COMPLIANCE COMMITTEE

CC/ERT/ARR/2010/27
9 April 2010

Report of the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2009

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 2009 was published on 9 April 2010. 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/2009/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

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/ARR/2009/GBR
9 April 2010

ENGLISH ONLY

Report of the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2009*

* In the symbol for this document, 2009 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 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 14 to 19 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Domenico Gaudioso (Italy) and Mr. Dennis Rudov (Belarus); energy – Mr. Leif Hockstad (United States of America) and Mr. Ole-Kenneth Nielsen (Denmark); industrial processes – Mr. Stanford Mwakasonda (South Africa) and Mr. Dušan Vácha (Czech Republic); agriculture – Mr. Donald Kamdonyo (Malawi) and Mr. Chang Liang (Canada); land use, land-use change and forestry (LULUCF) – Ms. Oksana Butrim (Ukraine), Mr. Walter Oyhantçabal (Uruguay) and Mr. Richard Volz (Switzerland); and waste – Ms. Violeta Hristova (Bulgaria) and Mr. Jose Ramon Villarin (Philippines). Mr. Hockstad and Mr. Mwakasonda were the lead reviewers. The review was coordinated by Ms. Astrid Olsson and Mr. Sabin Guendehou (UNFCCC secretariat).

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

B. Emission profiles and trends

3. In 2007, the main greenhouse gas (GHG) in the United Kingdom was carbon dioxide (CO_2), accounting for 85.3 per cent of total GHG emissions[1] expressed in CO_2 equivalent (eq), followed by methane (CH_4) (7.6 per cent) and nitrous oxide (N_2O) (5.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.7 per cent of the overall GHG emissions in the country. The energy sector accounted for 85.3 per cent of the total GHG emissions, followed by agriculture (6.8 per cent), industrial processes (4.4 per cent), waste (3.6 per cent) and other (0.01 per cent). Total GHG emissions amounted to 640,273.27 Gg CO_2 eq and decreased by 17.7 per cent between the base year[2] and 2007.

4. Tables 1 and 2 show total GHG emissions by gas and by sector, respectively. Table 1 shows emissions from sectors/categories listed in Annex A to the Kyoto Protocol and excludes emissions and removals from the LULUCF sector, including 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.

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[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 sectors/categories listed in Annex A to the Kyoto Protocol.

Table 1. Total greenhouse gas emissions by gas, 1990–2007[a]

Greenhouse gas	Gg CO_2 eq							Change base year–2007 (%)
	Base year[b]	1990	1995	2000	2005	2006	2007	
CO_2	591 264.78	591 264.78	553 350.90	553 105.73	557 008.97	554 871.96	546 425.09	–7.6
CH_4	104 477.04	104 477.04	91 132.58	69 813.69	51 127.72	50 439.24	48 939.21	–53.2
N_2O	64 604.86	64 604.86	53 739.59	41 934.18	36 460.93	34 977.11	34 288.67	–46.9
HFCs	15 587.67	11 385.55	15 587.67	9 987.88	10 175.53	9 980.24	9 611.19	–38.3
PFCs	470.89	1 401.60	470.89	498.07	256.35	301.38	215.60	–54.2
SF_6	1 239.30	1 029.95	1 239.30	1 798.47	1 110.35	874.52	793.51	–36.0

[a] "Total GHG emissions" include emissions from sectors/categories listed in Annex A to the Kyoto Protocol (and exclude emissions/removals from the LULUCF sector).
[b] "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 sectors/categories listed in Annex A to the Kyoto Protocol.

Table 2. Greenhouse gas emissions by sector, 1990–2007

Sector	Gg CO_2 eq							Change base year–2007 (%)
	Base year[a]	1990	1995	2000	2005	2006	2007	
Energy	612 241.37	612 241.37	569 316.77	560 738.00	559 136.92	556 862.47	546 003.74	–10.8
Industrial processes	57 472.69	53 991.93	46 507.49	32 160.23	28 243.85	26 939.39	27 891.31	–51.5
Solvent and other product use	IE, NE	IE, NE	IE, NE	IE, NE	IE, NE, NO	IE, NE, NO	IE, NE, NO	NA
Agriculture	54 957.38	54 957.38	52 697.71	50 119.81	45 833.56	44 714.54	43 459.17	–20.9
LULUCF	NA	2 953.90	1 278.82	–309.22	–1 909.74	–1 781.87	–1 779.84	NA
Waste	52 948.34	52 948.34	46 978.37	34 101.67	22 867.20	22 869.23	22 860.23	–56.8
Other	24.76	24.76	20.58	18.30	58.32	58.81	58.81	137.6
Total (with LULUCF)	NA	777 117.67	716 799.74	676 828.79	654 230.12	649 662.57	638 493.43	NA
Total (without LULUCF)	777 644.54	774 163.77	715 520.92	677 138.01	656 139.85	651 444.44	640 273.27	–17.7

Abbreviations: IE = included elsewhere, LULUCF = land use, land-use change and forestry, NA = not applicable, NE = not estimated, NO = not occurring.
[a] "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 sectors/ categories listed in Annex A to the Kyoto Protocol.

C. Annual submission and other sources of information

5. The 2009 annual inventory submission was submitted on 15 April 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007, and a national inventory report (NIR). The CRF tables were resubmitted on 27 May 2009. The United Kingdom also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including: accounting of Kyoto Protocol units, information on changes in the national system and in the national registry, and information on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2009. The annual submission was submitted in accordance with decision 15/CMP.1. The Party indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

6. In response to questions raised by the expert review team (ERT) during the review, the United Kingdom submitted on 2 November 2009 revised information on the completeness of its annual inventory submission (see para. 12 below). Where necessary, the ERT also used previous years' submissions during the review.

7. In addition, the ERT used the standard independent assessment report (SIAR) to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[3]

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

D. Completeness of the inventory

9. The inventory is complete in terms of years and geographical coverage.

10. The United Kingdom has provided all CRF tables for the years 1990–2007. The ERT found that the completeness of the national submission could be improved with respect to the Party's reporting of not estimated ("NE") for a number of categories including: CH_4 and N_2O emissions from liquefied petroleum gases in road transportation; CO_2, CH_4 and N_2O emissions from gaseous fuels in road transportation; CO_2 emissions from fugitive emissions from natural gas; CH_4 emissions from other leakage of natural gas; N_2O emissions from disturbance of soils in forest land converted to cropland; and CH_4 emissions from industrial wastewater.

11. The ERT recommends that the United Kingdom improve the completeness of the inventory by providing estimates for the categories currently reported as "NE" in its next annual submission. The ERT noted that the United Kingdom reports emissions from the LULUCF sector in its Crown Dependencies and Overseas Territories under sector 7. The ERT strongly recommends that the United Kingdom report these emissions under the LULUCF sector.

12. In response to questions raised by the ERT, the United Kingdom indicated that it would improve the completeness of its inventory in its next annual submission with regard to the energy (see para. 42 below) and waste sectors (see para. 90 below). However, the United Kingdom also indicated that it

[3] The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paragraphs 5 (a), 6 (c) and 6 (k)), under the auspices of the international transaction log 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. The SIAR is not publicly available.

would not be able to address completeness issues with regard to some categories currently reported as "NE" (see paras. 42 and 75 below) before its next annual submission due to lack of data and insufficient information to develop a tier 2 method to estimate N_2O emissions from disturbance associated with land use conversion to cropland. The ERT recommends that the United Kingdom improve the completeness of its next annual submission, especially for those categories that are known to occur within the Party and for which methodologies are available in the *Revised 1996* Intergovernmental Panel on Climate Change (IPCC) *Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). The ERT also recommends that the Party, when reporting emissions data for the first time for a given category, ensure that emissions data are provided for the entire inventory time series, and that the choice of methods and EFs are clearly explained in the NIR.

