equivalent

	As reported	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	3 070 872 567		3 070 872 567	
Annex A emissions for current inventory year				
CO_2	536 745 812.69	213 572.83	536 959 385.52	
CH_4	48 897 708.54	26 489.17	48 924 197.71	
N_2O	33 960 700.02	660 254.41	34 620 954.43	
HFCs	11 249 442.54	531 390.71	11 780 833.25	
PFCs	208 967.29		208 967.29	
SF_6	711 872.31		711 872.31	
Total Annex A sources	**631 774 503.39**	**1 431 707.12**	**633 206 210.51**	
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	–2 695 030.10		–2 695 030.10	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NO		NO	
3.3 Deforestation for current year of commitment period as reported	614 864.67		614 864.67	
Activities under Article 3, paragraph 4, for current inventory year[d]				
3.4 Forest management for current year of commitment period	–10 698 385.81		–10 698 385.81	
3.4 Cropland management for current year of commitment period				
3.4 Cropland management for base year				
3.4 Grazing land management for current year of commitment period				
3.4 Grazing land management for base year				
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

Abbreviations: NO = not occurring.

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

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

[c] "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

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

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2010 annual inventory submission was submitted on 15 April 2010; it contains a complete set of common reporting format (CRF) tables for the period 1990–2008 and a national inventory report (NIR). The CRF tables were resubmitted on 7 May 2010 and the NIR on 28 April and 27 May 2010. The United Kingdom 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 under Article 3, paragraph 14, of the Kyoto Protocol. Revised standard electronic format (SEF) tables were submitted on 28 April 2010. The annual submission was submitted in accordance with decision 15/CMP.1.

7. The United Kingdom officially submitted additional information relating to some methodological and completeness problems and its reporting on KP-LULUCF on 29 October 2010 in response to potential problems raised by the ERT during the review.

8. 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.[4] Where necessary, the ERT also used the previous years' submissions during the review.

9. During the review, the United Kingdom provided the ERT with additional information and documents which are not part of the annual submission but are in many cases referenced in the NIR. The full list of information and documents used during the review is provided in annex I to this report.

Completeness of inventory

10. The United Kingdom has submitted a complete set of CRF tables for the years 1990–2008 and an NIR; these are generally complete in terms of geographical coverage (an exception is specified in para. 45 below), sectors, categories and gases. However, the following categories, for which methodologies are available in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) 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), were not reported: N_2O emissions from the disturbance of soils associated with forest land and grassland conversion to cropland; fugitive CH_4 emissions from other leakage of natural gas; and N_2O emissions from the application of sewerage sludge to agricultural soils.

11. Having received clarifications from the Party, the ERT identified that a number of categories reported as not estimated ("NE") should have been reported as either not occurring ("NO") or included elsewhere ("IE") (see paras. 32, 49 and 86 below). The ERT

[4] The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), 6(c) and 6(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.

recommends that the United Kingdom revise the notation keys used in the CRF tables and provide adequate information in CRF table 9(a) on emissions included elsewhere.

12. In addition, the United Kingdom does not report emissions from some other categories (e.g. solvent and other product use) for which there are no default IPCC methodologies available or which are non-mandatory LULUCF categories. The ERT encourages the United Kingdom to report, in its future annual submissions, emission estimates for categories not yet addressed, in order to further improve the completeness and accuracy of its inventory.

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

Overview

13. The ERT concluded that the national system continues to perform its required functions. The United Kingdom described a minor change to the national system since the previous annual submission, relating to the addition of new groups to the National Inventory Steering Committee. This change is discussed in more detail in chapter II.H.3 of this report.

Inventory planning

14. The NIR described the national system and institutional arrangements for the preparation of the inventory. The Department of Energy and Climate Change (DECC) is the designated single national entity with overall responsibility for the national inventory. The national inventory is prepared by AEA Technology plc (AEA), which performs the role of inventory agency, under contract to DECC. AEA is responsible for inventory planning, inventory management, data collection, estimating emissions, quality assurance/quality control (QA/QC) and archiving. Other organizations involved in the preparation of the inventory estimates are: for the agriculture sector, North Wyke Research, under contract to the Department for Environment, Food and Rural Affairs (Defra); and, for the LULUCF sector, the United Kingdom Centre for Ecology and Hydrology, under separate contract to DECC. The United Kingdom has established a cross-government National Inventory Steering Committee, which considers and approves the inventory before it is submitted to the secretariat.

15. Key data for the inventory include the national energy statistics compiled by DECC, agricultural statistics compiled by Defra, pollution inventories compiled by the environment agencies and information on forestry from the Forestry Commission. Data also come from other sources, ranging from individual plant operators and industry associations to other governmental and non-governmental organizations. The Party's last three annual submissions have indicated that DECC is working to introduce data supply agreements with key data suppliers in order to formalize the acquisition of the data and ensure the delivery of quality and timely data for the inventory. During the review, the United Kingdom indicated that DECC has been working with Defra to establish agreements that encompass both the GHG and the air quality inventory and that the first of these agreements is expected to be in place by October 2010. The ERT recommends that the United Kingdom report on the progress in, and a time frame for, completing these agreements in its next annual submission.

16. The present ERT noted that many of the recommendations of the previous ERT, which in many cases were already reiterations of recommendations made in previous review reports, have still not been taken into account by the Party in its 2010 submission. The previous ERT had been informed by the Party that a number of these recommendations

would be implemented in the 2010 submission. The present ERT recommends that the United Kingdom use the recommendations made in the review reports as a tool for prioritizing planned improvements to its inventory, and include in the NIR either more details on the actions taken to address the recommendations or clear time frames for undertaking such actions in the future.

Inventory preparation

Key categories

17. The United Kingdom has reported a key category tier 2 analysis, both level and trend assessment, as part of its 2010 submission. The key category analysis performed by the Party and that performed by the secretariat[5] produced different results, as the United Kingdom's analysis includes uncertainties. The United Kingdom has included the LULUCF sector in its key category analysis, which was performed in accordance with the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC good practice guidance for LULUCF. The United Kingdom uses the key category analysis to plan improvements to its inventory.

18. With the adoption by the Party of a tier 2 key category analysis, a number of categories which would be considered key under the tier 1 approach are no longer considered key. The ERT recommends that the United Kingdom undertake a qualitative analysis to ensure that categories which are particularly significant in terms of level or trend are identified as key categories.

19. The United Kingdom has identified CO_2 emissions from all activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol as key categories. The NIR and the KP-LULUCF tables provide details on the criteria used to determine the key categories.

Uncertainties

20. The United Kingdom has performed both tier 1 and tier 2 uncertainty analyses. The NIR provides a description of the assumptions used for the analyses, along with an analysis of the uncertainty by gas and for the total emissions. The tier 1 and tier 2 analyses produced consistent estimates of the total uncertainty for the estimate of total emissions in 2008 (16 and 14 per cent, respectively). The tier 2 uncertainty reported for 2007 in the 2009 submission was 13 per cent. The United Kingdom reports that the results of the uncertainty analysis and associated key category analysis are considered by its National Inventory Steering Committee in determining priorities for the development of methodologies.

Recalculations and time-series consistency

21. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by the United Kingdom of the time series 1990–2007 have been undertaken to take into account the inclusion of new categories, revised activity data (AD) and methodologies, and the correction of errors (see paras. 34, 51, 65, 77, 88 below). The impact of these recalculations includes increases in the

[5] 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 LULUCF. 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.

estimated total GHG emissions in the base year of 0.1 per cent and in 2007 of 0.5 per cent, with major recalculations performed for emissions of fluorinated gases (F-gases) (13.8 per cent increase), N_2O from manure management (25.6 per cent increase) and emissions from the category other (energy sector) (17.6 per cent decrease). The reasons for these recalculations are provided in the NIR and in CRF table 8(b). However, the ERT recommends that the transparency of this information be enhanced by providing more detailed justifications and analysis of the impacts of the changes, particularly on time-series consistency.

Verification and quality assurance/quality control approaches

22. The United Kingdom has in place a QA/QC plan. The NIR provides a description of the Party's QA/QC and verification procedures, which are in line with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines). Information on tier 1 QC procedures, QA and verification activities is included in the introduction to the NIR, while information on category-specific procedures (tier 2) is included in the sectoral chapters. For example, DECC and the regulators of the EU emissions trading scheme (EU ETS) work to identify and resolve data inconsistencies between the published energy statistics used to estimate emissions for the inventory and the data from the EU ETS. The NIR also outlines the stakeholder consultations that have been undertaken in the last 12 months to resolve gaps and inconsistencies in data and to review emission factors (EFs). The ERT encourages the United Kingdom to undertake additional tier 2 QC checks, such as comparisons of its implied emission factors (IEFs) with default IPCC EFs and the IEFs of other Parties, where country-specific methods have been used.

23. Although the NIR states that tier 1 QC checks have been implemented, the ERT identified a number of omissions and mistakes. In the reporting on the agriculture sector, the ERT identified a number of mistakes and incomplete tables (see para. 64 below). In the reporting on the energy sector, the ERT noted that the amount of peat consumed in the residential sector has been omitted from the AD in the CRF tables in two subsequent submissions, even though this issue was raised during the previous review and acknowledged by the Party. The ERT also identified some inconsistencies between the NIR and the CRF tables for the LULUCF sector with respect to the AD reported in the land-use change matrix tables. The ERT recommends that the United Kingdom improve its QC checks on the NIR and the CRF tables prior to their submission and ensure the completeness of its reporting in all tables.

Transparency

24. The Party's 2010 submission is generally transparent, supplying background information to explain the AD used and methods applied. However, the ERT recommends that the United Kingdom enhance the transparency of the NIR by providing additional information to justify its choice of country-specific EFs and explain how time-series consistency has been maintained. In addition, the ERT reiterates the recommendation of the previous ERT that the Party include a more detailed discussion on completeness in the main body of the NIR. Other transparency issues identified relate to the reporting of emissions from the United Kingdom's Overseas Territories (OTs) and Crown Dependencies (CDs) and the aggregation and allocation of emissions across different categories, gases and sectors (see paras. 63, 75 and 87 below). More information on issues in relation to the transparency of the United Kingdom's inventory is provided in detail in the sector chapters of this report.

Inventory management

25. The United Kingdom has a centralized archiving system, maintained by AEA, 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.

3. Follow-up to previous reviews

26. The ERT found that the United Kingdom did implement, in its 2010 annual submission, some of the recommendations made in the previous review report, such as:

(a) Including estimates of fugitive CO_2 emissions from natural gas for the first time;

(b) Providing explanations for all recalculations in CRF table 8(b);

(c) Providing more detailed information in CRF table 9(a) on categories reported as "NE" and "IE";

(d) Explaining how the uncertainty analysis is used to prioritize further improvements to the inventory;

(e) Including more detailed descriptions of implemented QA procedures and the planning of external peer review activities;

(f) Upgrading the national registry software to address issues raised in the previous SIAR and enhancing the user interface of the registry by providing the required public information.

