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Report of the review of the initial report of the United Kingdom of Great Britain and Northern Ireland

According to decision 13/CMP.1, each Annex I Party with a commitment inscribed in Annex B to the Kyoto Protocol shall submit to the secretariat, prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later, a report (the 'initial report') to facilitate the calculation of the Party's assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol, and to demonstrate its capacity to account for emissions and the assigned amount. This report reflects the results of the review of the initial report of the United Kingdom of Great Britain and Northern Ireland conducted by an expert review team in accordance with Article 8 of the Kyoto Protocol.

CONTENTS

			Paragraphs	*Page*
I.	INTRODUCTION AND SUMMARY		1–10	3
	A.	Introduction	1–3	3
	B.	Summary	4–10	3
II.	TECHNICAL ASSESSMENT OF THE ELEMENTS REVIEWED		11–99	7
	A.	National system for the estimation of anthropogenic greenhouse gas emissions by sources and sinks	11–22	7
	B.	Greenhouse gas inventory	23–81	9
	C.	Calculation of the assigned amount	82–85	21
	D.	Calculation of the commitment period reserve	86–87	21
	E.	National registry	88–97	21
	F.	Land use, land-use change and forestry parameters and election of activities	98–99	23
III.	CONCLUSIONS AND RECOMMENDATIONS		100–108	24
	A.	Conclusions	100–105	24
	B.	Recommendations	106–107	25
	C.	Questions of implementation	108	25

Annexes

I.	Documents and information used during the review	26
II.	Acronyms and abbreviations	28

I. Introduction and summary

A. Introduction

1. This report covers the in-country review of the initial report of the United Kingdom of Great Britain and Northern Ireland, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 12 to 17 March 2007 in London, United Kingdom, and was conducted by the following team of nominated experts from the roster of experts: generalist – Mr. Marius Ţăranu (Republic of Moldova); energy – Mr. Tinus Pulles (Netherlands); industrial processes – Mr. Mauro Meirelles O. Santos (Brazil); agriculture – Mr. Rob Sturgiss (Australia); land use, land-use change and forestry (LULUCF) – Mr. Richard Volz (Switzerland); waste – Mr. Seungdo Kim (Republic of Korea). Mr. Tinus Pulles and Mr. Seungdo Kim were the lead reviewers. In addition the expert review team (ERT) reviewed the national system, the national registry, the calculations of the Party's assigned amount and commitment period reserve and took note of the LULUCF parameters and the elected Article 3, paragraph 4, activities. The review was coordinated by Ms. Astrid Olsson and Ms. Keryn Oude-Egberink (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 of Great Britain and Northern Ireland, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

3. Comments indicating that the Party will address the remarks made by the expert review team (ERT) in future submissions are not specifically recorded in this report. In many comments, the Party provides explanations of issues, raised by the ERT in the draft review report. In such cases, the ERT has left the relevant paragraphs unchanged since the ERT's recommendation to include such explanations in the national inventory report remains valid, and in many cases the Party has indicated the intention to do so in the next submission.

B. Summary

1. Timeliness

4. Decision 13/CMP.1 requests Parties to submit their initial report prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later. The initial report was submitted on 20 November 2006, which is in compliance with decision 13/CMP.1. In its initial report the United Kingdom referred to its updated 2006 greenhouse gas (GHG) inventory submission of 9 October 2006 (the national inventory report (NIR)) and 28 September 2006 (the common reporting format (CRF) tables).

2. Completeness

5. Table 1 below shows which of the mandatory elements have been included in the initial report, the assigned amount and the commitment period reserve. The assigned amount (3,412,080,630 tonnes carbon dioxide (CO_2) equivalent), and the commitment period reserve (3,070,872,567 tonnes CO_2 equivalent) are calculated based on the base year emissions (779,904,144 tonnes CO_2 equivalent including 365.59 Gg CO_2 equivalent from deforestation (see paragraph 84)) as reported by the United Kingdom in its initial report.

Table 1. Summary of the reporting on mandatory elements in the initial report

Item	Provided	Value/year/comment
Complete GHG inventory from the base year 1990 to the most recent year available 2004	Yes	1990–2004
Base year for HFCs, PFCs and SF_6	Yes	1995
Agreement under Article 4	Yes	87.5 per cent
LULUCF parameters	Yes	Minimum tree crown cover: 20% Minimum land area: 0.1 ha Minimum tree height: 2 m
Election of and accounting period for Article 3, paragraphs 3 and 4, activities	Yes	Forest management is elected under Article 3, paragraph 4. Accounting will be made for the entire commitment period for Article 3, paragraph 3 and elected Article 3, paragraph 4 activities.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8	Yes	3 412 080 630 tonnes CO_2 equivalent
Calculation of the commitment period reserve	Yes	3 070 872 567 tonnes CO_2 equivalent
Description of national system in accordance with the guidelines for national systems under Article 5, paragraph 1	Yes	
Description of national registry in accordance with the requirements contained in the annex to decision 13/CMP.1, the annex to decision 5/CMP.1 and the technical standards for data exchange between registry systems adopted by the CMP	Yes	

6. The information in the initial report covers all elements as required by decision 13/CMP.1, section I of the decision 15/CMP.1, and relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

3. Transparency

7. The initial report is generally transparent. However, some additional information in the NIR and a better description of the territorial coverage could improve the transparency of the reporting where emissions/removals from overseas territories and Crown dependencies are concerned.

4. Emission profile in the base year, trends and emission reduction target

8. In the base year (1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6), the most important GHG in the United Kingdom was CO_2, contributing 75.7 per cent to total[1] national GHG emissions expressed as CO_2 equivalent, followed by methane (CH_4), 13.3 per cent, and nitrous oxide (N_2O), 8.8 per cent (see figure 1). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) taken together contributed 2.2 per cent of the overall GHG emissions in the base year. The energy sector accounted for 78.4 per cent of the total GHG emissions in the base year, followed by industrial processes (7.9 per cent), agriculture (6.9 per cent), and waste (6.8 per cent) (see figure 2). Total GHG emissions amounted to 779,538.55 Gg CO_2 equivalent, including emissions from deforestation, and decreased by 14.6 per cent between the base year and 2004.