E. Main findings

13. The inventory is in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The inventory covers the period 1990–2007 and is complete in terms of years, sectors and geographical coverage. The United Kingdom submitted a complete set of CRF tables for the years 1990–2007 and an NIR.

14. The 2009 inventory submission of the United Kingdom is generally of high quality. The ERT found that the completeness of the annual submission could be improved with respect to the Party's reporting of "NE" for a number of non-LULUCF categories, especially those categories that are included in either the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance, and for which methods are prescribed therein.

15. The NIR shows significant improvements since the previous submission, in particular with regard to the introduction, in the quality assurance/quality control (QA/QC) procedures, of data obtained from the European Union emissions trading scheme (EU ETS) and completeness (see para. 34 below).

16. By supplying the additional information requested by the ERT during the review process, the United Kingdom demonstrated that it has sufficient capacity to comply with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines) and the IPCC good practice guidance.

17. The Party has submitted, in part, on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with Part I of the annex to decision 15/CMP.1. The United Kingdom also submitted, on a voluntary basis, some information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

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

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

20. 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 Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

21. The ERT encourages the United Kingdom to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.[4]

22. In the course of the review, the ERT formulated a number of recommendations relating to the completeness of the annual submission (see paras. 11, 12 above); transparency (see para. 35 below), uncertainty estimation (see para. 31 below), recalculations (see para. 33 below) and QA/QC procedures (see para. 34 below).

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

1. Overview

23. The ERT concluded that the national system of the United Kingdom continued to perform its required functions.

24. The NIR described the national system and the institutional arrangements for the preparation of the inventory. The Department of Energy and Climate Change (DECC), which, as the designated single national entity, has overall responsibility for the national inventory. The national inventory is prepared by AEA of AEA Technology plc, which performs the role of Inventory Agency, under contract with DECC. The United Kingdom provided in table 1.2 in its NIR a list of organizations involved in the GHG inventory preparation together with their key roles and general responsibilities. As examples, emission estimates for the agriculture sector are produced by the Land Management Improvement Division at the Department for Environment, Food and Rural Affairs (Defra) through contract with North Wyke Research. The LULUCF sector inventory is developed by the United Kingdom Centre for Ecology and Hydrology (CEH), under separate contract to DECC. Key data providers include government departments such as the Department for Business, Enterprise and Regulatory Reform (BERR), Defra and the Department for Transport (DfT), non-departmental public bodies such as the Environment Agency for England and Wales (EA) and the Scottish Environment Protection Agency (SEPA), private companies such as Corus, and business organizations such as the United Kingdom Petroleum Industry Association (UKPIA) and the United Kingdom Offshore Oil Association (UKOOA). Data providers currently supply data on the basis of informal agreements. The single national entity is currently in the process of drawing up formalized memoranda of understanding (MoUs) to back up these agreements. The single national entity has legislative powers to request data, although this has not yet been used. The ERT recommends that the United Kingdom implement the process of transforming current informal agreements into formal MoUs in order to ensure that the requirements regarding the quality, formatting, security and timely submission of the national inventory are met.

25. The United Kingdom included in annex 10 to its NIR, a description of arrangements in its national system to ensure transparent reporting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The Party plans to regularly update the forest inventory and implement a new method using grid cells of 20 x 20 km to gather data and estimate emissions and removals attributable to activities under Article 3, paragraphs 3 and 4 of the Kyoto Protocol.

26. The NIR also provided information on the changes in the national system since the previous annual submission and these changes are discussed in chapter VII of this report.

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[4] Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.<http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

2. Inventory planning

27. As the designated single national entity, DECC is responsible for management and planning in the national system and the development of its legal and contractual infrastructure. As inventory agency, the AEA of AEA Technology plc is responsible for all aspects of the preparation of the national inventory, reporting and quality management. Other organizations involved in the inventory and their roles and responsibilities are presented in paragraph 24 above. In order to assist DECC in the review and improvement of the inventory, the United Kingdom GHG Inventory Steering Committee was established in 2006 as an independent review team. Special advisors to the Steering Committee include the inventory agency team at AEA of AEA Technology plc, appropriate sector, legal and economic experts.

3. Inventory preparation

Key categories

28. The United Kingdom has reported a key category tier 1 analysis (both level and trend assessment) and a tier 2 analysis as part of its 2009 annual submission. The key category analysis performed by the Party and that performed by the secretariat produced different results owing to the different levels of disaggregation used by the Party and the secretariat.[5] 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 the IPCC good practice guidance for LULUCF.

29. The United Kingdom has reported that all categories relating to activities under Article 3, paragraph 3, and forest management as an elected activity under Article 3, paragraph 4, of the Kyoto Protocol are considered to be key categories, but provided little information on the criteria used. The ERT encourages the United Kingdom to elaborate on these criteria in its next annual submission, following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory, provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF.

30. The United Kingdom used the key category analysis as a driving force in the preparation of the inventory and to prioritize use of the resources available and further improvements in the inventory.

Uncertainties

31. The United Kingdom has performed both tier 1 and tier 2 uncertainty analyses and the results of these analyses are presented in the NIR, at the summary level and the individual category level. The results of the tier 2 analysis suggest that uncertainty in the combined global warming potential (GWP) weighted emissions of all GHGs for the latest reported year (2007) is 13 per cent; this uncertainty was reported as 14 per cent for the year 2006 in the 2008 submission. The Party does not report on how the uncertainty analysis is used to plan improvements in the preparation of the inventory. The ERT encourages the United Kingdom to describe in its next annual submission how the uncertainty analysis is used to prioritize further improvements in the inventory.

Recalculations and time-series consistency

32. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by the United Kingdom for the time series

[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.

(1990–2006) have been undertaken to take into account: in energy, of improvements in AD for energy industries following a revision of the national energy statistics, biomass consumption and introduction of carbon EFs for coal, fuel and natural gas use in power stations, and petroleum coke and fuel oil use in refineries based on emission estimates reported under the EU ETS, the reallocation of emissions within road transportation following a review of speed data for different types of road and area, vehicle km data (data on distance travelled) and fleet composition data; in industrial processes, of revision of the AD reported by several operators, changes in the methodology used to estimate emissions of fluorinated gases (F-gases); in agriculture, of revision to livestock numbers for other cattle and sheep for manure management and enteric fermentation, revision of EFs for animal waste management systems (AWMS) for swine and of EF for poultry, and nitrogen (N) excretion rate for dairy cattle and goats for manure management; in LULUCF, revisions of EFs for biomass burning on forest land and change in the method used to estimate emissions and removals from harvested wood products; and in waste, data from more solid waste disposal sites and update of data on wastewater management and chemical waste incineration. Further information on recalculations are provided in the appropriate chapters of this report (see paras. 43, 57, 66, 74, 86 below).

