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## **Report on the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2016\***

**Note by the expert review team**

### *Summary*

Each Party included in Annex I to the Convention must submit an annual greenhouse gas (GHG) inventory covering emissions and removals of GHG emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information required under Article 7, paragraph 1 of the Kyoto Protocol, with the inventory submission due under the Convention. This report presents the results of the individual inventory review of the 2016 annual submission of the United Kingdom of Great Britain and Northern Ireland, conducted by an expert review team in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol”. The review took place from 12 to 17 September 2016 in Bonn, Germany.

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\* In the symbol for this document, 2016 refers to the year in which the inventory was submitted, not to the year of publication.

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## I. Introduction<sup>1</sup>

1. This report covers the review of the 2016 annual submission of the United Kingdom of Great Britain and Northern Ireland organized by the UNFCCC secretariat, in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1, as revised by decision 4/CMP.11) (hereinafter referred to as the Article 8 review guidelines). As indicated in the Article 8 review guidelines, this review process also encompasses the review under the Convention, as described in the “Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention” (hereinafter referred to as the UNFCCC review guidelines) and particularly part III, “UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. The review took place from 12 to 17 September 2016 in Bonn, Germany, and was coordinated by Ms. Claudia do Valle and Mr. Roman Payo (UNFCCC secretariat). Table 1 provides information on the composition of the expert review team (ERT) that conducted the review of the United Kingdom.

Table 1

### Composition of the expert review team that conducted the review of the United Kingdom of Great Britain and Northern Ireland

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Mr. Newton Paciornik	Brazil
	Ms. Daniela Romano	Italy
Energy	Mr. Alexey Cherednichenko	Kazakhstan
	Mr. Hiroshi Ito	Japan
	Mr. Ole-Kenneth Nielsen	Denmark
	Mr. Shengmin Yu	China
IPPU	Ms. Niculina Mihaela Balanescu	Romania
	Mr. Julien Jabot	Norway
	Ms. Eva Krtkova	Czechia
Agriculture	Mr. Paul Duffy	Ireland
	Mr. Tomas Paulaitis	Lithuania
	Mr. Braulio Pikman	Brazil
LULUCF	Ms. Tracy Johns	United States of America
	Mr. Mattias Lundblad	Sweden
	Ms. Marina Shvangiradze	Georgia
Waste	Ms. Sumaia Elsayed	Sudan
	Ms. Katja Pazdernik	Austria
Lead reviewers	Mr. Nielsen	

<sup>1</sup> At the time of publication of this report, the United Kingdom of Great Britain and Northern Ireland had submitted its instrument of ratification of the Doha Amendment; however, the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
	Mr. Paciornik	

*Abbreviations:* IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry.

2. This report contains findings based on the assessment by the ERT of the 2016 annual submission against the Article 8 review guidelines. The ERT has made recommendations to resolve those findings related to issues,<sup>2</sup> including issues related to problems.<sup>3</sup> Other findings, and, if applicable, the ERT’s encouragements to resolve them, are also included.

3. 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.

4. Annex I shows annual greenhouse gas emissions for the United Kingdom, including totals excluding and including the land use, land-use change and forestry sector, indirect carbon dioxide emissions, and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from activities under Article 3, paragraph 3, forest management under Article 3, paragraph 4, and additional activities under Article 3, paragraph 4, of the Kyoto Protocol, if elected, by gas, sector and activity for the United Kingdom.

5. Information to be included in the compilation and accounting database can be found in annex II.

6. The ERT notes that the United Kingdom’s 2015 annual submission was delayed, consistent with decision 6/CMP.9, paragraph 4. As a result, the review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission, in accordance with decision 10/CMP.11, paragraph 1. To the extent that identical information is presented in both annual submissions, the ERT has reviewed this information only once, and, as appropriate, has replicated the findings below in both the 2015 and the 2016 annual review reports.

## II. Summary and general assessment of the 2016 annual submission

7. Table 2 provides the ERT assessment of the annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5 below.

Table 2

### Summary of review results and general assessment of the inventory of the United Kingdom of Great Britain and Northern Ireland

<i>Assessment</i>	<i>Issue or problem ID#(s) in tables 3 and/or 5<sup>a</sup></i>
Dates of submission	Original submission: 15 June 2016 (NIR), 15 June 2016, version 3 (CRF tables), 15 April 2016 (SEF tables)  Revised submissions: 3 November 2016, version 6 and 21 September 2017, version 1 (CRF tables), 22 April 2016 and 1 July 2016 (SEF tables)  The values from the latest submission are used in this report

<sup>2</sup> Issues are defined in decision 13/CP.20, annex, paragraph 81.

<sup>3</sup> Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

<i>Assessment</i>		<i>Issue or problem ID#(s) in tables 3 and/or 5<sup>a</sup></i>	
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	1. Identification of key categories	Yes	G.8, I.2
	2. Selection and use of methodologies and assumptions	Yes	E.24, I.16, I.20, I.21, L.3, KL.7, KL.12
	3. Development and selection of emission factors	No	
	4. Collection and selection of activity data	Yes	E.21, E.28, I.18, A.2, A.6, W.11, KL.9
	5. Reporting of recalculations	No	
	6. Reporting of a consistent time series	Yes	I.10, I.11, I.15, L.5
	7. Reporting of uncertainties, including methodologies	No	
	8. QA/QC	QA/QC procedures were assessed in the context of the national system (see below)	
	9. Missing categories/completeness <sup>b</sup>	Yes	G.13, L.17, L.19, KL.5, KL.6, KL.10, KL.13, KL.15, KL.16
	10. Application of corrections to the inventory	Yes	E.22, E.23, KL.4
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	NA	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified in the following areas:		
	1. National system:		
	(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	Yes	G.13
	(b) Performance of the national system functions	Yes	G.13
	2. National registry:		
	(a) Overall functioning of the national registry	No	
	(b) Performance of the functions of the national registry and the technical standards for data exchange	No	
	3. ERUs, CERs, AAUs and RMUs and on information on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, taking into consideration any findings or recommendations contained in the SIAR	No	

Assessment	Issue or problem ID#(s) in tables 3 and/or 5 <sup>a</sup>
4. Matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, including any changes since the previous annual submission	No
5. LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol:	
(a) Reporting in accordance with the requirements of decision 2/CMP.8, annex II, paragraphs 1–5	Yes KL.6
(b) The Party has demonstrated methodological consistency between the reference level and reporting on forest management in accordance with decision 2/CMP.7, annex, paragraph 14	Yes KL.6
(c) The Party has reported information in accordance with decision 6/CMP.9	Yes KL.10
(d) Country-specific information has been reported to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	No
(e) Other issues	No
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18? No G.11
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol? No
	The ERT accepts that the revised estimate submitted by the United Kingdom in its 2016 submission can replace a previously applied adjustment in the compilation and accounting database NA
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties? Yes
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review? No
Questions of implementation	Did the ERT list questions of implementation? No

*Abbreviations:* AAU = assigned amount unit, CER = certified emission reduction unit, CPR = commitment period reserve, CRF = common reporting format, ERT = expert review team, ERU = emission reduction unit, LULUCF = land use, land-use change and forestry, NA = not applicable, NIR = national inventory report, QA/QC = quality assurance/quality control, RMU = removal unit, SEF = standard electronic format, SIAR = standard independent assessment report, UNFCCC Annex I inventory reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories", Wetlands Supplement = *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*.

<sup>a</sup> The ERT identified additional issues in all sectors that are not specifically listed in table 2 but are included in table 3 and/or 5.

<sup>b</sup> Missing categories, for which methods are provided in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, may affect completeness and are listed in annex III to this document.

### III. Status of implementation of issues and/or problems raised in the previous review report

8. Table 3 compiles all the recommendations made in the previous review report. Owing to the unique circumstances of the 2015 annual submission described in paragraph 6 above, the latest available review report was for the review of the 2014 annual submission, published on 2 March 2015. For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2016 annual submission and provided the rationale for its determination, taking into consideration the publication date of the previous review report and national circumstances.

Table 3

#### Status of implementation of issues and/or problems raised in the previous review report of the United Kingdom of Great Britain and Northern Ireland

<i>ID#</i>	<i>Issue and/or problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report<sup>c</sup></i>	<i>ERT assessment and rationale</i>
General			
G.1	QA/QC and verification (13, 2014) Transparency	Describe in the NIR any changes in the QA/QC procedures	Resolved. Information has been provided in the QA/QC section of the NIR (section 1.6.1)
G.2	QA/QC and verification (14, 2014) Transparency	Provide a short summary of the pre-submission review outcome in the NIR	Resolved. A description of the pre-submission review outcome has been provided in the NIR (section 1.2.2.4)
G.3	Transparency (15, 2014) Transparency*	Improve the transparency of the NIR by including sufficient information in the annual submission	Addressing. The United Kingdom has addressed most of the previous recommendations on transparency; the remaining issues identified during this review cycle are being evaluated under the related sectors (see I.2, L.2, W.2 and W.3 below)
G.4	Key category analysis (18, 2014) (12, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Perform a key category analysis following the IPCC good practice guidance at an aggregation level where individual methodologies and EFs are used	Resolved. The Party revised the key category analysis and level of disaggregation following the 2006 IPCC Guidelines. The results are described in the NIR (section 1.5) and in annex A.1. However, some clarification is still needed and the ERT raised a new question (see G.8 in table 5)
G.5	Inventory planning (19, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve the inventory preparation in terms of prioritizing inventory improvements using the key category analysis	Resolved. An additional tool (key category ranking system) prioritizing inventory improvements has been developed and the results of its application are provided in the NIR (section 1.5) and in annex 1 (table A 1.5.1)
G.6	Article 3, paragraph 14, of the Kyoto Protocol (116, 2014) (120, 2013) Transparency	Explicitly report any change(s) in the information provided under Article 3, paragraph 14, of the Kyoto Protocol	Resolved. The changes have been clearly reported in the relevant section of the NIR (section 15.1)

<i>ID#</i>	<i>Issue and/or problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report<sup>c</sup></i>	<i>ERT assessment and rationale</i>
Energy			
E.1	1. General (energy) (28, 2014) Comparability	Complete the improvements regarding the use of comparable units	Resolved. The 2016 submission contains an additional Excel file with a full list of EFs on an energy basis, to assist in the assessment of comparability with the EFs of other Parties. Further information can be found in annex 3 to the NIR (p.677)
E.2	1. General (energy) (31, 2014) Transparency	Include a summary of information on the possible sources of differences between the reference approach and sectoral approach for liquid and solid fuels in the NIR	Resolved. The summary information has been included in the NIR (section 3.2.1.1)
E.3	Fuel combustion – reference approach – solid fuels – CO <sub>2</sub> (32(a), 2014) Accuracy	Investigate the possibility of using disaggregated coal data in the reference approach	Resolved. CRF table 1.A(b) now includes separate data for the production of bituminous coal, coking coal and anthracite
E.4	Fuel combustion – reference approach – solid fuels – CO <sub>2</sub> (32(b), 2014) Accuracy	Implement checks to ensure that all imports of coke oven/gas coke are correctly accounted for	Resolved. In the NIR (section 3.1.1.1), the Party explained that the omission of imports of coke oven/gas coke had been corrected. The ERT checked the submission and confirmed that the data are consistent
E.5	Fuel combustion – reference approach – solid fuels – CO <sub>2</sub> (32(c), 2014) Accuracy	Review the EFs used in the reference approach for brown coal briquettes/patent fuel	Resolved. The recommendation was implemented in the 2015 inventory submission (section 3.1.1.1 of the 2015 NIR)
E.6	Fuel combustion – reference approach – all fuels – CO <sub>2</sub> (33, 2014) Accuracy	Apply the relevant IPCC defaults for the fractions of carbon oxidized	Resolved. The Party revised the methods used in accordance with the 2006 IPCC Guidelines
E.7	Feedstocks, reductants and other non-energy use of fuels – gaseous fuels – CO <sub>2</sub> (36, 2014) Accuracy	Include the carbon content of emissions in the IPPU sector in the amount of carbon stored for natural gas in non-energy use of fuels reported in the energy sector in column E of CRF table 1.A(d)	Resolved. The methodology for this sector has been modified as the methods used were revised in accordance with the 2006 IPCC Guidelines. The IEF is now 15.54 t C/TJ
E.8	1.A.1.a Public electricity and heat production – solid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (37, 2014) Accuracy	Implement the planned improvements to avoid errors in future CRF tables	Resolved. A list of the main improvements has been provided in the NIR (section 1.6.1)
E.9	1.A.1.a Public electricity and heat production – solid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	Provide in the NIR an update on the status of QA/QC improvements	Resolved. Improvements to the QA/QC system have been listed in the NIR (section 1.6.1.2)



ID#	Issue and/or problem classification <sup>a, b</sup>	Recommendation made in previous review report <sup>c</sup>	ERT assessment and rationale
	(37, 2014) Transparency		
E.10	1.A.1 Energy industries – solid fuels – CO <sub>2</sub> (38, 2014) Transparency	Improve the text of the relevant sections of the NIR to better explain the reasons for the low EFs, and justify the extrapolation of these EFs over the entire time series	Resolved. The Party provided information in the relevant sections of the NIR. In annex 3, section A 3.1.1, to the NIR, the Party presents the EFs, while in section A 3.1.2.1, the Party describes the approach used for calculating the time series of carbon EFs and how these are used in the inventory
E.11	1.A.1 Energy industries – solid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (39, 2014) Transparency	Improve the documentation of country-specific EFs and oxidation factors, including any corrections performed, in the NIR; in addition, clearly document in the NIR any revision of the EFs to discount carbon unoxidized	Resolved. A description of a review of the country-specific carbon emission factors by Baggott et al. (2004) <sup>d</sup> is included in annex 3 to the NIR, together with information on how it has been used for inventory purposes. Except for coal in category 1.A.1.a, country-specific oxidation factors that could not be fully justified have been replaced with IPCC defaults (NIR, section 3.2.6). The impact of the resulting recalculations is described in the NIR (chapter 10)
E.12	1.A. Fuel combustion – sectoral approach – gaseous fuels – CH <sub>4</sub> and N <sub>2</sub> O (40 and 41, 2014) Accuracy	Provide evidence that the EFs for CH <sub>4</sub> and N <sub>2</sub> O used for the combustion of blast furnace gas and coke oven gas are best represented by the tier 1 default EFs from the 2006 IPCC Guidelines, or provide revised emission estimates based on the default EFs from the Revised 1996 IPCC Guidelines or the previous EFs from the <i>EMEP/EEA Air Pollution Emission Inventory Guidebook</i> <sup>e</sup>	No longer relevant. The recommendation is no longer relevant owing to the implementation of the revised UNFCCC Annex I inventory reporting guidelines (decision 24/CP.19)
E.13	1.A.3.b Road transportation – liquid fuels – CO <sub>2</sub> (43, 2014) Accuracy	Review the report on carbon factors in detail and investigate whether the EFs that are currently used are accurate	Resolved. The Party reviewed the country-specific EFs from the report by Baggott et al. (2004) <sup>d</sup> for all liquid fuels, compared them with the default EFs provided in the 2006 IPCC Guidelines and found them to be largely within the range of the default EFs. No new data for the United Kingdom have been identified and the EFs from that report are still considered to be the most relevant country-specific EFs
E.14	1.A.3.b Road transportation – liquid fuels – CO <sub>2</sub> (43, 2014)	Report the findings of the review of the report on carbon factors in the NIR	Resolved. The rationale is as for E.13 above. The Party has reported the information in annex 3 (section A 3.1.2.1) to the NIR