27. The main recommendations made in previous review reports which have not been implemented by the United Kingdom in its 2010 annual submission include:

(a) Estimating emissions for categories reported as "NE" and for which methods exist in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance;

(b) Including, in the main body of the NIR, a complete discussion on completeness;

(c) Concluding formal data supply agreements with data providers;

(d) Allocating fuel consumption for and emissions from direct flights between the United Kingdom and its OTs under domestic aviation;

(e) Including the emissions from the LULUCF sector in the CDs and OTs under the LULUCF sector and not under the sector 7 "other";

(f) Allocating emissions from fuels used in manufacturing industries and construction to the appropriate subcategories;

(g) Reporting emissions of F-gases by species.

4. Areas for further improvement

Identified by the Party

28. The 2010 NIR identifies several areas for improvement. The United Kingdom indicated that it is working to improve its estimates of: direct N_2O emissions from soils and N_2O from leaching/run-off; N_2O and ammonia (NH_3) emissions from manure management systems; CH_4 emissions from enteric fermentation; CH_4 emissions from landfills; and

emissions of F-gases disaggregated by species. The ERT commends the United Kingdom for its efforts to improve the inventory and encourages the Party to give an indication in the NIR of when the results will be implemented in the annual submission.

Identified by the expert review team

29. The ERT identifies the following cross-cutting issues for improvement, namely that the Party should:

(a) Address outstanding recommendations made in previous review reports and include in the NIR either more details on the actions taken to address these recommendations or clear time frames for undertaking such actions in the future;

(b) Improve the transparency of the NIR by including more information to justify the choice of country-specific EFs and explanations of how time-series consistency has been maintained where data sources have changed or there have been recalculations;

(c) Improve the transparency of the reporting on the OTs and CDs by including information on the methods and data used for estimating their emissions and reporting those emissions under the appropriate categories and subcategories;

(d) Review its use of the notation keys in the CRF tables;

(e) Improve the QC of the CRF tables and the NIR prior to their submission. The ERT also encourages the Party to undertake additional tier 2 category-specific QC checks, such as comparisons of its IEFs with the IPCC default EFs and the IEFs of other Parties, where country-specific methods have been used;

(f) Undertake a qualitative analysis to ensure that categories which are particularly significant in level or trend are identified as key categories.

30. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

B. Energy

1. Sector overview

31. The energy sector is the main sector in the GHG inventory of the United Kingdom. In 2008, emissions from the energy sector amounted to 536,276.47 CO_2 eq, or 84.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 12.4 per cent. The Party explained that the drivers for this emission trend were fuel switching to less carbon-intensive energy sources (like coal to gas in the power sector) and the reduced energy intensity of the economy. Over the period 1990–2008, the only category in which there was an increase in emissions was transport (by 8.6 per cent). Within the sector, 38.7 per cent of the emissions were from energy industries, followed by 24.1 per cent from transport, 19.9 per cent from other sectors and 14.3 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 1.8 per cent and fugitive emissions from solid fuels accounted for 0.6 per cent. The remaining 0.6 per cent were from military fuel use.

32. The inventory for the energy sector is generally complete, with the exception of CH_4 emissions from other leakage, which are reported as "NE". Since the Party has not submitted estimates for these emissions as requested by the ERT, an adjustment was calculated for the category (see chapter II.G of this report). The ERT noted several categories reported as "NE" which should be reported as either "NO" (other fuels (scrap tyres) in public electricity and heat production) or "IE" (gaseous fuels and liquefied petroleum gas (LPG) in road transportation, and solid fuels in domestic navigation).

33. The reporting on the energy sector is generally transparent, with the exception of the reporting on emissions from manufacturing industries and construction (as discussed in para. 42 below) and on feedstocks and non-energy use of fuels (see para. 40). The methodologies used are well documented in the NIR, with sufficient background information to explain the methods applied and justify the choice of EFs. The use of EU ETS data in the inventory is also transparently described.

34. Recalculations have been performed for all years and all categories, owing to revisions to the energy statistics and EFs used and the inclusion of estimates of fugitive CO_2 emissions from natural gas for the first time. The impact of these recalculations on emission levels in the energy sector is generally very small: in total, a 925.60 Gg CO_2 eq, or 0.2 per cent, increase for 2007 and a 118.47 Gg CO_2 eq, or 0.02 per cent, decrease for 1990. The recalculations and their impact (in terms of emission levels and trends) are transparently described in the CRF tables and the NIR.

35. Most of the recommendations of the previous ERT with regard to the energy sector have not been taken into account in the Party's 2010 submission. As a result, the present ERT reiterates in the paragraphs below many of the recommendations of the previous ERT. It recommends that the United Kingdom use the recommendations made in previous review reports as a tool for prioritizing planned improvements to its inventory, and include in the NIR more details on the actions taken to address those recommendations.

2. Reference and sectoral approaches

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

36. The CO_2 emission estimates for 2008 calculated using the reference approach were 0.9 per cent higher than the estimates calculated using the sectoral approach. The United Kingdom provides explanations for the differences in both the NIR and the CRF tables.

37. The ERT noted that the apparent energy consumption in the reference approach and the apparent energy consumption (excluding feedstocks and non-energy use of fuels) reported in CRF table 1.A(c) are almost identical, even though a significant fuel consumption is listed for non-energy purposes in CRF table 1.A(d). The ERT reiterates the recommendation made in the previous review report that the United Kingdom correct this inconsistency in its next annual submission and that it properly report fuel quantities in the respective tables.

38. Apparent energy consumption in the United Kingdom's reference approach corresponds closely to the data reported to the International Energy Agency (IEA), with the respective data within 1 per cent of each other for all years of the time series. The growth rate in the period 1990–2008 for the total apparent consumption is 0 per cent as reported in the CRF tables and 1 per cent according to the IEA data.

International bunker fuels

39. The fuel consumption for international aviation as reported in CRF table 1.C is within 5 per cent of that reported to the IEA from 1999 to 2008. The differences in the data relating to international marine bunkers are more significant, with a difference between the reporting in the CRF tables and the IEA data of around 15 per cent for the earlier years of the time series and of close to 6 per cent for the later years. The United Kingdom informed the ERT that the Digest of United Kingdom Energy Statistics (DUKES) provides to the IEA the volume of bunker fuel allocated to domestic and international shipping, while in the inventory, the DUKES volume from international bunker fuel is allocated to international bunker fuel and military mobile combustion. The ERT recommends that the United Kingdom include this information in its next annual submission.

Feedstocks and non-energy use of fuels

40. Previous ERTs have identified that several fuels used as feedstocks for non-energy purposes are reported in CRF table 1.A(d), while the section in the NIR regarding feedstocks and non-energy use of fuels refers only to the section explaining the use of natural gas as a feedstock for the production of NH_3, methanol and acetic acid. The United Kingdom provided the previous ERT with relevant information on this issue, which was recommended to be included in its next NIR. However, the transparency of the NIR has not been improved in the 2010 submission. The present ERT reiterates the recommendation of previous ERTs that the United Kingdom, in the NIR of its next annual submission, include relevant information on all fuel types used as feedstocks and for non-energy uses, including information on the data sources for the fractions of carbon stored. In addition, the ERT recommends that additional information be reported in CRF table 1.A(d) indicating from which categories in the energy sector carbon stored is subtracted and where associated CO_2 emissions are allocated, in order to improve the transparency of the reporting.

3. Key categories

Stationary combustion: all fuels – CO_2, CH_4 and N_2O

41. Emissions from stationary combustion are estimated using a combination of tier 1, 2 and 3 methodologies. National energy statistics published in DUKES are the main source of AD for stationary combustion. The Party also uses plant-specific data from sources such as the EU ETS and the directive on integrated pollution prevention and control to verify and improve data collected from DUKES. The ERT commends the Party for sourcing all available data in order to calculate the most accurate estimate possible for the inventory and to improve the QA/QC for the stationary combustion category.

42. With regard to emissions from fuels used in manufacturing industries and construction, the United Kingdom has reported all emissions under the category other (manufacturing industries and construction), except for emissions from iron and steel. This significantly reduces the transparency of the inventory. Given that the United Kingdom's energy statistics are disaggregated according to the same categories as required in the CRF tables, previous ERTs have identified that the Party should have the institutional arrangements and/or capacity to report these emissions under the appropriate categories. Previous ERTs have recommended that the United Kingdom allocate these emissions to the appropriate categories in its future annual submissions. In response to questions raised by the previous ERT, the United Kingdom indicated that disaggregating data is possible but would require substantial work, and it indicated its plan to include these disaggregated data in its 2010 submission. However, this plan has still not been implemented. The present ERT reiterates the recommendation of previous ERTs and strongly recommends that the United Kingdom continue its efforts to allocate these emissions to different categories, and report thereon in its next annual submission.

Road transportation: liquid and gaseous fuels – CO_2, CH_4 and N_2O[6]

43. Emissions of CH_4 and N_2O from the use of LPG for road transportation and all emissions from the use of natural gas for road transportation are currently reported as "NE". According to the NIR and additional information provided to the ERT by the United Kingdom, CH_4 and N_2O emissions from road transportation are estimated on the basis of information on vehicle kilometres travelled split by the petrol and diesel fuel types. Since

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

this information is considered to be complete, this implies that CH_4 and N_2O emissions from the use of LPG and natural gas for road transportation are included in the emission estimates for petrol and diesel. The United Kingdom also informed the ERT that the consumption of natural gas (and the related CO_2 emissions) is included under other categories in DUKES. The ERT recommends that the United Kingdom report these emissions as "IE" in its next annual submission and include transparent information on the reporting of the category in the NIR.

4. Non-key categories

Stationary combustion: other fuels – CO_2, CH_4 and N_2O

44. As noted in the NIR, the CO_2 EF used for combustion of municipal solid waste (MSW) developed in 1993 has been reviewed and is considered to need improvement, since the composition of the waste has most likely changed over time; however, the choice of a new methodology and the revision of emission estimates were not possible for the 2010 submission. The ERT recommends that the United Kingdom report revised emission estimates in its next annual submission. Emissions from the incineration of MSW in heat generation are currently reported under other sectors, which is not in accordance with the IPCC good practice guidance. The ERT recommends that the United Kingdom reallocate these emissions to the category public electricity and heat production in its next annual submission. In response to a question raised by the ERT, the United Kingdom indicated that it intends to reallocate these emissions in its next annual submission.

Civil aviation: liquid fuels – CO_2, CH_4 and N_2O

45. The data contained in DUKES are used to estimate emissions from civil aviation. This means that only fuel used in England, Wales, Scotland and Northern Ireland and any oil supplied from the United Kingdom to the Channel Islands and the Isle of Man are included. However, as previous ERTs have noted, direct flights operate to Gibraltar and Bermuda, which should also be considered under civil aviation according to the IPCC good practice guidance but which are currently reported under international bunkers (aviation). The current methodology leads to an underestimation of the emissions from domestic aviation reported under the energy sector. The ERT reiterates the recommendation made in previous review reports that the United Kingdom reallocate the fuel consumption for and the emissions from all direct flights between the United Kingdom and its OTs, which are currently reported under international bunkers (aviation), to civil aviation, consistent with the methodological approach provided in the IPCC good practice guidance. Since the Party did not submit revised estimates as requested by the ERT, an adjustment was calculated for this category (see chapter II.G of this report).