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

Figure 1. Shares of gases in total GHG emissions, base year

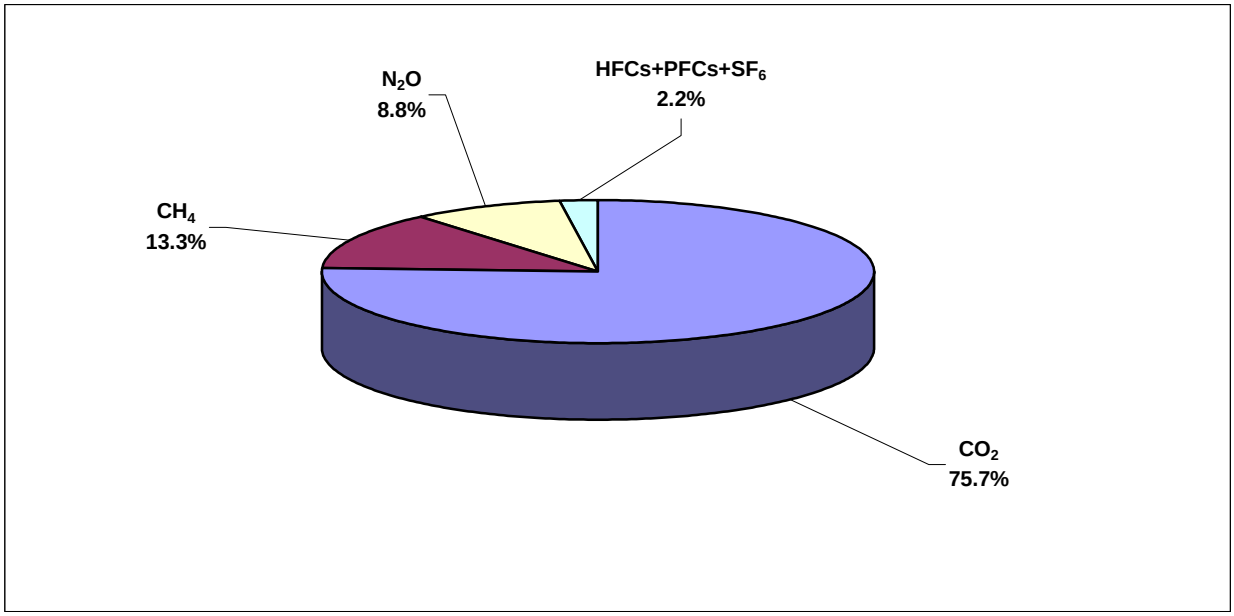
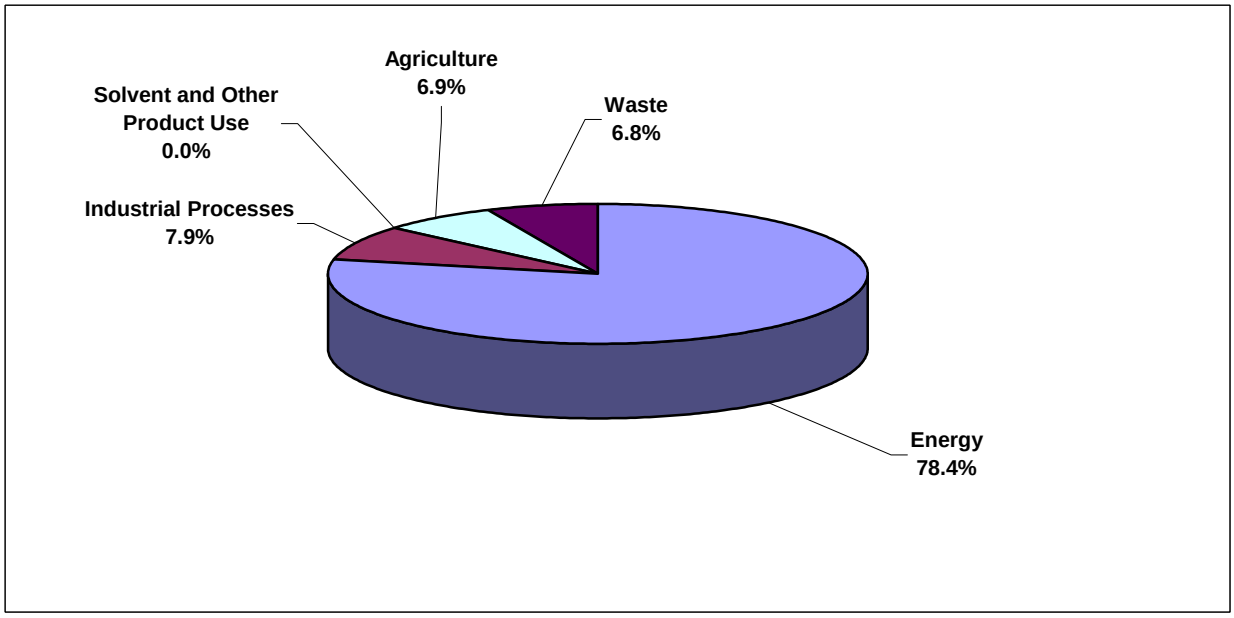


Figure 2. Shares of sectors in total GHG emissions, base year



9. Tables 2 and 3 show the GHG emissions by gas and by sector, respectively.

10. The United Kingdom's quantified emission limitation is 92 per cent as included in Annex B to the Kyoto Protocol. As the United Kingdom is part of the European Community, whose member States will meet their reduction commitment jointly in accordance with Article 4 of the Kyoto Protocol, the United Kingdom's quantified emission limitation is 87.5 per cent. The United Kingdom's assigned amount has been calculated based on the Party's Article 4 commitment.

Table 2. Greenhouse gas emissions by gas, 1990–2004

GHG emissions (without LULUCF)	Gg CO_2 equivalent								Change
	Base year	1990	1995	2000	2001	2002	2003	2004	BY–2004 (%)
CO_2	590 319.32	590 319.32	549 820.35	548 045.41	563 370.86	547 340.55	558 938.38	562 359.08	–4.7
CH_4	103 640.07	103 640.07	90 242.15	68 505.47	62 670.78	59 691.21	53 603.34	51 823.15	–50.0
N_2O	68 375.55	68 375.55	57 054.51	44 255.80	42 122.35	40 472.55	40 107.84	40 795.03	–40.3
HFCs	15 493.60	11 375.39	15 493.60	9 091.67	9 686.24	9 907.12	10 201.41	8 873.14	–42.7
PFCs	470.71	1 401.49	470.71	498.25	425.35	322.72	296.81	352.23	–25.2
SF_6	1 239.30	1 029.95	1 239.30	1 798.19	1 424.76	1 508.92	1 323.69	1 127.56	–9.0

Note: BY = Base year; LULUCF = Land use, land-use change and forestry.

Table 3. Greenhouse gas emissions by sector, 1990–2004

Sectors	Gg CO_2 equivalent								Change
	Base year	1990	1995	2000	2001	2002	2003	2004	BY–2004 (%)
Energy	611 351.03	611 351.03	565 655.35	558 064.25	574 471.50	558 842.31	566 763.73	569 613.44	–6.8
Industrial processes	61 605.10	58 208.32	50 230.73	31 668.96	29 721.16	26 998.00	28 028.90	27 907.48	–54.7
Solvent and other product use	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	IE,NE,NO	NA
Agriculture	53 679.01	53 679.01	51 527.79	49 027.05	46 094.50	46 430.32	45 782.56	45 474.30	–15.3
LULUCF[a]	NA	2 930.67	1 046.24	–418.90	–570.90	–1 098.36	–1 159.36	–1 923.10	NA
Waste	52 903.41	52 903.41	46 906.73	33 434.52	29 413.17	26 972.45	23 896.27	22 334.97	–57.8
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	779 072.44	715 366.85	671 775.88	679 129.43	658 144.72	663 312.10	663 407.09	NA
Total (without LULUCF)	779 538.55	776 141.77	714 320.61	672 194.78	679 700.33	659 243.08	664 471.46	665 330.19	–14.7

Note: BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable; NE = Not estimated; NO = Not occurring; IE = Included elsewhere.

[a] The LULUCF sector is a net source for the United Kingdom in the base year. In accordance with decision 13/CMP.1, total base year emissions for the purpose of the calculation of the assigned amount under the Kyoto Protocol shall include GHG emissions from conversion of forests (deforestation). In 1990, emissions from deforestation amounted to 365.59 Gg CO_2 eq for the United Kingdom. Emissions from deforestation are neither shown separately nor included as a separate element of the emissions from the LULUCF sector in the rows for total emissions in this table. However, they were added to the total base year emissions for the purpose of the calculation of the assigned amount (see chapter II.C of this report).

II. Technical assessment of the elements reviewed

A. National system for the estimation of anthropogenic greenhouse gas emissions by sources and sinks

11. The United Kingdom's national system is prepared in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). With this the United Kingdom's national system can perform the general and specific functions as required by the national systems guidelines.

12. Table 4 shows which of the specific functions of the national system are included and described in the initial report.

Table 4. Summary of reporting on specific functions of the national system

Reporting element	Provided	Comments
Inventory planning		
Designated single national entity*	Yes	See section II.A.1
Defined/allocated specific responsibilities for inventory development process*	Yes	See section II.A.1
Established process for approving the inventory*	Yes	See section II.A.1
Quality assurance/quality control plan*	Yes	See section II.A.2
Ways to improve inventory quality	Yes	See section II.B.3
Inventory preparation		
Key category analysis*	Yes	See section II.B.1
Estimates prepared in line with IPCC guidelines and IPCC good practice guidance*	Yes	See section II.B.2
Sufficient activity data and emission factor collected to support methodology*	Yes	See section II.B
Quantitative uncertainty analysis*	Yes	See section II.B.2
Recalculations*	Yes	See section II.B.2
General QC (tier 1) procedures implemented*	Yes	See section II.A.2
Source/sink category-specific QC (tier 2) procedures implemented	Yes	See section II.A.2
Basic review by experts not involved in inventory	Yes	See section II.A.2
Extensive review for key categories	Yes	See section II.A.2
Periodic internal review of inventory preparation	Yes	See section II.A.2
Inventory management		
Archive inventory information*	Yes	See section II.A.3
Archive at single location	Yes	See section II.A.3
Provide ERT with access to archived information*	Yes	See section II.A.3
Respond to requests for clarifying inventory information during review process*	Yes	See section II.A.1

* Mandatory elements of the national system.

1. Institutional, legal and procedural arrangements

13. During the in-country visit, the United Kingdom explained the institutional arrangements, as part of the national system, for preparation of the inventory. The Department for Environment, Food and Rural Affairs (Defra) is the designated single national entity. Within Defra, the International Climate Change and Ozone Division[2] is the national focal point and the Climate, Energy, Science and Analysis (CESA) Division manages the national system, including coordinating expertise from across government and managing the external contractors who compile the databases, estimate emissions and export the

[2] Formerly the Global Atmosphere Division.

results to the United Kingdom's annual inventory submission. The main contracts are currently with the National Environmental Technology Centre (Netcen) of AEA Energy and Environment (AEA), which is responsible for producing the emission estimates for the energy, industrial processes, solvent and other product use and waste sectors; AEA is also responsible for collecting and processing activity data (AD), selecting appropriate emission factors (EFs) and estimation methods, compiling the inventory, applying quality assurance/quality control (QA/QC), carrying out uncertainty assessments, and delivering the NIR and the CRF tables to the European Union Monitoring Mechanism (EUMM) and the UNFCCC secretariat on behalf of Defra. It is also responsible for inventory management and archiving. The Centre for Ecology and Hydrology is responsible for preparation and development of the LULUCF inventory.