<i>ID#</i>	<i>Issue and/or problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report<sup>c</sup></i>	<i>ERT assessment and rationale</i>
Transparency			
E.15	1.B.2.b Natural gas – CH <sub>4</sub> (44, 2014) (30, 2013) Transparency	Improve the transparency of the description in the NIR of the methodology followed for the estimation of fugitive emissions from natural gas transmission and distribution systems	Resolved. The NIR (section 3.4) presents the methodological descriptions for this sector
E.16	1.B.2.b Natural gas – CH <sub>4</sub> (45, 2014) (31, 2013) Accuracy	For the estimation of CH <sub>4</sub> emissions, perform the exercise of comparing the higher-tier method used in NIR with the tier 1 approach of the IPCC good practice guidance (table 2.16), and provide the conclusion in the NIR	Resolved. The exercise was carried out (using the tier 1 default methods from the Revised 1996 IPCC Guidelines and the 2006 IPCC guidelines) and reported in the NIR (chapter 3, MS 20, p.206). The results of the comparison showed that, considering the uncertainty of the source category, the estimate is in the same order of magnitude
E.17	1.A.3.c Railways – solid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (47, 2014) Comparability	Improve the time-series consistency of the estimates and consider reallocating the relevant emissions from “other industrial combustion” to railways	Resolved. The Party explained in the assessment report that it does not have sufficient data to make a reallocation of emissions and considers solid fuel combustion by heritage railways to be a source too minor to warrant additional investigation, particularly as it is known that there is no omission of emissions. The ERT agrees that there is no underestimation or overestimation of emissions and that the resources needed to further investigate this issue would outweigh the limited gain
E.18	1.A.3.c Railways – solid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (47, 2014) Adherence to the UNFCCC Annex I inventory reporting guidelines	Use the correct notation key in the CRF tables for the years prior to 2005	Resolved. The Party has corrected the notation key
E.19	1.B.1.a Coal mining and handling – solid fuels – CH <sub>4</sub> (48, 2014) (39, 2013) Transparency	Revise the comment on the use of the notation key “IE” in CRF table 1.B.1 for the associated emissions from post-mining activities of surface mines	Resolved. The Party has revised the comment in CRF table 9. The Party confirmed that emissions from mining activities of surface mines include post-mining emissions
IPPU			
I.1	2. General (IPPU) (51, 2014) Transparency	Improve the consistency in the use of units in the NIR tables and between what is reported in the NIR and in the CRF tables, especially where the NIR is intended to include numerical descriptions of GHG emissions, including the impact of recalculations	Resolved. Improvements to the QA/QC process are described in the NIR (section 1.6.1)

<i>ID#</i>	<i>Issue and/or problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report<sup>c</sup></i>	<i>ERT assessment and rationale</i>
I.2	2. General (IPPU) (52, 2014) Transparency*	Conduct the key category analysis for F-gases at the subcategory level (e.g. HFCs from refrigeration and air-conditioning equipment)	Addressing. The United Kingdom undertook a review of the key category analysis in response to another recommendation to implement a different level of aggregation (see G.4 above). However, for F-gases, this recommendation was implemented only for the categories under 2B – chemical industry
I.3	2.B.2 Nitric acid production – N <sub>2</sub> O (53, 2014) Transparency	Include in the NIR information provided to the ERT during the review on the monitoring standards, including standards for emissions and QA/QC followed by nitric acid plant operators	Resolved. Information has been included in the NIR (section 4.7.2, p.234)
I.4	2.B.2 Nitric acid production – N <sub>2</sub> O (53, 2014) Transparency	Include the reason for the change in the N <sub>2</sub> O IEF from 2011 to 2012, together with information on specific abatement measures taken at the two nitric acid production sites in the NIR	Resolved. Information has been included in the NIR (section 4.7.2, p.236). The changes in the N <sub>2</sub> O IEF were due to control equipment implemented in two plants in the United Kingdom and to the change in the NO <sub>x</sub> abatement system at one plant
I.5	2.F.1 Refrigeration and air conditioning – HFCs, PFCs and SF <sub>6</sub> (54, 2014) Transparency	Incorporate in the NIR information on F-gas regulations and their coverage, and how collection/destruction is accounted for in the models to estimate emissions from consumption of halocarbons and SF <sub>6</sub>	Resolved. Information has been included in the NIR (section 4.29.2, table 4.20)
I.6	2.F.1 Refrigeration and air conditioning – HFCs (55, 2014) Transparency	Continue to refine the underlying assumptions and methodologies of the models used, and conduct checks of the consistency of the reported AD in order to avoid discrepancies between the main calculations that the model performs and the CRF output function of the model	Resolved. The Party reviewed its refrigeration and air conditioning model <sup>f</sup> and the description can be found in the NIR (section 4.29.2). No discrepancies were observed in the submission
I.7	2.F.2 Foam-blowing agents – HFCs (56, 2014) Transparency	Provide a more specific explanation of how the Party has determined the EF(s) for foam blowing and indicate more consistently whether or not the emissions from manufacturing, stocks and disposal are reported separately, or provide clear reasons as to why these emissions are aggregated when reporting	Resolved. The Party has included sufficient information in the NIR (section 4.30.2, tables 4.22 and 4.23)
I.8	2.F.2 Foam-blowing agents – HFCs (57, 2014) Transparency	Improve the QC procedures to ensure consistent reporting between the NIR and the CRF tables prior to submission, but in particular to ensure the provision of correct information in the tables of the NIR regarding emissions	Resolved. The Party has improved consistency between the NIR and the CRF tables, and the information provided in sections 4.30 and 4.31 of the NIR demonstrates that correct information has been provided regarding emissions

<i>ID#</i>	<i>Issue and/or problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report<sup>c</sup></i>	<i>ERT assessment and rationale</i>
I.9	2.B.1 Ammonia production – CO <sub>2</sub> (59, 2014) Transparency	Improve the consistency under the same section of the NIR of the description related to feedstocks used to calculate the IEF to exclude the natural gas used for acetic acid and acetic anhydride production, and the correction of the production amount, particularly as relates to the use of units in the tables under the sections for “Source specific recalculations”, especially regarding quantitative data, and focus on the consistent use of units	Resolved. The units in tables 4.10 and 4.12 of the NIR are consistent. Owing to confidentiality reasons, detailed data could not be reported in the NIR; however, the United Kingdom provided information on these data upon a request of the ERT
Agriculture			
A.1	3. General (agriculture) (64, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Enhance the QC procedures to avoid inconsistencies between what is reported in chapter 10 of the NIR (recalculations and improvements) and the CRF table (8a), especially with regard to the values for the emission estimates	Resolved. The consistency between the NIR and the CRF table (8s, previously 8a) has been improved by directly linking the outputs of the calculations to tables in the NIR (QA/QC system, listed under section 1.6.1)
A.2	3.A Enteric fermentation – CH <sub>4</sub> (65, 2014), (55, 2013) Accuracy*	Implement the planned improvement of digestible energy <sup>g</sup> data through the commissioned research projects	Addressing. The Party will implement the recommendation in the 2017 submission, as an output of the Agricultural Greenhouse Gas Platform projects funded by Defra
A.3	3.A Enteric fermentation – CH <sub>4</sub> (66, 2014), (56, 2013) Accuracy*	Apply a methodology that more closely reflects the country-specific conditions, for instance by moving to the IPCC tier 2 methodology for the sheep subcategory, in addition to documenting national circumstances leading to methodological choice	Addressing. The United Kingdom will move to the tier 2 method for reporting emissions from sheep in the 2017 submission based on data from the Agricultural Greenhouse Gas Platform project funded by Defra
A.4	3.B Manure management – N <sub>2</sub> O (67, 2014) Transparency	Include information on the country-specific methodology for all animals in the form of a summary explanation of how the nitrogen excretion values used in the inventory were derived	Resolved. In the NIR (section 5.3.2.2), the United Kingdom explains that country-specific values for nitrogen excretion per head for the different livestock types were derived from the report of a Defra project <sup>h</sup> and interpretation (expert opinion) by Cottrill and Smith (from ADAS). <sup>i</sup> Nitrogen excretion for dairy cattle is derived from a link with the annual milk yield (see NIR, annex A.3.3, table A 3.3.11). The proportion of manure managed in the different systems is described in the NIR (section 5.3.2.1)
LULUCF			
L.1	4. General (LULUCF) (73, 2014) Transparency	Incorporate an explanation of changes made since the previous NIR regarding areas allocated to land-use categories in 1990, as	Resolved. The Party included the information in the NIR (section 6.1.1) and in CRF table 4.1. Buffer area was allocated to

ID#	Issue and/or problem classification <sup>a, b</sup>	Recommendation made in previous review report <sup>c</sup>	ERT assessment and rationale
		reported in the land-use matrix (NIR table 7.1)	undisturbed grassland and area remained constant throughout the time series. However, the ERT requested the Party to expand the information in the 2017 submission (see L.10 in table 5)
L.2	4.A Forest land – CO <sub>2</sub> (76, 2014) Transparency*	Continue efforts to gather information on the management of privately owned forests and include information on the management prescriptions and rotation ranges in the NIR	Addressing. The Party has provided information in the NIR (annex 3.4.1, tables A 3.4.2 and A 3.4.3). However, the ERT considered that the information was not complete and raised a follow up question (see L.12 in table 5)
L.3	4.A Forest land – CO <sub>2</sub> (77, 2014) Accuracy*	Continue efforts to improve the representation of soil carbon dynamics in forest carbon accounting models applied to the United Kingdom and the documentation of the representation soil carbon dynamics associated with forest land	Addressing. The Party explained in the NIR (table 10.14) that progress has been made in developing a new methodology; however, it is not yet ready for implementation. During the review, the United Kingdom provided additional information on the status of the implementation of new methods to estimate the carbon stock changes in soils. Significant efforts are under way to improve the modelling of soil carbon processes and to verify model estimates through comparison with available field surveys and experiments. Since early 2015, new sub-models for litter and soil carbon have been under development for application within the CARBINE model for forest carbon accounting. However, the National Inventory Steering Committee felt that there was a need to fully explore and validate the preliminary model before the new model could be implemented for use in the GHG inventory
L.4	4. General (LULUCF) – CO <sub>2</sub> (80, 2014) Completeness	Research again the possibility of generating suitable data for overseas territories and Crown dependencies and report on the progress made to estimate emissions and removals from organic soils under cropland and grassland, and instead of reporting the emissions using the notation key “NO”, until additional information becomes available, report using the notation key “NE”	Resolved. The Party revised the data and provided explanations for the use of the notation key. However, during the review, the ERT noted that the United Kingdom had changed the way in which it reports cropland and grassland between the 2014 and 2015/2016 submissions. Therefore, a new issue was raised (see L.9 in table 5)

<i>ID#</i>	<i>Issue and/or problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report<sup>c</sup></i>	<i>ERT assessment and rationale</i>
L.5	4.B Cropland – CO <sub>2</sub> (81, 2014) (83, 2013) Consistency*	Assign orchards to cropland and provide documentation on the method used to estimate the carbon stock changes over time, and ensure that changes in the area of orchards over time have been taken into account	Addressing. As indicated in table 10.8 of the NIR, the Party correctly assigned orchards to cropland from 1984 onward. Prior to 1984, orchards have been incorrectly assigned to forest land. The Party explained that a new methodology is being developed (see L.3 above) that will allow more explicit tracking of land-use changes within forest land and cropland. When this new methodology is implemented, the area of orchards for the period prior to 1984 will be correctly assigned to cropland
L.6	4.C.2.2 Cropland converted to grassland – CO <sub>2</sub> (82, 2014) Transparency	Report land-use changes from cropland to grassland for 2010 onward	Resolved. See section 6.3.7 of the NIR
L.7	4.E.2 Land converted to settlements – CO <sub>2</sub> (83, 2014) (85 and 86, 2013) Transparency	Investigate the internal consistency of the reported changes in carbon stock and more transparently provide information on the methods used	Resolved. The use of notation keys for gains and losses of living biomass was updated; the Party used the notation key “IE” instead of “NO”, where appropriate
L.8	4.D. Wetlands (84, 2014) Completeness	Assess the appropriateness of the use of the notation key “NE” for the carbon stock changes in living biomass in overseas territories for forest land converted to wetlands and the related area, and report thereon	No longer relevant. The new structure of the CRF tables as a result of decision 24/CP.19 means that this recommendation is no longer relevant, since only relevant land-use conversions are reported
<b>Waste</b>			
W.1	5. General (waste) (87, 2014) (91, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve the QC checks in the main text of the NIR and the annexes, and consistency among them and with the CRF tables	Resolved. No such discrepancies were detected in the NIR
W.2	5.A Solid waste disposal on land – CH <sub>4</sub> (91, 2014) (98, 2013) Transparency*	Implement the proposed improvements of the emission estimates for solid waste disposal sites in the overseas territories and Crown dependencies by providing further information on the methodologies used to estimate the emissions and by completing the CRF tables with specific parameters such as AD, MCF and DOC	Addressing. The United Kingdom has provided some information in table A 3.5.3 (section A 3.5.1 of annex 3 to the NIR), however, details on the data and parameters used for the landfill emission estimates for overseas territories and Crown dependencies are missing and therefore more specific information on the parameters used (AD, DOC and MCF) is needed

<i>ID#</i>	<i>Issue and/or problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report<sup>c</sup></i>	<i>ERT assessment and rationale</i>
W.3	5.D Wastewater treatment and discharge – CH <sub>4</sub> (92, 2014) (102, 2013) Transparency*	Improve the transparency of the EFs employed by providing a more detailed explanation in the NIR	Not resolved. The Party explained that the recommendation is no longer relevant owing to the implementation of the 2006 IPCC Guidelines. However, the NIR still has some transparency issues as it provides only a small amount of information on the exact methodology applied by the water companies (see W.8 in table 5)
W.4	5.C.1 Waste incineration – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (93, 2014) Transparency	Improve the documentation in the NIR, provide a detailed explanation of the methodology used to estimate emissions from accidental fires (vehicles) and standardize the terminology used for waste classification	Resolved. A methodological description has been included in the NIR (chapter 7.4.2, p.430), using the terminology “chemical waste” and “clinical waste” in line with CRF terminology
<b>KP-LULUCF</b>			
KL.1	Deforestation – CO <sub>2</sub> (101, 2014) Transparency	Include the explanation that liming on deforested land occurs only in England	No longer relevant. The recommendation is no longer relevant owing to the implementation of the revised UNFCCC Annex I inventory reporting guidelines (decision 24/CP.19). Liming is now reported under the agriculture sector
KL.2	Forest management – CO <sub>2</sub> (103, 2014) Transparency	Incorporate additional information on the effect of “windblow” disturbances	Resolved. Wind damage has been taken into account in the natural disturbance provision under Article 3, paragraph 3, of the Kyoto Protocol, and information has been provided in the NIR (section 11.4.4)

*Abbreviations:* AD = activity data, CRF = common reporting format, DOC = degradable organic carbon, Defra = Department for Environment, Food and Rural Affairs, EF = emission factor, ERT = expert review team, F-gas = fluorinated gas, GHG = greenhouse gas, IE = included elsewhere, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, MCF = methane correction factor, NE = not estimated, NIR = national inventory report, NO = not occurring, NO<sub>x</sub> = nitrogen oxide, QA/QC = quality assurance/quality control, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC Annex I inventory reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

<sup>a</sup> References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue was raised. Issues are further classified as defined in decision 13/CP.20, annex, paragraph 81. In the review of the supplementary information reported in accordance with Article 7, paragraph 1, of the Kyoto Protocol, the ERT has applied the classification in decision 22/CMP.1, annex, paragraph 69, in conjunction with decision 4/CMP.11.

<sup>b</sup> An asterisk is included next to each issue type for all issues that are also problems, as defined in decision 22/CMP.1, annex, paragraphs 68 and 69, including those that lead to an adjustment or a question of implementation.