C. Industrial processes and solvent and other product use

1. Sector overview

46. In 2008, emissions from the industrial processes sector amounted to 28,845.20 Gg CO_2 eq, or 4.6 per cent of total GHG emissions. Emissions from the solvent and other product use sector have been reported as "NE" or "NO". Since the base year, emissions have decreased by 49.7 per cent in the industrial processes sector. The key drivers for the fall in emissions in the industrial process sector are the use of new abatement technologies, resulting in very large decreases in N_2O emissions from adipic acid production and in HFC-23 emissions from hydrochlorofluorocarbon (HCFC)-22 production, and the fact that CO_2 emissions from cement production decreased by almost one third, owing to a decrease in production. These decreases were partly compensated for by the large increase in the use of

HFCs in applications, resulting in increasing HFC emissions. Within the industrial processes sector, 25.1 per cent of the emissions were HFC emissions from refrigeration and air-conditioning equipment, followed by 18.0 per cent from cement production, 10.5 per cent from aerosols and 8.9 per cent from iron and steel production. Limestone and dolomite use accounted for 5.4 per cent and N_2O from nitric acid production accounted for 5.1 per cent. The remaining 27.1 per cent were from other categories.

47. The reporting of emissions for this sector is largely complete, with soda ash production and ferroalloys production being reported as "NE" for the period 1990–1993. A number of other categories for which there are no default IPCC methods are also reported as "NE".

48. In several cases, the NIR does not explain transparently how time-series consistency was maintained (e.g. when different sources for the AD for 1990–2003 and for 2004 onwards were used for reporting on CO_2 from lime production; and with regard to how AD for the glass industry for the period 1999–2008 were extrapolated for estimating CO_2 from limestone and dolomite use) or how the country-specific EFs and their trends over time were determined (e.g. for CO_2 and PFC emissions from aluminium production and for consumption of halocarbons and SF_6). In addition, the description of which emissions from non-energy use/feedstocks have been included in the estimates of CO_2 from other chemical production is not fully transparent. The ERT recommends that the United Kingdom include in its next NIR more specific information on the above issues using the information provided during the review week.

49. Country-specific categories have been added in CRF table 2(II) under the subcategory other (consumption of halocarbons and SF_6). However, no further details on these categories are included in CRF table 2(II).F. The ERT recommends that the United Kingdom provide further relevant details in this CRF table in order to ensure the transparency and comparability of its reporting. The ERT noted the incorrect use of the notation keys for the categories degreasing and dry cleaning and other (solvent and other product use) in CRF table 3.A-D, where N_2O emissions are reported as "NE" instead of "NO". The ERT recommends that the United Kingdom review its use of the notation keys in CRF table 3.A-D.

50. The United Kingdom reports F-gases only at the aggregated level of total HFCs and PFCs (in CO_2 eq), thereby reducing transparency and preventing the assessment of the consistency and comparability of these emissions and the IEFs. In 2009, the United Kingdom indicated that it was planning to review the way in which PFC and HFC emissions were reported, but no relevant progress was seen or reported in the 2010 NIR. The United Kingdom informed the ERT that it is continuing to investigate this matter and requires more time. Noting this response, the ERT recommends that the Party either report HFCs and PFCs disaggregated by gas in its next annual submission or, if that is not possible, report on the progress towards doing so. The ERT also encourages the United Kingdom to recheck with operators as to whether they would approve the disclosure of information on the by-product HFC-23 emissions from HCFC-22 production, as operators in other countries do.

51. Major recalculations were performed for HFC emissions from refrigeration and foam blowing, in order to incorporate sales data (resulting in an increase of 1,373.47 Gg CO_2 eq in the emission estimate for 2007). Smaller recalculations were performed for emissions from lime production and soda ash use, where AD were updated (resulting in an increase of 269.96 Gg CO_2 eq in the emissions estimate for 2007). Overall, the recalculations in this sector resulted in a 0.2 per cent decrease in the estimate of the sectoral emissions for the base year and a 6.0 per cent increase for 2007. The recalculations are generally well justified.

52. All recommendations made in the previous review report relating to the industrial processes sector have been implemented, except for the disaggregated reporting of F-gases (see para. 50 above).

2. Key categories

Nitric acid production – N_2O

53. Production data for the early 1990s used to calculate N_2O emissions from nitric acid production are based largely on the production capacity reported by the plant operators directly in days of use per year, which the ERT considers to be an acceptable method for estimating the AD when reported production levels are missing. From 1998 onwards, all production and emissions data were supplied by the plant operators directly. The method used by plants to estimate emissions in recent years was not described in the NIR, but this information was provided during the review. To improve the transparency of the NIR, the ERT recommends that the United Kingdom provide this information in the NIR as well as a more accurate description of how the AD for the early 1990s were estimated. Moreover, since all N_2O emissions are currently determined by continuous emission monitoring systems, the ERT recommends that the EF uncertainty estimate for the last year be updated. The ERT noted that the AD reported in the CRF tables are too low by a factor of 1,000. The ERT recommends that the units used be checked, and corrected if necessary.

Consumption of halocarbons and SF_6 – HFCs and SF_6

54. The estimates for this category are model-based. The present description in the NIR of the EFs used is not transparent, in that it does not provide the basic EF values, the data source of and rationale for the selected EF values or explain their trends over time. In response to a question raised by the ERT, the United Kingdom provided information on the EFs for SF_6 from electrical equipment, HFCs from fire extinguishers, and semiconductor manufacture. The ERT recommends that the United Kingdom enhance the transparency and comparability of its reporting by including a table with EFs (product manufacturing factors, product life factors (PLFs) and disposal loss factors) by application over time in its next annual submission. In addition, the ERT recommends that the United Kingdom check the model used for calculating emissions from refrigeration and the AD, emissions and PLFs reported in the CRF sectoral background data table 2(II).F for refrigeration, and correct them if necessary.

55. The United Kingdom has reported annual leakage rates (PLFs) for mobile air conditioners and transport refrigeration in 2008 of 7.5 per cent and 8 per cent, respectively. These rates are lower than the IPCC default ranges of 10–20 per cent and 15–50 per cent, respectively, and the values reported by other Parties (for mobile air conditioners, mostly around 10–12 per cent). In response to the potential problem raised by the ERT with regard to this issue, the United Kingdom provided additional information which was sufficient to justify the low PLF for mobile air conditioners. However, the information was found insufficient to justify why the average annual leakage rate for transport refrigeration in the United Kingdom in recent years is lower than the IPCC default rate and the values reported by other Parties. This was considered to be a potential underestimation and led to an adjustment being calculated (see chapter II.G of this report).

3. Non-key categories

Cement production – CO_2

56. According to the United Kingdom's tier 2 key category analysis, cement production is not a key category. However, excluding uncertainties, this category is by far the most significant category within the industrial processes sector. The ERT recommends therefore,

based on this quantitative and qualitative criterion, that the United Kingdom consider this category as key.

57. EU ETS data are used to estimate emissions from cement production for the period 2005–2008. During the review, the United Kingdom explained that, in 2008, 80 per cent of these emissions were estimated using tier 3 (plant-specific) EFs and 20 per cent were estimated using tier 2 (country-specific default) EFs. The United Kingdom also explained that the IEF for cement production is higher than the IPCC default and among the highest of all the values reported by Parties as the United Kingdom's estimates include, in addition to emissions from clinker and kiln dust, emissions from non-carbonate sources and other process sources. The ERT recommends that the United Kingdom include, in its next annual submission, the summary information on the components of the EFs provided during the review week as well as additional information to better explain the inter-annual variation in the IEF, the choices made for the year(s) to backcast the EF to maintain time-series consistency and the extent and type of category-specific QC performed, such as the information provided during the review week.

58. In its 2010 submission, the United Kingdom did not provide AD for cement production, but used the notation key "C" (confidential). The United Kingdom explained that providing these data would disclose the production of one plant in Northern Ireland. The total production of all 13 other plants is publicly available and cement production was reported in the Party's previous annual submissions. Since this lack of AD reduces the transparency and comparability of the Party's IEF (level and trend), the ERT encourages the United Kingdom to find a way to provide the missing AD, for example by providing an estimated national total.

Ferroalloys production – CO_2

59. According to the British Geological Survey and the United States Geological Survey,[7] production of ferroalloys did take place in the United Kingdom in the period 1990–1993; however, the Party has not reported emissions under this subcategory in its NIR. The ERT encourages the Party to investigate this further and report the results in its next annual submission.

Aluminium and magnesium foundries – HFCs and SF_6

60. The United Kingdom reports in the NIR that both SF_6 and HFCs are used as a cover gas in magnesium foundries. The Party reports these emissions under the subcategory other (metal production), since it is not possible to report HFCs under the subcategory aluminium and magnesium foundries. The ERT commends the United Kingdom for including HFC estimates and, since they are reported only by the United Kingdom, the ERT recommends that the Party provide more background information on the use and emissions of HFCs under this category in its next NIR, including the amounts emitted.

D. Agriculture

1. Sector overview

61. In 2008, emissions from the agriculture sector amounted to 43,831.22 Gg CO_2 eq, or 6.9 per cent of total GHG emissions. Since 1990, emissions have decreased by 21.2 per cent. The key drivers for the fall in emissions are the decrease in livestock numbers and the reduced use of synthetic fertilizer, owing to changes in agricultural practices. Within the

[7] <http://www.bgs.ac.uk/downloads/start.cfm?id=1551> and <http://minerals.usgs.gov/minerals/pubs/commodity/ferroalloys/>.

sector, 53.2 per cent of the emissions were from agricultural soils, followed by 35.4 per cent from enteric fermentation and 11.2 per cent from manure management. The remaining 0.15 per cent were from other, which includes N_2O emissions from manure management in the CDs and OTs.

62. The inventory for the agriculture sector is generally complete in terms of categories and gases covered, except for N_2O emissions from the application of sewage sludge, which were reported as "NE". Since the Party has not submitted this estimate as requested by the ERT, an adjustment was calculated for the category (see chapter II.G of this report). Rice cultivation and savanna burning do not occur in the country and the field burning of agricultural residues has not occurred since 1994. With regard to geographical coverage, emissions from the CDs and OTs are reported, although the N_2O emissions from manure management are reported under the category other (agriculture). The ERT recommends that the Party report these emissions under manure management.

63. The ERT recommends that the Party further enhance the transparency of its NIR by including in its next annual submission the following: a complete characterization for the animals for which a tier 2 approach is used; references for all parameters used; justifications for EFs (and IEFs) which differ from the IPCC defaults (e.g. the CH_4 EF for enteric fermentation and manure management for sheep and the CH_4 EF for manure management for cattle, which are lower than the IPCC default ranges); and the direct web link for the official agricultural statistics. In addition, the ERT recommends that the AD, methods and EFs used for estimating emissions from the CDs and OTs be reported in the Party's next annual submission.

64. The ERT also recommends that the United Kingdom improve its QC checks on the CRF tables prior to their submission, as the ERT identified a number of mistakes in the reporting (e.g. incorrect CH_4 producing potential (Bo), volatile solids values, values used to report nitrogen (N) excretion, and the N_2O IEF for liquid systems) and incomplete tables (e.g. FRAC parameters, pregnancy parameters and methane conversion factors).