33. The ERT noted that the recalculations mentioned in paragraph 32 above resulted in an increase in total GHG emissions in the base year (0.3 per cent) and a decrease in 2006 (0.6 per cent). The rationale for these recalculations is provided in the NIR, but not fully in CRF table 8(b). The ERT recommends that the United Kingdom include all rationale for the recalculations made in the CRF table 8(b) in its next annual submission.

Verification and quality assurance/quality control approaches

34. The United Kingdom has in place a detailed QA/QC plan, which complies with the tier 1 procedures outlined in the IPCC good practice guidance, and includes both general and category-specific QA/QC procedures. The QA/QC system is being further developed and the range of activities is being extended so that the QA/QC plan complies with tier 2 procedures. Facility-level data obtained from the EU ETS are not used directly in the preparation of the inventory, but are used to cross-check information on fuel consumption from the Digest of United Kingdom Energy Statistics (DUKES); carbon content data reported under the EU ETS have been used in the inventory to replace extrapolated data supplied by operators. The ERT identified that QA procedures are not described in sufficient detail in the relevant section of the NIR and information on the planning of external peer review activities has not been reported by the Party. In response to questions raised by the ERT during the review, the United Kingdom clarified that the current contract for compiling the inventory includes annual bilateral reviews on a sectoral basis. The first of these reviews was conducted together with the French inventory team which reviewed the agriculture sector of the inventory of the United Kingdom on a spot basis. It is not clear whether the Party intends to introduce external verification. The ERT recommends that the Party provide a more detailed description of the QA procedures that have been implemented in its next annual submission.

Transparency

35. The submission is in general transparent with regard to the NIR and the CRF tables. The information reported in the sectoral chapters of the NIR enabled the ERT to fully assess underlying assumptions and rationale for choice of data, methods and other inventory parameters. The information included in the general introductory section is not sufficiently detailed and needs further clarification, which is generally provided in the annexes to the NIR. The ERT recommends that the United Kingdom include in its next annual submission a complete discussion of issues such as completeness and uncertainty analysis in the main body of the NIR. Specific recommendations formulated by the ERT regarding the transparency of the reporting are described in detail in the sector chapters below.

Inventory management

36. The United Kingdom has a centralized archiving system, held by the AEA of AEA Technology plc, which includes the archiving of disaggregated EFs and AD, and documentation on how these EFs and AD 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.

G. Follow-up to previous reviews

37. A number of improvements have been made to the annual submission by the United Kingdom in response to recommendations made during previous reviews. These improvements are contained in table 10.3 in the NIR. Major improvements to the current inventory concern the introduction, in the QA/QC procedures, of data obtained from the EU ETS and the estimation of emissions from offshore oil and gas production, aviation, road transportation, harvested wood products, landfills and animal manure management systems, and emissions of F-gases. The ERT noted that several recommendations made during previous reviews have not yet been implemented, partly – as mentioned in chapter 10 in the NIR – due to the short time available to implement them (the report of the individual review of the annual GHG inventories submitted in 2007 and 2008 was published on 30 April 2009). These recommendations include the allocation of emissions from fuels used in manufacturing industries and construction to the appropriate subcategories, the reporting of emissions of F-gases by species, the reporting of CH_4 and N_2O emissions from industrial wastewater, the reporting of emission estimates for several categories, mostly in the LULUCF and energy sectors that are reported as "NE" and the provision of complete information on categories reported as "NE" and included elsewhere ("IE") in CRF table 9(a). The United Kingdom indicated during the review that work was under way to address these issues and that it intends to present the relevant results in its next annual submission. The ERT supports this intention and recommends that the United Kingdom implement the remaining recommendations in the next annual submission.

H. Areas for further improvement

1. Identified by the Party

38. The 2009 NIR identifies several areas for improvement. In response to recommendations made during the previous review, the United Kingdom indicated that it is working to improve its estimates of:

(a) N_2O emissions from nitric acid production;

(b) CH_4 and N_2O emissions from the agriculture sector;

(c) Carbon stock change in and N_2O emissions from afforested drained peat land;

(d) N_2O emissions from drainage of soils on forest land;

(e) N_2O and CH_4 emissions from industrial wastewater;

(f) Emissions of F-gases disaggregated by species.

2. Identified by the expert review team

39. The ERT identifies the following cross-cutting issues for improvement:

(a) Ensure, to the extent possible, the inclusion in its next annual submission, emissions estimates for categories currently reported as "NE" and for which methods exist for these categories in the Revised 1996 IPCC Guidelines and/or the IPCC good practice

guidance, and if emissions for a given category cannot be estimated then provide sufficient explanation in the NIR as to why it cannot be estimated;

(b) Provide more detailed information in CRF table 9(a) on categories reported as not estimated and included elsewhere;

(c) Include all rationale for the recalculations made in the CRF table 8(b);

(d) Include a complete description of how the uncertainty analysis is used to prioritize further improvements in the inventory;

(e) Include, in the main body of the NIR, a complete discussion on completeness and uncertainty analysis;

(f) Include a more detailed description of implemented QA procedures and the planning of external peer review activities;

(g) Conclude formal MoUs with data providers;

(h) Allocate fuel consumption and emissions from direct flights between the United Kingdom and its overseas territories under domestic aviation;

(i) Include the emissions from the LULUCF sector in the Crown Dependencies and Overseas Territories in the LULUCF sector and not in sector 7;

(j) Further improve the measures put in place in the national registry with a view to ensuring minimal operator errors and reliable interoperability with other registry systems, including the international transaction log (ITL), in accordance with paragraph 115 of the annex to decision 22/CMP.1 and paragraph 25 of the annex to decision 24/CP.8, and report in the next annual submission on the changes made to the registry following the successful implementation and testing of these measures, including any relevant test plans and test reports;

(k) Take appropriate actions to reduce the number of out-of-sequence messages sent by the registry;

(l) Enhance the user interface of the registry by providing the public information referred to in paragraph 45, 46 and 48 of the annex to decision 13/CMP.1, and report on any changes to that public information in the next annual submission.

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

II. Energy

A. Sector overview

41. The energy sector is the main sector in the GHG inventory of the United Kingdom. In 2007, emissions from the energy sector amounted to 546,003.74 Gg CO_2 eq, or 85.3 per cent of total GHG emissions. Since 1990, emissions have decreased by 10.8 per cent. The key driver for the fall in emissions is the decline in emissions from energy industries, emissions from manufacturing industries and construction, and fugitive emissions from fuels. Over the period 1990–2007 the only category in which there was an increase in emissions was transport (11.9 per cent). Within the sector, 38.9 per cent of the emissions were from energy industries, followed by 24.5 per cent from transport, 18.7 per cent from other sectors and 14.8 per cent from manufacturing industries and construction. Fugitive emissions

from oil and natural gas accounted for 1.9 per cent and fugitive emissions from solid fuels accounted for 0.5 per cent. The remaining 0.6 per cent was from military fuel use.

42. The inventory is generally complete, but some categories are reported as "NE": CH_4 and N_2O emissions from liquefied petroleum gas in road transportation; CO_2, CH_4 and N_2O emissions from gaseous fuels in road transportation; CO_2 emissions from fugitive emissions from natural gas; and CH_4 emissions from other leakage of natural gas. In response to questions raised by the ERT during the review, the United Kingdom indicated that it intends to include CO_2 emissions from fugitive emissions of natural gas in the 2010 inventory submission. The Party also intends to include CH_4 emissions from other leakage of natural gas in the 2010–2011 inventory, as it intends to review the gas leakage model after discussions with the gas network operators. For the remaining categories, the Party indicated that it has no firm data on the number of vehicles running on liquefied petroleum gas and that the United Kingdom energy statistics are not able to give the amount of gas used as transport fuels. The ERT recommends that the Party ensure, to the extent possible, the inclusion in its next annual submission emissions for categories currently reported as "NE" and for which methods exist for these categories in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance, and if emissions for a given category cannot be estimated then the Party is to provide sufficient explanation in the NIR as to why it cannot be estimated.