<sup>c</sup> The review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission, and as such, the 2015 annual review report was not available at the time of this review. Therefore, the recommendations reflected in table 3 are from the 2014 annual review report. For the same reason, the year 2015 is excluded from the list of years in which the issue has been identified.

<sup>d</sup> Baggott SL, Lelland A, Passant NP and Watterson J. 2004. *Review of Carbon Emission Factors in the UK Greenhouse Gas Inventory*. Available at <[https://uk-air.defra.gov.uk/assets/documents/reports/cat07/0611061401-417\\_Review\\_of\\_Carbon\\_Emission\\_Factors\\_2004NIR\\_Issue1\\_v1.3.2.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cat07/0611061401-417_Review_of_Carbon_Emission_Factors_2004NIR_Issue1_v1.3.2.pdf)>.

<sup>e</sup> Available at <<http://www.eea.europa.eu/publications/emep-eea-guidebook-2013>>.

<sup>f</sup> The refrigeration/air-conditioning (RAC) model was updated by ICF International in 2011. The model was reviewed and updated again in 2015. Available at <[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/48250/3844-greenhouse-gas-inventory-improvement-project-deve.PDF](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48250/3844-greenhouse-gas-inventory-improvement-project-deve.PDF)>.

<sup>g</sup> Indicator of a feed's energy value.

<sup>h</sup> *Nitrogen and Phosphorus Output of Livestock Excreta*. Final report of Project WT0715NVZ (Nitrogen and phosphorus output standards for farm livestock). Available at <<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=13963>>.

<sup>i</sup> For information on ADAS see <<http://www.adas.uk/>>.

#### IV. Issues identified in three successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues included in table 4 have been identified in three successive reviews, including the review of the 2016 annual submission of the United Kingdom, and have not been addressed by the Party.

Table 4

##### Issues identified in three successive reviews and not addressed by the United Kingdom of Great Britain and Northern Ireland

<i>ID#<sup>a</sup></i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed<sup>b</sup></i>
General		
	No such general issues were identified	
Energy		
	No such issues for the energy sector were identified	
IPPU		
	No such issues for the IPPU sector were identified	
Agriculture		
A.2*	Implement the planned improvement of digestible energy data through the commissioned research projects	3 (2013–2015/2016)
A.3*	Apply a methodology that more closely reflects the country-specific conditions, for instance by moving to the IPCC tier 2 methodology for the sheep subcategory, in addition to documenting the national circumstances leading to the methodological choice	3 (2013–2015/2016)
LULUCF		
L.5	Assign orchards to cropland and provide documentation on the method used to estimate the carbon stock changes over time, and ensure that changes in the area of orchards over time have been taken into account	3 (2013–2015/2016)
Waste		
W.2	Implement the proposed improvements of the emission estimates for solid waste disposal sites in the overseas territories and Crown dependencies by providing further information on the methodologies used to estimate the	3 (2013–2015/2016)



ID# <sup>a</sup>	Previous recommendation for the issue identified	Number of successive reviews issue not addressed <sup>b</sup>
	emissions and by completing the CRF tables with specific parameters such as AD, MCF and DOC	
W.3	Improve the transparency of the EFs employed by providing a more detailed explanation in the NIR	3 (2013–2015/2016)
KP-LULUCF	No such issues for KP-LULUCF activities were identified	

*Abbreviations:* AD = activity data, CRF = common reporting format, DOC = degradable organic carbon, EF = emission factor, IPCC = Intergovernmental Panel on Climate Change, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, MCF = methane correction factor, NIR = national inventory report.

<sup>a</sup> An asterisk is included after any issue ID# where the underlying issue is related to accuracy or completeness of a key category, a missing category or a potential key category, as indicated in decision 13/CP.20, annex, paragraph 83.

<sup>b</sup> The review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission. As the reviews of the 2015 and 2016 annual submissions are not “successive” reviews, but are rather being held in conjunction, for the purpose of counting successive years in table 4, 2015/2016 is considered as one year. The ERT noted that this table 4 is the same as that in the 2015 annual review report for the United Kingdom, modified to reflect the combined 2015/2016 review.

## V. Additional findings made during the 2016 technical review

10. Table 5 contains findings made by the ERT during the technical review of the 2016 annual submission of the United Kingdom that are additional to those identified in table 3 above.

Table 5  
**Additional findings made during the 2016 technical review of the annual submission of the United Kingdom of Great Britain and Northern Ireland**

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue<sup>a</sup> and/or a problem<sup>b</sup>? If yes, classify by type</i>
General			
G.7	Transparency	<p>The ERT noted that the United Kingdom has addressed some of the recommendations of the previous reviews and provided additional information in the NIR that has improved the transparency of the descriptions for some sectors and categories in its submission. However, there are still many categories where the description of the estimation methodologies and trends lacks transparency (see sectoral transparency issues in table 3 (not resolved or addressing) and in this table)</p> <p>The ERT recommends that the United Kingdom address the transparency issues identified in the previous and current annual review reports and provide information on the implementation of the recommendations on transparency in the NIR</p>	Not an issue
G.8	Key category analysis	<p>The ERT noted that the United Kingdom has improved the level of disaggregation used to assess the key categories (see G.4 in table 3); in its NIR, the Party explained that the 2006 IPCC Guidelines were followed to disaggregate the categories. However, there are cases where the United Kingdom does not properly follow the suggestions in the 2006 IPCC Guidelines (e.g. for F-gases from fluorochemical production, as described in I.2 in table 3, and for the LULUCF sector). Following a question raised by the ERT during the review, the United Kingdom provided the rationale for the choice of the selected level of disaggregation</p> <p>The ERT encourages the United Kingdom to ensure that its reporting is in line with the level of disaggregation suggested in table 4.1 of the 2006 IPCC Guidelines, and recommends that it provide justification for the level of category disaggregation used and the rationale for its use if there is any deviation from the level suggested by the IPCC</p>	Yes. Transparency*
G.9	Uncertainty analysis	<p>The description of the sources of uncertainty is not sufficiently detailed in the NIR. The United Kingdom stated for a number of categories (i.e. those on pp.132, 138, 144, 146, etc.) that expert judgment was used to estimate the uncertainty in some new categories and sectoral experts were involved in the discussions on those figures. The ERT noted that it would have been useful for the Party to have reported some of the results of the analyses made by expert judgment in the NIR. Upon request, the United Kingdom made available to the ERT during the review information that characterizes and explains the uncertainty assessment of some industrial categories (e.g. iron and steel; F-gases). The ERT commends the Party for providing this information</p> <p>The ERT recommends that the United Kingdom include in the NIR a brief description of and reference to the information used to quantitatively assess the uncertainty for all categories where</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
		expert judgment was used	
G.10	National registry	<p>The ERT noted that the national registry complies with the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1</p> <p>However, the ERT recommends that the United Kingdom implement the recommendations from the SIAR regarding the inclusion of a report date in the file to allow the assessment of the timeliness of the report and the inclusion of the commitment period used for all accounting in the report</p>	Yes. Transparency*
G.11	Commitment period reserve	<p>The CPR reported by the Party in its initial report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol is correct. However, the ERT noted that there are inconsistencies in the information reported by the United Kingdom. The value reported in the NIR is different from that provided in the original submission of the initial report: in the NIR the CPR is 2,471,658,632 t CO<sub>2</sub> eq, calculated as 90 per cent of its adjusted assigned amount, whereas in the initial report the CPR is 2,470,443,599 t CO<sub>2</sub> eq</p> <p>On 29 August 2017, the United Kingdom submitted a revised version of its initial report; however, the ERT noted inconsistencies in the way the Party had calculated the CPR based on “100 per cent of eight times its 2014 emission”. The CPR should be calculated considering the total emissions in 2014, excluding LULUCF (526,732,105 t CO<sub>2</sub> eq), and without considering the Article 3, paragraphs 3 and 4, activities, as indicated in the Party’s initial report (p.10)</p> <p>The ERT recommends that the United Kingdom, when preparing the NIR, compare the 90 per cent of assigned amount value against the total GHG emissions, excluding LULUCF, in the most recent year</p>	Yes. Accuracy*
G.12	National system	<p>In its original 2016 submission, the United Kingdom’s GHG inventory included its Crown dependencies of Guernsey, Jersey and the Isle of Man, and its overseas territories of Bermuda, Montserrat, the Cayman Islands, the Falkland Islands and Gibraltar (NIR, section 6.9). The ERT noted that in its original submission of the initial report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol, the United Kingdom states that “the final extent of territorial coverage for the second commitment period of the Kyoto Protocol has yet to be fully determined, as it will depend on which of the UK’s Crown dependencies and overseas territories will join the United Kingdom’s ratification in respect of the second commitment period”</p> <p>The ERT included this potential problem related to the national system in the list of potential problems and further questions raised by the ERT. During the review week, the United Kingdom explained that “GHG emissions reported by UK in its Initial Report under the Second Commitment</p>	Not an issue

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
G.13	National system	<p>Period of the Kyoto Protocol include those from the UK, UK's Crown Dependencies of Guernsey, Jersey and Isle of Man, and from the UK's overseas territories of Bermuda, Cayman Islands, Falkland Islands and Gibraltar", and that Montserrat was no longer included under the Kyoto Protocol. The Party also explained that "the definition of the final territorial coverage was still pending because it requires the constitutional processes of each overseas territory and Crown dependency to be followed in full"</p> <p>The ERT noted that, according to decision 24/CP.19, 'completeness' of a GHG inventory also means the full geographical coverage of the sources and sinks of an Annex I Party according to the instrument of ratification, acceptance, approval or accession to the Convention of each Annex I Party. The ERT believes that the non-definition of the territorial coverage of the United Kingdom might affect the base-year emission levels and, consequently, the value of the CPR could change according to the base-year emissions. In addition, the Party's assigned amount might also be affected, considering the fact that land-use change and forestry constitute a net source of GHG emissions in the base year</p> <p>The ERT decided to raise a potential question of implementation in the draft report sent to the Party for comments. On 29 August 2017, the United Kingdom resubmitted its initial report, clarifying that "territorial coverage has been extended to include complete coverage of emissions for the UK's Crown Dependencies. These are Guernsey, Jersey and the Isle of Man. Territorial coverage also includes those UK overseas territories that have joined the UK's ratification of the UNFCCC and intend to join the UK's ratification of the Kyoto Protocol during its second commitment period. These overseas territories are the Cayman Islands, Falkland Islands and Gibraltar. Bermuda is the only territory included in the first commitment period that is not included in the UK's coverage for the second commitment period.". Therefore, the ERT concluded that the potential question of implementation was no longer relevant</p> <p>As identified by the ERT during the review (see G.12 above), the United Kingdom had not defined the final extent of its territorial coverage for the second commitment period of the Kyoto Protocol in its original submission of the initial report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol received on 1 July 2016</p> <p>Based on the original submission of the initial report, the ERT considered that the overall organization of the national system of the United Kingdom, including the effectiveness and reliability of the institutional, procedural and legal arrangements, was not fully performing the functions required by the guidelines for national systems for the estimation of anthropogenic GHG emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol, as included in the annex to decision 19/CMP.1. It is part of the mandatory general functions of the</p>	Yes. Completeness*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
		<p>national system to “Provide information necessary to meet the reporting requirements defined in the guidelines under Article 7 in accordance with the relevant decisions of the COP and/or COP/MOP” (decision 19/CMP.1, annex, paragraph 10(e))</p> <p>Consequently, the ERT decided to raise a potential question of implementation in the draft report sent to the Party for comments. On 29 August 2017, the United Kingdom resubmitted its initial report, clarifying its territorial coverage, and the ERT decided to remove the potential question of implementation (see G.12 above). However, the ERT concluded that the inventory is not complete for the LULUCF sector and for activities under KP-LULUCF (see L.19 and KL.16, respectively, below)</p> <p>The ERT noted, in particular, that in accordance with decision 2/CMP.7, annex, paragraph 25, national inventory systems established under Article 5, paragraph 1, shall ensure that areas of land subject to KP-LULUCF activities are identifiable, and information on these areas shall be provided by each Party included in Annex I in their national inventories in accordance with Article 7 of the Kyoto Protocol</p> <p>The ERT recommends that the United Kingdom strengthen its national system in order to ensure that it can ensure the completeness of the coverage of the LULUCF and KP-LULUCF estimates of emissions and removals, and report on the improvements made in the next NIR</p>	
	Energy		
E.20	1. General (energy sector) – all fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The NIR (pp.35 and 49) states that the United Kingdom’s submission is based on the full coverage of the United Kingdom and relevant overseas territories and Crown dependencies. Further, the NIR (p.49) states that the geographical coverage of DUKES<sup>c</sup> is only the United Kingdom. During the review, the Party clarified that the geographical coverage of DUKES is the United Kingdom and its Crown dependencies, and that additional estimates for fuel consumption for each overseas territories and Crown dependencies were calculated using data provided by the respective government departments and, where necessary (when reporting different geographical coverage), the Party was able to add or remove those estimates</p> <p>The ERT recommends that the United Kingdom improve the transparency of its reporting by clearly indicating the geographical coverage of DUKES as well as by demonstrating how fuel consumption data at the subcategory level for each overseas territories and Crown dependencies are obtained and incorporated into the national totals for that subcategory</p>	Yes. Transparency*
E.21	1. General (energy sector) – liquid fuels	In response to a question raised by the ERT during the review on stock change differences in many years of the time series related to liquid fuels and natural gas between the reference approach and	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
	and natural gas – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	IEA data, the Party explained that the stock change is slightly different in national statistics compared with the IEA return (the IEA return includes non-refiners' stock)	
		<p>In response to a follow-up comment by the ERT that national energy statistics should in principle account for all stocks held by every business entity as far as these data are available, the Party confirmed that there is a minor discrepancy between the United Kingdom energy statistics and the IEA statistics for crude oil stocks data, which is expected to be rectified in the next national energy balance (July 2017), once the United Kingdom energy statistics system “catches up” with an improvement that has already been implemented for the IEA submission</p> <p>The ERT recommends that the United Kingdom rectify the stock data in its energy statistics and implement relevant recalculations in the CRF tables, as necessary, and explain all the recalculations in its NIR</p>	
E.22	Feedstocks, reductants and other NEU of fuels – other fuels – CO <sub>2</sub>	<p>The ERT noted from column I (“Carbon fraction excluded from reference approach”) of CRF table 1.A(d) that the Party has reported 16,395 kt CO<sub>2</sub> generated from NEU of coking coal for 2014, but in column J (reported under “Select category(ies) from the category tree”), the Party did not indicate under which category these emissions were reported (table A 3.1.2 of the NIR simply reported the emission source for this category as “NA”). During the review, the United Kingdom confirmed that CO<sub>2</sub> emissions excluded from the reference approach for coking coal and fuel derived from coking coal are included in the national totals. CRF table 1.A(d) includes the source categories for these emissions but in the wrong cell owing to problems using CRF Reporter (see the figures reported in cell J35 (for coke oven/gas coke), which should have been reported in cell J29 (coking coal); that is, emissions from NEU of coking coal predominantly occur in iron and steel production (category 2.C.1), but also where coke is used in other IPPU sources within the chemical and metal production industries). The United Kingdom will seek to rectify this in future submissions, should the CRF Reporter software become fit for purpose</p> <p>The ERT recommends that the United Kingdom rectify its reporting of NEU of coking coal (coke oven/gas coke and coking coal) in CRF table 1.A(d)</p>	Yes. Comparability*
E.23	Feedstocks, reductants and other NEU of fuels – liquid fuels – CO <sub>2</sub>	<p>The ERT noted that the Party has reported, in CRF table 1.A(b), column P (“Carbon stored [C excluded]”) figures for gas/diesel oil, residual fuel oil, LPG, ethane, naphtha, bitumen, lubricants and other oil, while in CRF table 1.A(d), column F (“Carbon excluded”), the Party has used the notation key “NO” to report carbon excluded from the reference approach for these fuel types. During the review, the United Kingdom confirmed that the values in CRF table 1.A(b) are the correct values and should be reported in both tables. However, its submission was greatly affected by the inadequacy of the CRF Reporter software, and hence the inventory team was inclined to focus</p>	Yes. Consistency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
E.24	International navigation – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>its resources wherever possible on ensuring that the CRF data under the sectoral approach were correct once uploaded to the CRF tables. The United Kingdom commented that it would be much better if CRF Reporter were able to accept one data input for these two tables as the data are expected to be identical, rather than the Party having to make unnecessary effort and there being an opportunity to introduce an error because of the requirement to populate two cells with identical inputs. The ERT took note of this explanation</p> <p>The ERT recommends that the United Kingdom rectify its reporting on carbon excluded and CO<sub>2</sub> emissions from NEU of gas/diesel oil, residual fuel oil, LPG, ethane, naphtha, bitumen, lubricants and other oil in CRF table 1.A(d) in order to make it consistent with CRF table 1.A(b)</p> <p>The ERT noted discrepancies between CRF table 1.D and CRF table 1.A(b) regarding the AD for residual fuel oil and gas/diesel oil consumed by international marine bunkers for all years of the time series. Both residual fuel oil and gas/diesel oil in CRF table 1.D are approximately 1.05 per cent higher across the entire time series. During the review, the United Kingdom explained that this appears to be an issue with the gross to net energy conversion</p> <p>The ERT recommends that the United Kingdom ensure the accuracy of the emission estimates for international navigation bunkers as well as the internal consistency between CRF table 1.D and CRF table 1.A(b) by using the correct calorific values to convert activity from a mass basis to an energy basis in its future submissions</p>	Yes. Accuracy*
E.25	1.A.1.c Manufacture of solid fuels and other energy industries – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>The NIR (p.849 and table A 4.2.6) states that some LPG and OPG fuel consumption is abstracted from upstream oil and gas exploration and production sources (category 1.A.1.c.ii), and that no data have been collected for this source. The DUKES<sup>c</sup> latest published data are for the year 2002; therefore, the data from the EU ETS are used directly for the United Kingdom’s GHG inventory for the period 2008–2014, with estimates for the period 2003–2007 derived by interpolation between the EU ETS data for 2008 and the DUKES data for 2002</p> <p>In response to a question raised by the ERT during the review about the potential underestimation of emissions, the United Kingdom explained that the gap in data reporting for the energy statistics applies to onshore terminals only and that in fact the data from the EU ETS are very closely consistent with reporting of emissions from the same installations under parallel regulatory mechanisms for which there is no threshold for reporting and where the operator estimates of CO<sub>2</sub> emissions must be complete. Onshore terminals must report annual emission estimates under European Union directives (previously directive 2008/1/EC on integrated pollution prevention and control (IPPC) regulations, now directive 2010/75/EU on industrial emissions (IE directive)) to the United Kingdom’s regulators. Therefore, based on checks between emissions reported for individual</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
E.26	1.A.2 Manufacturing Industries and Construction – other fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>installations via these parallel systems, the inventory agency is able to ensure that the national total GHG inventory emissions are complete. The ERT took note of the Party's justification for the completeness of its reporting</p> <p>The ERT recommends that the United Kingdom improve the transparency of its reporting by providing in its next submission a clear and concise explanation that the estimates for AD and for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from category 1.A.1.C.ii (oil and gas extraction) are complete, including relevant information such as that made available to the ERT during the review (as described above)</p> <p>During the review, the Party stated it would feed back to the national inventory improvement programme a suggestion made by the ERT regarding the consideration of the resumption of data collection for LPG and OPG fuels abstracted from upstream oil and gas exploration and production sources</p> <p>The ERT also recommends that the United Kingdom provide in its next submission up-to-date information on its consideration of or progress in its efforts to improve the energy statistics collection system for LPG and OPG fuels abstracted from upstream oil and gas exploration and production sources</p> <p>The NIR (p.118 and table A 7.1.1) states that emissions from the use of waste oils, fossil-containing wastes, scrap tyres and waste solvents in subcategory 1.A.2 are estimated using the sectoral approach on the basis of EU ETS and operator data, because the reporting of these fuels in the national energy statistics is not complete</p> <p>In response to a question raised by the ERT during the review about the potential underestimation of emissions (as the scope of the EU ETS may also be incomplete), the United Kingdom explained that the use of specific waste-derived fuels in the country is limited to specific sectors because of the stringent plant permit conditions that are enforced on operators through the mature system of environmental regulations (such as the IPPC and IE directives, through which operators have to submit annual emission estimates for all emissions (i.e. those which are complete) on site). The inventory team has worked closely with the EU ETS regulators, the national energy statistics team, and environmental regulators that permit industrial and commercial plants under these regulations to identify reporting inconsistencies as well as where waste-derived fuels are being used. Extensive QC activities have been conducted between the EU ETS data and the complete data from the IPPC and IE directives, and there is no evidence to suggest a gap in or overestimation of emissions. Therefore, after making the best use of all available data, the United Kingdom is very confident that the national estimates are complete and accurate. The ERT took note of the Party's justification for the</p>	Yes. Transparency*