65. The United Kingdom has reported recalculations in the agriculture sector for the entire time series. The correction of the application of N volatilization rates for the estimation of N_2O emissions from manure management and agricultural soils led to the most significant recalculations. Other reasons for recalculations included updates to the weights of dairy cattle, and the implementation of a tier 2 method for estimating emissions from enteric fermentation for non-dairy cattle. The recalculations in the sector resulted in an increase in the estimate of the sectoral emissions of 688.30 Gg CO_2 eq (1.2 per cent) for 1990 and an increase of 876.65 Gg CO_2 eq (2.0 per cent) for 2007. These recalculations were performed in response to recommendations made by previous ERTs.

2. Key categories

Enteric fermentation – CH_4

66. Emissions from dairy and non-dairy cattle are estimated using the IPCC tier 2 method. The United Kingdom's IEF for dairy cattle is the highest of those reported by the EU countries, owing to its selection of a higher digestibility (DE) value (75 per cent). While the DE value is within the range provided in the IPCC good practice guidance, the NIR does not provide a justification for why this high value was selected. During the review, the United Kingdom explained that the DE value is based on country-specific data[8] on different feeds. To enhance the transparency of the country-specific data, the ERT recommends that the Party provide in its NIR the complete time series of the parameters

[8] Ministry of Agriculture, Fisheries and Food. 1990. *UK tables of nutritive value and chemical composition of feeding stuffs*. Rowett Research Services Ltd, Bucksburn, Aberdeen.

used in the tier 2 approach for estimating emissions from cattle, providing also references and justifications for any country-specific assumptions.

67. The ERT identified that between 2004 and 2005 the IEF for dairy cattle increased by 15.6 per cent. During the review, the Party explained that this difference is due to a change in the methodology used for gathering the AD in 2005. The ERT recommends that the Party include an explanation of any changes in methods for AD collection and the implications of such changes for time-series consistency in its next annual submission.

Manure management – N_2O

68. Tier 1 methods are used to estimate N_2O emissions from manure management for all animal categories, although the Party had already indicated its intention to use tier 2 methods for its 2010 submission. As this category is identified as a key category, the ERT recommends that the United Kingdom implement tier 2 methods, giving priority to cattle, swine and sheep.

69. The N_2O IEF for solid storage and dry lot and other animal waste management systems reported by the United Kingdom has been identified as the highest of these values among the reporting Parties. The United Kingdom indicated that this high IEF is due to an error in the calculations and that the estimates would be revised for its next annual submission. The ERT recommends that the justification for the selection of, and references for, the N excretion parameters, along with explanations for any recalculations, be provided in the Party's next annual submission.

70. The United Kingdom used a constant N excretion rate for beef cattle across the time series. The previous ERT recommended that the Party revise its N excretion rates on the basis of the animals' average body weights. During the review, the Party explained that, as the weights of non-dairy cattle are kept constant throughout the time series, the N excretion rates are also held constant. The present ERT reiterates the recommendation of the previous ERT that the Party estimate changes in weight over time for the non-dairy cattle classes, as has been done for dairy cattle.

Agricultural soils – N_2O

71. The United Kingdom's inventory includes a country-specific subcategory under agricultural soils called improved grassland. The NIR does not provide adequate information on the methods used to calculate the estimates for this subcategory. The ERT recommends that the United Kingdom provide detailed information on this subcategory in its next annual submission.

3. Non-key categories

Manure management – CH_4

72. The tier 1 method is used to estimate CH_4 emissions from manure management for all animal categories, except for cattle, sheep and deer. The ERT encourages the Party to prioritize improvements to the swine category, which has the second highest share of the CH_4 emissions from manure management.

73. The ERT noted that, for swine, different manure management system allocations for solid storage and pasture are used for the estimation of CH_4 and N_2O emissions. As the allocations selected can result in significantly different estimates of emissions, the ERT recommends that the Party select the most appropriate allocation for its national circumstances and use this allocation consistently for the estimates of CH_4 and N_2O emissions from manure management.

E. Land use, land-use change and forestry

1. Sector overview

74. In 2008, net removals from the LULUCF sector amounted to 1,941.92 Gg CO_2 eq. In 1990, the LULUCF sector was a net source of 2,953.90 Gg CO_2 eq, but it has become a net sink since 1999. The key driver for this change is the increase in removals from forest land and grassland during the period 1990–2008. Cropland remained a major source of emissions over the entire time series 1990–2008. Within the sector, in 2008, forest land and grassland accounted for net removals of 13,609.91 and 8,147.52 Gg CO_2 eq, respectively. Cropland contributed net emissions of 15,243.39 Gg, CO_2 eq followed by settlements with 6,286.35 Gg CO_2 eq. In addition, the Party has reported an increase in the harvested wood products pool, corresponding to an increase in carbon stock equal to 1,714.23 Gg CO_2 eq.

75. The inventory for the LULUCF sector is generally complete, incorporating estimates for the mandatory categories, gases and pools, with the exception of N_2O emissions from the disturbance of soils associated with forest land and grassland conversion to cropland. In response to a recommendation of the previous ERT, information has been provided to support the assumption that there have been no net changes in carbon stocks on forest land remaining forest land. With regard to geographical coverage, LULUCF estimates for the CDs and OTs are reported under the sector other (sector 7). However, such reporting does not distinguish between the LULUCF categories and subcategories (e.g. land conversions). The ERT recommends that the Party identify the land-use categories relevant to the emissions/removals of the CDs and OTs and report the corresponding estimates as a subcategory of the appropriate land-use categories in the CRF tables, as well as that the Party amend the relevant information provided in the NIR.

76. The United Kingdom uses approach 2 for the representation of land-use areas in the inventory and compiles data from several different sources into a non-spatially explicit land-use conversion matrix. The data presently available to the United Kingdom do not distinguish wetlands from other land types, so wetlands have been included under grassland or other land, depending on habitat type. As the emissions and removals associated with conversion to and from wetlands may differ significantly from those associated with grassland and other land, the ERT recommends that the United Kingdom develop systems for separately identifying wetlands.

77. The United Kingdom has reported recalculations in the LULUCF sector for the entire time series. The main reasons for these recalculations were: corrections made to the emission estimates for the OTs reported under the sector other (1990–2007); updated AD for forest land converted to settlements (2000–2005), liming and peat extraction (2007); and corrections made to afforestation rates (2007). These recalculations resulted in 4.0 per cent changes in the sector for 2007.

78. In response to recommendations of previous ERTs, the United Kingdom identified, in the NIR and during the review week, a number of planned improvements to its LULUCF inventory, including: the setting of a 20-year period after which converted lands are moved to the lands remaining categories, consistent with the IPCC good practice guidance for LULUCF; the reallocation of emissions/removals from orchards from the forest land to the cropland categories; the reallocation of emissions from peatland extraction from the grassland to the wetlands category; and the application of a 20 by 20 km grid scale for the spatial disaggregation of planting series. The ERT encourages the Party to implement these improvements for its next annual submission.

2. Key categories

Land converted to forest land – CO_2

79. The United Kingdom uses a tier 3 approach based on a carbon flow model to generate estimates of carbon gains and losses. The carbon flow model-based estimates show significant losses of carbon stock in living biomass. These losses are larger than would normally be expected in the land converted to forest land category, and the NIR does not transparently explain the estimates. The ERT recommends that the United Kingdom include an explanation of the biomass carbon loss component in its next annual submission.

80. The areas of forest land planted annually in the United Kingdom are available from the Forestry Commission and the Forest Service. However, as information on their prior land uses is not available, the areas planted are allocated to the cropland, grassland and settlement converted to forest land categories on the basis of the proportional changes in the land-use change matrices from the Countryside Survey. The ERT noted that the Party plans to implement spatial monitoring for reporting afforestation/reforestation activities under Article 3, paragraph 3, of the Kyoto Protocol. The ERT recommends that data collected through this monitoring be used to enhance the reporting of the land converted to forest land categories under the Convention.

81. The NIR states that, as AD on wildfires are not sufficient to split the associated emissions between forest land remaining forest land and land converted to forest land, emissions from all wildfires are reported under land converted to forest land. Since the quantity of biomass burned on forest land remaining forest land is likely to be different from that on land converted to forest land, the ERT recommends that the United Kingdom identify and estimate emissions from biomass burning separately for the two categories.

Land converted to cropland – CO_2

82. Emissions from forest land converted to cropland are reported as "IE". During the review, the Party explained that the method used for identifying land-use changes identifies a small area in the forest land converted to cropland category; however, the expert judgement was that this area is an artefact of the statistical method rather than a genuine land-use change area, and so this area is included under the grassland or settlements converted to cropland category. The ERT recommends that this explanation be clearly documented in the CRF tables and the NIR. During the review, the Party indicated that when the latest Countryside Survey data (2007) become available, they will be used to improve the reporting of the land use and land-use change matrices from 1998 to 2007. The ERT welcomes the realization of the new survey and recommends that the United Kingdom use the new information for the reporting in its next annual submission.

Grassland remaining grassland – CO_2

83. The United Kingdom currently reports changes in carbon stock from the extraction of peat for horticulture under grassland remaining grassland (CRF table 5.C.1). The ERT reiterates the recommendation of the previous ERT that the United Kingdom report these changes under the wetlands category.

3. Non-key categories

N_2O emissions from disturbance of soils – N_2O

84. The N_2O emissions from the disturbance of soils in forest land and grassland converted to cropland are reported as "NE". The NIR states that the United Kingdom does not consider the approach provided in the IPCC good practice guidance to be suitable, and

that country-specific EFs are being developed to estimate emissions from this category. Given that significant areas of grassland (5,482.44 kha) and forest land (71.71 kha) are converted to cropland in the United Kingdom, these land-use changes could potentially lead to significant levels of N_2O emissions as a result of soil mineralization. The ERT recommends that emissions from this category be estimated using the default data provided in the IPCC good practice guidance until a country-specific method becomes available.

F. Waste

1. Sector overview

85. In 2008, emissions from the waste sector amounted to 22,821.61 Gg CO_2 eq, or 3.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 56.9 per cent. The key driver for the fall in emissions is the reduction in CH_4 emissions from solid waste disposal on land, as a result of landfill gas recovery. Within the sector, 88.9 per cent of the emissions were from solid waste disposal on land, followed by 9.0 per cent from wastewater handling. The remaining 2.1 per cent were from waste incineration.

86. The inventory for the waste sector is complete, with all geographical areas and categories for which there are IPCC default methods covered. The emissions from industrial wastewater (wastewater and sludge) are reported as "NE"; however, the ERT recommends that this notation key be changed to "IE" (see para. 95 below). A number of categories for which there are no default IPCC methods are also reported as "NE".

87. The reporting on this sector is generally transparent, although the ERT noted a number of issues with the transparency of the reporting on the OTs and CDs. For example, the inclusion of the estimates for the OTs and CDs is inconsistent across the sector, with their emissions sometimes provided as a separate subcategory (e.g. for solid waste disposal) and sometimes included in the total estimate for the category (e.g. for waste incineration). In addition, for the subcategories reported separately, AD are not provided in the CRF tables, which reduces the transparency and comparability of the reporting. The ERT recommends that the United Kingdom improve the transparency of the reporting on the OTs and CDs both in the CRF tables and the NIR. In addition, the ERT noted that there was insufficient information on the recalculations in the NIR and recommends that the United Kingdom include in its NIR more details on the reasons for recalculations, their documentation and impact.