43. In the 2009 submission, recalculations reported by the United Kingdom in the energy sector for 1990 resulted in an overall increase in the emission estimate by 1,050.24 Gg CO_2 eq, or 0.2 per cent of total GHG emissions. The largest changes in emission estimates were reported in energy industries (–0.4 per cent), transport (–0.4 per cent) and manufacturing industries and construction (0.4 per cent). The recalculations reported for 2006 resulted in an overall decrease in the emission estimate by 5,998.52 Gg CO_2 eq, or 1.1 per cent. The recalculation for 2006 was carried out following an update to the N_2O EFs for road transportation, the inclusion of EF data obtained from the EU ETS on the public power sector and revisions to the energy statistics. In an annex to the NIR, the United Kingdom discusses the EFs obtained under the EU ETS. These EFs are lower than the EFs previously used. Although the EU ETS data are more detailed, the use of these data should be in line with the IPCC good practice guidance and ensure time-series consistency (see para. 50 below).

B. Reference and sectoral approaches

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

44. The United Kingdom has calculated CO_2 emissions from fossil fuel combustion using the reference and sectoral approaches for all years of the time series. For 2007, CO_2 emissions calculated using the reference approach are 2.7 per cent higher than those estimated using the sectoral approach. For all years of the time series, with the exception of 1990, the CO_2 emissions estimated using the reference approach are higher than those estimated using the sectoral approach. In the NIR, the Party states that these differences were caused by the use of different independent data sources for the two approaches. Some categories, including waste incineration and non-fuel use in the industrial processes, are not included in the reference approach. The United Kingdom, in annex 4 to the NIR, has reported corrected differences taking into account fuel consumption in ammonia production and iron and steel production. The previous ERT recommended that the United Kingdom add the categories that were not accounted for to the appropriate category of the reference approach (e.g. other liquid/solid/gaseous fuels) in order to further reduce the differences between the emission estimates calculated using the two approaches and to verify whether those categories are the cause of the difference. The present ERT reiterates this recommendation.

45. In the reference approach the apparent energy consumption and the apparent energy consumption excluding feedstocks and non-energy use of fuels are identical, even though significant fuel consumption

is listed for these purposes. The ERT recommends that the United Kingdom correct this inconsistency in its next annual submission.

46. The ERT identified that for both international and national navigation, there are large discrepancies between data reported in the CRF tables and the data reported to the International Energy Agency (IEA). For domestic aviation the amount of jet kerosene reported in the CRF tables is lower than that reported to IEA for all years by more than 100 per cent. This was also mentioned in the previous review report. The ERT recommends that the United Kingdom reconcile the data reported to IEA with the data reported to the UNFCCC secretariat.

2. International bunker fuels

47. In response to a recommendation made during the previous review, the United Kingdom states in the NIR that the fuel consumption data used to estimate emissions from international marine and domestic navigation are provided by BERR and published in DUKES. The Party also states in the NIR that the figure for total jet kerosene consumption used in the inventory (the sum of international and domestic jet kerosene consumption) is cross-checked with the data contained in DUKES.

48. The use of data contained in DUKES to estimate emissions from aviation 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, the ERT noted that there are direct flights to Gibraltar and Bermuda. In response to questions raised by the ERT during the review, the United Kingdom indicated that flights between the United Kingdom and its overseas territories as described in DUKES are considered international due to the fact that the Civil Aviation Authority classifies each flight as international or domestic and deviating from this classification could result in a decrease in the accuracy of the overall emission estimate. The ERT recommends that the United Kingdom include fuel consumption and report under civil aviation emissions from all direct flights between the United Kingdom and its overseas territories as contained in DUKES in the next annual submission consistent with the methodological approach in the IPCC good practice guidance for calculating international bunker fuels. The United Kingdom indicated during the review that due to the fact that the 2010 submission was already well under way, it is likely that any change in the reporting of domestic aviation emissions would not be incorporated into the United Kingdom's 2010 annual submission, but would have to be included in future submissions. The ERT notes this, but further reiterates that the United Kingdom's methodological approach to calculating international bunker fuels is inconsistent with the IPCC good practice guidance, and will lead to an underestimation in reporting domestic aviation emissions in the energy sector.

3. Feedstocks and non-energy use of fuels

49. According to the NIR, natural gas is used as feedstock for the production of ammonia (NH_3), methanol and acetic acid. Other fuels used as feedstock or for non-energy purposes are reported in CRF table 1.A(d). The previous ERT recommended that the United Kingdom provide detailed background information in the NIR, together with a full description of the fractions of carbon stored for the other fuels. The Party reported in the NIR that it intended to make efforts to include this information in the 2010 submission. In response to a question raised during the review related to the provision of this information, the United Kingdom provided the ERT with information on data sources concerning the fractions of carbon stored. The ERT recommends that the United Kingdom include this information in its 2010 submission.

C. Key categories

Stationary combustion: gaseous, solid fuels – CO_2

50. In response to recommendations made by the previous review, the United Kingdom has included detailed comparisons between inventory data and data submitted under the EU ETS. The use of EU ETS data is explained, including the number of installations included in the EU ETS, for the different categories. The United Kingdom has allocated fuel consumption in its overseas territories under the relevant categories in the CRF tables. The ERT commends the United Kingdom for these improvements. The ERT recommends that the United Kingdom continue to monitor data reported under the EU ETS, ensure time-series consistency and ensure that QA/QC procedures are carried out on the EU ETS data used in the calculation of emission estimates in order to ensure that these estimates are line with the IPCC good practice guidance and report thereon in the next annual submission.

51. With regard to CO_2 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 iron and steel. Given that the United Kingdom's energy statistics are disaggregated according to the same categories as in the CRF tables, the ERT identified that the Party should have the institutional arrangements and/or capacity to report emissions under the appropriate categories. The previous ERT recommended that the United Kingdom allocate emissions to the appropriate categories in future submissions. In response to questions raised by the ERT during the review with regard to the implementation of this recommendation, the United Kingdom indicated that disaggregating data is possible, but it would require substantial work and therefore it would not be able to include this information in the 2010 submission.

52. The lack of transparency and comparability meant that the ERT was unable to identify potential time-series inconsistencies in these categories. The ERT reiterates the recommendation made during the previous review and strongly recommends that the United Kingdom take measures as soon as possible to allow it to report emissions from manufacturing industries and construction in a transparent manner in future annual submissions.

D. Non-key categories

1. Stationary combustion: other fuels – CO_2

53. The emissions from incineration of municipal solid waste are reported under fuel combustion for waste incineration with energy recovery. The Party assumes that the CO_2 EF and gross calorific value remain constant at 75 kg/t and 9.5 GJ/t, respectively, for the period 1990–2007. The reference for the EF is from 1993. In response to a question raised by the ERT during the review, the United Kingdom reported that the composition of waste incinerated would have changed over the time period and this may have had a significant impact on the carbon content of waste. The United Kingdom indicated that it intended to review the methodology used to estimate emissions from this category. The ERT agrees that there is a need to revise the estimates for this category and recommends that the United Kingdom report the revised estimates in its 2010 submission.