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		<p>completeness of its reporting</p> <p>The ERT recommends that the United Kingdom improve the transparency of its reporting by providing a clear and concise explanation that the estimates for subcategory 1.A.2 (manufacturing industries and construction – other fuels) are complete, including relevant information such as that made available to the ERT during the review</p>	
E.27	1.A.2.b Non-ferrous metals – solid fuels – CO <sub>2</sub>	<p>In response to a question raised by the ERT during the review concerning the inter-annual change (– 7.9 per cent) in the CO<sub>2</sub> IEF for solid fuels in subcategory 1.A.2.b (non-ferrous metals) between 2004 and 2005, the United Kingdom explained that the change was due to the switch from using the carbon EFs from a 2004 report by Baggott et al.<sup>d</sup> to the EU ETS carbon EFs from 2005 onward for coal use in one large autogeneration power plant at the Lynemouth Aluminium Smelter, which accounts for over 80 per cent of all non-ferrous metal coal use and is the source of the carbon EF from 2005 onward</p> <p>When cross-checking the United Kingdom’s background calculations, the ERT noted that the carbon EF for coal for autogenerators in 1.A.2.b dropped by 8.3 per cent (from 647.78 to 594.28 kt/Mt) between 2004 and 2005. In response to a follow-up question raised by the ERT on whether this switch to using the EU ETS carbon EF from 2005 onward contributes to the remarkable inter-annual change in the CO<sub>2</sub> IEF, the United Kingdom explained that its inventory approach prior to the EU ETS essentially involved using the same type of raw data as that used for the EU ETS because the carbon EF data from 2005 onward are taken from the annual operator data, which are reported to the EU ETS, whereas the method for earlier years takes operator-provided carbon EF data for the year 2003 (which are then reported in the 2004 report cited above). Further, the Party explained that because it does not have a full time series of operator carbon EF data for earlier years, data on calorific values (for which there is a full time series in the national energy statistics) are used to extrapolate the 2003 data back to 1990 and also forward one year to 2004. The United Kingdom also stated that there is a very large data set, subject to rigorous QA and third-party verification within the EU ETS, which indicates that carbon EFs of about 610 kt/Mt are very common, with the carbon EF for the Lynemouth Aluminium Smelter only a few percentage points below that value, and are the best available data for 2005 onward. The ERT took note of this explanation</p> <p>The ERT recommends that the United Kingdom investigate the underlying cause of the drop in the carbon EF for coal use at the Lynemouth Aluminium Smelter between 2003 and 2005 and report the findings of this investigation in its NIR</p>	Yes. Transparency*
E.28	1.B.1.a Coal mining and handling – solid	The ERT noted that the United Kingdom reported CO <sub>2</sub> emissions from underground mines and surface mines (category 1.B.1.a) as “NO” in CRF table 1.B.1. However, according to the 2006 IPCC	Yes. Comparability*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
	fuels – CO <sub>2</sub>	<p>Guidelines, CO<sub>2</sub> emissions can be generated in some coal seams, by flaring or catalytic oxidation of drained gas or ventilation air</p> <p>During the review, the Party explained that there are no data available on the CO<sub>2</sub> content of coal mine methane in the United Kingdom and therefore emissions of CO<sub>2</sub> that originate in vented coal mine gas were not estimated. This decision was based on the 2006 IPCC Guidelines (volume 2, section 4.1.2): “The following sections focus on methane emissions, as this gas is the most important fugitive emission for coal mining. CO<sub>2</sub> emissions should also be included in the inventory where data are available.” Nonetheless, the United Kingdom acknowledged that the notation key “NE” may be more appropriate for this subcategory, and will address this issue in future submissions. The ERT took note of this explanation</p> <p>The ERT recommends that the United Kingdom use the more appropriate notation key “NE” for CO<sub>2</sub> emissions from category 1.B.1.a in future submissions if data are still not available for an estimation</p>	
E.29	1.B.1.a Coal mining and handling – solid fuels – CH <sub>4</sub>	<p>The NIR (p.190) states that emissions from surface coal mining (category 1.B.1.a.2.i) are calculated from saleable coal production statistics for open cast coal taken from DUKES.<sup>c</sup> However, according to the 2006 IPCC Guidelines (volume 2, section 4.1.4), the AD required for surface coal mining should be raw coal production; where AD are in the form of saleable coal, an estimate should be made of the amount of production that is washed. Raw coal production is then estimated by increasing the amount of “saleable coal” by the fraction lost through washing</p> <p>During the review, the United Kingdom explained that there are no data currently available to generate an estimate for any losses of coal through washing at open cast coal sites in the country, therefore the United Kingdom energy statistics for saleable coal production are used as the AD. Further, the Party explained that the country-specific EF applied is based on the total methane content of fresh coal samples and is therefore likely to be a conservative EF. The United Kingdom also explained that it is unlikely that inventory improvements will be prioritized for this source, given its very low significance in the national context (2.71 kt CO<sub>2</sub> eq in 2014, amounting to about 0.01 per cent of the total national GHG inventory emissions), and the lack of national data from an industry that is rapidly declining. The ERT took note of the additional information provided by the Party during the review</p> <p>The ERT encourages the Party to improve the accuracy of this category, as appropriate</p>	Not an issue
IPPU			
I.10	2.A.1 Cement	The United Kingdom has estimated CO <sub>2</sub> emissions using data provided by MPA <sup>e</sup> for the period	Yes. Consistency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
	production – CO <sub>2</sub>	<p>2005–2010 and EU ETS data for the period 2011–2014. However, there is no explanation in the NIR of how the Party has ensured time-series consistency while using different sources of data across the time series</p> <p>Upon a request of the ERT, the Party explained that the inventory agency has had strong, established contacts with the key trade association (MPA) for many years, and that a reporting template was developed to enable MPA to summarize the sector’s energy and process emissions, which are provided annually to both the inventory agency and the national energy statistics team. In addition, specific checks between the data reported under the EU ETS (for 2005 onward) and the MPA data are conducted annually. The data are cross-checked and the greater of the two are used in a conservative approach</p> <p>The Party also explained that prior to 2005,<sup>f</sup> installation-specific emission totals for CO<sub>2</sub> were reported in the pollution inventory and other regulators’ inventories, in some cases extending back to 1993. However, although these data cover both fuel combustion and decarbonization, they are not complete (i.e. not all kilns are reported in all years, owing to the development of United Kingdom environmental regulatory mechanisms during this period), and these emission data are therefore not used in the national inventory. Instead, for the inventory process, the EF for 2005 is extrapolated back and applied to the clinker production time series that is available for the period 1990–2004. There were no notable changes in the United Kingdom’s cement industry during that period that would have led to any significant change in the EF for decarbonization over that period, and hence this approach is justified and indeed helps to ensure time-series consistency. The ERT commends the Party for providing this explanation</p> <p>The ERT recommends that the United Kingdom include the information provided during the review on the different sources for AD and CO<sub>2</sub> EF and on all the assumptions used in the estimations in its next NIR to improve the transparency of time-series consistency</p>	
I.11	2.A.2 Lime production – CO <sub>2</sub>	<p>The NIR (section 4.3.2) explains that the Party uses EU ETS data to determine emissions from lime production for 2005 onward, pollution inventory data for the period 1994–2004 and BGS data for the period 1990–1993. However, the ERT noted that there is no explanation in the NIR of how the Party ensures time-series consistency while using different sources of data across the time series</p> <p>In response to a question raised by the ERT during the review, the Party explained that there are very well established working relationships with the key trade association (MPA<sup>e</sup>) and with the key regulatory agencies.<sup>g</sup> The national inventory team checks the assumptions with MPA and seeks clarification on any data inconsistencies; the regulatory agencies provide to the inventory agency, after conducting their own QC of the emission estimates, the data managed under the regulatory mechanisms of the IPPC and IE directives, which also require lime kiln operators to submit annual</p>	Yes. Consistency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
		<p>emission data. In addition, the inventory team conducts installation-specific quality checks between the parallel emission reporting mechanisms (data under the EU ETS, the IPPC and IE directives, and pollution inventory). Based on an analysis for years where data reported via several sources are available (i.e. data from BGS, the pollution inventory and the EU ETS and other industry data from MPA) the BGS data appear to slightly underestimate lime production. Therefore, a conservative approach is applied and a factor of 1.08 is used for the BGS data for the years 1990–1993, based on the estimate of the average underestimation of lime production by BGS in the following seven-year period (1994–2000). The ERT commends the United Kingdom for the explanation provided</p> <p>The ERT recommends that the United Kingdom include the information provided during the review on the different sources for AD and CO<sub>2</sub> EF and on all the assumptions used in the estimations in its NIR to improve the transparency of time-series consistency</p>	
I.12	2.B.1 Ammonia production – CO <sub>2</sub>	<p>The ERT noted that the United Kingdom has not provided any information in its NIR on whether urea is produced in the ammonia plants. During the review, the Party explained that urea production amounted to 335,000 t in 1986 at the Billingham ammonia plant, but that this facility was no longer in operation by the early 1990s as the operator Imperial Chemical Industries divested its portfolio of United Kingdom chemical production plants concurrently with a national recession in the late 1980s. No other urea production facilities have been commissioned in the country, and in the records of United Kingdom environment regulation and permitting of production plants (whereby individual plants operate under agreed permits, a system which was implemented in England from 1993 onward), there is no mention of urea production in any permits under the IPC, IPPC or IE directives</p> <p>The ERT recommends that the United Kingdom include the information provided during the review on urea production at ammonia plants in the NIR to improve the transparency of its reporting</p>	Yes. Transparency*
I.13	2.B.1 Ammonia production – CO <sub>2</sub>	<p>The Party has provided in its NIR (pp. 228–231) information on ammonia production facilities; however, the information is limited. Following a request made by the ERT, the United Kingdom provided a detailed description of the methodology used, specifically for each of the four plants (Sevenside, Billingham, Ince and Hull), including information on the type of fuels used, origin of emission data, tier level and explanation of the trends of EF. The ERT commends the United Kingdom for the detailed explanation provided</p> <p>The ERT recommends that the United Kingdom include information on the methodology used, including type of fuels used, origin of emission data, tier level and explanation of the trends of EF for the Sevenside, Billingham, Ince and Hull plants</p>	Yes. Transparency*
I.14	2.B.2 Nitric acid	<p>The ERT noted that in its NIR (section 4.7.2) the United Kingdom provides information on the methodology used for the estimation of N<sub>2</sub>O emissions as a combination of emission data provided</p>	Yes. Transparency*