14. Another division in Defra, Sustainable Food and Farming Strategy, manages a contract with the Institute for Grassland and Environmental Research, which is responsible for the preparation and development of the agriculture sector inventory for compilation with the rest of the inventory by AEA.

15. Key data providers include the Department for Trade and Industry (DTI), the Department for Transport (DfT), the Environment Agency for England and Wales (EA) and the Scottish Environment Protection Agency (SEPA). AD for individual industries in the United Kingdom are collected on a voluntary basis. However, Defra is moving to introduce data supply agreements that will formalize the type, quality and format of data to be provided by major emitters, as well as a timeline for submission. Legal powers to force bodies to hand over data lie with the Defra Secretary of State. Companies participating in the European Union (EU) emissions trading scheme (ETS) are legally bound to submit verified emissions data. The European Pollutant Emission Register (EPER) system under the Integrated Pollution Prevention and Control (IPPC) Directive requires specific companies to submit emissions data to the Environment Agency once every three years. A draft climate change bill was published in March 2007 which may result in additional monitoring and reporting requirements.

16. The ERT considers that there are reliable institutional, procedural and legal arrangements in place for estimating GHG emissions in the United Kingdom. The Party ensures enough capacity for timely performance of the general and specific functions of the national system.

17. The United Kingdom intends to account for Article 3, paragraphs 3 and 4, LULUCF activities for the entire commitment period, rather than annually, since this fits well with the periodic nature of forest surveys. It will use statistical data on forest type and planting date from the Forestry Commission. Deforestation data are derived from administrative records, forest inventory data and mapping information.

18. In early 2006 the CESA Division of Defra established a formal cross-government National Inventory Steering Committee (NISC) made up of representatives of relevant organizations (Defra, the DTI, the DfT, the Department for Communities and Local Government, the EA, SEPA, the Environment and Heritage Service in Northern Ireland, and the devolved administrations of Scotland, Wales and Northern Ireland). The NISC plans, reviews and approves the inventory prior to submission to the UNFCCC secretariat. Expert panels have been set up at the sectoral level to review methods, AD, EFs and emission estimates on a regular basis. The NISC ensures that the inventory meets the reporting guidelines and is delivered on time each year to the EUMM and the UNFCCC secretariat. It will monitor and discuss the development of the next inventory submission, taking into account the outcomes of the current review process and the ERT's recommendations. The NISC also has the role of helping the Defra GHG inventory management team to manage and prioritize the overarching inventory QA and facilitating better communication between inventory stakeholders across government departments and agencies. The responsible organization is the CESA Division within Defra. The ERT noted that the system worked well during the review and the United Kingdom provided responses to requests for clarification of inventory information resulting from the different stages of the review process, as well as information on the national system.

2. Quality assurance/quality control

19. The United Kingdom has elaborated and implemented a QA/QC plan in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). AEA is responsible for coordinating inventory-wide QA/QC procedures. The plan incorporates a series of activities which are carried out each year at various stages of the inventory compilation process. These include documentation, including providing documentation in the NIR; complementing the database; checking, including checks before data are entered into the national database of GHG emissions, and when data are extracted from the database; recalculations; uncertainties assessment; and archiving. This includes general QC procedures (tier 1) with several cases of category-specific procedures (tier 2) for key categories.

20. The United Kingdom's inventory is moving towards tier 2 category-specific QC, in addition to complying with the tier 1 procedures. According to the Party, steps to move the QC towards tier 2 compliance include:

(a) Review of QA/QC provisions and engagement with key data providers to determine their QA/QC procedures and if necessary recommend enhancements to ensure that appropriate QA/QC systems are applied throughout the inventory preparation process;

(b) Improvements to the data processing systems (e.g. a complete review of the system used to calculate the emissions from road transport, through the development of a new database).

21. The inventory is subject to periodic internal and external audits. Thus a series of internal reviews within AEA Technology, which is accredited for the standards of the United Kingdom (BS EN ISO 9001:2000), have been carried out to detect any anomalies in the estimates (variations in the time series and inter-annual changes), and these were then rectified. Since 2002, the United Kingdom has been implementing a programme of external peer review for key categories. To date, two peer reviews have been completed – on CO_2 from fossil fuel combustion (Simmons, 2002) and emissions from agriculture (Daemmgen, Doering, Brown et al., 2005). Further reviews are planned of GHG emissions from waste-water treatment and of emissions from the offshore oil and gas industry. Recommendations from these reviews are used to help improve the emission estimates for individual sectors.

3. Inventory management

22. The United Kingdom has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documenting how these factors and data have been generated and aggregated for the preparation of the inventory. The information archived also includes internal documentation on QA/QC procedures, external and internal reviews, documentation on annual key categories and key category identification, and planned inventory improvements. AEA maintains the archive of the United Kingdom's GHG inventory. Electronic information is stored on hard disks at two separate locations which are regularly backed up, while the paper-based information is archived in a Lektreiver® or Roller Racking system at the AEA offices in Oxfordshire. From these archives the Party was able to provide any additional information the ERT requested during the review.

B. Greenhouse gas inventory

23. In its initial report the United Kingdom referred to its updated 2006 greenhouse gas (GHG) inventory submission of 9 October 2006 (the NIR) and 28 September 2006 (the CRF tables), which contain a complete set of CRF tables for the years
1990–2004. Where needed the ERT also used the previous year's (2005) submission, including the CRF tables for the years 1990–2003.

24. During the review the United Kingdom provided the ERT with additional information sources. These documents are not part of the initial report 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.

1. Key categories

25. The United Kingdom has reported a key category analysis for 2004, both level and trend assessment (excluding and including the LULUCF sector), as part of its initial report submission. Although the NIR describes the key category analysis as tier 1, it is in fact a tier 2 approach (i.e. one which takes into account uncertainties). The results of key category analysis have been used by the United Kingdom to prioritize activities to improve inventory quality and reduce overall uncertainty.

26. The key category analyses performed by the Party and the secretariat[3] for 2004 produced different results. These differences are primarily due to the incorporation of uncertainty estimates into the analysis by the United Kingdom. Thus, the Party has in fact used a simplified tier 2 approach which, according to the IPCC good practice guidance, generally results in fewer key categories. The ERT also noted that the United Kingdom's key category analysis includes only categories that add up to a cumulative total of more than 94 per cent. This is not in line with the IPCC good practice guidance, which defines key categories under the tier 1 approach as follows: "Key categories are those that, when summed together in descending order of magnitude, add up to over 95 per cent of total emissions". The ERT encourages the United Kingdom to continue to use a tier 2 approach for identifying its key categories, as set out in the IPCC good practice guidance, and to describe it correctly as tier 2 in its next submission. The changes in key categories compared with those presented in the 2005 NIR and the reasons for the changes are well documented in the current inventory submission.

27. The United Kingdom has only provided a key category analysis for the year 2004. In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines), Parties shall report a key category analysis for the base year and the latest reported inventory year. The ERT recommends the United Kingdom to follow the recommendations of the UNFCCC reporting guidelines for the key category analysis and to include a key category analysis for the base year. The structure of the report is based on the secretariat's key category analysis as the United Kingdom did not provide a key category analysis for the base year.

2. Cross-cutting topics

28. The United Kingdom's inventory is in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as 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 good practice guidance for LULUCF). The inventory includes information on key categories, methods, data sources, EFs, uncertainty estimates, QA/QC procedures and contains most of the relevant information needed for replication of the inventory. The ERT noted some minor questions of transparency and consistency, which are described in sections 4–8 below (paras. 40–74). From the inventory submission it is evident that the United Kingdom is seeking to address the questions raised by previous review reports, either as part of work already under way or in direct response to the reviews.

[3] The secretariat identified, for each Party, those categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) for the base year as well as the latest inventory year. Key categories according to the tier 1 trend assessment were also identified. 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.