2. Oil and natural gas – CH_4

54. For natural gas, all AD and emissions are reported under the sub-category distribution. No explanation for this is provided in the NIR and the CRF tables. In responding to a question raised by the ERT during the review, the United Kingdom indicated that it could work in cooperation with the data suppliers to disaggregate these data. The ERT notes that disaggregating these data would increase the transparency and comparability of the category and recommends that the United Kingdom report more disaggregated data and emissions in its next annual submission.

III. Industrial processes and solvent and other product use

A. Sector overview

55. In 2007, emissions from the industrial processes sector amounted to 27,891.31 Gg CO_2 eq, or 4.4 per cent of total GHG emissions. Emissions are not reported for the solvent and other product use sector. Since the base year (which is 1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6), emissions have decreased by 51.5 per cent in the industrial processes sector. The key driver for the fall in emissions in the sector is the decrease in N_2O emissions from adipic acid production as a result of the installation of an N_2O abatement plant. Within the industrial processes sector, 36.4 per cent of the emissions were from consumption of halocarbons and SF_6, followed by 31.1 per cent from mineral products, 21.2 per cent from the chemical industry and 10.5 per cent from metal production. Production of halocarbons and SF_6 accounted for 0.8 per cent.

56. The inventory is complete except for the following categories which have been reported as "NE": N_2O emissions from the production of fletton bricks and ammonia production, CO_2 and CH_4 emissions from carbide production, N_2O emissions from solvent and other product use, potential emissions of HFCs from fire extinguishers and from Crown Dependencies and Other Territories. In some cases, the ERT identified that an incorrect notation key would be used (e.g. CO_2 and CH_4 emissions from carbide production are reported as "NE" instead of not occurring ("NO"), CO_2 emissions from non-methane volatile organic compounds from aerosols are reported as "IE" instead of "NE" and N_2O emissions from solvent and other product use are reported as "NE" instead of "NO"). The ERT encourages the United Kingdom to clarify its use of such notation keys and explore approaches available in the scientific literature, to estimate emissions for categories that do not have methodologies prescribed in the Revised 1996 IPCC Guidelines nor the IPCC good practice guidance, with a view to enhancing further, to the extent possible, the completeness and accuracy of its inventory.

57. For the 2009 submission, the United Kingdom carried out recalculations for CO_2 emissions from ammonia production, which resulted in a decrease in the emission estimate for 2006 of 711.00 Gg CO_2 eq, or 2.6 per cent. Recalculations for emissions of F-gases from consumption of halocarbons and SF_6 resulted in an increase in emissions for 2006 of 696.74 Gg CO_2 eq, or 2.6 per cent. Recalculations for a number of other categories (e.g. limestone and dolomite use and SF_6 used in aluminium and magnesium foundries) have a small effect on emission estimates. Detailed descriptions of all recalculations are provided in the NIR. The total impact of recalculations in the industrial processes sector for 1990 is an increase in emissions of 43.01 Gg CO_2 eq, or 0.1 per cent, and for 2006 an increase of 138.08 Gg CO_2 eq, or 0.5 per cent.

58. The general QA/QC procedures that are used for the inventory as a whole are applied to this sector. QA/QC procedures for the industrial processes sector could be improved by comparing the basic information collected for the inventory and CO_2 emission estimates with the information collected and reported under the EU ETS and from other sources of data.

B. Key categories

Consumption of halocarbons and SF_6 – HFCs and PFCs

59. The ERT observed that the United Kingdom did not report information on emissions and use of individual gases but reported only an unspecified mix of gases. In order to increase the transparency and comparability of the inventory, the ERT recommends that the United Kingdom report in the NIR HFCs and PFCs by type of gas instead of using the term "unspecified mix". In the previous review report, the United Kingdom expressed its intention to report emissions using a new model in the 2009 annual submission. The ERT welcomes the use of this new model and recommends that the United Kingdom document in a transparent manner the recalculations made using the model in its next annual submission.

60. In some cases the incorrect notation key has been used, such as potential emissions of halocarbons from imports are reported as "NE" instead of "IE" or "NO". The ERT recommends that the United Kingdom use the appropriate notation keys for this category in its next annual submission.

C. Non-key categories

1. Other (chemical industry) – CO_2

61. The United Kingdom has reported emissions from waste chemicals burned and CO_2 emissions from certain fuels used for non-energy purposes. The NIR does not provide information about type of chemicals and/or waste. The ERT recommends that the United Kingdom provide in its next annual submission more information about the methodology used, the basic assumptions for types of chemicals or groups of materials, together with information to explain why CO_2 emissions from the combustion of waste chemicals used as fuel are reported under the industrial processes sector instead of the energy sector.

2. Iron and steel production – CO_2

62. Emissions from iron and steel production are reported under several categories including: (i) emissions from the combustion of gases in coke ovens are reported under manufacture of solid fuels and other energy industries, (ii) emissions from process and combustion in the iron and steel industry are reported under iron and steel in the energy sector, (iii) emissions from losses of coke oven gas from coke ovens are reported under solid fuel transformation, (iv) emissions from the use of dolomite and limestone in sintering and basic oxygen furnaces are reported under limestone and dolomite use, and (v) emissions from steel production and flaring of blast furnace gas are reported under iron and steel production in the industrial processes sector. CO_2 and CH_4 emissions from pig iron production, sintering and coke production are reported under the energy sector instead of the industrial processes sector. The ERT welcomes the United Kingdom's plans to review the EFs and AD used and encourages the Party to review the way in which emissions are reported in order to be in line with the IPCC Revised 1996 Guidelines and, if necessary, recalculate emissions. The ERT recommends that the United Kingdom provide information about relevant recalculations, QA/QC processes and verification in its next annual submission.

3. Aluminium production – PFCs

63. The ERT observed that the United Kingdom did not report tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6) emissions separately. The ERT welcomes the United Kingdom's plans to review the way in which emissions are reported which will make it possible to report CF_4 and C_2F_6 emissions separately. Providing this information would increase the transparency and comparability of the United Kingdom's inventory.

IV. Agriculture

A. Sector overview

64. In 2007, emissions from the agriculture sector amounted to 43,459.17 Gg CO_2 eq, or 6.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 20.9 per cent. The key driver for the fall in emissions is the reduction in livestock numbers and fertilizer consumption. Within the sector, 53.6 per cent of the emissions were from agricultural soils, followed by 35.8 per cent from enteric fermentation and 10.5 per cent from manure management. The remaining 0.1 per cent was from other which includes N_2O emissions from manure management in the United Kingdom's Crown Dependencies and Overseas Territories. Most of the emissions from this category were N_2O, which accounted for 57.6 per cent of the emissions, while CH_4 accounted for 42.4 per cent.

65. The inventory is complete in terms of categories and gases. The Party reported that activities including rice cultivation and savannah burning do not occur in the country. It indicated that field burning of crop residues has not occurred in the country since 1994.

66. The United Kingdom reported recalculations in the agriculture sector to take into account revision to livestock numbers for other cattle and sheep for manure management and enteric fermentation, revision of EFs for AWMS for swine and of EF for poultry, and N excretion rate for dairy cattle and goats for manure management. The recalculations resulted in an increase in emissions of 597.39 Gg CO_2 eq (1.4 per cent) in 1990 and an increase in emissions of 1,067.38 Gg CO_2 eq (2.0 per cent) in 2006.