88. Recalculations of the estimates of emissions from the waste sector were driven by revisions of AD (e.g. adding new data on landfilling in Guernsey for solid waste disposal on land), a change in protein consumption (wastewater handling) and the addition of new data for the Isle of Man (waste incineration). The recalculations resulted in an overall increase in the reported sectoral emissions for 2007 of 76.05 Gg CO_2 eq (0.3 per cent) and no change for 1990.

89. The present ERT noted that some of the recommendations of the previous ERT have been implemented by the Party in its 2010 submission, such as the inclusion of emission estimates for waste incinerators in Scotland and Northern Ireland, which has improved the geographical coverage of the AD on incineration. However, some recommendations of previous ERTs have still not been implemented, such as the updating or justification of the constant amount of landfilled waste from commercial and industrial sources, as recommended in the last two review reports. The section on recalculations for solid waste disposal on land has been only formally added, without providing detailed information on the changes made. The present ERT recommends that the United Kingdom address the recommendations of previous ERTs that have not yet been implemented, in its next annual submission.

2. Key categories

Solid waste disposal on land – CH_4

90. A modified first order decay (tier 2) model from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* was used to estimate CH_4 emissions from solid waste disposal on land. The AD were determined on the basis of different studies and were compared with data collected by the Environment Agency and the Scottish Environment Protection Agency. AD collected for England were scaled up to cover the whole of the United Kingdom. The ERT accepts this approach and recommends that the Party present a clear plan for the periodic update of the AD.

91. The United Kingdom assumes a constant amount of commercial and industrial waste since 2002. The United Kingdom informed the ERT that new data on waste will be available at the end of 2010 from a survey on England, which will be used to revise this assumption. The ERT recommends that the United Kingdom update the AD used and provide recalculations in its next annual submission, ensuring time-series consistency and the transparent documentation of the recalculations.

92. The recovery rate of CH_4 has increased over time, reaching over 71 per cent in 2008. The amount of landfill gas utilized for energy generation is estimated from information provided by trade associations and DECC. Data from the direct monitoring of flared landfill gas are not available and the amount of CH_4 recovered is estimated on the basis of the total available flaring capacity. Previous ERTs have recommended that the United Kingdom collect updated survey data, in accordance with the IPCC good practice guidance, in order to avoid a possible overestimation of the CH_4 recovery rates. In the NIR, the United Kingdom reports that Defra are currently reviewing the CH_4 emissions from landfills. The present ERT reiterates recommendations of previous ERTs that the Party update its AD on landfill gas and provide detailed information on data in its next annual submission.

Wastewater handling – N_2O

93. The IPCC default methodology was used to estimate N_2O emissions from human sewage. The previous ERT identified an inconsistency in the AD time series due to a change in the method used for estimating per capita protein consumption after 1996. This time-series inconsistency has not been addressed by the Party in its 2010 submission. In addition, the present ERT noted that the protein consumption reported for 2007 and 2008 (25.86 kg/person/year) is significantly lower than the data provided by the United Kingdom to the Food and Agriculture Organization of the United Nations (FAO) (37.8 kg/person/year). During the review, the United Kingdom was able to explain the possible reasons for this difference. The ERT recommends that the Party either include these explanations and the justifications for the use of these values, or revise the value in question and update the emission estimates as needed, in its next annual submission. The present ERT reiterates the recommendation of the previous ERT that the United Kingdom ensure the time-series consistency of the AD.

3. Non-key categories

Wastewater handling – CH_4

94. CH_4 emissions from domestic wastewater are estimated using the Hobson model, which aggregates emissions from water and sludge. The ERT considers this national model to be consistent with the IPCC methodologies. However, as indicated in the previous review report, the model is based on data from 1990 to 1995 and therefore needs to be updated to reflect changes in technologies and consumption patterns over time. During the previous review, the Party indicated that it was working to improve its estimation method;

however, there has been no change to the model for the 2010 submission. The present ERT reiterates the recommendation of the previous ERT that the model be updated and revalidated.

95. Emissions from industrial wastewater are reported in CRF table 6.B as "NE". In response to a question raised by the ERT, the Party clarified that, as explained in the NIR, the model considers domestic, commercial and industrial wastewater together. The ERT recommends that the Party reconsider the use of the notation key "NE" for industrial wastewater and replace it with "IE" in the next annual submission.

G. Adjustments

96. The ERT identified and recommended four adjustments in the energy, industrial processes and agriculture sectors for the year 2008. In accordance with the technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1), the adjustments were prepared by the ERT in consultation with the United Kingdom. Also, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1), the ERT officially notified the United Kingdom of the calculated adjustments.

97. The underestimations leading to adjustments in the energy, industrial processes and agriculture sectors in 2008 include: CO_2, CH_4 and N_2O emissions from civil aviation, CH_4 emissions from other leakage, HFC emissions from transport refrigeration, and N_2O emissions from sewage sludge application to agricultural soils.

98. The adjusted estimate for GHG emissions in 2008 amounts to 633,206.21 Gg CO_2 eq, compared to the 631,774.50 Gg CO_2 eq originally reported by the United Kingdom in its 2010 annual submission. The calculation of the adjustments leads to an increase in estimated total GHG emissions of 0.23 per cent (1,431.71 Gg CO_2 eq).

99. In its response to the draft annual review report, the United Kingdom notified the secretariat of its intention to accept the calculated adjustments.

100. The ERT notes that the United Kingdom may submit revised estimates for a part of its inventory to which adjustments were applied, in conjunction with its next inventory, or at the latest with the inventory for the year 2012. The revised estimates will be part of the Article 8 review and if accepted by the ERT the revised estimates will replace the adjustments.

2. Civil aviation

Original estimate

101. In the 2010 annual submission of the United Kingdom, the estimate of GHG emissions from civil aviation for 2008 is 2,200.41 Gg CO_2 eq. The category is not identified as a key category.

The underlying problem

102. During the review, the ERT identified that the estimate of emissions from civil aviation is a potential underestimate since it does not include the emissions from direct flights to Gibraltar and Bermuda, which should also be considered under civil aviation according to the IPCC good practice guidance. These emissions are included under bunker fuels (aviation) and as such are not included in the national total. This issue has been raised during previous reviews. During the review, the ERT informed the United Kingdom of the potential problem of this underestimation, to which the United Kingdom responded that

flights between the United Kingdom and its OTs are considered international in DUKES following the Civil Aviation Authority's classification and that deviating from this classification could result in a decrease in the accuracy of the overall emission estimates. In addition, the United Kingdom indicated that it is working on this issue and might revise the estimate in its next annual submission.

The rationale for the adjustment

103. During the review, the ERT recommended that the United Kingdom address this potential problem by reallocating the fuel consumption for and emissions from all direct flights between the United Kingdom and its OTs, which are currently reported under international bunkers (aviation), to civil aviation, consistent with the methodological approach provided in the IPCC good practice guidance, and provide revised estimates. The United Kingdom responded to the notification on potential problems on 29 October 2010, within the six-week period established by the Article 8 review guidelines, stating that it accepted the recommendations and indicating its intention to reallocate the emissions associated with the flights between the United Kingdom and its OTs to civil aviation in the next annual submission. In addition, the United Kingdom provided information that in 2007 flights from the United Kingdom to its OTs accounted for 0.088 Mt CO_2, or 4 per cent of the total emissions from domestic aviation.

104. The ERT concluded that the United Kingdom did not adequately correct the problem, since the Party has not officially resubmitted the CRF tables with the revised estimate. The rationale for the adjustment is the fact that the estimate in question was prepared in a way that is not consistent with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance and leads to an underestimation of the total emissions in the latest reported year.

The assumptions, data and methodology used to calculate the adjustment

105. In order to calculate the adjustment, the ERT requested the United Kingdom to provide the AD for the flights to and from the OTs and the EFs for CO_2, CH_4 and N_2O that the Party plans to use for its 2011 submission.

106. The United Kingdom provided the ERT with the requested data. The source of the AD was the United Kingdom's Civil Aviation Authority and the data included flights to and from the United Kingdom. Only jet kerosene (aviation turbine fuel) was consumed for the flights, and fuel consumption was provided for landing and take-off (LTO) and cruise (in Mt) consistent with the tier 3 method applied by the Party for estimating emissions from civil aviation. The EFs for 2008 provided were as follows: for CO_2, 859 kt carbon/Mt; and for N_2O, 0.1 kg/Mt, consistent with the values reported in the 2010 submission. For CH_4, the EF is 0 for cruise and 0.069 kt/Mt for LTO.

107. Given that the AD and EFs used were not the cause of the adjustment, preference was given to using national data to calculate the adjustment. The AD are at reasonable levels and the CO_2, N_2O and CH_4 EFs are close to the IPCC default values. In calculating the adjustment, the ERT applied the conservativeness factors to the CO_2, CH_4 and N_2O emission estimates provided by the Party, since it considered them to be the most appropriate given the national circumstances of the Party. This approach is in line with the technical guidance on methodologies for adjustments (paras. 28 and 29 of the annex to decision 20/CMP.1).

The adjusted estimate

108. Table 4 presents the results of the calculation of the ERT, including the original estimate as reported by the United Kingdom, the adjusted estimate as calculated by the ERT and the impact of the adjustment on the Party' s total GHG emissions in 2008. The

adjustment leads to an increase in the total estimated emissions for 2008 by 215.96 Gg CO_2 eq, or 0.03 per cent of total emissions.

Conservativeness of the expert review team's calculation of the adjustment

109. The ERT applied the conservativeness factors 1.21 (for CO_2) and 1.37 (for CH_4 and N_2O) (table 2 of appendix III to the technical guidance on methodologies for adjustments, annexed to decision 20/CMP.1) for estimating the missing emissions from civil aviation. The ERT therefore considers the resulting adjusted value to be conservative.

Table 4
Description of the adjustment(s) calculation for Annex A sources

Parameter/estimate	*Value*	*Unit*	*Source*
Category: civil aviation			
Party's estimate of CO_2, CH_4 and N_2O emissions from flights between the United Kingdom and its Overseas Territories	Included elsewhere	Gg CO_2 eq	The United Kingdom's 2010 submission
Party's estimate of emissions/removals from civil aviation	2 200.41	Gg CO_2 eq	The United Kingdom's 2010 submission
Input data/parameters for calculation of adjustment for civil aviation, flights between the United Kingdom and its Overseas Territories:			
Activity data for jet kerosene	2 314.95 (cruise) 144.63 (landing and take-off)	TJ TJ	The United Kingdom's Civil Aviation Authority (CAA)
CO_2 emission factor	71.76	t/TJ	CAA
CH_4 emission factor	0 (cruise) 1.58 (landing and take-off)	kg/TJ	CAA
N_2O emission factor	2.28	kg/TJ	CAA
Calculated estimate for:			Expert review team's calculation
CO_2 emissions	176.51	Gg CO_2 eq	
CH_4 emissions	0.005		
N_2O emissions	1.74		
Total greenhouse gas emissions	178.25		
Conservativeness factor:			Table 2 of appendix III to the technical guidance on methodologies for adjustments, annexed to decision 20/CMP.1
CO_2 emissions	1.21		
CH_4 and N_2O emissions	1.37		
Adjusted conservative estimate for CO_2, CH_4 and N_2O emissions from civil aviation, flights between the United Kingdom and its Overseas Territories	215.96	Gg CO_2 eq	Expert review team's calculation
Adjusted conservative estimate for emissions from civil aviation	2 416.37	Gg CO_2 eq	Expert review team's calculation

Parameter/estimate	*Value*	*Unit*	*Source*
Total aggregated greenhouse gas emissions (excluding land use, land-use change and forestry) as reported by the Party	631 774.50	Gg CO_2 eq	The United Kingdom's 2010 submission
Total aggregated greenhouse gas emissions (excluding land use, land-use change and forestry) after calculation of adjustment	631 990.46	Gg CO_2 eq	Expert review team's calculation
Difference between original and adjusted estimates of total aggregated greenhouse gas emissions	215.96	Gg CO_2 eq	Expert review team's calculation
	0.03	%	Expert review team's calculation

3. Methane emissions from other leakage (natural gas)

Original estimate

110. In the 2010 annual submission of the United Kingdom, the estimate of fugitive emissions from natural gas in 2008 is 206.35 Gg. The category is not identified as a key category. Emissions from other leakage are reported as "NE", with a statement explaining that these emissions are expected to be at a low level.