Completeness

29. The national inventory submitted by the United Kingdom is comprehensive and complete. All major categories and direct and indirect GHGs are reported. The CRF tables provided are largely complete in terms of categories and geographical coverage. However, the ERT noted some minor omissions. The United Kingdom does not provide information on recalculations in CRF table 8 (a): only the column referring to "latest submission" is filled in. Moreover, table 9 (b) has not been filled in. The United Kingdom explained that it was not able to complete table 8 (a) because of problems with installing the CRF Reporter software in 2006, and that there is no additional information to report in table 9 (b).

30. The NIR states that emissions/removals for the LULUCF sector for overseas territories and Crown dependencies have not been estimated. However, these emissions/removals are reported as 0 in tables 9.4 and 9.6 of the NIR. The United Kingdom explained that LULUCF emissions were not estimated for overseas territories and Crown dependencies as there is not sufficient information available, and that the emissions reported in table 9.4 should be reported as not estimated ("NE") instead of 0.

Transparency

31. The CRF tables and the NIR provide sufficient transparency for the ERT to be able to assess the data used and methodologies applied. The United Kingdom provides justification for the assumptions made and the choice of data and methods. The ERT noted that nearly all the data necessary to compile the United Kingdom inventory are publicly available. Most categories are reported with the detail required by the CRF, with a few exceptions when emissions from some categories have been reported as confidential to protect commercially sensitive information. The Party gave the ERT access to all confidential data during the review.

Consistency

32. In general, the United Kingdom's inventory is consistent, as defined in the UNFCCC reporting guidelines. Some minor inconsistencies have been found between the NIR and the CRF tables, referring mainly (a) to the reporting of emissions from the United Kingdom overseas territories and Crown dependencies, and (b) to the non-energy use of fuels, which is reported in the NIR in sector 7, Other emissions, whereas these emissions have been allocated to the appropriate IPCC sectors in the CRF tables. The United Kingdom indicated that the reporting in the NIR and the CRF will be fully harmonized in its next inventory submission. In addition the ERT noted that the method applied, reported in CRF table Summary 3, does not always correspond to that which is reported in the NIR.

33. In some specific cases where the source of statistics or other parameters changed (e.g. average per capita protein consumption used for estimating N_2O emissions from human sewage), the United Kingdom has not applied the methods described in the IPCC good practice guidance to ensure time series consistency over the whole time span. The ERT recommends the Party to address all the inconsistency problems mentioned above in its next submission.

Comparability

34. The United Kingdom's inventory is generally comparable with those of other Annex I Parties in terms of methodologies and formats, as defined in the UNFCCC reporting guidelines.

Accuracy

35. The United Kingdom's inventory is considered to be accurate, as defined in the UNFCCC reporting guidelines. The ERT noted that the NIR also provides estimates of uncertainties.

Recalculations

36. The United Kingdom's national system can ensure that recalculations of previously submitted estimates of GHG emissions by sources and removals by sinks are prepared in accordance with the IPCC good practice guidance. Within the framework of the national system, each year the GHG inventory is updated (because of revision of statistics, use of additional datasets and/or the adoption of revised methodologies) and extended (by including a new inventory year and emissions from additional categories, if a new category has been identified and there are sufficient AD and suitable EFs). The ERT noted that where an improvement is identified and has a substantial impact on the estimates, the United Kingdom's historical emissions are recalculated in order to present a consistent time series of emission estimates.

37. The ERT noted that the United Kingdom has recalculated the full time series from the base year to 2003, using improved methods, correcting identified errors in emission estimates, including new categories and applying new knowledge. The major changes and the reasons for recalculations are thoroughly described in chapter 10 of the NIR. However, as indicated above, the United Kingdom does not provide information on the recalculations in CRF table 8 (a). The ERT recommends the Party to solve this problem in time for its 2007 inventory submission. The ERT noted that the recalculations are sufficiently justified in the NIR and have improved the inventory. The results of the recalculations are increases in the estimates of total national emissions by 3.7 per cent in the base year and by 2.1 per cent for 2003. As this increase applies throughout the time series, the trend in emissions is not greatly affected.

Uncertainties

38. The Party has provided an uncertainty analysis according to both tier 1 and tier 2 procedures described by the IPCC good practice guidance. The tier 1 approach provides estimates of uncertainties by pollutant according to IPCC sector, while the tier 2 approach provides estimates according to GHG (base year and latest reporting year) and has been extended to provide emissions by IPCC sector. The Party has provided tier 1 and tier 2 uncertainty analyses for each category and for the inventory in total. The information provided by the United Kingdom on uncertainties is generally appropriate and as required by the UNFCCC reporting guidelines. The uncertainties have been reduced compared to the previous (2005) submission taking into account the revision of AD and EFs uncertainty parameters. From the NIR it is clear that the United Kingdom uses its uncertainty analysis to prioritize further improvements in its GHG inventory.

3. Areas for further improvement

Identified by the Party

39. Several areas for improvement have been identified in the United Kingdom's NIR. They concern:

(a) The need to develop more formal agreements between Defra and key data providers in order to specify the framework of data supply. These agreements will formalize the acquisition of data and clarify the main requirements regarding quality, format, security and timely delivery of data for the national inventory;

(b) The process for official consideration and approval of the GHG inventory, where the work will be focused on carrying out a pre-submission review of inventory data by a review group that is independent of the main GHG inventory compilation process;

(c) Review of the QA/QC system. The Party has stated that in a few cases the resources for and the effectiveness of these systems within the key organizations that provide data

could be significantly improved as they currently do not provide reliable data that are consistent across the inventory reporting time series;

(d) Review by the United Kingdom National Inventory Steering Committee in the light of the ERT's feedback and other inputs, from which priorities for QA/QC and improvements to the inventory will be derived;

(e) Full harmonization of reporting between the NIR and the CRF tables.

4. Areas for further improvement identified by the ERT

40. The ERT identified the following cross-cutting issues for improvement:

(a) Consistency between the NIR and the CRF and within the NIR should be improved;

(b) It might be a useful exercise in good practice for the Party to use both tier 1 and tier 2 approaches for identifying the key categories, as this can provide additional insight into the reasons why particular categories are key and can assist in prioritizing activities to improve the quality of the inventory and reduce overall uncertainty;

(c) Some additional information in the NIR could improve the transparency of the reporting of emissions/removals from the United Kingdom's overseas territories and Crown dependencies.

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

5. Energy

Sector overview

42. In the base year, the energy sector was the largest contributor to the GHG emissions of the United Kingdom, amounting to 611,351.03 Gg CO_2 equivalent, or 78.4 per cent of total national emissions. Within this sector the largest contributions arose from energy industries (39.0 per cent of the energy sector total) and transport (19.6 per cent). Energy sector emissions have declined by 6.8 per cent since 1990 due to fuel switching and the reduced energy-intensity of the economy, according to the NIR. Transport emissions increased by 12.5 per cent because of the increasing activities in transport: fuel use in road transport increased by 8.7 per cent between 1990 and 2004. At the same time, N_2O emissions increased by a factor of 4 because of the introduction of catalytic converters in passenger cars. In civil aviation fuel consumption and emissions of CO_2 and N_2O all increased by 79.7 per cent. Fugitive emissions are also accounted for in this sector (they make up 5.8 per cent of the energy sector total), and include emissions arising from the production and extraction of coal, oil and natural gas, and their storage, processing and distribution. These emissions have fallen by 53.9 per cent since 1990 because of significant decreases in mining activities.

43. The reporting of the energy sector is transparent, complete, comparable and consistent, with major categories reported in all years with all respective gases, and appears to be accurate. The United Kingdom has updated its carbon content EFs for fuel combustion in the energy sector and has continued to improve the transparency of the NIR by providing the time series for these EFs. For comparability, the NIR continues to provide detailed information on how categories are accounted for in the data collection system of the United Kingdom and are linked in to the correct IPCC categories.

Reference and sectoral approaches

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 the sectoral approaches for all years in the time series. For the year 1990, there is a difference of 0.61 per cent in the CO_2 emission estimates. The differences between the two approaches are below 2 per cent across the entire time series, so that explanations are not required in the CRF tables. The differences are described in the NIR; they are caused by the different independent data sources used for the two approaches and are within the range that might be expected.

International bunker fuels

45. The United Kingdom's inventory submission provides information on the consumption of aviation and marine international bunker fuels. The emissions from international aviation are based on detailed estimates taking into account individual traffic movements and fuel statistics and using a method that is consistent with a tier 2 approach. The ERT was informed that the national energy statistics will adopt the same approach to splitting aviation bunkers in domestic and international aviation. This will bring the data on consumption in international aviation and international marine bunkers fully into line with the energy data reported to international agencies.