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	production – N <sub>2</sub> O	<p>by the process operators, site-specific emission data and a default EF (7 kt N<sub>2</sub>O/Mt, 100 per cent acid produced). Tables 4.10, 4.11 and 4.12 of the NIR provide some details about the number of sites that provide data for the emissions inventory. However, the information on the number of sites does not include a transparent indication of the methodology used</p> <p>During the review, the Party explained that since 2002, the United Kingdom has operator-reported emissions (tier 3) for all production sites in the country (four sites from 2002 and then two closures in 2008, with two sites operating from 2009 onward). From 1998 to 2001, there are operator-reported emissions for all sites in England (tier 3), and for the one site in Northern Ireland, the 2002 emissions/production plant specific IEF is used and applied to the operator information on annual production (i.e. based on plant-specific performance, but essentially a tier 2 method is used for that site). For 1994 to 1997, for all six operating sites in the United Kingdom there is no operator emissions reporting, but plant-specific EFs for each installation are available. For the years 1990–1993 there were three sites operating in the country for which the Party does not have any information on emissions (those sites then closed), together with an additional five sites operating for which the Party has plant-specific EFs from data reported for 1998. Therefore, the method used for those years applies default EFs based on plant design information for the three sites for which there are no data, and IEF × production data for the five sites where IEFs are available. The ERT commends the United Kingdom for the detailed explanation</p> <p>The ERT recommends that the United Kingdom include the information provided during the review on AD and EFs used for the estimates for the entire time series in its NIR in order to improve the transparency of its reporting</p>	
I.15	2.C.1 Iron and steel production – CO <sub>2</sub>	<p>The Party reports in its NIR that coke oven coke in foundries and other iron and steel industry processes is included in category 1.A.2.a (iron and steel), but any process emissions from foundries of direct GHGs are likely to be very small and are not estimated (section 4.16.2, p.254)</p> <p>In response to a question raised by the ERT during the review on how these data were considered in the inventory, the Party explained how coke oven coke is considered across different subcategories. According to the Party, all coke oven coke consumed in the United Kingdom (and reported in the national energy balance) is included in the United Kingdom inventory; therefore, there is no possibility of an underestimation of emissions. However, because the national energy statistics do not provide full details of which sectors and sites use the coke oven coke, the Party cannot easily allocate the emissions to specific industry sectors using the energy statistics alone. For the more recent part of the time series (2005 onward), the Party uses EU ETS data and other evidence from consultations with operators and the review of installation permits; as a result, the inventory team is confident about which national sites have been users of coke oven coke since the mid-1990s. No</p>	Yes. Transparency*

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		<p>data exist on individual users for the early 1990s. For the iron and steel sector, the Party uses data from the EU ETS and also from integrated steelworks operators to estimate the emissions from coke use within the different units of an integrated steelworks, which includes a significant proportion of the total coke emissions allocated to the sinter plant under iron and steel production (category 2.C.1), as well as a small amount of coke emissions from an iron and steel combustion plant that are allocated to category 1.A.2.a. In addition, the United Kingdom allocates all coke used in the non-ferrous metal industry to category 2.C.6 (zinc production) across the entire time series, as that is the only sector within the category non-ferrous metals for which the Party has evidence for the use of coke oven coke. The ERT commends the Party for the explanation provided</p> <p>The ERT recommends that the United Kingdom include an appropriate explanation of how NEU of coke oven coke is considered across different subcategories and along the time series in its NIR</p>	
I.16	2.D.1 Lubricant use – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	<p>In the NIR (section 4.22), the United Kingdom explained the methodology used for the estimates of CO<sub>2</sub> emissions only and no information was provided on the methodology for the estimation of CH<sub>4</sub> and N<sub>2</sub>O emissions. However, the ERT noted that in CRF tables 2(I)s2 and 2(I).A-Hs2, emissions of CH<sub>4</sub> and N<sub>2</sub>O are reported. In response to a question raised by the ERT during the review, the United Kingdom explained that the methodology used for the estimation of CH<sub>4</sub> and N<sub>2</sub>O emissions is based on other industrial combustion (category 1.A.2.g.viii) and the EFs used are 3 kg/TJ (net) for CH<sub>4</sub> and 0.6 kg/TJ (net) for N<sub>2</sub>O. The Party stated that in the next submission, more detailed information would be included in the NIR and CRF documentation boxes. The ERT noted, however, that this approach is not in line with the 2006 IPCC Guidelines (volume 3, chapter 5)</p> <p>The ERT recommends that the United Kingdom assess the methodology used for the estimation of emissions for lubricant use (category 2.D.1) and apply the methodology from the 2006 IPCC Guidelines</p>	Yes. Accuracy*
I.17	2.D.2 Paraffin wax use – CO <sub>2</sub>	<p>In its NIR (section 4.23.2), the Party explains the methodology used to estimate CO<sub>2</sub> emissions, making reference to lubricants instead of paraffin wax. During the review, the Party explained that the methodology used for estimating emissions from paraffin wax use is equivalent to that used for estimating emissions from lubricant use, with the exception that road transport use of paraffin wax is not considered</p> <p>The ERT recommends that the United Kingdom improve its QA/QC procedures and review its NIR to include information on the methodology to estimate CO<sub>2</sub> emissions from paraffin wax, and to correct the text from lubricants to paraffin wax, as appropriate</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
I.18	2.D.2 Paraffin wax	<p>The ERT noted that in the NIR (section 4.23.2), the United Kingdom states that DUKES<sup>c</sup> provides information on total consumption of petroleum wax for the years 1990–2009 only. For 2010 onward,</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
	use – CO <sub>2</sub>	<p>data on petroleum wax consumption are available only as part of the much larger consumption of “miscellaneous petroleum products”. The ERT noted that data for NEU of paraffin wax are part of the official IEA (OECD)/Eurostat/UNECE questionnaires, which are submitted annually to Eurostat. During the review, the Party explained that the inventory agency works closely with the national energy statistics team; however, the inventory team is not aware of any additional published data specifically for petroleum wax</p> <p>The ERT recommends that the United Kingdom improve the accuracy of the inventory data by examining possible sources of AD, especially the IEA (OECD)/Eurostat/UNECE questionnaires</p>	
I.19	2.D.3 Other (non-energy products from fuels and solvent use) – CO <sub>2</sub>	<p>The ERT noted that the United Kingdom reports in CRF table 2(I).A-Hs2 AD and CO<sub>2</sub> emissions of “non-energy use of petroleum coke”. However, no explanation of the methodology applied to obtain these estimates was found in the NIR (section 4.24). During the review, the United Kingdom informed the ERT that the methodological description was omitted from the NIR in error and that the inventory team will include this information in future submissions</p> <p>The ERT recommends that the United Kingdom include an explanation of the methodology used to estimate CO<sub>2</sub> emissions from category 2.D.3 in its NIR</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
I.20	2.F.1 Refrigeration and air conditioning – HFCs	<p>The United Kingdom uses a country-specific model to estimate emissions from refrigeration and air conditioning (RAC model). In 2015, the Party updated the model (see I.6 in table 3) and, according to the NIR, the methodology used was from the IPCC good practice guidance. The ERT requested the Party to explain whether the methodology included in the model is in line with the 2006 IPCC Guidelines. The Party explained that the text in the NIR refers to the IPCC good practice guidance because the original RAC model was set up to be compliant with the IPCC good practice guidance and because the revision and update of the model were conducted in 2011,<sup>h</sup> when the 2006 IPCC Guidelines were not yet incorporated in the UNFCCC Annex I inventory reporting guidelines. However, the ranges provided in the 2006 IPCC Guidelines were also available at that time and were taken into consideration by the 2011 research team as they sought to determine the methods and factors that were most representative for the national circumstances. In the vast majority of cases, the values chosen by the 2011 research team were compliant with the ranges presented in both the IPCC good practice guidance and the 2006 IPCC Guidelines. The NIR (table 4.20) provides further information on which parameters used in the calculations are outside the range of those provided in the 2006 IPCC Guidelines. During the review, the Party further stated that the RAC model has been updated several times since the 2011 study to further improve the national estimates for RAC sub-sources and to ensure compliance with the 2006 IPCC Guidelines</p> <p>The ERT recommends that the United Kingdom further update the RAC model in order to improve</p>	Yes. Accuracy*

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I.21	2.F.5 Solvents – HFCs	<p>the accuracy of its reporting and provide a more transparent explanation of the parameters applied in its future NIRs</p> <p>The ERT noted that in the NIR (section 4.34.2, p.297), the United Kingdom provides information on the approach used for the estimation of HFC emissions from solvents (tier 1a), including the equation used. The Party has used a global report prepared by US EPA (2013), which assumes that approximately 90 per cent of solvent that is consumed in a year is emitted, while 10 per cent is destroyed, to estimate emissions. The 2006 IPCC Guidelines also state that solvent recovered and subsequently destroyed is considered, but that doing so is an unlikely practice given the cost of the chemicals involved (volume 3, chapter 7, p.7.24). The reference for the US EPA (2013) report could not be found by the ERT during the review week</p> <p>Following a request made by the ERT for the Party to present the reasons for using such a destruction factor, the United Kingdom provided information explaining that the US EPA report referred to was the 2014 NIR of the United States of America, and the assumption adopted by the United Kingdom is mentioned in an annex to that NIR (p.A.228) on the vintage model. The Party's understanding of the use of HFCs as solvents is that the remaining liquid phase fluid becomes steadily more contaminated with use until it reaches a point where the product is unusable. The process of extracting the active agent from the contaminated fluid is expensive; therefore, in many cases, users choose to destroy the waste product instead. The ERT noted that the methodology applied is not in line with the 2006 IPCC Guidelines</p> <p>The ERT recommends that the United Kingdom update the methodology used in the next submission in accordance with the 2006 IPCC Guidelines, or include a transparent explanation of the approach used to derive the destruction factor</p>	Yes. Accuracy*
Agriculture			
A.5	3.A.4 Other livestock – CH <sub>4</sub> and N <sub>2</sub> O	<p>The Party explains in the NIR (section 5.2.2) that the statistical outputs of England, Wales, Scotland and Northern Ireland<sup>i</sup> are used to estimate the annual populations of horses, deer and goats. However, the ERT noted that figures for these populations are not provided in the referenced statistical report of England. During the review, the Party explained that data for deer and goats for England are provided directly by Defra, and data for horses are estimated based on the analysis of data in the National Equine Database and a combination of stakeholder data sets available for the years 1990, 1995, 1998, 2005, 2010 and 2015, and are interpolated for the other years of the time series. The ERT considered the additional information very useful</p> <p>In order to increase the transparency of its reporting, the ERT recommends that the United Kingdom fully document in its NIR: (1) the method used to estimate the annual populations of horses, deer</p>	Yes. Transparency*



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		and goats, including any adjustments to the original population data that the Party receives from national statistical agencies; and (2) the use of any additional data sources and estimations, as required by the 2006 IPCC Guidelines (volume 4, section 10.2.2 and equation 10.1)	
A.6	3.B.4 Other livestock (horses) – N <sub>2</sub> O	<p>The ERT noted that the United Kingdom reported the notation key “NO” for the category 3.(I)B.4 (manure management – horses). During the review, the Party explained that it uses a simplified approach to estimate the emissions, assuming that “all horses are on pasture the entire year”, and therefore only pasture range and paddock manure management systems are used for horse manure. The ERT further noted that this approach is used only by the United Kingdom and considers that the assumption used by the Party of considering horses on pasture the entire year is not reasonable</p> <p>The ERT recommends that the United Kingdom make an effort to determine the number of horses in stabling and the respective manure management in order to determine the fraction of the total amount of nitrogen excretion for each manure management system for category 3.(I)B.4 (manure management – horses)</p>	Yes. Accuracy*
A.7	3.D.a.3 Urine and dung deposited by grazing animals – N <sub>2</sub> O	<p>The ERT noted that for the period 1990–2014, the N<sub>2</sub>O IEF for urine and dung deposited by grazing animals (0.004432 kg N<sub>2</sub>O-N/kg N) is lower than the values reported by other Parties (0.01–0.02 N<sub>2</sub>O-N/kg N). In response to a question raised by the ERT, the Party explained that experiments were carried out in some locations covering a range of soils and climates and with applications simulating deposition during grazing in the early, mid and late grazing seasons. The average N<sub>2</sub>O EFs (kg N<sub>2</sub>O-N/kg N) from all the dung and urine experiments were 0.15 and 0.634, respectively, and weighting for an assumed typical excreta of 40 per cent faeces and 60 per cent urine provides a weighted EF of 0.004432 kg N<sub>2</sub>O-N/kg N. The Party further explained that data were obtained from two Defra projects (AC0116<sup>j</sup> and AC0213) and a study from Misselbrook et al. (2014).<sup>k</sup> The ERT commends the United Kingdom for providing the additional documents</p> <p>The ERT recommends that the United Kingdom increase the transparency of its NIR by providing a complete reference to the data sources used and a clear description of the method, assumptions and calculations used for estimating emissions in this category, as well as an explanation for the difference between the country-specific EF and the default EF from the 2006 IPCC Guidelines</p>	Yes. Transparency*
LULUCF			
L.9	4. General (LULUCF) – 4.B cropland and 4.C grassland – CO <sub>2</sub>	<p>In response to a recommendation made in the previous review report (see L.4 in table 3), the United Kingdom informed the ERT that for the 2015 and 2016 inventory submissions the Party revised the data on the extent of cropland and improved the data on grassland on organic soils, thereby improving the estimates of emissions from those soils. In addition, the Party explained in the NIR (table 10.14) that the notation key “NO”, which was used to report organic soils under grassland,</p>	Yes. Transparency*

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L.10	Land representation activity data	<p>will be maintained for some overseas territories and Crown dependencies as there is no evidence of emissions on those areas; the Party further explained that the estimation of cropland and grassland is being refined for overseas territories and Crown dependencies under a wetlands project funded by the Department of Energy and Climate Change and therefore the notation key “NE” is reported when data are not available</p> <p>During the review, the ERT noted that the total area of cropland (for 2012) has decreased (from 5,400.31 kha in the 2014 submission to 4,817.31 kha in the 2015/2016 submission), the reporting of organic soils under cropland and grassland has changed between the 2014 and 2015/2016 submissions, the areas of mineral and organic soils are reported together, and the Party has not reported the notation key “NE” in the CRF tables when data are not available. In response to a question raised by the ERT, the Party explained that the revision of the cropland area was performed in order to include only organic soils in England, Scotland, Wales and Northern Ireland using a consistent methodology and definition of organic soils (where the peat depth meets the United Kingdom’s definition of an organic soil, which is the World Reference Base definition of a histosol). This reassessment of the area of organic soils also allowed the area of improved grassland on organic soils to be estimated for the first time. The Party also explained that areas of mineral and organic soils are reported together because the carbon model does not allow for the disaggregation of soils. The ERT commends the Party for the explanation provided; however, the ERT considers that the aggregated reporting of mineral and organic soils is not transparent as the areas are apparently available for reporting in CRF table 4(II)</p> <p>The ERT recommends that the United Kingdom report mineral and organic soils separately under cropland and grassland, and that the Party assess the use of notation keys for the reporting of organic cropland and grassland soils, as appropriate</p> <p>The United Kingdom uses a buffer zone (undisturbed grassland area) to ensure that the land area is constant over years (see L.1 in table 3). As no detailed explanation was found on the method used to calculate the area in the grassland chapter of the NIR, the ERT requested the Party to provide more information. During the review, the United Kingdom explained that undisturbed grassland is calculated as the difference between the total land area (from the official national statistics of the United Kingdom’s land area) and the sum of all other land-use areas (calculated from land-use matrices, afforestation areas, peat extraction areas, etc.) for each year. The ERT commends the Party for the explanation provided</p> <p>The ERT recommends that the United Kingdom include the detailed information on the calculation of the undisturbed grassland area provided during the review in the grassland chapter of its NIR</p>	Yes. Transparency*