The underlying problem

111. The United Kingdom reports emissions from other leakage as "NE". A default IPCC method for estimating these emissions is available, though specific EFs for Western Europe are not provided. This issue has been raised during previous reviews, with the United Kingdom responding that the inclusion of emission estimates for this category in its annual submission is planned.

The rationale for the adjustment

112. During the review, the ERT recommended that the United Kingdom address this issue by providing an estimate for the emissions from other leakage, following the default IPCC method and applying justified EFs. The United Kingdom responded to the notification on potential problems on 29 October 2010, stating that an industry consultation process is currently ongoing and that the United Kingdom is expecting to be in position to include an estimate of these emissions in its 2011 submission. In addition, the Party provided a preliminary estimate, using Germany's EF, of 1.4–1.5 Mt CO_2 eq in 2008.

113. The ERT concluded that the United Kingdom did not adequately correct the problem, since the Party has not officially resubmitted the CRF tables with the estimate and has not provided methodological information. The rationale for the adjustment is the incompleteness of the inventory leading to an underestimation of the total emissions in the latest reported year.

The assumptions, data and methodology used to calculate the adjustment

114. In order to calculate the adjustment, the ERT requested the United Kingdom to provide the AD needed for the estimate. The United Kingdom provided the estimates developing a country-specific estimation method. The Party provided AD on the number of houses with gas-fired central heating, derived on the basis of the proportion of houses in Great Britain with gas-fired central heating in 2006 (87 per cent) and the number of households in the United Kingdom in 2006 (25.8 million). The AD are assumed to be the

same for 2008. It is also assumed that there is one boiler per house with gas-fired central heating. The ERT finds these assumptions to be reasonable. The United Kingdom also provided a country-specific EF for estimating CH_4 emissions per boiler (see table 5). The EF takes into account, for example, the average boiler size, typical natural gas and air flow rates, and average operating hours for domestic heating and domestic water heating. The ERT accepted the provided approach and applied the country-specific method for estimating the adjustment. Given that the AD and EFs used were not the cause of the adjustment, preference was given to using national data to calculate the adjustment. In calculating the adjustment, the ERT applied the conservativeness factor to the CH_4 emissions. This approach is in line with the technical guidance on methodologies for adjustments (paras. 28 and 29 of the annex to decision 20/CMP.1).

The adjusted estimate

115. Table 5 presents the results of the calculation of the ERT, including the original estimate as reported by the United Kingdom, the adjusted estimate as calculated by the ERT and the impact of the adjustment on the Party's total GHG emissions in 2008. The adjustment leads to an increase in the total estimated emissions for 2008 by 26.48 Gg CO_2 eq, or 0.004 per cent.

Conservativeness of the expert review team's calculation of the adjustment

116. The ERT applied the conservativeness factor 1.37 (table 2 of appendix III to the technical guidance on methodologies for adjustments, annexed to decision 20/CMP.1) for estimating CH_4 emissions from other leakage. The ERT therefore considers the resulting adjusted value to be conservative.

Table 5
Description of the adjustment(s) calculation for Annex A sources

Parameter/estimate	*Value*	*Unit*	*Source*
Category: other leakage			
Party's estimate of CH_4 emissions from other leakage	Not estimated		The United Kingdom's 2010 submission
Party's estimate of emissions/removals from other leakage	Not estimated	Gg CO_2 eq	The United Kingdom's 2010 submission
Input data/parameters for calculation of adjustment:			
Activity data: number of households in the United Kingdom in 2006	25.8 million	Households	Department for Communities and Local Government, Household estimates and projections 2009, table 401
Activity data: proportion of houses in Great Britain with gas-fired central heating in 2006	87	%	Buildings Research Establishment, Domestic Energy Factfile 2008, section 6.4
CH_4 emission factor	0.041009234	Gg CH_4/million domestic gas boilers	Implied emission factor based on analysis by the Party

Parameter/estimate	*Value*	*Unit*	*Source*
Calculated estimate for CH_4 from other leakage	0.92	Gg	Expert review team's calculation
	19.33	Gg CO_2 eq	
Conservativeness factor	1.37		Table 2 of appendix III to the technical guidance on methodologies for adjustments, annexed to decision 20/CMP.1
Adjusted conservative estimate for CH_4 emissions from other leakage	1.26	Gg	Expert review team's calculation
Adjusted conservative estimate for emissions from other leakage	26.48	Gg CO_2 eq	Expert review team's calculation
Total aggregated greenhouse gas emissions (excluding land use, land-use change and forestry) as reported by the Party	631 774.50	Gg CO_2 eq	The United Kingdom's 2010 submission
Total aggregated greenhouse gas emissions (excluding land use, land-use change and forestry) after calculation of adjustment	631 800.98	Gg CO_2 eq	Expert review team's calculation
Difference between original and adjusted estimates of total aggregated greenhouse gas emissions	26.48	Gg CO_2 eq	Expert review team's calculation
	0.004	%	Expert review team's calculation

4. Hydrofluorocarbons from transport refrigeration

Original estimate

117. In the 2010 annual submission of the United Kingdom, the estimate of HFC emissions from transport refrigeration for 2008 is 138.18 Gg CO_2 eq, of which 124.45 Gg CO_2 eq is from stocks of fluid in operating systems. The category is not identified as a key category.

The underlying problem

118. The ERT found that the annual leakage rate (PLF) for transport refrigeration in 2008 (reported in the CRF tables as 8 per cent, but 7.5 per cent when calculated from the emissions of 124.45 Gg CO_2 eq and the operating stock of 1,668.80 Gg CO_2 eq reported in the same table for 2008) is lower than the IPCC default range of 15–50 per cent and the values reported by other Parties (15–32 per cent). The United Kingdom indicated that these figures were derived from an AEA study[9] (AEA, 2004). The PLFs for transport refrigeration in that study, which remained unchanged in subsequent studies, were based on expert assessments (responses to a questionnaire, extensive stakeholder consultation within the United Kingdom and various studies). The ERT noted that the study cites estimated

[9] AEA, 2004. *Emissions and Projections of HFCs, PFCs and SF_6 for the UK and Constituent Countries*. Final Report prepared for the Department for Environment, Food and Rural Affairs, 2nd Edition, June 2004, AEAT/ED50090/R02. AEA Technology, Oxfordshire, UK.

leakage values of 6–8 per cent per year, from a "Stakeholder workshop (2002)" reference which is not included in the reference list of the AEA study.

119. The ERT concluded that the references mentioned by the United Kingdom were insufficient to show that the low leakage rate used is representative of the United Kingdom's vehicle fleet equipped with transport refrigeration.

The rationale for the adjustment

120. The ERT recommended that the United Kingdom address this potential problem either by providing additional information that could show that the PLF applied is representative of the United Kingdom's vehicle fleet equipped with transport refrigeration or by providing a revised estimate for the emissions from transport refrigeration. The ERT concluded that the United Kingdom's response to the notification on potential problems, on 29 October 2010, provided no specific additional information to justify the PLF used for transport refrigeration or a revised estimate.

121. The ERT noted that the United Kingdom stated in its response that an estimate of the impact of the recommended revision to the PLF for transport refrigeration had not been possible as this would involve amending the F-gas model, including amending inputs to other categories accordingly to ensure an overall balance with the data on total fluid sales.

122. The ERT concluded that the United Kingdom did not adequately correct the problem, neither by providing sufficient justification for the use of the country-specific PLF for transport refrigeration nor by providing a revised estimate. The rationale for the adjustment is the finding of the ERT that the justification for the use of the country-specific PLF is not sufficiently transparent to demonstrate that it is consistent with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance and that the PLF used may lead to an underestimation of the total emissions in the latest reported year.

The assumptions, data and methodology used to calculate the adjustment

123. In order to calculate the adjustment, the ERT requested the United Kingdom to provide the average annual stock of fluid banked in operating systems for transport refrigeration and the HFC emissions from transport refrigeration separately for emissions from manufacturing, from stocks and from disposal. These data were supplied by the United Kingdom.

124. In calculating the adjustment, the ERT applied the IPCC default approach, in line with the technical guidance on methodologies for adjustments and the recommended prioritization of adjustment methods.

125. Since the adjustment relates to the PLF only, the ERT used the average annual stock of fluid banked in operating systems for transport refrigeration in 2008 (1,668.80 Gg CO_2 eq) as provided by the United Kingdom (using the mix of HFCs reported by the United Kingdom) to calculate the adjustment.

126. The adjusted estimate of HFC emissions from the average annual stock was calculated using the amount of fluid banked in operating systems multiplied by the adjusted PLF. The adjusted PLF was calculated using a default EF of 32.5 per cent, which is the midpoint of the tier 1 default range listed in the IPCC good practice guidance (15–50 per cent), and the relevant conservativeness factor. This resulted in an adjusted PLF of 39.3 per cent compared with the United Kingdom's reported implied PLF of 8 per cent (7.5 per cent when calculated from the emissions and operating stock reported in the CRF tables for 2008). The emissions in 2008 from the manufacturing and disposal of transport refrigeration remained unchanged at 1.90 and 11.84 Gg CO_2 eq, respectively (as provided by the United Kingdom).

The adjusted estimate

127. Table 6 presents the results of the calculation of the ERT, including the original estimate as reported by the United Kingdom, the adjusted estimate as calculated by the ERT and the impact of the adjustment on the Party's total GHG emissions in 2008. The adjustment leads to an increase in the total estimated emissions for 2008 by 531.39 Gg CO_2 eq, or 0.08 per cent.

Conservativeness of the expert review team's calculation of the adjustment

128. The ERT applied the conservativeness factor 1.21 (table 2 of appendix III to the technical guidance on methodologies for adjustments, annexed to decision 20/CMP.1) for estimating HFCs from transport refrigeration. The ERT therefore considers the resulting adjusted value to be conservative.