Feedstocks and non-energy use of fuels

46. Emissions from feedstocks are largely reported in the industrial processes sector. Emissions from iron and steel production have been determined using a mass balance approach, based on modelling of integrated steel works. The greater part of CO_2 emissions for energy supply is reported in the energy sector under the category manufacturing industries and construction. Emissions from the use of coke in blast furnaces are split between combustion in iron and steel and iron and steel production in the industrial processes sector according to a mass balance approach. The mass balance approach assures that all emissions from the integrated steelworks are accounted for.

Country-specific issues

47. Earlier stages of the 2006 review identified a number of cases with relatively large inter-annual changes in implied emission factors (IEFs). These changes are caused by the annually agreed/derived carbon content factors for many fuels as published in the Carbon Emission Factor Review. The purpose of the annual values is to take trends in fuel quality into account. The ERT recommends the United Kingdom to assess the uncertainties in these values. If the uncertainties are in the same range as the inter-annual changes, the United Kingdom may consider applying regression analysis to account for trends in fuel quality and at the same time avoid these inter-annual changes.

Key categories

Fuel combustion: all fuels – CO_2

48. The methods applied and the data used for estimating emissions in all categories included in fuel combustion (1.A) in the United Kingdom are well developed and in line with the IPCC good practice guidance. Fuel combustion data are obtained from the Digest of United Kingdom Energy Statistics (DUKES). CO_2 EFs are derived annually in a clear and transparent process based on actual carbon contents of fuels used in the country (the Carbon Emission Factor Review).

Stationary combustion: all fuels – CO_2

49. For stationary combustion in energy industries and manufacturing industries and construction a correction has been made to the fuel split between power plants and industry in DUKES to ensure proper reporting of electricity generated by the so-called auto-producers.

50. The 1990–2004 values of the CO_2 IEF (179.06–200.57 t/TJ) for solid fuels in iron and steel are the highest of reporting Parties (4.51–200.57 t/TJ) and higher than the IPCC default range (94.60–106.70 t/TJ). The Party explained that various "solid" fuels are used in the United Kingdom iron and steel industry but the most significant in terms of carbon emissions is blast furnace gas. This classification is consistent with the IPCC fuel classification in the Revised 1996 IPCC Guidelines. This fuel has a high carbon content (as it is mostly carbon monoxide (CO) with a small amount of CO_2), but has a relatively low energy content. The CO_2 IEF for this category is high because of the high usage of this fuel (the CO_2 EF for United Kingdom blast furnace gas is approximately 260 t/TJ).

Fugitive emissions from solid fuels – CH_4

51. The trend in the CH_4 IEF for solid fuel transformation fluctuates. In its answer to queries raised during the early stages of the 2006 review, the United Kingdom explained that the total AD for the category solid fuel transformation are incorrectly reported in the CRF. The emissions, however, are correctly reported. The United Kingdom will correct this error in its future submissions.

Non-key categories

Stationary combustion: all fuels – CH_4, N_2O

52. EFs for CH_4 and N_2O are generally derived from international publications and, where available, based on plant-specific information.

Transportation: all fuels – CO_2

53. CO_2 emissions from transport are directly based on fuel sales statistics from DUKES. As indicated above, the national inventory system has improved the DUKES methods for determining fuel used for domestic and international aviation and shipping. CO_2 EFs are derived annually in a clear and transparent process based on actual carbon contents of fuels used in the country.

Road transportation: liquid fuels – CH_4, N_2O

54. In road transportation, the United Kingdom uses detailed fleet composition, mileage and driving pattern data, matched with the fuel sales statistics, and appropriate EFs to estimate CH_4 and N_2O emissions.

6. Industrial processes and solvent and other product use

Sector overview

55. In the United Kingdom, the profile of the industrial processes sector is similar to that found in neighbouring countries in Europe. In the base year (1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6), the sector contributed 61,605.10 Gg CO_2 equivalent (7.9 per cent) to total national emissions. The dominant gas in the industrial processes sector is N_2O, which accounts for 47.5 per cent of emissions from the sector, almost all of it from the chemical industry. It is followed by HFC (25.1 per cent) and CO_2 (24.3 per cent), and minor contributions of SF_6 (2.0 per cent), PFCs (0.8 per cent) and CH_4 (0.3 per cent). N_2O emissions come mainly from two activities – adipic acid production (85.8 per cent) and nitric acid production (14.1 per cent); HFC emissions are mostly by-product emissions from the production of halocarbons and SF_6 (90.2 per cent), the bulk being HFC-23 emissions from HCFC-22 production; and for CO_2 emissions, the three major activities are cement

production (44.6 per cent), iron and steel production (12.4 per cent) and carbon from non-energy-use products (12.3 per cent).

56. Emissions of all gases have decreased since the base year, with the largest decreases taking place in N_2O from adipic acid production (by 95.6 per cent) and in production of halocarbons and SF_6 (by 98.0 per cent) because of the introduction of abatement technologies. The decrease in overall emissions from the industrial processes sector between the base year and 2004 was 54.7 per cent. The decrease in N_2O emissions was, however, partly offset by a large increase (525.8 per cent) in emissions of HFCs and PFCs caused by substitution of ozone depleting substances for consumption of halocarbons and SF_6. Other important reductions were seen in CO_2 emissions from cement production and in N_2O from nitric acid production because of shrinking production.

57. The United Kingdom has improved its estimates with the inclusion in this submission of CO_2 emissions from carbon from non-energy-use products for the whole time series. This increased the estimated base year emissions in the industrial processes sector by 3.1 per cent; other minor recalculations have been made in some categories, leading to an overall increase of 2.9 per cent. Emissions from solvent and other product use have only been estimated for non-methane volatile organic compounds (NMVOCs). The NIR provides the necessary information, although some inconsistencies with the CRF tables were found which were resolved during the review.

Key categories

Adipic acid production – N_2O

58. The major contributor to total national emissions (3.2 per cent) from the industrial process sector is N_2O emissions from adipic acid production which is identified as a key category by level only for the base year. There is only one production plant in the United Kingdom. Data on adipic acid production are confidential but the Party commented that N_2O emissions from this category decreased from 1990 to 1994 because of a decrease in production and fell significantly after 1998 with the introduction of abatement equipment for N_2O, which explains the behaviour of emissions from this category. The ERT was given access to the underlying confidential data, which satisfied the ERT that this trend has been estimated in the appropriate way.

Other (production of halocarbons and SF_6) – HFCs and PFCs

59. HFC-23 is the major component of this mix of gases. There are two plants producing HCFC-22 which in the base year released HFC-23 as a by-product. In 1998 a thermal oxidizer unit was installed in one of the plants, and in late 2003 the other did the same, effectively eliminating HFC-23. AD for this category are confidential and could not be fully assessed, but the estimates are mostly based on expert judgement and default EFs. During the review the United Kingdom provided additional information on how the estimate was derived, which the ERT considered to be in line with the IPCC good practice guidance.

Cement production – CO_2

60. The CO_2 emissions resulting from cement production are based on the tier 2 approach of the IPCC good practice guidance. A 25.2 per cent decrease in the emissions between 1990 and 1992 was linked to a significant downturn in construction activity in the United Kingdom between these years. The ERT recommends the United Kingdom to include this explanation in its future NIRs.

Nitric acid production – N_2O

61. This category represents 0.5 per cent of the base year emissions. The emissions of N_2O from nitric acid production, particularly between 1990 and 1994, are associated with a higher level of uncertainty than in later years of the time series. The higher uncertainty arises because some production

data between 1990 and 1994 is unknown and has to be estimated from surrogate parameters. The ERT recommends the Party tries to reduce the uncertainty in this category by reviewing the assumptions used and investigating if other industrial data could be used as the basis for more accurate estimates of emissions.

Non-key categories

Other (chemical industry) – CO_2

62. A recent United Kingdom report assessed the significant amount of carbon contained in petroleum products listed as "non-energy use" that is not stored but emitted. Estimates were made of the resulting emissions and these were included for the whole times series, showing a stable and slightly growing trend since the base year. The United Kingdom implemented this in the 2006 inventory submission and the ERT believes this to be an improvement in the United Kingdom inventory.

7. Agriculture

63. In the base year, the agriculture sector contributed 6.9 per cent of total United Kingdom emissions. Emissions amounted to 53,679.01 Gg CO_2 equivalent in the base year and are estimated to have declined by 15.3 per cent between the base year and 2004. Emissions of CH_4 fell by 12.6 per cent and emissions of N_2O fell by 17.1 per cent. As in all countries, uncertainties are high for estimates in this sector, particularly for N_2O emissions (two standard deviations divided by the mean equal to 424 per cent for agricultural soils). In the case of the United Kingdom, once these high levels of uncertainty are taken into account, emissions from agricultural soils become the largest key category in the agriculture sector (and are identified as such in the NIR annex 1).