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L.11	Land representation activity data	<p>The ERT noted inconsistencies in the reporting of land-use change on organic soils (cropland to forest land, and grassland to forest land). For example, in the NIR (p.380), emissions from drained organic soils on cropland and grassland are assumed to be constant over time and it is assumed that no land-use changes occur on these soils, which is reflected in CRF table 4(II), but this is not consistent with CRF table 4.A, where there are land-use changes reported for both cropland to forest land and from grassland to forest land on organic soils</p> <p>During the review, the Party explained that the inventory currently assumes that afforestation on organic soils occurs on undrained organic soils and that this does not affect the area reported in CRF table 4(II). The United Kingdom also explained that the reason for this inconsistency is because data for afforestation are published annually whereas other elements of the land-use change matrices are generated approximately decadal, when new Countryside Survey data become available. The United Kingdom further informed the ERT that it is in the process of exploring how to implement the Wetlands Supplement guidance. Any maps of organic soils developed as a result of the implementation, combined with the use of more spatially explicit data, will improve the tracking of the proportion of land-use change on mineral and organic soils, and remove such inconsistencies in future inventories</p> <p>The ERT encourages the United Kingdom to report on its progress in relation to the implementation of the Wetlands Supplement guidance and to apply the results as soon as possible in the GHG inventory</p>	Not an issue
L.12	4.A Forest land – CO <sub>2</sub>	<p>As already pointed out in previous reviews (see L.2 in table 3), there is little information in the NIR related to the management of privately owned forests. Following a request made by the ERT, the United Kingdom provided additional information, which was useful for the understanding of the management of privately owned forests. According to this information, privately owned forests are assigned a species based on the National Inventory of Woodland and Trees species survey, then mapped to species for which the United Kingdom has suitable growth models. The distribution of growth rates for these species is assumed to be the same as on the public forest estates for each devolved administration (Scotland, Wales, Northern Ireland, England). The overall percentage of woodland being managed for wood production is estimated so as to calculate wood production over the period that is consistent with the wood production statistics. The rotation lengths are based on the age of maximum mean annual increment, with a range to match the given age distribution and planting records</p> <p>The ERT recommends that the United Kingdom include the additional information provided during the review on the management of privately owned forests in its next NIR</p>	Yes. Transparency*

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L.13	4.A Forest land – activity data	<p>The ERT noted that according to the NIR, the United Kingdom compiles several data sources to calculate the representation of land-use areas and to estimate the forest land area; in addition, the Party combines planting statistics from the <i>Forestry Statistics</i> publication published by the Forestry Commission with data from the National Inventory of Woodland and Trees. According to the NIR, the National Inventory of Woodland and Trees is used for a base year (2000) and Forestry Commission data are used to roll the inventory forward</p> <p>In response to a question raised by the ERT during the review related to how data for the area of forest land remaining forest and land converted to forest land for the period 1990–1999 were calculated, the United Kingdom explained that the area of woodland planted according to the planting statistics is also used to roll back the inventory to provide information on the areas during the period 1990–1999</p> <p>The ERT recommends that the United Kingdom include the information provided during the review in its next NIR and provide a more concise description of how the areas for different categories have been estimated from 1990 onward</p>	Yes. Transparency*
L.14	4.A Forest land – activity data	<p>In response to a question raised by the ERT during the review related to the forest definition used in the inventory, the United Kingdom explained that the same definition of woodland is used throughout the time series. However, the Party also noted in its response that new National Forest Inventory data, which will include more information on woodlands as small as 0.1 ha, will be available for the GHG inventory covering the period 1990–2015</p> <p>The ERT encourages the United Kingdom to include this new data from the National Forest Inventory in the GHG inventory and to improve in the NIR the description of the use of different data sources for the assessment of the forest area</p>	Not an issue
L.15	4.A Forest land – CO <sub>2</sub>	<p>During the review, the ERT asked the Party to verify some of the main parameters used in the CARBINE model (this model is used to estimate carbon stock changes of harvested wood products). In the NIR, the only mention of the verification of results from the CARBINE model is that it provides similar results to those of the previous model (C-Flow, from the United Kingdom Centre for Ecology and Hydrology). The Party explained that the parameters in the CARBINE model are typically based on country-specific values. As an example, the Party referred to the stemwood density value for Sitka spruce grown under British conditions, which would be expected to be somewhat lower than the value for the same species in the 2006 IPCC Guidelines, which is from a German publication. The Party confirmed that the CARBINE model has the functionality to represent sensitivity with respect to all key parameters, most of which can be changed from default values by the user. The Party referred to the sensitivity analysis carried out by comparing the</p>	Yes. Transparency*

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		<p>CARBINE model data with the data calculated using the previously applied C-Flow model and the BSORT model (developed by Forestry Research to provide estimates of forest biomass). The ERT acknowledges the Party's efforts to ensure the robustness of the model used but noted that the UNFCCC Annex I inventory reporting guidelines state that Parties preparing their emissions and/or removals using higher-tier (tier 3) methods and/or models shall provide verification information consistent with the 2006 IPCC Guidelines</p> <p>The ERT recommends that the United Kingdom include information on the verification of all carbon stock changes estimated using tier 3 methods and/or models (CARBINE, C-Flow and BSORT) in its next NIR</p>	
L.16	4.B Cropland – activity data	<p>In response to a question raised by the ERT during the review related to the reporting of areas for organic soils under cropland, the United Kingdom explained that only the overseas territories and Crown dependencies are reported in CRF table 4.B, while mainland organic soils are reported in CRF table 4(II). However, in CRF table 4.B, it is reported that both the areas and the emissions of CO<sub>2</sub> from mainland organic soils are included under mineral soils</p> <p>The ERT recommends, in order to avoid any double counting of emissions and to improve transparency, that the United Kingdom report CO<sub>2</sub> emissions from all organic cropland soils in CRF table 4.B</p>	Yes. Comparability*
L.17	4(IV) Indirect N <sub>2</sub> O emissions from managed soils – N <sub>2</sub> O	<p>The ERT found that the Party reports only indirect emissions of N<sub>2</sub>O related to LULUCF for cropland and grassland since these categories are included under the agriculture sector. The ERT could not find any information in the NIR related to the calculation of indirect N<sub>2</sub>O emissions for the LULUCF sector. During the review, the Party informed the ERT that indirect N<sub>2</sub>O emissions from managed soils were omitted and that it will rectify this matter in the next inventory submission. As the United Kingdom reports both emissions from fertilizer use for land converted to forests in CRF table 4(I) and mineralization for land-use changes in CRF table 4(III), it should be possible to calculate and include the N<sub>2</sub>O emissions in CRF table 4(IV)</p> <p>The ERT recommends that the United Kingdom report indirect emissions of N<sub>2</sub>O from managed soils in CRF table 4(IV) or provide a justification for exclusion in terms of the likely level of emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines</p>	Yes. Completeness*
L.18	4.G Harvested wood products – CO <sub>2</sub>	<p>The ERT noted that the United Kingdom used harvest data from the CARBINE model to calculate the carbon stock changes in the HWP pool. As the CARBINE model delivers the HWP estimates directly, no AD have been included in CRF table 4.Gs2 or in the NIR. The Party mentioned that the predicted timber production has been compared with the actual timber production based on data</p>	Yes. Transparency*

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L.19	4. General (LULUCF) – CO <sub>2</sub>	<p>from sawmills, but no quantitative estimates of the comparison are provided in the NIR. During the review, the ERT attempted to verify the estimates of HWP reported in the CRF tables using country data from the FAOSTAT database of the Food and Agriculture Organization of the United Nations, which resulted in a large difference compared with the reported values</p> <p>In response to questions raised by the ERT during the review related to the difference, the Party explained that owing to the age structure of the forest and the rotation lengths assumed in the CARBINE model, it predicts significant production in the 1940s and 1950s, which leads to high HWP losses, though this effect diminishes over time. The Party also indicated that the method used for calculating the carbon content of the wood products is different from the IPCC default method and that the data from FAOSTAT change the product mix over time, while the CARBINE model keeps a constant product mix over the entire time for a given size of wood (as the trees become larger, the sawlogs available increase)</p> <p>Owing to the differences found, the ERT recommends that the United Kingdom include verifiable production data from the CARBINE model and the corresponding numbers used to convert the production data to carbon, and report those data in CRF table 4.Gs2 to enable a thorough verification of the HWP estimates</p> <p>The ERT noted from the information provided in the CRF tables and the NIR that the reporting of the LULUCF sector is not complete: the estimates of emissions and removals do not cover the overseas territories of Montserrat, Bermuda, the Cayman Islands and Gibraltar. In the NIR (section 6.9), the United Kingdom explains that no emissions or removals are estimated or reported for the Cayman Islands, Bermuda and Montserrat owing to insufficient information on land use and land-use change activities, and for Gibraltar that emissions for this sector are considered to be negligible (see also G.12 and G.13 above and KL.16 below). The ERT concluded that the reporting of the LULUCF sector is not complete</p> <p>The ERT recommends that the United Kingdom provide estimates of emissions and removals for the missing land areas (Montserrat, Bermuda, Cayman Islands and Gibraltar)</p>	Yes. Completeness*
Waste	5.A Solid waste disposal on land – CH <sub>4</sub>	<p>The United Kingdom applies a first-order decay model (MELMod, the Methane Emissions from Landfill model) for calculating methane generation in landfill sites for the estimation of CH<sub>4</sub> emissions from the category solid waste disposal on land. Only limited information is provided in the NIR (section 7.2.2) on the parameters applied</p> <p>During the review, the Party provided the following information: (1) the years of disposals covered;</p>	Yes. Transparency*

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W.6	5.A Solid waste disposal on land – CH <sub>4</sub>	<p>(2) the values of DOC and DOCf applied; (3) more detailed information on the decay rates (k) applied; (4) the oxidation factor; and (5) the time delay considered. Further, the Party provided a report<sup>l</sup> on the review of landfill methane emissions modelling justifying the use of the comparable high k value. The ERT commends the Party for providing this information</p> <p>The ERT recommends that the United Kingdom provide information on the parameters used in the MELMod model in its next NIR, including the exact figures and background information on their origin or method of derivation, and also that the Party include in its next NIR the web link to the report on the review of landfill methane emissions modelling</p> <p>The ERT noted a discrepancy in the information on CH<sub>4</sub> emissions from overseas territories and Crown dependencies. The NIR (section 7.2.3.4) states that the IPCC landfill model was not applied for the Isle of Man as sufficient information is not currently available. Table A 3.5.3 in annex 3 to the NIR, however, shows that the IPCC landfill model was also applied for the Isle of Man. In response to a question raised by the ERT during the review, the Party stated that the landfill model was used for the Isle of Man but with simplified parameters (population and regional defaults)</p> <p>The ERT recommends that the United Kingdom modify the text in the NIR (section 7.2.3.4) to avoid inconsistency of the information on the estimation of CH<sub>4</sub> emissions from the Isle of Man</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
W.7	5.B. Biological treatment of solid waste – CH <sub>4</sub> and N <sub>2</sub> O	<p>The United Kingdom applies EFs from the 2006 IPCC Guidelines (corrigenda by the IPCC Task Force on National Greenhouse Gas Inventories, dated 31 July 2015) for the calculation of CH<sub>4</sub> and N<sub>2</sub>O emissions from this category. However, the ERT noted that anaerobic digestion (category 5.B.2) in CRF table 5.B has a higher IEF for CH<sub>4</sub> (3.30 g CH<sub>4</sub>/kg waste) than the default EF in the 2006 IPCC Guidelines (2 g CH<sub>4</sub>/kg waste). Moreover, the origin of the EF applied to estimate N<sub>2</sub>O emissions from anaerobic digestion (0.12 g N<sub>2</sub>O/kg waste) is unclear as no default EF is provided in the 2006 IPCC Guidelines</p> <p>During the review, the United Kingdom explained that emissions from the composting stage of mechanical-biological treatment – calculated using the higher CH<sub>4</sub> EF for composting – are reported under anaerobic digestion (category 5.B.2), which increases the CH<sub>4</sub> IEF and introduces an N<sub>2</sub>O IEF that would otherwise not occur (N<sub>2</sub>O emissions from anaerobic digestion at biogas facilities are negligible according to the 2006 IPCC Guidelines). The Party informed the ERT about its plan to separate emissions from mechanical-biological treatment into composting and anaerobic treatment to allow for separate reporting</p> <p>The ERT welcomes this plan and recommends that the United Kingdom report CH<sub>4</sub> and N<sub>2</sub>O emissions from the composting stage of mechanical-biological treatment under composting (5.B.1) and not under anaerobic digestion at biogas facilities (5.B.2)</p>	Yes. Comparability*

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W.8	5.D.1 Domestic wastewater – CH <sub>4</sub>	<p>Under domestic wastewater (category 5.D.1), the United Kingdom reports CH<sub>4</sub> emissions from municipal wastewater treatment, private wastewater treatment (such as septic tanks) as well as (for the 1990s) the disposal of wastewater in the sea. The previous review report recommended that the Party improve the transparency of the EFs used (see W.3 in table 3). However, the NIR provides little information on the exact methodology applied by the water companies for their reporting. As stated in the NIR, CH<sub>4</sub> emissions from municipal wastewater treatment are determined by applying a country-specific approach based on reports from national water companies that follow the Carbon Accounting Workbook (a tool developed by UK Water Industry Research and used by the water industry to report emissions to Defra). As these data are only available from 2009 onward, extrapolation back to 1990 was necessary based on the IEF derived. During the review, the Party provided an internal paper<sup>m</sup> with the reporting format and methodology used according to the <i>Carbon Accounting Workbook</i> and specifying the sources covered. The Party also explained that not all treatment paths covered by the reporting system are considered for reporting under category 5.D.1, only wastewater treatment (mechanical treatment, short-term sludge storage) and sewage sludge treatment (digestion and composting at the sites of centralized wastewater treatment plants)</p> <p>The ERT recommends that the United Kingdom increase the transparency of its reporting by more clearly stating in the NIR which paths are covered under category 5.D.1 and by providing more information on the methodology applied by the water companies for their reporting according to the <i>Carbon Accounting Workbook</i>. Moreover, the ERT recommends that the Party implement verification activities in accordance with paragraph 41 of the UNFCCC Annex I inventory reporting guidelines, provide justification for the use of the country-specific model, and report thereon in the sectoral chapter on QA/QC activities</p>	Yes. Transparency*
W.9	5.D.1 Domestic wastewater – CH <sub>4</sub>	<p>The method used for estimating CH<sub>4</sub> emissions from domestic wastewater from private wastewater management is based on the 2006 IPCC Guidelines and is well described in the NIR. However, it remained unclear to the ERT what BOD value is applied to the wastewater of this origin. In response to a question raised by the ERT, the Party provided information on population numbers connected to a septic system, as well as the BOD values applied</p> <p>The ERT recommends that the United Kingdom include the information provided during the review on population numbers and BOD values applied in the next NIR</p>	Yes. Transparency*
W.10	5.D.1 Domestic wastewater – N <sub>2</sub> O	<p>To calculate the N<sub>2</sub>O emissions from domestic wastewater, the United Kingdom applies the method from the 2006 IPCC Guidelines. The fraction of nitrogen in protein (F<sub>NPR</sub>) and the EF used are in line with the 2006 IPCC Guidelines. However, the fraction of non-consumed protein added to the wastewater (F<sub>NON-CO<sub>N</sub></sub>) and the fraction of industrial and commercial co-discharged protein into the sewer system (F<sub>IND-CO<sub>M</sub></sub>) are not considered in the calculation. In response to a question raised by the</p>	Yes. Transparency*