Table 6
Description of the adjustment(s) calculation for Annex A sources

Parameter/estimate	*Value*	*Unit*	*Source*
Category: transport refrigeration			
Party's estimate of product life factor	8.0 (7.5)	%	The United Kingdom's 2010 submission
Party's estimate of emissions/removals from transport refrigeration	138.18	Gg CO_2 eq	The United Kingdom's 2010 submission
Input data/parameters for calculation of adjustment:			
Average annual stock of fluid banked in operating systems	1 668.80	Gg CO_2 eq	Estimate provided by the United Kingdom
Calculated estimate for product life factor	32.5	%	Midpoint of tier 1 default range from the Intergovernmental Panel on Climate Change *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*
Conservativeness factor	1.21		Table 2 of appendix III to the technical guidance on methodologies for adjustments, annexed to decision 20/CMP.1
Adjusted conservative estimate for product life factor	39.3	%	Expert review team's calculation
Adjusted conservative estimate for emissions from transport refrigeration	669.57	Gg CO_2 eq	Expert review team's calculation
Total aggregated greenhouse gas emissions (excluding land use, land-use change and forestry) as reported by the Party	631 774.50	Gg CO_2 eq	The United Kingdom's 2010 submission
Total aggregated greenhouse gas emissions (excluding land use, land-use change and forestry) after calculation of adjustment	632 305.89	Gg CO_2 eq	Expert review team's calculation

Parameter/estimate	*Value*	*Unit*	*Source*
Difference between original and adjusted estimates of total aggregated greenhouse emissions	531.39	Gg CO_2 eq	Expert review team's calculation
	0.08	%	Expert review team's calculation

5. Direct and indirect nitrous oxide emissions from application of sewage sludge in agriculture

Original estimate

129. In the 2010 annual submission of the United Kingdom, the estimate of N_2O emissions from agricultural soils in 2008 is 23,322.16 Gg CO_2 eq. N_2O emissions from agricultural soils is identified as a key category.

The underlying problem

130. During the review, the ERT identified that this estimate is a potential underestimate since it does not include the direct and indirect N_2O emissions from the application of sewage sludge to agricultural soils. Data to estimate emissions from this emission source are available from data collected under the EU sewage sludge directive 86/278/EEC and there is a default IPCC method for estimating these emissions.

The rationale for the adjustment

131. During the review, the ERT recommended that the United Kingdom address this potential problem by providing estimates of the emissions from sewage sludge applied to agricultural soils and by describing the data and method applied. The United Kingdom responded to the notification on potential problems on 29 October 2010, stating that it intends to include estimates of these emissions in its next annual submission and indicating that direct N_2O emissions from sewage sludge applied to agricultural soils would contribute less than 1.6 per cent to the estimate of N_2O emissions reported for 2008, based on a provisional assessment.

132. The ERT concluded that the United Kingdom did not adequately correct the problem, since the Party has not officially resubmitted the CRF tables with the estimates and has not provided methodological information. The rationale for the adjustment is the incompleteness of the inventory leading to an underestimation of the total emissions in the latest reported year.

The assumptions, data and methodology used to calculate the adjustment

133. In order to calculate the adjustment, the ERT requested the United Kingdom to provide the AD (sewage sludge applied to agricultural soils) that it plans to use for its 2011 submission. The United Kingdom provided the ERT with a complete time series (1990–2008) of AD. The data for 2008 were supplied by the regulatory authorities responsible for water and sewage in the United Kingdom. The Party also provided a country-specific value for the N content of sewage sludge, which is based on the results of a research project.

134. The adjusted estimates of direct and indirect N_2O emissions from the application of sewage sludge to agricultural soils were calculated using the tier 1 methodology described in the IPCC good practice guidance, in line with the technical guidance on methodologies for adjustments and the recommended prioritization of adjustment methods. The direct and indirect emissions (from deposition and leaching) were estimated by applying the relevant default IPCC equations, EFs and parameters (see table 7). The amount of sewage N applied

was calculated using the country-specific data on the amount of sewage sludge (1,404,200 t dry matter) and the N content of sludge (3.6 per cent).

135. Since the AD used were not the cause of the adjustment, preference was given to using national data, consistent with the technical guidance on methodologies for adjustments (para. 29 of the annex to decision 20/CMP.1).

136. The rest of the reported estimates of direct and indirect N_2O emissions from agricultural soils remained unchanged.

The adjusted estimate

137. Table 7 presents the results of the calculation of the ERT, including the original estimate as reported by the United Kingdom, the adjusted estimate as calculated by the ERT and the impact of the adjustment on the Party's total GHG emissions in 2008. The adjustment leads to an increase in the total estimated emissions for 2008 by 657.87 Gg CO_2 eq, or 1.5 per cent with respect to the total emissions from the agriculture sector.

Conservativeness of the expert review team's calculation of the adjustment

138. The ERT applied the conservativeness factor 1.37 (table 2 of appendix III to the technical guidance on methodologies for adjustments, annexed to decision 20/CMP.1) for estimating direct and indirect N_2O emissions from the application of sewage sludge in agriculture. The ERT therefore considers the resulting adjusted value to be conservative.

Table 7
Description of the adjustment(s) calculation for Annex A sources

Parameter/estimate	*Value*	*Unit*	*Source*
Category: N_2O emissions from agricultural soils			
Party's estimate of N_2O emissions from agricultural soils	23 322.16	Gg CO_2 eq	The United Kingdom's 2010 submission
Party's estimate of emissions/removals from direct and indirect N_2O emissions from the application of sewage sludge	Not estimated	Gg CO_2 eq	The United Kingdom's 2010 submission
Input data/parameters for calculation of adjustment: Activity data: t sewage sludge	1 404 200	t sewage sludge dry matter	Estimate provided by the United Kingdom's water and sewage regulatory authorities
Nitrogen content of sewage sludge	3.6	%	Defra, Research project ESO 128
FracGASM	0.2		Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*
FracLEACH	0.3		*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*
Emission factor for direct emissions	1.25	kg N_2O-N/kg N	*Revised 1996 IPCC Guidelines for National Greenhouse Gas*

Parameter/estimate	*Value*	*Unit*	*Source*
			Inventories
Emission factor for atmospheric deposition	0.01	kg N_2O-N/kg NH_4-N and NO_X-N deposited	IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*
Emission factor for leaching and run-off	0.025	kg N_2O-N/kg N	IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*
Calculated estimate for direct and indirect N_2O emissions from the application of sewage sludge	480.20	Gg CO_2 eq	Expert review team's calculation
Conservativeness factor	1.37		Table 2 of appendix III to the technical guidance on methodologies for adjustments, annexed to decision 20/CMP.1
Adjusted conservative estimate for direct and indirect N_2O emissions from the application of sewage sludge	657.87	Gg CO_2 eq	Expert review team's calculation
Adjusted conservative estimate for N_2O emissions from agricultural soils	23 980.03	Gg CO_2 eq	Expert review team's calculation
Total aggregated greenhouse gas emissions (excluding land use, land-use change and forestry) as reported by the Party	631 774.50	Gg CO_2 eq	The United Kingdom's 2010 submission
Total aggregated greenhouse gas emissions (excluding land use, land-use change and forestry) after calculation of adjustment	632 391.22	Gg CO_2 eq	Expert review team's calculation
Difference between original and adjusted estimates of total aggregated greenhouse gas emissions	657.87	Gg CO_2 eq	Expert review team's calculation
	0.10	%	Expert review team's calculation

H. 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

139. The United Kingdom provided information relating to KP-LULUCF following the annotated outline of the NIR,[10] providing general, land-specific and activity-specific information in line with the requirements of the annex to decision 15/CMP.1.

[10] <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/

140. The Party reported activities under Article 3, paragraph 3, of the Kyoto Protocol and elected forest management under Article 3, paragraph 4, of the Kyoto Protocol. The United Kingdom has elected to account for KP-LULUCF activities at the end of the commitment period.

141. The spatial assessment units for the reporting are the four countries of the United Kingdom: England, Scotland, Wales and Northern Ireland (reporting method 1). Detailed data are available to allow for the reporting of areas of afforestation/reforestation and forest management in 20 by 20 km units; however, similar data are not available for deforestation. Data on deforestation are based on various assumptions, which are not adequately justified in the 2010 submission (see para. 144 below). The ERT recommends that the Party provide full details on the sources of data on deforestation for all years from 1990 to the latest inventory year. In addition, no information is provided on afforestation and reforestation, deforestation or forest management in the CDs and OTs. The ERT recommends that the United Kingdom elaborate the methodology used for identifying lands and provide information to ensure complete coverage of land areas in accordance with the requirements of paragraph 20 of the annex to decision 16/CMP.1. The United Kingdom responded that it is working on the above-stated issues and that the new woodland map and revised figures are expected in March 2011 and will be included in the 2012 submission.

142. The inventory methodology adopted for reporting under the Kyoto Protocol is similar to that for reporting under the Convention. A carbon flow model is used to estimate carbon stock changes in forest biomass. All carbon pools are reported, with below-ground biomass calculated as part of above-ground biomass, and deadwood calculated as part of the litter pool. Carbon stock changes in soils as a result of changes in land use are calculated using a dynamic model of carbon stock change.

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

Afforestation and reforestation – CO_2

143. The reported area of land subject to afforestation and reforestation does not currently include planted areas that are not state-owned or grant-aided. The ERT recommends that such areas be included in the Party's next annual submission.

Deforestation – all gases

144. The NIR states that since 1990 no afforested lands have been deforested, but does not indicate whether this land conversion can actually be identified. The ERT recommends that the Party include in its NIR the justification for this assumption and ensure that there is no underestimation of emissions occurring. In addition, data on deforestation are not available for Northern Ireland and it is assumed that deforestation does not occur there. The United Kingdom indicated that it is currently working on a spatial assessment of deforestation and will update the assumptions used once this work has been completed. The ERT recommends that the United Kingdom include more detail on the planned improvements and on how these will provide data on the areas described above in its next annual submission.

145. Data on deforestation are also not available for Scotland and Wales for the period 1990–1998. For this period, the data for England are extrapolated to cover these countries. The ERT recommends that the United Kingdom provide in the NIR a justification as to why the deforestation rates in England can be considered as a suitable proxy for the deforestation rates in Scotland and Wales.

146. Emissions from wildfires on deforested lands are reported as "NE". The NIR states that no AD on wildfires on non-forested lands are available. The ERT recommends that the United Kingdom either provide evidence that wildfires do not occur or provide the relevant estimates in its future annual submissions.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

147. The United Kingdom has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the SIAR on the SEF tables and the SEF comparison report.[11] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

148. Information on the accounting of Kyoto units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, 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 set out in paragraph 88 (a–j) of the annex to decision 22/CMP.1.

National registry

149. 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 took note of the SIAR and its finding that 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 decisions 16/CP.10 and 12/CMP.1. In addition, the national registry has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate. However, the SIAR identified the following problems: outdated publicly available information on Kyoto units and transactions, and the inconsistency of the statements in the NIR on publicly available information with the information reported in the SEF tables. The ERT recommends that the United Kingdom address these problems as well as clearly specify the nature and extent of changes made to publicly available information and actions taken to improve the user interface, including a clear indication of those elements that are deemed to be confidential, and report the results in its next annual submission.

Calculation of the commitment period reserve

150. The United Kingdom has reported its commitment period reserve in its 2010 annual submission. The United Kingdom reported that its commitment period reserve has not changed since the initial report review (3,070,872,567 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.