67. The United Kingdom indicated in the NIR that tier 1 QC checks have been undertaken. However, there are a number of inconsistencies between the NIR and the CRF tables. The ERT recommends that the United Kingdom improve category-specific QA/QC activities and report the results of these activities in its next annual submission.

B. Key categories

1. Enteric fermentation – CH_4

68. The United Kingdom calculated CH_4 emissions from dairy cows using the IPCC tier 2 method and CH_4 emissions from beef cattle using the IPCC tier 1 method. The use of an IPCC tier 1 method to calculate CH_4 emissions from beef cattle is not in line with the IPCC good practice guidance, as it is a key category. In response to questions raised by the ERT during the review, the United Kingdom indicated that it intends to use the IPCC tier 2 method and revise the EFs for enteric fermentation to estimate emissions for all cattle categories in its next annual submission. The ERT recommends that the Party implement this plan for the next annual submission.

2. Manure management – CH_4

69. The United Kingdom calculated CH_4 emissions from beef cattle using the IPCC tier 1 method rather than using a tier 2 method, assuming a constant average weight of beef cattle over time. The ERT does not consider this to be a plausible assumption. Since the United Kingdom stated that it intends to use a tier 2 method to derive EFs for enteric fermentation for all cattle categories (see para. 68 above), the ERT recommends that the Party apply the IPCC tier 2 method to estimate CH_4 emissions from manure management of beef cattle in its next annual submission. The Party indicated during the review that it plans to revise the EFs for manure management in its next annual submission.

3. Agricultural soils – N_2O

70. The ERT identified that poultry litter is incinerated for electricity generation and that the share of N in poultry litter incinerated has not been subtracted from the estimate of N_2O emissions from poultry litter applied to soils. The ERT recommends that the United Kingdom resolve this issue in its next annual submission. In response to the draft report, the Party indicated that a correction for fuel was included in the calculation and provided the spreadsheets used to substantiate this fact. The ERT recommends that the United Kingdom provide a clear methodological explanation in future NIRs in order to avoid similar misunderstandings in the future.

C. Non-key categories

Manure management – N_2O

71. The changes in average body weight for beef cattle over time as indicated by dressed carcass weight[6] affect the CH_4 EFs for enteric fermentation and manure management. These changes may also affect N excretion rates and in turn N_2O emissions from manure management systems. The United Kingdom has used a constant N excretion rate for manure from beef cattle across the time series. The ERT recommends that the Party update N excretion rates for manure based on average body weight for beef cattle over time taking into account the fact that the United Kingdom intends to use a tier 2 method to estimate CH_4 emissions and include recalculated estimates in its next annual submission. During the review, the Party indicated that it intends to revise the estimates of N_2O emissions from manure management in accordance with the Revised 1996 IPCC Guidelines and it also plans to provide explanations for the changes in the data used. The ERT recommends that the United Kingdom include the revised estimates in its next annual submission.

72. As identified during the previous review, the ERT found that the United Kingdom assumes that 20 per cent of N in AWMS volatilizes as NO_X and NH_3 and then the Party subtracts this from the estimated amount of N emitted as N_2O during manure management. However, as the Party uses the IPCC default EF, which is based on total N treated in AWMS, this approach leads to an underestimation of N_2O emissions from manure management. The ERT reiterates the recommendation made during the previous review that the United Kingdom provide revised estimates in its next annual submission. The Party informed the ERT that it intends to revise these emission estimates in its next annual submission (see para. 71 above).

V. Land use, land-use change and forestry

A. Sector overview

73. In 2007, net removals from the LULUCF sector amounted to 1,779.84 Gg CO_2 eq, offsetting 0.3 per cent of total GHG emissions. The LULUCF sector changed from a net source (2,953.90 Gg CO_2 eq) in the base year to a net sink. The key driver for the rise in removals is the increase in carbon stock changes in forest land and grassland. Cropland was a net source for the entire time series. Within the sector, 14,155.32 Gg CO_2 eq of removals occurred in forest land, followed by 7,957.06 Gg CO_2 eq from grassland and 1,292.74 Gg CO_2 eq from the category other (harvested wood products). Cropland was a net source of emissions, accounting for 15,288.35 Gg CO_2 eq, followed by settlements which accounted for 6,336.92 Gg CO_2 eq.

74. The United Kingdom reported recalculations for the whole time series for the following categories: forest land remaining forest land, grassland remaining grassland, settlements remaining settlements, other land remaining other land and the category other (harvested wood products). These recalculations resulted in a slight increase in net removals for 1990 (+1 per cent) and in a decrease in net removals for 2006 (–8.9 per cent) since the previous submission. The rationale for the recalculations was the use of new statistics that became available in 2007, but it is not explained in sufficient detail in the NIR. The ERT recommends that the Party provide a clearer explanation of the rationale for these recalculations in its next annual submission.

75. The ERT identified some inconsistencies between the NIR and the CRF tables (e.g. the data in table 7.1 and table 7.2 of the NIR related to AD are different from the data in the CRF tables for cropland, grassland and settlements). The ERT recommends that the United Kingdom improve consistency between the NIR and the CRF tables. The ERT identified that N_2O emissions from disturbance of soils in forest land converted to cropland are reported as "NE". In response to questions

[6] See <http://www.statistics.gov.uk/STATBASE/Source.asp?vlnk=1275>.

raised by the ERT during the review, the United Kingdom indicated that estimates for this category made using the default EFs and C:N ratio from the IPCC good practice guidance for LULUCF would result in an increase of net emissions from the LULUCF sector in 1990 by over 50 per cent, with similar impacts on other years. The Party informed the ERT that it would seem prudent to await an alternative approach to estimating N_2O emissions due to land use conversion to cropland before reporting estimates, given that there is not currently sufficient information to develop tier 2 methods. The ERT encourages the United Kingdom to continue to explore ways to improve emission estimates for categories currently reported as "NE".

76. The United Kingdom described in annex 10 to the NIR progress made in the development of methodologies for estimating emissions and removals of GHG from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The Party reported estimates of emissions by sources and removals by sinks of GHG resulting from these activities for the time series 1990–2007, but it is not clear how these estimates have been derived as no information is provided for instance on land area, EFs used or carbon pools. However, the United Kingdom includes in its NIR a detailed explanation of many planned improvements such as a new method using grid cells of 20 x 20 km to gather data and to estimate emissions and removals from land subject to afforestation, reforestation, deforestation or forest management, regularly updating the forest inventory, and investigation of the impact of forest management on forest carbon stocks and fluxes. The ERT encourages the United Kingdom to implement these planned improvements, as it would significantly improve the quality of future submissions including reporting on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

B. Key categories

1. Land converted to forest land – CO_2

77. The United Kingdom uses the IPCC default method based on carbon gains and losses to estimate the carbon stock change in living biomass. The Party used the carbon flow model to generate data on gains and losses of carbon. The United Kingdom used the annual increment of above-ground biomass for representative tree species using tables published in 1981. As stated in the previous review report, it is not possible for these national data to be representative of the present growth of tree species of the forests in the country. The ERT acknowledges that the United Kingdom plans to establish a new forest inventory in order to update the data required for the GHG inventory and it recommends that the Party use new data in its future annual submission.