64. The coverage for the sector is complete. Estimates have been prepared for all categories where emissions occur – enteric fermentation, manure management, agricultural soils and, in 1990, emissions from field burning of agricultural residues. Emissions from the latter category ceased in 1994 as a result of new regulations. Transparency is high: estimation methodologies are well documented in the NIR and calculation working sheets were provided to the ERT during the course of the review. The estimates for 1990 are easily replicable and were verified by the ERT, except for one subcategory in enteric fermentation (see para. 66 below). The sector was reviewed by independent international experts in 2005, indicating that the United Kingdom has systematically implemented quality assurance for this sector. Quality control systems are in place, although additional effort could be expended on improving levels of consistency between the NIR and the CRF tables.

65. The AD are of high quality. Comprehensive data have been collected for long periods of time by Defra, largely for independent policy purposes, and are available on the Internet. The United Kingdom has used tier 2 methodologies for important subcategories – dairy cattle within enteric fermentation and for all cattle within manure management. Tier 1 methods are used for the remaining livestock categories and for the agricultural soils category. Overall, the United Kingdom's choice of methodologies is consistent with the Revised 1996 IPCC Guidelines. Nonetheless, the methodologies applied tend to utilize highly aggregated AD. Given the range of quality data that are available, the United Kingdom is encouraged to develop methodologies that use more disaggregated data for its inventory in future.

Key categories

Enteric fermentation – CH_4

66. The United Kingdom has implemented a tier 1 IPCC default approach for emissions from beef cattle rather than a tier 2 approach because, it is argued, there is no material difference in the estimates generated by the two approaches. While this is true for the data presented, the use of a tier 1 approach is neither strictly consistent with IPCC good practice guidance, nor with the tier 2 approach implemented for dairy cattle. Implementing a tier 2 approach for beef cattle would make it possible to estimate

changes in emissions per animal over time and increase the opportunity to monitor the impacts of changes in farming practices, consumer preferences and policy action on emissions. The ERT recommends that the United Kingdom consider implementing a tier 2 approach for beef cattle in its future submissions. The United Kingdom's methodology is very transparent. However, in one instance, relating to the calculation of the tier 2 EFs for beef cattle, some additional background information could have been provided in the NIR (it was readily provided to the ERT on request). The ERT recommends that the United Kingdom include this information in its future NIRs.

Agricultural soils – N_2O

67. The United Kingdom has implemented tier 1, IPCC-consistent methodologies for this subcategory, but at a very high level of aggregation of AD. Improved emission estimates for this key category could be obtained by disaggregation of the AD for spatial, land-use and possibly temporal variations. Rich AD sets already exist for some subcategories (e.g. fertilizer use) and the ERT encourages the United Kingdom to continue to support the development of empirical work to estimate country-specific parameters in this area. Given the number of independent data sources that are available, the United Kingdom could give consideration to the reporting of quality control, cross-checks for direct emissions from fertilizers, and the use of a method that utilizes the same data sources for the application of both fertilizer and lime (reported under the LULUCF sector).

8. Land use, land-use change and forestry

68. In the base year, total net emissions by the LULUCF sector amounted to 2,930.67 Gg CO_2 equivalent or 0.4 per cent of total national GHG emissions (including LULUCF). In 2004, total net removals by the LULUCF sector amounted to 1,923.10 Gg CO_2 equivalent, or 0.3 per cent of total national GHG emissions. From 1990 to 2004, the LULUCF sector changed from being a net source to being a net sink. The United Kingdom has provided the complete set of tables for all years from 1990 to 2004. Emissions and removals are estimated in CRF tables 5.A, 5.B, 5.C, 5.E and 5(IV). In table 5(V), emissions from biomass burnt during deforestation are estimated. Emissions and removals from harvested wood products are reported in table 5. Overseas territories and Crown dependencies are not included in the estimates but their contributions seem to be negligible.

69. The area of every land-use category is subdivided into four regional subdivisions. Annual land-use conversion rates are provided for the years 1990–1999. These rates are applied to estimate carbon stock change in soils caused by land-use change. The NIR does not provide comprehensive information on land use and land-use change in the United Kingdom. The ERT invites the United Kingdom to provide a land-use matrix as described for approaches 2 and 3 in chapter 2 of the IPCC good practice guidance for LULUCF.

Key categories

70. CO_2 emissions from forest land, cropland, grassland and settlements are identified as key categories on the basis of the level assessment; CO_2 emissions from cropland are also identified as a key category on the basis of the trend assessment. Changes to emissions or removals in these categories result from carbon stock changes in soil.

Forest land – CO_2

71. Forest land in the United Kingdom is a net sink of 12,202.57 Gg CO_2 in the base year. Forest land remaining forest land is reported as carbon neutral. Only forests in existence before 1920 are reported under this subcategory. All forests afforested since 1920 are reported under the subcategory land converted to forest land. Areas afforested before 1990 and after 1990 are reported in different subdivisions. The United Kingdom uses a model approach described as a tier 3 method as defined in the IPCC good practice guidance for LULUCF to estimate emissions and removals from forests,

afforestation and deforestation. The model provides net changes of the three carbon pools living biomass, dead organic matter, and carbon stock in soils, as well as wood products harvested from forests in the United Kingdom. No data are provided in the columns "increase" and "decrease" of carbon stock changes in living biomass in CRF table 5.A. The ERT argues that it should be possible to provide data for increase and decrease separately, because yield classes are used as inputs to the model, and harvested volume and natural loss rates are used as parameters for losses in the model. Providing data on increase and decrease would increase comparability and transparency.

72. Emissions from deforestation in the base year are estimated to amount to 350.35 Gg CO_2 or 365.59 Gg CO_2 equivalent, of which 199.31 Gg CO_2 was due to carbon emissions from soils of deforested areas and 151.04 Gg due to biomass burning on the deforestation sites. Emissions of non-CO_2 gases amounted to 15.24 Gg. The United Kingdom experts explained that 40 per cent of the biomass of deforested sites is assumed to be burnt immediately (releasing emissions), while 60 per cent is assumed to be used as timber. The timber volume is moved to the pool of harvested wood products and therefore not included in the emissions from deforestation. To verify the emissions from deforestation the ERT requested complementary information on annual areas of afforestation and deforestation and on the growing stock removed during deforestation in order to verify the reported emissions from forest land converted to other land-use categories. The United Kingdom experts provided annual data on the area of deforestation, on afforestation and on grassland conversion from 1990 to 2004. The relevant area of deforestation in 1990 is 856 ha with a removed growing stock of 286,053 m^3. There are no data available on the type of forests removed. Deforestation involves mainly small areas; it is therefore assumed that the biomass removed consists of mature stands of broadleaved trees because small forest patches consist of deciduous trees, whereas conifer forests are in large patches. The ERT encourages the United Kingdom to make efforts to improve the information on types of forest and biomass removed by deforestation. The ERT would further like to point out that harvested wood products are not accounted for during the first commitment period.

Cropland, grassland, settlements – CO_2

73. Grassland in the United Kingdom was a net sink of 6,192.80 Gg CO_2 equivalent in the base year. The sink mainly results from increases in carbon stock in the soil on areas where cropland was converted to grassland. From grassland remaining grassland and from forest land converted to grassland, small carbon emissions are reported. The categories cropland and settlements are net sources of 15,841.67 Gg and 6,925.01 Gg CO_2, respectively, in the base year. This is mainly because of grassland converted to cropland or settlements. The effect of land-use change on the carbon stock in the soils from 1950 to the present is taken into account. These changes in the carbon stock in soil linked to land-use change in recent decades contribute considerably to the fact that the LULUCF sector in the United Kingdom changes from being a net source in 1990 to being a net sink in 2004.

Non-key categories

74. The LULUCF inventory does not include separate estimates of N_2O from fertilization of forests or disturbance of soils because of the lack of data and methodological uncertainties. Nor are estimates reported for emissions caused by wildfires. The ERT recommends the United Kingdom to prepare such estimates for its future inventories.

9. Waste

Sector overview

75. In the base year, GHG emissions from the waste sector in the United Kingdom amounted to 52,903.41 Gg CO_2 equivalent, or 6.8 per cent of total national emissions. Solid waste disposal on land accounted for 94.1 per cent of emissions in the sector, waste-water handling for 3.3 per cent, and waste incineration for 2.6 per cent. CH_4 accounted for 95.7 per cent of emissions from the sector, CO_2 for

2.3 per cent, and N_2O for 2.0 per cent. GHG emissions from the waste sector decreased by 57.8 per cent between the base year and 2004 as a result of decreases in emissions from solid waste disposal on land and waste incineration. An increase in the rate of methane recovery over time is one main reason for the reduction of emissions from solid waste disposal on land, while there has been energy recovery from incineration of municipal waste since 1997; the associated emissions are included in the energy sector from 1997.