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W.11	5.D.2 Industrial wastewater – CH <sub>4</sub>	<p>ERT during the review the United Kingdom justified this lack with its well-developed municipal waste management and collection system as well as a passage in the IPCC 2006 Guidelines on negligible N<sub>2</sub>O emissions from industrial wastewater treatment. The ERT, however, considers these explanations as not sufficient for assuming zero additional protein discharge and considers this issue as a potential case of underestimation of emissions</p> <p>In response to the list of potential problems and further questions raised by the ERT during the review, the United Kingdom investigated alternative sources of factors for F<sub>NON-COM</sub> (i.e. alternatives to those contained in the 2006 IPCC Guidelines) and decided to apply a value of 1.16 for F<sub>NPR</sub> based on a UNESCO estimate of the relation of black water (i.e. toilet water) and grey water (e.g. kitchen or laundry water), which is considered to be the most representative and accurate of factors available for the national municipal wastewater treatment system. For F<sub>IND-COM</sub>, the default value of 1.25 was applied by the Party. The Party also removed sludge incineration and spreading on agricultural lands from the emission estimate from sewage sludge decomposition to avoid double counting. The ERT considered the suggested factors to be appropriate and agreed to the use of these values by the Party in its revised submission. In its resubmission of CRF tables on 3 November 2016, the United Kingdom provided revised estimates, resulting in an increase in N<sub>2</sub>O emissions from this category by 297 kt CO<sub>2</sub> eq, or 72 per cent, for 2014</p> <p>The ERT recommends that the United Kingdom provide a detailed description and justification in the NIR for the use of this new approach adopted in response to the list of potential problems and further questions raised by the ERT during the review (i.e. the update of the fractions F<sub>NPR</sub> (to 1.16) and F<sub>IND-COM</sub> (to 1.25), and the information on the consideration of sludge incineration and sludge spreading on agricultural lands) and update the CRF tables accordingly</p> <p>The United Kingdom reports in its NIR (section 7.5.2.4) that (1) the proportion of industrial wastewater disposed to the municipal sewage system (i.e. treated together with domestic wastewater) is reported under domestic wastewater (category 5.D.1); (2) on-site treatment of wastewater from the food and chemical industries is reported under industrial wastewater (category 5.D.2); (3) CH<sub>4</sub> emissions reported under category 5.D.1 are based on reports from national water companies; and (4) CH<sub>4</sub> emissions reported under category 5.D.2 are calculated by applying the default methodology from the 2006 IPCC Guidelines based on total production data and IPCC default factors. The ERT noted that CH<sub>4</sub> emissions from these industrial sources are, however, partly already accounted for under domestic wastewater (category 5.D.1), leading to an overestimation of CH<sub>4</sub> emissions from this source (as stated in the NIR, p.440)</p> <p>During the review, the ERT raised a question on the possible consideration of data from the water companies' reports to eliminate the double counting. The Party explained that there are currently</p>	Yes. Accuracy*

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KP-LULUCF	General (KP-LULUCF) – activity data	<p>only limited data available on the contribution of industry to the BOD loading of the municipal system in the United Kingdom, and that this information is insufficient to fully develop a robust time series of separate estimates of emissions from industrial sources through the municipal system (the domestic–industrial split is only available for 2008 (13.2 per cent) and 2009–2012 (10.8–11.7 per cent)). The inventory team has expressed concerns over trying to make an arbitrary calculation to split those estimates back across the time series, and to do so would have little impact on the overall totals or uncertainty of the United Kingdom’s GHG inventory. This total emission source is only approximately 0.1 per cent of the United Kingdom’s GHG total (split as approximately 10 per cent). The Party will, however, continue to work with the national water companies to collect more information on any annually reported data on the wastewater treatment inputs from domestic and industrial users. The ERT welcomes the Party’s plan</p> <p>The ERT recommends that the United Kingdom report on any progress in collecting the data needed to report AD and emissions from industrial wastewater separately from domestic wastewater</p> <p>According to annex I of decision 2/CMP.8, the initial report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol shall contain information on how the national system under Article 5, paragraph 1, of the Kyoto Protocol will identify land areas associated with elected activities and how the Party ensures that land that was accounted for in the first commitment period continues to be accounted for in the second commitment period. The ERT could not find this information in the initial report and so requested clarification from the Party. In response, the United Kingdom informed the ERT that it intends to track land under cropland management and grassland management (identified from agricultural statistics published annually). As these land areas are already part of the reporting under the Convention, the ERT is of the view that the United Kingdom will be able to track land under cropland management and grassland management</p> <p>In addition, the United Kingdom provided information on an ongoing project related to the reporting of wetland drainage and rewetting, including the scope, methodology, expected costings and timeline (work was expected to be completed in 2016). The ERT considers the ambitious project covers all of the components required to identify lands and to adequately report wetland drainage and rewetting.” The project plan contains a work package, which aims to provide support to the United Kingdom in advance of the election of activities as well as to summarize the key operational issues for implementation of the IPCC methodology for peatlands and the potential implications of including wetland drainage and rewetting in the overall LULUCF emissions inventory based on readily available data</p>	Yes. Transparency*

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		<p>Based on the description of the work package, the ERT is of the view that the report to be compiled as part of the work package is likely to include the information needed to ensure that the United Kingdom is in a position to adequately identify lands related to wetland drainage and rewetting. According to the time frame for the project, the report was due to be finalized in October 2014, but owing to the internal nature of the paper it could not be distributed to the ERT</p> <p>The ERT recommends that the United Kingdom include specific information on how it identifies land under cropland management, grassland management, and wetland drainage and rewetting, especially related to the report developed as part of the ongoing project on wetland drainage and rewetting</p>	
KL.4	General (KP-LULUCF) – activity data	<p>During the review, the ERT found inconsistencies related to the reporting of areas under the Convention and under the Kyoto Protocol (i.e. the area of land converted to forest in CRF table 4.1 for 2014 (12.9 kha) does not match the area of afforestation/reforestation reported in table NIR-2 (10.7 kha))</p> <p>The ERT recommends that the United Kingdom improve its QA/QC process and correct the inconsistencies in the area of land converted to forest under the Convention and the Kyoto Protocol</p>	Yes. Accuracy*
KL.5	General (KP-LULUCF) – CO <sub>2</sub>	<p>The ERT noted that the United Kingdom reports emissions and removals for cropland and grassland under the Convention including the overseas territories and Crown dependencies. The Party also informed the ERT that overseas territories and Crown dependencies are not included in cropland management and grassland management for the KP-LULUCF activities owing to a lack of information. It was not clear to the ERT why the data used under the Convention could not be used for the KP-LULUCF activities</p> <p>In response to a question raised by the ERT, the Party explained that information on agricultural activities in the overseas territories and Crown dependencies is less detailed than that for the mainland United Kingdom, and does not allow for reporting on the effect of changes in land management regimes for cropland or grassland/grazing land. Further, the Party explained that emissions from the conversion of forest land to cropland or grassland/grazing land are allocated to deforestation under the Kyoto Protocol. In addition, the Party explained that emissions and removals from land-use change between cropland and grassland/grazing land and conversion of cropland and grassland/grazing land to settlements should have been included under cropland management and grassland management but were omitted for the overseas territories and Crown dependencies</p> <p>The ERT recommends that the United Kingdom ensure that emissions and removals from land-use change between cropland and grassland/grazing land and conversion of cropland and</p>	Yes. Completeness*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
		grassland/grazing land to settlements are included in Kyoto Protocol accounting	
KL.6	General (KP-LULUCF) – activity data	<p>The ERT noted that information required in accordance with decision 2/CMP.8, annex II, paragraph 5(c) and (e), was missing from the Party’s submission, specifically: (1) information that demonstrates that emissions by sources and removals by sinks resulting from forest management under Article 3, paragraph 4, and any elected activities under Article 3, paragraph 4, are not accounted for under activities under Article 3, paragraph 3; and (2) information on the methodological consistency between the reference level and the reporting for forest management during the second commitment period, including the area accounted for, the treatment of HWP, and the accounting of any emissions from natural disturbances</p> <p>The ERT recommends that the United Kingdom include in its next submission the information required in accordance with decision 2/CMP.8, annex II, paragraph 5(c) and (e)</p>	Yes. Completeness*
KL.7	Afforestation and reforestation – CO <sub>2</sub>	<p>The carbon stock changes in soils (both mineral and organic) are reported as a sink under afforestation/reforestation (CRF table 4(KP-I)A.1). As stated by the United Kingdom in the NIR (p.375), there is evidence that the soil organic carbon pool under afforestation/reforestation is most likely a source, and an investigation is ongoing to review the method used in the current submission. The United Kingdom informed the ERT that it is in the process of compiling a systematic literature review of relevant research from temperate and boreal forests<sup>o</sup> and that a new model is likely to be applied for the GHG inventory covering the period 1990–2015. The ERT acknowledges the work performed by the Party thus far</p> <p>The ERT recommends that the United Kingdom implement the new model in its next annual submission</p>	Yes. Accuracy*
KL.8	Deforestation – CO <sub>2</sub>	<p>In response to a question raised by the ERT during the review related to the significant increase in the deforestation rate from 1999 onward, the Party explained that the increase is driven by the introduction of biodiversity policies on the restoration of open habitats in plantation forests and renewable energy policies for wind farm development. However, the Party also explained that there are no known policies or land-use drivers that would significantly change the estimated level of deforestation in the 1990s</p> <p>The ERT recommends that the United Kingdom provide further information on the drivers of deforestation and the associated carbon stock changes</p>	Yes. Transparency*
KL.9	Deforestation – CO <sub>2</sub>	<p>During the review, the United Kingdom provided additional information on how the carbon stocks in living biomass prior to deforestation were estimated, and explained that there are no data available on the age or species distribution of land deforested that could be used to verify whether using an</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
		average for the forest estate leads to an underestimation or overestimation of the carbon stock changes in living biomass under deforestation	
		The ERT recommends that the United Kingdom find a method to verify that the carbon stocks prior to deforestation are not underestimated	
KL.10	Article 3.4 activities activity data	The ERT noted that the Party includes information in the NIR on pools not yet included in the reporting under the Kyoto Protocol and therefore reports them as “NE” in CRF tables 4(KP-I)B.2, 4(KP-I)B.3 and 4(KP-I)B.5. These pools are litter and deadwood for cropland management, litter, deadwood and organic soils for grazing land management, and all carbon pools under wetland drainage and rewetting	Yes. Completeness*
		The ERT recommends that the United Kingdom provide estimates of the carbon stock changes in litter and deadwood for cropland management, litter, deadwood and organic soils for grazing land management, and all carbon pools under wetland drainage and rewetting, and include a description of how these changes are estimated	
KL.11	Forest management – CO <sub>2</sub>	In its submission, the United Kingdom has reported a technical correction referring to several changes affecting the estimate for the FMRL. As the changes are significant in relation to the original FMRL value, the ERT requested further information on the main changes in the inventory leading to this technical correction. The Party explained that the most important change to the FMRL is due to the inclusion of carbon emissions and removals from forest areas afforested prior to 1921. Other changes that will have a significant effect are the changes in the assumptions used for the species mix, growth rates and intensity of management. The ERT found the detailed information provided by the Party very useful when assessing the technical correction	Yes. Transparency*
		The ERT recommends that the United Kingdom include the information on the main changes in the inventory leading to the technical correction of the FMRL in its next submission	
KL.12	Forest management Article 3.4 activities – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	Pursuant to Article 3, paragraphs 7 and 8, or any amendments thereto, the forest management cap shall not exceed 3.5 per cent of the base-year GHG emissions excluding LULUCF times the duration of the commitment period in years (eight years). The United Kingdom reported its forest management cap in the CRF table “accounting” as 224,972.636 kt CO <sub>2</sub> eq (in the revised estimates provided to the ERT on 21 September 2017). However, the ERT noted that in the revised estimates provided by the Party the base-year emissions excluding LULUCF are 802,945,277 t CO <sub>2</sub> eq. Consequently, the ERT calculated the value of the forest management cap as 28,103.085 kt CO <sub>2</sub> eq, which, when multiplied by eight, equals 224,824.678 kt CO <sub>2</sub> eq	Yes. Accuracy*
		The ERT recommends that the United Kingdom correct the value of the forest management cap in	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
		the CRF table “accounting”	
KL.13	Cropland management – CO <sub>2</sub>	<p>The ERT noted that CO<sub>2</sub> emissions from drained organic soils are reported for cropland under the Convention (CRF table 4(II)) but are reported as “NO” for cropland management under the Kyoto Protocol (CRF table 4(KP-I)B.2). In addition, the United Kingdom reports emissions of N<sub>2</sub>O for cultivation of organic soils (i.e. histosols) in CRF table 3.D under the agriculture sector, which indicates that there are organic soils under cultivation. During the review, the Party explained that conversion of land on organic soils to cropland occurred prior to 1990 and that the emissions arising from activities prior to 1990 are not reportable under the Kyoto Protocol. However, emissions persist as long as the soil is classified as an organic soil</p> <p>The ERT recommends that the United Kingdom report emissions from drained organic soils under cropland management and ensure that the reporting of cropland management under the Kyoto Protocol is consistent with the reporting of LULUCF and agriculture under the Convention</p>	Yes. Completeness*
KL.14	Harvested wood products – CO <sub>2</sub>	<p>The United Kingdom uses AD from the CARBINE model for the HWP calculations. The HWP pool is calculated directly in the model, using the simple decay function as proposed by the Kyoto Protocol Supplement. The method (as described by the IPCC) requires the use of AD for 1900 onward, but the United Kingdom did not provide any information in its NIR on the years included in the time series of AD used for the HWP calculations. During the review, the Party explained that all woodland in existence 1990 is included in the calculations for 1900 onward and that land deforested prior to 1990 is excluded. However, it is not clear how land deforested after 1990 is handled</p> <p>The ERT recommends that the United Kingdom increase the transparency of its reporting by including information in the NIR on the data used for the HWP calculations and by providing corresponding AD (harvest) for deforestation, afforestation and reforestation, and forest management separately</p>	Yes. Transparency*
KL.15	Direct and indirect N <sub>2</sub> O emissions from N fertilization – N <sub>2</sub> O	<p>The ERT could not find information in the NIR on the calculation of indirect N<sub>2</sub>O emissions for the LULUCF sector (those not associated with cropland and grassland) (see L.17 above). When the United Kingdom reports N<sub>2</sub>O emissions in CRF table 4(IV), it should be possible to separate them into different categories and include emissions for relevant activities under the Kyoto Protocol</p> <p>The ERT recommends that the United Kingdom include indirect emissions of N<sub>2</sub>O for relevant activities under the Kyoto Protocol</p>	Yes. Completeness*
KL.16	General (KP-LULUCF) – activity data	The ERT noted from the information provided in the CRF tables and the NIR that the reporting of the LULUCF sector is not complete: the estimates of emissions and removals do not cover the overseas territories of Montserrat, Bermuda, the Cayman Islands and Gibraltar. In the NIR (section	Yes. Completeness*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue <sup>a</sup> and/or a problem <sup>b</sup> ? If yes, classify by type
		<p>6.9), the United Kingdom explained that no emissions or removals are estimated or reported for the Cayman Islands, Bermuda and Montserrat owing to insufficient information on land use and land-use change activities, and for Gibraltar that emissions for this sector are considered to be negligible (see also L.19 above)</p> <p>However, the ERT is of the view that emission estimates should have been provided for the Cayman Islands and Gibraltar. Bermuda and Montserrat are not covered by the second commitment period of the Kyoto Protocol (see G.12 and G.13 above). According to data from the Food and Agriculture Organization of the United Nations, the Cayman Islands has a total land area of 26,000 ha, of which 13,000 ha is forest, while Gibraltar has no forest area. The ERT concluded that estimates of emissions and removals for all KP-LULUCF activities could be underestimated</p> <p>The ERT recommends that the United Kingdom provide estimates of emissions and removals for the Cayman Islands and Gibraltar</p>	

*Abbreviations:* AD = activity data, Annex I Party = Party included in Annex I to the Convention, BGS = British Geological Survey, BOD = biological oxygen demand, COP = Conference of the Parties, COP/MOP, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CPR = commitment period reserve, CRF = common reporting format, Defra = Department for Environment, Food and Rural Affairs, DOC = degradable organic carbon, DOCf = fraction of degradable organic carbon, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, F-gas = fluorinated gas, FMRL = forest management reference level, GHG = greenhouse gas, HWP = harvested wood products, IE directive = industrial emissions directive, IEA = International Energy Agency, IEF = implied emission factor, IPC = integrated pollution control, IPPC = integrated pollution prevention and control, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol Supplement = *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*, LPG = liquefied petroleum gas, LULUCF = land use, land-use change and forestry, MCF = methane correction factor, N = nitrogen, NA = not applicable, NE = not estimated, NEU = non-energy use, NIR = national inventory report, NO = not occurring, OECD = Organisation for Economic Co-operation and Development, OPG = other petroleum gas, QA/QC = quality assurance/quality control, SIAR = standard independent assessment report, UNECE = United Nations Economic Commission for Europe, UNESCO = United Nations Educational, Scientific and Cultural Organization, UNFCCC Annex I inventory reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”, US EPA = United States Environmental Protection Agency, Wetlands Supplement = *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

<sup>a</sup> Recommendations are related to issues as defined in decision 13/CP.20, annex, paragraph 81, or problems as identified in decision 22/CMP.1, annex, paragraph 69, identified by the ERT during the review. Encouragements are made to the Party to address all findings not related to such issues.