78. The Party reports under this category all areas converted to forest land since 1921. It is not clear how the Party reports areas converted to forest land before 1920. According to the IPCC good practice guidance for LULUCF, land is considered forest land remaining forest land 20 years after the land-use conversion to forest (the IPCC default land-use conversion period is 20 years). The ERT recommends that the United Kingdom provide detailed information on land conversion to forest land, taking into account the IPCC default conversion period or any other justified time period used in the next annual submission.

79. In the previous review, the ERT noted that it was not clear from the NIR how the United Kingdom determined the area of harvested forest that is replanted and the area that is converted to other uses. In addition, it was not clear in the previous review how the United Kingdom would put in place methods for internal auditing and verification of the estimates based on the planting statistics. In relation to this, the NIR mentions that removals (harvesting) and thinning are considered deforestation, but it is not clear whether thinning is deforestation in line with the national definition of forest of the United Kingdom. The ERT recommends that the Party provide further clarification on these issues in its next inventory submission.

2. Land converted to cropland – CO_2

80. Emissions from mineral soils account for the largest share of emissions in this category. The United Kingdom used a tier 3 method to estimate the changes in carbon stocks and emissions and removals from all conversions to cropland, which is in line with the IPCC good practice guidance for LULUCF. The ERT identified that different data sources have been used. Given the significant contribution of emissions from this category to sectoral emissions, the ERT recommends that the United Kingdom provide detailed explanation that ensure the consistency between the different sources of AD used in the tier 3 model.

3. Grassland – CO_2

81. In the NIR, only peat extraction used in horticulture has been reported under grassland remaining grassland. The United Kingdom provides country-specific EFs used to calculate emissions from peat extraction. However, the ERT recommends that the Party explain the relationship between EFs per volume of peat and EFs per unit area as reported in the CRF tables. The ERT also recommends that the United Kingdom explain why peat extraction is reported under grassland remaining grassland and not under wetlands in its next annual submission.

82. Furthermore, it is not clear how the remaining land area of grassland remaining grassland is reported. The ERT recommends that the United Kingdom improve the transparency of its reporting by providing detailed information on land area reported under grassland.

4. Land converted to settlements – CO_2

83. The information provided by the United Kingdom is not sufficiently transparent to assess whether the method applied is in line with the IPCC good practice guidance for LULUCF. The most significant carbon pools include biomass and soils. The ERT recommends that the United Kingdom provide more information on the method used to estimate emissions and removals from land converted to settlements in its next annual submission.

C. Non-key categories

Forest land remaining forest land – CO_2

84. The United Kingdom reports under this category the area of forests that existed prior to 1920. The Party assumes that there has been no net change in carbon stocks in forest land remaining forest land since 1920. Therefore emissions from this category are reported as "NO". The ERT recommends that the Party provide evidence to support this assumption in its next annual submission.

VI. Waste

A. Sector overview

85. In 2007, emissions from the waste sector amounted to 22,860.23 Gg CO_2 eq, or 3.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 56.8 per cent. The key driver for the fall in emissions is the decrease in the amount of municipal solid waste disposed of in landfills. Within the sector, 88.7 per cent of the emissions were from solid waste disposal on land, followed by 9.0 per cent from wastewater handling. The remaining 2.3 per cent were from waste incineration.

86. Recalculations were performed to take into account data from more commercial and industrial solid waste disposal sites, changes in wastewater emissions in the Crown Dependencies and Overseas Territories, and updates made to the pollution inventories of chemical waste incinerators. The effect of these recalculations was an increase in total GHG emissions by 0.1 per cent (or 861.95 Gg CO_2 eq) in 2006. The impact on the base year is negligible (0.0 per cent or –0.44 Gg).

B. Key categories

Solid waste disposal on land – CH_4

87. To estimate CH_4 emissions from solid waste disposal on land, the United Kingdom uses a first order decay method that is based on the Revised 1996 IPCC Guidelines and uses waste decay rates that are country-specific. The method is applied to four waste categories, namely: rapidly degrading, moderately degrading, slowly degrading and inert. The time series for AD on municipal solid waste has been reconstructed using surveys, interpolation and extrapolation, the results of all this are taken from several studies cited in the NIR. The ERT commends the United Kingdom for improving the completeness of the reporting of CH_4 emissions from commercial and industrial solid waste by including sources from across the United Kingdom rather than just England and Wales as was done in the past. This led to higher emission estimates in this category for the year 1998 onwards. The ERT recommends that that the United Kingdom explain why the inclusion of more sources did not affect the emissions estimates for the years prior to 1998.

88. The previous ERT recommended that the United Kingdom update the survey data on gas utilization, which has remained constant since 2005, and flaring, which has remained constant since 2002. The Party assumed that the amount of landfilled waste from commercial and industrial sources has remained constant at 65.94 Mt from 2002 onwards. The ERT reiterates the recommendations made during the previous review that the Party address these issues of time-series consistency and justify these constant trends in data in the next annual submission.

89. The reporting of this key category in the 2009 NIR does not follow the structure outlined in the UNFCCC reporting guidelines in decision 18/CP.8. The ERT recommends that United Kingdom follow the structure outlined in the UNFCCC reporting guidelines, as it has done for the other categories in this sector.

C. Non-key categories

1. Wastewater handling – CH_4, N_2O

90. CH_4 emissions are estimated by extrapolation using a model (Hobson) based on data for the period 1990–1995. Since technologies used in wastewater treatment and consumption patterns change over time, there is a need to update and/or validate the results from the Hobson model using more recent data. In response to this concern that was raised during the review, the Party reported that UK Water Industry Research is currently working to produce suitable EFs to be used to estimate emissions from wastewater treatment. The United Kingdom informed the ERT that it intends to report progress made in estimating emissions from this category in the 2010 NIR. The ERT recommends that the United Kingdom apply the outcomes of this work to improve the emission estimates from wastewater handling in its next annual submission.

91. A change in protein consumption data between 1996 and 1997 occurs due to a change in the methods used by the United Kingdom, and not due to a change in actual protein consumption. In response to the recommendation made by the ERT during the review to apply the revised method to the years prior to 1997, the Party reported that it does not have a method to recalculate the data. In order to fill this data gap and to ensure time-series consistency, the ERT suggests that the years before 1997 be extrapolated using a surrogate method that uses gross domestic product (GDP) or GDP per capita as a driver.

92. During the review, the United Kingdom informed the ERT that it had experienced difficulties in collecting AD for industrial wastewater, but that some information on this may be available in its Pollution Inventory. The ERT recommends that the United Kingdom use this Pollution Inventory and/or other similar sources of information to estimate emissions from industrial wastewater handling.

2. Waste incineration

93. The issue of geographical coverage of emissions from waste incineration was not resolved during the previous review. In particular, the previous ERT recommended that emissions from Scotland and Northern Ireland be included in future submissions. In response to this recommendation, the United Kingdom reported during the review that there were no significant chemical waste incineration facilities in Scotland or Northern Ireland. The ERT recommends that the United Kingdom estimate these emissions to demonstrate their contribution to sectoral emissions in its next annual submission.

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

A. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

94. The United Kingdom has reported information on its accounting of Kyoto Protocol units in the relevant 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 their comparison report.[7] 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.

95. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with section 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 ITL and the clean development mechanism registry and meets the requirements set out in paragraphs 88(a) to (j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements included in the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No non-replacement has occurred.