76. The United Kingdom has used appropriate methodologies to estimate GHG emissions from this sector. Although transparency has been improved, there is room for improvement in the categories solid waste disposal on land and waste incineration. An inconsistency in the time series was noted for N_2O emissions from human sewage in waste-water handling. A problem in the completeness of the inventory was observed for waste-water handling, as CH_4 and N_2O emissions have not been estimated for industrial waste water. The ERT also noted that little information is provided on waste management policies and measures which can influence emissions in this sector. The ERT encourages the United Kingdom to consider opportunities for including this information in its future NIRs.

Key categories

Solid waste disposal on land – CH_4

77. A modified tier 2 methodology has been used to estimate CH_4 emissions from solid waste disposal on land. AD for the base year were determined from a model study. Using a model to determine AD could lead to high uncertainties if a complete set of parameter values is not available. However, the trend of AD from the base year to 2004 demonstrates a reasonable pattern, suggesting that the model studies used to calculate the AD are acceptable. The ERT recommends the United Kingdom to state more clearly in the NIR how AD are obtained.

78. The recovery rate of CH_4 is reasonable for the base year, and it linearly increases with time, reaching the highest level, 69.4 per cent, in 2004. The ERT recommends the United Kingdom further to clarify how it has obtained such high recovery rates of CH_4 in recent years (2000–2004) in comparison with other European countries.

Non-key categories

Waste-water handling – CH_4, N_2O

79. The IPCC default methodology has been used to estimate N_2O emissions from human sewage. An inconsistency in the time series was observed for N_2O emissions from human sewage. From 1990 to 1996, average per capita protein consumption was 22.7–23.7 kg/person/yr, based on Defra's National Food Survey, whereas it was 25.7–26.3 kg/person/yr from 1997 to 2004, based on the Expenditure and Food Survey. The reason for the discrepancy is ascribed to the use of different data sources for per capita protein consumption. The ERT recommends that the United Kingdom explain in its future NIRs how the time series are consistent, or use the methods offered in the IPCC good practice guidance to overcome the discrepancy in the time series.

80. The United Kingdom has not estimated CH_4 and N_2O emissions from industrial waste water because of a lack of information on AD and processes. The ERT recommends that the United Kingdom include these emissions in its future inventories.

Waste incineration – CO_2

81. The United Kingdom uses country-specific EFs for CO_2 for waste incineration. The NIR does not provide adequate information on how the biogenic portions of incinerated municipal solid waste (MSW) were treated when the country-specific EFs were estimated. However, the United Kingdom

provided the relevant information during the course of the in-country review, and the ERT recommends that it include this information in the NIR in future.

C. Calculation of the assigned amount

82. The assigned amount pursuant to Article 3, paragraphs 7 and 8, has been calculated in accordance with the annex to decision 13/CMP.1.

83. The United Kingdom's base year is 1990 and the Party has chosen 1995 as the base year for HFCs, PFCs and SF_6. The United Kingdom's quantified emission limitation is 92 per cent as included in Annex B to the Kyoto Protocol. As the United Kingdom is part of the European Community, whose member States will meet their reduction commitment jointly in accordance with Article 4 of the Kyoto Protocol, the United Kingdom's quantified emission limitation is 87.5 per cent. The United Kingdom's assigned amount has been calculated based on the Party's Article 4 commitment.

84. Land-use change and forestry constituted a net source of GHG emissions in 1990 and the Party's aggregate anthropogenic CO_2 equivalent emissions by sources minus removals by sinks in 1990 from land-use change (deforestation) are included in the base year emissions for the purpose of calculating the assigned amount. Deforestation emissions amounted to 365.59 Gg CO_2 equivalent in 1990.

85. Based on the United Kingdom's base year emissions including land-use change – 779,904.144 Gg CO_2 equivalent – and its Kyoto Protocol Annex 4 target of 87.5 per cent, the Party calculates its assigned amount to be 3,412,080,630 tonnes CO_2 equivalent. The ERT agrees with this figure.

D. Calculation of the commitment period reserve

86. The calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 18/CP.7.

87. Based on its calculated assigned amount (3,412,080,630 tonnes CO_2 equivalent), the United Kingdom calculates its commitment period reserve to be 3,070,872,567 tonnes CO_2 equivalent. The ERT agrees with this figure.

E. National registry

88. The United Kingdom has provided all information on the national registry system as required by the reporting guidelines under Article 7, paragraphs 1 and 2, of the Kyoto Protocol (decision 15/CMP.1). The information provided is transparent and broadly follows these reporting guidelines requirements. However, the ERT noted that the information in the initial report is limited to mainly technical information on the systems in place, and the security and safeguarding measures installed. During the review, the United Kingdom made a set of documents available to the ERT that describes the functional design and the user interface of the system.

89. During the initial review, the ERT was provided with additional and updated information on the national registry of the United Kingdom. This includes the Registry Design Specification, the Registry Functional Specification, the Guide for Registry Administrators and the Test results for the registry. The ERT recommends the Party to provide this information in its next inventory report under the Kyoto Protocol.

90. Table 5 summarizes the information on the mandatory reporting elements of the national registry system, as stipulated by decision 15/CMP.1, which describes how the national system performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1.

Table 5. Summary of reporting on the national registry system

Reporting element	Provided / referenced	Comments
Registry administrator		
Name and contact information	Yes	Contact information is provided in the initial report, but not the name of the registry administrator
Cooperation with other Parties in a consolidated system		
Names of other Parties with which the United Kingdom cooperates, or clarification that no such cooperation exists	Yes	No such cooperation exists[a]
Database structure and capacity of the national registry		
Description of the database structure	Yes	Covered in the Independent Assessment Report (IAR)[b]
Description of the capacity of the national registry	Yes	The United Kingdom informed the ERT that it is believed the capacity of the system to be set at an adequate level; in addition, contracts with hardware and software providers ensure an adequate response whenever the system detects that its capacity might become insufficient
Conformity with data exchange standards (DES)		
Description of how the national registry conforms to the technical DES between registry systems	Yes	The United Kingdom indicated that the system is now compliant with DES version 1.1c
Procedures for minimizing and handling of discrepancies		
Description of the procedures employed in the national registry to minimize discrepancies in the transaction of Kyoto Protocol units	Yes	
Description of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction	Yes	
Prevention of unauthorized manipulations and operator error		
An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error	Yes	Covered in the IAR
An overview of how these measures are kept up to date	Yes	
User interface of the national registry		
A list of the information publicly accessible by means of the user interface to the national registry	Yes	Covered in the IAR
The Internet address of the interface to United Kingdom's national registry	Yes	<http://etr.defra.gov.uk/default.asp>
Integrity of data storage and recovery		
A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	Yes	Covered in the IAR
Test results		
The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems.	Yes	Covered in the IAR

[a] The United Kingdom states in its initial report "The United Kingdom National Registry is currently linked to the other operational EU member states' National Registries by way of the European Commission CITL (Community Independent Transaction Log)."
[b] Pursuant to decision 16/CP.10, once registry systems become operational, the administrator of the international transaction log (ITL) is requested to facilitate an interactive exercise, including with experts from Parties to the Kyoto Protocol not included in Annex I to the Convention, demonstrating the functioning of the ITL with other registry systems. The results of this exercise will be included in an IAR. They will be also included in its annual report to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

91. After the in-country visit, the ERT was informed that the internal operational test of the registry for network connection was completed on 31 May 2007. The initialization process is expected to be

completed by 2 August 2007 and the registry to be fully operational by 30 November 2007. Information on the registry is publicly available at <http://etr.defra.gov.uk/default.asp>.

92. The ERT was also informed of the procedures and security measures in place to minimize discrepancies, terminate transactions and correct problems, and minimize operator error. These procedures and security measures included automatic responses to data integrity tests and reconciliation issues identified by the transaction log, validation and confirmation of user inputs, and a final fall back option of a manual interference. Any manual action will have to pass the next reconciliation test.

93. The ERT acknowledged the effort made by the United Kingdom to put in place adequate security measures for the registry to prevent unauthorized manipulations and to prevent operator error. The servers are located in a physically secure data centre with on-site guards 24 hours a day, every day of the year, a closed-circuit television system and an access control system. All data centres are fitted with smoke detection and automatic fire suppression systems. The ERT gained the overall impression that the United Kingdom attaches adequate importance, and allocates adequate resources, including human resources, to the development, operation and maintenance of the registry.