[11] 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.

3. Changes to the national system

151. The United Kingdom reported that there is no significant change in its national system since the previous annual submission. Since the previous annual submission, the National Inventory Steering Committee has been expanded to include additional groups from DECC (National Climate Change – Carbon Markets; International Climate Change and Energy; and Energy Analysis) and Defra (Air Quality and Industrial Pollution; Water Policy; and Waste) to ensure that the groups are aware of their responsibilities in relation to the development and preparation of the inventory. The Carbon Markets group provides access to the EU ETS data and information on the national registry for the annual submission. The other groups provide policy expertise and assist in improving the quality of the inventory data.

152. The ERT concluded that the United Kingdom'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

153. The United Kingdom provided information on changes to its national registry in its 2010 annual submission, namely functional changes to the registry, an upgrade of the version of the software used, a change in the contact information and a change in the development and support company. In addition, following the recommendation of the previous ERT, there were changes made to the publicly accessible information.

154. The SIAR noted that the Party's NIR is unclear as to whether changes made to the structure and capacity of the database, its conformance with the technical standards for data exchange between registry systems, and test procedures were considered to be significant and whether an evaluation was undertaken to determine whether testing was required and whether the readiness documentation was updated. The Party confirmed that the required testing had been performed. The ERT reiterates the recommendation of the SIAR that the United Kingdom clearly state in the NIR if changes to the national registry are significant and whether an evaluation has been undertaken to determine whether Annex H testing is required and whether the readiness documentation has been updated. In addition, the NIR should contain a summary of all tests that are executed as part of a test plan.

155. The ERT concluded that, taking into account the confirmed changes in the national registry, the United Kingdom's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). The ERT recommends that the Party report in its next annual submission any change(s) in its national registry in accordance with chapter I.G of the annex to decision 15/CMP.1.

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

156. The United Kingdom has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its 2010 annual submission.

157. The actions reported by the United Kingdom are organized into the following groups: research/review/analysis; projects from the sustainable development dialogue; capacity-building projects on renewable energy and energy efficiency; other United Kingdom initiatives (e.g. trading, and reform and development of the EU Common Agricultural Policy); and actions within the EU community. The United Kingdom has not reported, however, information on how it gives priority to the actions taken in

implementing its commitments under Article 3, paragraph 14, of the Kyoto Protocol (para. 24(a–f) of the annex to decision 15/CMP.1).

158. The ERT commends the United Kingdom for the actions undertaken by it. The ERT concluded that the reported information is transparent and encourages the Party to include information on activities undertaken in accordance with paragraph 24 of the annex to decision 15/CMP.1 in its next annual submission.

III. Conclusions and recommendations

159. The United Kingdom made its annual submission on 15 April 2010. The CRF tables were resubmitted on 7 May 2010 and the NIR was resubmitted on 28 April 2010 and again on 27 May 2010. 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 minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol) and is in line with decision 15/CMP.1.

160. The ERT concludes that the annual submission of the United Kingdom has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2008 and an NIR; these are generally complete in terms of geographical coverage, sectors, categories and gases. However, the following categories, for which methodologies are available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, were reported as "NE": CH_4 emissions from other leakage of natural gas; direct and indirect N_2O emissions from the application of sewage sludge to agricultural soils; and N_2O emissions from the disturbance of soils associated with forest land and grassland conversion to cropland. In response to recommendations of the ERT, the United Kingdom provided information indicating its plan to address the first two of those categories in its next annual submission.

161. 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.

162. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, the following were not in line with the IPCC good practice guidance: the reporting of fuel consumption for and emissions from direct flights between the United Kingdom and its OTs as a memo item under international aviation bunkers; the reporting of emissions from the LULUCF sector for the CDs and OTs under the sector other; the incomplete reporting on feedstocks and non-energy use of fuels; and the use, without adequate justification, of country-specific annual leakage rates for HFC emissions from transport refrigeration that are inconsistent with the IPCC defaults and the rates of other Parties.

163. In accordance with the provisions of decisions 20/CMP.1 and 22/CMP.1, adjustments were calculated in cases where the submitted data were found to be incomplete and prepared in a way that is not consistent with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance and lead to an underestimation of the Party's emissions in the commitment period (i.e. for 2008) (see chapters II.G and IV of this report).

164. The United Kingdom has elected to account for activities under Article 3, paragraph 3, and forest management under Article 3, paragraph 4, of the Kyoto Protocol at the end of the commitment period. The Party has followed the requirements of paragraphs 5 to 9 of

the annex to decision 15/CMP.1. The KP-LULUCF inventory has been prepared generally in line with the IPCC good practice guidance for LULUCF and using reporting method 1. However, the following issues were identified in relation to the reporting on KP-LULUCF: no information is provided on afforestation and reforestation, deforestation or forest management in the CDs and OTs; no justifications are provided for the assumptions that since 1990 no lands subject to afforestation and reforestation have been deforested, that there is no deforestation in Northern Ireland and that the rates of deforestation in England are appropriate for Scotland and Wales; and emissions from wildfires on deforested lands are reported as "NE".

165. The United Kingdom has reported information on its accounting of Kyoto Protocol units in accordance with chapter I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

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

167. 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.

168. The United Kingdom has reported the information requested in chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14", as part of its 2010 annual submission. The information was provided on 15 April 2010. The reported information is transparent and generally complete, although the United Kingdom has not reported information on how it gives priority to the actions taken in implementing its commitments under Article 3, paragraph 14 in accordance with paragraph 24 of the annex to decision 15/CMP.

169. In the course of the review, the ERT formulated a number of recommendations relating to methodological choice, and the completeness and transparency of the information presented in the United Kingdom's annual submission. The key recommendations are that the United Kingdom:

(a) Address in its next annual submission all the issues that led to the calculation of adjustments during the review;

(b) Use the recommendations made in the review reports as a tool for prioritizing planned improvements to its inventory and include in the NIR either more details on the actions taken to address the recommendations of ERTs or clear time frames for undertaking such actions;

(c) Improve the transparency of the NIR by including more information to justify the choice of country-specific EFs and explanations as to how time-series consistency has been maintained where data sources have changed or there have been recalculations;

(d) Improve the transparency of the reporting on the OTs and CDs by including information on the methods and data used to estimate their emissions and by reporting these emissions under the appropriate categories and subcategories;

(e) Improve the information provided on the treatment of feedstocks and non-energy use of fuels in the inventory;

(f) Review the use of the notation keys in the CRF tables and improve the QC of the CRF tables prior to their submission. The ERT also encourages the Party to undertake additional tier 2 category-specific QC checks, such as comparisons of its IEFs with the IPCC default EFs and the IEFs of other Parties where country-specific methods have been used;

(g) Undertake a qualitative analysis to ensure categories which are particularly significant in level or trend are identified as key categories;

(h) Include better explanations of the nature and extent of changes in the national registry, including test plans and test results in the case of upgrades of the version of the software used;

(i) Ensure regular updates of the publicly available information on Kyoto units and transactions and include information in the NIR on the nature and extent of changes in the publicly available information and on actions taken to improve the user interface, including a clear indication of the elements deemed confidential;

(j) Estimate and report N_2O emissions from the disturbance associated with land-use conversion to cropland, using the IPCC default methods;

(k) Elaborate in its next annual submission the methodology used for identifying land areas and provide information to demonstrate that complete coverage of land areas subject to afforestation and reforestation, deforestation and forest management has been achieved, in accordance with the requirements of paragraph 20 of the annex to decision 16/CMP.1;

(l) Estimate emissions from wildfires on deforestation lands or provide evidence that wildfires do not occur.

IV. Adjustments

170. The ERT concludes, based on the review of the 2008 inventory, that for the CO_2, CH_4 and N_2O emissions from civil aviation, CH_4 emissions from other leakage, HFC emissions from transport refrigeration and N_2O emissions from sewage sludge application to agricultural soils the coverage, AD and EFs used are not fully in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance as required by Article 5, paragraph 2, of the Kyoto Protocol. The ERT recommended that the Party submit revised estimates or provide further justifications for its calculations for the identified categories as a way of resolving the identified potential problems. The ERT, following the review of the additional information provided by the United Kingdom during and after the centralized review, concluded that it did not satisfactorily correct the problem through the submission of acceptable revised estimates and decided to calculate and recommend four adjustments in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1).

171. The United Kingdom, in its responses to the draft annual review report, accepted the calculated adjustments. In accordance with the guidelines for review under Article 8 of the Kyoto Protocol, the ERT applied the calculated adjustments.

172. The application of accepted adjustments by the ERT resulted in a change in the estimate of the 2008 emissions from civil aviation and from CH_4 emissions from other leakage in energy – from 2,200.41 Gg CO_2 eq and "NE", as originally reported by the United Kingdom, to 2,416.37 Gg CO_2 eq and 26.28 Gg CO_2 eq or 0.03 per cent of total emissions, from the HFCs from transport refrigeration – from 138.18 Gg CO_2 eq, as originally reported by the United Kingdom, to 669.57 Gg CO_2 eq or 0.08 per cent, and from direct and indirect N_2O emissions from sewage sludge application to agricultural soils – from 23,322.16 Gg CO_2 eq, as originally reported by the United Kingdom for N_2O emissions from agricultural soils, to 23,980.03 Gg CO_2 eq or 0.1 per cent of the total national emissions. This in turn resulted in a change in the estimated total emissions of the United Kingdom for 2008 – from 631,774.50 Gg CO_2 eq, as originally reported by the United Kingdom, to 633,206.21 Gg CO_2 eq or 0.23 per cent of the total national emissions.

V. Questions of implementation

173. 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>.

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

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

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

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

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

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

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

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

Status report for the United Kingdom 2010. Available at <http://unfccc.int/resource/docs/2010/asr/gbr.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2010. Available at <http://unfccc.int/resource/webdocs/sai/2010.pdf>.

FCCC/ARR/2009/GBR. Report of the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2009. Available at <http://unfccc.int/resource/docs/2010/arr/gbr.pdf>.

UNFCCC. Standard Independent Assessment Report, Parts I and II. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Helen Champion and Ms. Jenny Ward (United Kingdom Greenhouse Gas Inventory, Department of Energy and Climate Change), including additional material on the methodologies and assumptions used. The following documents[1] were also provided by the United Kingdom:

March 1999. *UK Emissions of HFCs, PFCs and SF_6 and Potential Emission Reduction Options*, March Consulting Group.

AEA, 2004. *Emissions and Projections of HFCs, PFCs and SF_6 for the UK and Constituent Countries*. Final Report prepared for the Department for Environment, Food and Rural Affairs, 2nd Edition, June 2004, AEA Technology, Oxfordshire, UK

AEA. 2010. *HFC consumption and emissions forecasting*. Containing an update to the June 2008 HFC projections. DRAFT – Restricted Commercial not for dissemination. Report to DEFRA. ED05478. Issue 1, January 2010.

[1] Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
C	confidential
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
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 land use, land-use change and forestry
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1,000 grams)
LTO	landing and take-off
LULUCF	land use, land-use change and forestry
Mt	million tonnes
N	nitrogen
NA	not applicable
NE	not estimated
NH_3	ammonia
NO	not occuring
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change