2. National registry

96. The ERT took note of the SIAR and its findings 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 noted from the SIAR and its findings that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry has adequate security in place. The ERT reiterates the recommendation made in the SIAR that the United Kingdom further improve the measures put in place in its national registry to prevent operator errors and ensure reliable interoperability with other registry systems, including the ITL, in accordance with paragraph 115 of the annex to decision 22/CMP.1 and paragraph 25 of the annex to decision 24/CP.8. The ERT also reiterates the recommendation that the United Kingdom report in its next annual submission on the changes made to its registry following the successful implementation and testing of the measures contained in the SIAR, including any relevant test plans and test reports. The ERT recommends that the United Kingdom take appropriate actions to reduce the number of out-of-sequence messages sent by its registry and enhance the user interface of its registry by providing the public information referred to in paragraphs 45, 46 and 48 of the annex to decision 13/CMP.1, and report in its next annual submission on any changes made to that public information.

[7] 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. Calculation of the commitment period reserve

97. The United Kingdom has reported its commitment period reserve in its 2009 annual submission. The Party 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 the most recently reviewed inventory. The ERT agrees with this figure.

B. Changes to the national system

98. The United Kingdom reported a change in its national system since the previous annual submission regarding the single national entity which is now DECC. The ERT concluded that, taking into account the confirmation by the United Kingdom of this change, the Party's national system continues to be in accordance with the requirements of national systems set out in decision 19/CMP.1. The ERT recommends that the Party, in its next annual submission, report any change(s) in its national system in accordance with section I.F of the annex to decision 15/CMP.1.

C. Changes to the national registry

99. The United Kingdom reported no change in its national registry since the previous annual submission. The ERT concluded that the Party'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 CMP decisions.

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

100. The United Kingdom reported on a voluntary basis information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The information reported covers the elements contained in paragraph 24 (a), (e) and (f) of the annex to decision 15/CMP.1. The ERT recommends that the Party provide in its next annual submission all the required elements as included in section I.H of the annex to decision 15/CMP.1, with a view to allowing a thorough and comprehensive review of such information during the in-country visit to be conducted in conjunction with the review of national communications.

VIII. Conclusions and recommendations

101. The United Kingdom made its annual submission on 15 April 2009. The Party indicated that it is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on Kyoto Protocol units, information on changes to the national system and the national registry and information on minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1. The United Kingdom has reported some information on activities under Article 3, paragraphs 3 and 4 of the Kyoto Protocol.

102. The ERT concludes that the inventory 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 1990–2007 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as generally complete in terms of categories and gases. The following categories, for which methodologies are available in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance to estimate emissions, were reported as "NE": CH_4 and N_2O emissions from liquefied petroleum gas in road transportation; CO_2, CH_4 and N_2O emissions from gaseous fuels in road transportation; CO_2 emissions from fugitive emissions from natural

gas; CH_4 emissions from other leakage of natural gas; N_2O emissions from disturbance of soils associated with forest land converted to cropland; and CH_4 emissions from industrial wastewater.

103. The submission on a voluntary basis of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1.

104. 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, reporting fuel consumption and emissions from direct flights between the United Kingdom and its overseas territories as a memo item under international aviation bunker and reporting emissions from LULUCF sector in the Crown Dependencies and Overseas Territories under sector 7 is not in line with the IPCC good practice guidance.

105. The Party has reported information on the accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the relevant reporting format tables as required by decision 14/CMP.1.

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

107. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

108. In the course of the review, the ERT formulated a number of recommendations[8] relating to the completeness of the annual submission, transparency, uncertainty estimation, recalculations and QA/QC procedures. The key recommendations are that the United Kingdom:

(a) Ensure, to the extent possible, the inclusion in its next annual submission, emissions estimates for categories currently reported as "NE" and for which methods exist for these categories in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance, and if emissions for a given category cannot be estimated then provide sufficient explanation in the NIR as to why it cannot be estimated;

(b) Provide more detailed information in CRF table 9(a) on categories reported as not estimated and included elsewhere;

(c) Include all rationale for the recalculations made in CRF table 8(b);

(d) Include a complete description on how the uncertainty analysis is used to prioritize further improvements in the inventory;

(e) Include a detailed discussion on completeness and uncertainty analysis in the main body of the NIR;

(f) Include a more detailed description of the QA procedures implemented and the planning of external peer review activities;

(g) Conclude formal MoUs with data providers;

(h) Report fuel consumption and emissions from direct flights between the United Kingdom and its overseas territories under domestic aviation;

[8] For a complete list of recommendations, the relevant chapters of this report should be consulted.

(i) Include emissions from LULUCF sector in the Crown Dependencies and Overseas Territories in the LULUCF sector and not under sector 7;

(j) Further improve the measures in place in its national registry with a view to minimizing operator errors and ensuring reliable interoperability with other registry systems, including the ITL, in accordance with paragraph 115 of the annex to decision 22/CMP.1 and paragraph 25 of the annex to decision 24/CP.8 and with a view to reporting in its next annual submission on the changes made to the registry following the successful implementation and testing of those measures, including any relevant test plans and test reports;

(k) Take appropriate actions to reduce the number of out-of-sequence messages sent by its registry;

(l) Enhance the user interface of the registry by providing the public information referred to in paragraphs 45, 46 and 48 of the annex to decision 13/CMP.1, and report, in its next annual submission, on any changes made to that public information.

IX. Questions of implementation

109. 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. *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 of Great Britain and Northern Ireland 2009. Available at <http://unfccc.int/resource/docs/2009/asr/gbr.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <http://unfccc.int/resource/webdocs/sai/2009.pdf>.

FCCC/ARR/2008/GBR. Report of the individual review of the greenhouse gas inventory of the United Kingdom of Great Britain and Northern Ireland submitted in 2007 and 2008. Available at <http://unfccc.int/resource/docs/2009/arr/gbr.pdf>.

UNFCCC. Standard independent assessment report, Parts I and II. Unpublished document.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Helen Champion (UK Greenhouse Gas Inventory/Climate & Energy: Science and Analysis/Department of Energy and Climate Change), Ms. Sarah Choudrie (AEA Technology Environment) and Ms. Joanna Jackson (AEA Technology plc) including additional material on the methodology and assumptions used. The following document was also provided by the United Kingdom of Great Britain and Northern Ireland:

Norris, J, Stewart, R and Passant, N, 2006. *Review of the fate of lubricating oils in the UK*. AEA Energy and Environment. Available at <http://www.airquality.co.uk/reports/cat07/0703280957_Review_of_Fate_Of_Lubricating_Oil_2005_NIR_Issue1_v1.3.1_cd4569rs.pdf>.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
C_2F_6	hexafluoroethane
CF_4	tetrafluoromethane
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU ETS	European Union emissions trading scheme
F-gas	fluorinated gas
GCV	gross calorific value
GDP	gross domestic product
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
GJ	gigajoule (1 GJ = 10^9 joule)
GWP	global warming potential
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1 thousand grams)
km	kilometre
LULUCF	land use, land-use change and forestry
MoU	memorandum of understanding
Mt	million tonnes
N	nitrogen
N_2O	nitrous oxide
NE	not estimated
NH_3	ammonia
NIR	national inventory report
NO	not occurring
NOx	nitrous oxides
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
t	tonne
UNFCCC	United Nations Framework Convention on Climate Change

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