94. The ERT took note of the results of the technical assessment of the national registry, including the results of standardized testing, as reported in the independent assessment report that was forwarded to the ERT by the administrator of the international transaction log, pursuant to decision 16/CP.10, on 20 August 2007. The Independent Assessment Report (IAR) identified some minor issues concerning documentation, and the Party informed the ERT that it will rectify these issues before the registry is fully operational with the ITL, and not later than the end of 2007.

95. The ERT reiterated the main findings of this report, including that the registry has fulfilled sufficient obligations regarding conformity with the data exchange standards (DES). These obligations include having adequate transaction procedures; adequate security measures to prevent and resolve unauthorized manipulations; and adequate measures for data storage and registry recovery.

96. The IAR identified some minor limitations in the state of registry readiness, including the following: the disaster recovery plan is incomplete and evidence of testing the disaster recovery plan has not been submitted; the test report indicates that the test plan has not yet been completed in full. These limitations are to be rectified before the registry is fully operational with the ITL, and not later than the end of 2007.

97. Based on the results of the in-country visit and the technical assessment, as reported in the independent assessment report, the ERT concluded that the United Kingdom's national registry is sufficiently compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1, noting that registries do not have obligations regarding operational performance or public availability of information prior to the operational phase.

F. Land use, land-use change and forestry parameters and election of activities

98. Table 6 shows the Party's choice of parameters for forest definition as well as elections for Article 3, paragraphs 3 and 4, activities in accordance with decision 16/CMP.1.

Table 6. Selection of LULUCF parameters

Parameters for forest definition		
Minimum tree cover	20%	
Minimum land area	0.1 ha	
Minimum tree height	2 m	
Elections for Article 3, paragraphs 3 and 4, activities		
Article 3.3 activities	**Election**	**Accounting period**
Afforestation and reforestation	Mandatory	Commitment period
Deforestation	Mandatory	Commitment period
Article 3.4 activities		
Forest land management	Elected	Commitment period
Cropland management	Not elected	Not applicable
Grazing land management	Not elected	Not applicable
Revegetation	Not elected	Not applicable

99. The United Kingdom declares in its initial report that the values selected for the forest definition are consistent with the information provided to the Food and Agriculture Organization of the United Nations (FAO). The ERT, however, found that the FAO statistics apply a different value of minimum area. The ERT was informed that the United Kingdom provided data to the FAO on the basis of a minimum value of 0.1 ha, according to the definition of forest that has been in use since the woodland census of 1980. The United Kingdom areas were adjusted according to the minimum area used in the Global Forest Resources Assessment, but the underlying data were compiled according to a 0.1 ha minimum value.

III. Conclusions and recommendations

A. Conclusions

100. The ERT concluded that the information provided by the United Kingdom is complete and submitted in accordance with the relevant provisions of paragraphs 5, 6, 7 and 8 of the annex to decision 13/CMP.1 and section I of the annex to decision 15/CMP.1, and relevant decisions of the CMP; that the assigned amount pursuant to Article 3, paragraphs 7 and 8, has been calculated in accordance with the annex to decision 13/CMP.1, and is consistent with the inventory estimates as submitted and reviewed; and that the calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1, and the LULUCF definitions are within the agreed range.

101. The United Kingdom has described its national system in accordance with the annex to decision 19/CMP.1. The ERT is confident that this system will be able to perform all the inventory tasks required under the Kyoto Protocol.

102. The inventory for the base year is transparent and provides a well-documented estimate of the country's emissions in the base year. The inventory is complete and does not overestimate the base year emissions, so adjustments are not needed.

103. The calculation of the assigned amount (3,412,080,630 tonnes CO_2 equivalent) and the commitment period reserve (3,070,872,567 tonnes CO_2 equivalent) is based on the reported base year emissions (779,904.144 Gg CO_2 equivalent). The calculations are in accordance with the annex to decision 13/CMP.1 and the results are provided in the initial report.

104. The United Kingdom has clearly described its choices for the LULUCF parameters in the initial report in line with decision 16/CMP.1. A "forest" is defined as an area with a minimum size of 0.1 hectares, a minimum tree crown cover of 20 per cent and a minimum tree height of 2 metres. The United Kingdom has elected forest land management as an activity under Article 3, paragraph 4, of the Kyoto Protocol. Accounting will be made for the entire commitment period for Article 3, paragraph 3, and elected Article 3, paragraph 4, activities.

105. Based on the results of the in-country visit and the technical assessment, as reported in the independent assessment report, the ERT concluded that the national registry is sufficiently compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1.

B. Recommendations

106. The United Kingdom's national inventory system is well organized and functions well, resulting in high-quality, transparent, complete, consistent, comparable and accurate emission inventories for the full time series between 1990 and 2004. All the mandatory elements of the system required by the decisions of the CMP are in place and the result is an accurate estimate for the base year and a subsequent accurate calculation of the assigned amount.

107. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of the country's information presented in the initial report. The key recommendations[4] are that the United Kingdom:

- Provide the additional and updated information on its national registry, which it provided to the ERT during the in-country review, in its next inventory report under the Kyoto Protocol;
- Rectify minor issues identified in the IAR concerning documentation before the national registry is fully operational with the ITL, and not later than the end of 2007;
- In the general part: improve consistency between the NIR and the CRF. Include in its key categories all categories which, taken together, account for more than 95 per cent of total national emissions, identify the key categories for the base year and continue to use the tier 2 approach to identify the key categories;
- In the energy sector: estimate the uncertainty in the carbon EFs used and explain in the NIR any unusual IEFs (e.g. for iron and steel);
- In the industrial processes sector: try to separate HFC and PFC emissions by species and not just by subcategories. Include some of the explanations that were provided to the ERT during the review in future NIRs (e.g. for nitric acid and cement production);
- In the agriculture sector: further develop existing methodologies that use more disaggregated data, which are available;
- In the LULUCF sector: provide a land-use change matrix for the United Kingdom in line with the IPCC good practice guidance for LULUCF. For forest land, change in living biomass should be divided into increase and decrease;
- In the waste sector: provide more supporting information on the high CH_4 recovery rate in solid waste disposal on land.

C. Questions of implementation

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

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

Annex I

Documents and information used during the review

A. Reference documents

IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

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B. Additional information provided by the Party

Responses to questions during the review were received from Mr. James Davey and Mr. Jim Penman (Defra) including additional material on the methodology and assumptions used.

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UK Forestry Commission. Forestry Statistics. Available at: <http://www.forestry.gov.uk>.

Hargreaves KJ, Milne R and Cannell MGR 2003. Carbon balance of afforested peatland in Scotland. *Forestry* 76, pp 299–317.

Levy, P.E and R. Milne, 2004. Estimation of deforestation rates in Great Britain. *Forestry* 77, pp. 9–16.

UK Department for Environment, Food and Rural Affairs. The British Survey of Fertiliser Practice, Fertiliser Use on Farm Crops for Crop Year 2004.

UK Department for Environment, Food and Rural Affairs. *Agriculture in the United Kingdom, 2004*.

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UK Department for Environment, Food and Rural Affairs. EU/UN Emissions Trading Registry Phase 2 Functional Specification.

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Annex II

Acronyms and abbreviations

AD	activity data
CESA	Climate, Energy, Science and Analysis Division (of Defra)
CH_4	methane
CMP	Conference of the Parties serving as the Meeting of the Parties
CO	Carbon monoxide (appears once)
CO_2	carbon dioxide
CO_2 eq.	carbon dioxide equivalent
CRF	common reporting format
Defra	United Kingdom Department for Environment, Food and Rural Affairs
DES	data exchange standards
DfT	United Kingdom Department for Transport
DTI	United Kingdom Department for Trade and Industry
DUKES	Digested United Kingdom Energy Statistics
EA	Environment Agency for England and Wales
EF	emission factor
ERT	expert review team
EPER	European Pollutant Emission Register
ETS	emissions trading scheme
EU	European Union
EU	European Union Monitoring Mechanism
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
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
kg	kilogram (1 kg = 1 thousand grams)
LULUCF	land use, land-use change and forestry
m^3	cubic metre
Mg	megagram (1 Mg = 1 tonne)
Mt	million tonnes
Mtoe	millions of tonnes of oil equivalent
NA	not applicable
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
Netcen	National Environmental Technology Centre
NIR	national inventory report
NISC	United Kingdom National Inventory Steering Committee
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 1015 joule)
QA/QC	quality assurance/quality control
SEPA	Scottish Environment Protection Agency
SF_6	sulphur hexafluoride
Tg	teragram (1 Tg = 1 million tonnes)
TJ	terajoule (1 TJ = 10^{12} joule
UNFCCC	United Nations Framework Convention on Climate Change

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