<sup>b</sup> An asterisk is included next to each issue type that is also a problem, as defined in decision 22/CMP.1, annex, paragraphs 68 and 69, including those that lead to an adjustment or a question of implementation.

<sup>c</sup> Digest of United Kingdom Energy Statistics 2015. Available at <<https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>>.

<sup>d</sup> Baggott SL, Lelland A, Passant NP and Watterson J. 2004. *Review of Carbon Emission Factors in the UK Greenhouse Gas Inventory*. Available at <[https://uk-air.defra.gov.uk/assets/documents/reports/cat07/0611061401-417\\_Review\\_of\\_Carbon\\_Emission\\_Factors\\_2004NIR\\_Issue1\\_v1.3.2.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cat07/0611061401-417_Review_of_Carbon_Emission_Factors_2004NIR_Issue1_v1.3.2.pdf)>.

<sup>e</sup> Mineral Products Association. Formerly the British Cement Association.

<sup>f</sup> Prior to 2005, there was no emissions trading and no requirement for the sites to collect and report the detailed, high-quality emission data that are now required for the EU ETS.

<sup>g</sup> The Environment Agency (EA), the Scottish Environmental Protection Agency (SEPA), the Northern Ireland Department of the Environment (NIEA) and Natural Resources Wales (NRW).

<sup>h</sup> ICF International. 2011. *Development of the GHG refrigeration and air conditioning model (RAC model)*. Final report. Available at <[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/48250/3844-greenhouse-gas-inventory-improvement-project-deve.PDF](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48250/3844-greenhouse-gas-inventory-improvement-project-deve.PDF)>.

<sup>i</sup> The statistics are based on the annual survey “Structure of the agricultural industry in England and the United Kingdom at June”. The data set is available at <<https://www.gov.uk/government/statistical-data-sets/structure-of-the-agricultural-industry-in-england-and-the-uk-at-june>>.

<sup>j</sup> See <<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=17181&FromSearch=Y&Publisher=1&SearchText=AC0116&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>>.

<sup>k</sup> Misselbrook TH, Cardenas LM, Camp V, Thorman RE, Williams JR, Rollett AJ and Chambers BJ. 2014. An assessment of nitrification inhibitors to reduce nitrous oxide emissions from UK agriculture. *Environmental Research Letters*. 9(11): 115006.

<sup>l</sup> Defra. 2014. *Review of Landfill Methane Emissions Modelling*. Available at <[http://randd.defra.gov.uk/Document.aspx?Document=12439\\_WR1908ReviewofMethaneEmissionsModelling.pdf](http://randd.defra.gov.uk/Document.aspx?Document=12439_WR1908ReviewofMethaneEmissionsModelling.pdf)>.

<sup>m</sup> Ricardo AEA. 2013. “Reporting to DECC for UK GHG inventory(draft): Assumptions and estimation of emissions from wastewater and sewage sludge treatment”.

<sup>n</sup> Areas of wetland drainage and rewetting will be identified as part of a research project funded by the Department for Business, Energy and Industrial Strategy, which aims to generate new mapping of peat conditions for the United Kingdom.

<sup>o</sup> Building on the work of Morison J, Matthews R, Miller G, Perks M, Randle T, Vanguelova E, White M and Yamulki S. 2012. *Understanding the Carbon and Greenhouse Gas Balance of Forests in Britain*. Available at <[http://www.forestry.gov.uk/pdf/FCRP018.pdf/\\$FILE/FCRP018.pdf](http://www.forestry.gov.uk/pdf/FCRP018.pdf/$FILE/FCRP018.pdf)>.



## **VI. Application of adjustments**

11. The ERT has not identified the need to apply any adjustments to the 2016 annual submission of the United Kingdom.

## **VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol**

12. The United Kingdom has elected commitment period accounting and therefore the issuance and cancellation of units for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are not applicable for the 2016 review.

## **VIII. Questions of implementation**

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

## Annex I

### Overview of greenhouse gas emissions and removals for the United Kingdom of Great Britain and Northern Ireland for submission year 2016 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

1. Tables 6–9 provide an overview of total greenhouse gas emissions and removals, as submitted by the United Kingdom of Great Britain and Northern Ireland.

Table 6

#### Total greenhouse gas emissions for the United Kingdom of Great Britain and Northern Ireland, base year<sup>a</sup>–2014<sup>b</sup>

(kt CO<sub>2</sub> eq)

	Total GHG emissions excluding indirect CO <sub>2</sub> emissions		Total GHG emissions including indirect CO <sub>2</sub> emissions <sup>c</sup>		Land-use change (Article 3.7 bis as contained in the Doha Amendment) <sup>d</sup>	KP-LULUCF activities (Article 3.3 of the Kyoto Protocol) <sup>e</sup>	KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)	CM, GM, RV, WDR	FM
	Total including LULUCF	Total excluding LULUCF	Total including LULUCF	Total excluding LULUCF					
FMRL									–8 268.00
Base year	803 195.91	802 945.28	803 195.91	802 945.28	246.05		507.28		
1990	799 561.70	799 311.06	799 561.70	799 311.06					
1995	751 529.75	751 697.24	751 529.75	751 697.24					
2000	713 886.08	716 808.69	713 886.08	716 808.69					
2010	605 440.41	613 250.82	605 440.41	613 250.82					
2011	556 789.31	565 116.74	556 789.31	565 116.74					
2012	573 813.47	582 173.60	573 813.47	582 173.60					
2013	560 680.86	569 307.74	560 680.86	569 307.74		–2 122.68	5 604.09		–17 637.45
2014	517 765.65	526 732.11	517 765.65	526 732.11		–2 410.60	5 330.44		–17 050.50

*Abbreviations:* CM = cropland management, FM = forest management, FMRL = forest management reference level, GHG = greenhouse gas, GM = grazing land management, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, RV = revegetation, WDR = wetland drainage and rewetting.

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub>. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

<sup>b</sup> Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.

<sup>c</sup> The Party has not reported indirect CO<sub>2</sub> emissions in common reporting format table 6.

<sup>d</sup> The value reported in this column refers to 1990.

<sup>e</sup> Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

Table 7

**Greenhouse gas emissions by gas for the United Kingdom of Great Britain and Northern Ireland, excluding land use, land-use change and forestry, 1990–2014<sup>a</sup>**

(kt CO<sub>2</sub> eq)

	CO <sub>2</sub> <sup>b</sup>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF <sub>6</sub>	NF <sub>3</sub>
1990	595 692.81	137 525.48	48 770.37	14 391.43	1 651.50	NO, NE	1 279.06	0.42
1995	560 513.93	130 860.49	39 366.21	19 094.50	596.91	NO, NE	1 264.37	0.83
2000	560 576.28	114 903.23	29 038.06	9 875.03	596.78	NO, NE	1 817.61	1.69
2010	506 754.81	66 656.71	22 176.95	16 688.90	287.71	NO, NE	685.47	0.27
2011	464 083.13	63 702.57	21 096.45	15 212.30	416.93	NO, NE	605.05	0.30
2012	483 683.35	60 925.66	20 954.97	15 771.59	255.04	NO, NE	582.65	0.33
2013	475 129.18	56 159.77	21 063.87	16 154.64	318.73	NO, NE	481.20	0.36
2014	434 093.26	53 855.61	21 637.08	16 399.28	278.31	NO	468.16	0.40
<b>Per cent change 1990–2014</b>	<b>–27.1</b>	<b>–60.8</b>	<b>–55.6</b>	<b>14.0</b>	<b>–83.1</b>	<b>NA</b>	<b>–63.4</b>	<b>–4.0</b>

*Abbreviations:* NA = not applicable, NE = not estimated, NO = not occurring.

<sup>a</sup> Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

<sup>b</sup> The United Kingdom did not report indirect CO<sub>2</sub> emissions in common reporting format table 6.

Table 8  
**Greenhouse gas emissions by sector for the United Kingdom of Great Britain and Northern Ireland, 1990–2014<sup>a, b</sup>**  
 (kt CO<sub>2</sub> eq)

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other<sup>c</sup></i>
1990	609 796.18	66 795.09	53 416.92	250.63	69 302.87	
1995	566 259.54	61 208.35	52 693.30	- 167.49	71 536.06	
2000	558 853.70	41 174.30	49 733.57	-2 922.60	67 047.12	
2010	502 297.99	36 333.67	44 169.10	-7 810.41	30 450.07	
2011	460 226.01	32 801.11	44 065.06	-8 327.43	28 024.56	
2012	480 224.19	33 096.18	43 538.04	-8 360.13	25 315.19	
2013	468 634.76	35 189.97	43 805.35	-8 626.88	21 677.66	
2014	427 435.64	35 035.54	44 854.53	-8 966.45	19 406.39	
<b>Per cent change 1990–2014</b>	<b>-29.9</b>	<b>-47.5</b>	<b>-16.0</b>	<b>-3 677.5</b>	<b>-72.0</b>	

*Abbreviations:* IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry.

<sup>a</sup> Emissions/removals reported in the sector other (sector 6) are not included total greenhouse gas emissions.

<sup>b</sup> The United Kingdom did not report indirect CO<sub>2</sub> emissions in common reporting format table 6.

<sup>c</sup> “Other sector” reported as blank in the Party’s submission.

Table 9

**Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year<sup>a, b</sup>–2014, for the United Kingdom of Great Britain and Northern Ireland**
(kt CO<sub>2</sub> eq)

	<i>Article 3.7 bis as contained in the Doha Amendment<sup>c</sup></i>			<i>Forest management and elected Article 3.4 activities of the Kyoto Protocol</i>					
	<i>Article 3.3 of the Kyoto Protocol</i>	<i>Land-use change</i>	<i>Afforestation and reforestation</i>	<i>Deforestation</i>	<i>Forest management</i>	<i>Cropland management</i>	<i>Grazing land management</i>	<i>Revegetation</i>	<i>Wetland drainage and rewetting</i>
FMRL					-8 268.00				
Technical correction					-5 658.00				
Base year		246.05				401.85	105.42	NA	NE
2013			-3 148.16	1 025.47	-17 637.45	8 074.21	-2 470.12	NA	NE
2014			-3 344.69	934.09	-17 050.50	7 930.01	-2 599.57	NA	NE
<b>Per cent change 1990–2014</b>						<b>1 873.4</b>	<b>-2 565.9</b>	<b>NA</b>	<b>NA</b>

*Abbreviations:* FMRL = forest management reference level, NA = not applicable, NE = not estimated.

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub>. The base year for cropland management, grazing land management, revegetation and wetland drainage and rewetting under Article 3, paragraph 4, of the Kyoto Protocol is 1990 for the United Kingdom. For activities under Article 3, paragraph 3, of the Kyoto Protocol, and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

<sup>b</sup> Values in this table include emissions on lands subject to natural disturbances, if applicable.

<sup>c</sup> The value reported in this column refers to 1990.

2. Table 10 provides an overview of relevant key data for the United Kingdom's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 10

**Key relevant data for the United Kingdom of Great Britain and Northern Ireland under Article 3, paragraphs 3 and 4, of the Kyoto Protocol**

<i>Key parameters</i>	<i>Values</i>
Periodicity of accounting	(a) Afforestation/reforestation: commitment period accounting (b) Deforestation: commitment period accounting (c) Forest management: commitment period accounting (d) Cropland management: commitment period accounting (e) Grazing land management: commitment period accounting (f) Revegetation: not elected (g) Wetland drainage and rewetting: commitment period accounting
Election of activities under Article 3, paragraph 4	Cropland management, grazing land management, wetland drainage and rewetting
Election of application of provisions for natural disturbances	Yes, for afforestation and reforestation, and forest management
3.5% of total base year GHG emissions, excluding LULUCF	28 103.084 kt CO <sub>2</sub> eq (224 824.677 kt CO <sub>2</sub> eq for the duration of the commitment period)
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. Afforestation and reforestation in 2014	NA
2. Deforestation in 2014	NA
3. Forest management in 2014	NA
4. Cropland management in 2014	NA
5. Grazing land management in 2014	NA
6. Revegetation in 2014	NA
7. Wetland drainage and rewetting in 2014	NA

*Abbreviations:* AAU = assigned amount unit, CER = certified emission reduction, ERU = emission reduction unit, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable, RMU = removal unit.

## Annex II

### Information to be included in the compilation and accounting database

Tables 11 and 12 include the information to be included in the compilation and accounting database for the United Kingdom of Great Britain and Northern Ireland. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable), as well as the final data to be included in the compilation and accounting database.

Table 11

#### Information to be included in the compilation and accounting database for 2014, including the commitment period reserve, for the United Kingdom of Great Britain and Northern Ireland

(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised estimates</i>	<i>Adjustment<sup>a</sup></i>	<i>Final<sup>b</sup></i>
<b>Commitment period reserve</b>	2 470 443 599			2 470 443 599
<b>Annex A emissions for 2014</b>				
CO <sub>2</sub> <sup>c</sup>	434 794 557	434 093 262		434 093 262
CH <sub>4</sub>	53 890 865	53 855 608		53 855 608
N <sub>2</sub> O	21 348 543	21 637 077		21 637 077
HFCs	16 422 557	16 399 282		16 399 282
PFCs	278 315	278 315		278 315
Unspecified mix of HFCs and PFCs	NO			NO
SF <sub>6</sub>	468 162	468 162		468 162
NF <sub>3</sub>	399	399		399
<b>Total Annex A sources</b>	<b>527 203 397</b>	<b>526 732 105</b>		<b>526 732 105</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014</b>				
3.3 Afforestation and reforestation	-3 344 690			-3 344 690
3.3 Deforestation	934 093			934 093
<b>Forest management and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014</b>				
3.4 Forest management for 2014	-17 050 497			-17 050 497
3.4 Cropland management for 2014	7 930 009			7 930 009
3.4 Cropland management for the base year	401 854			401 854
3.4 Grazing land management for 2014	-2 599 565			-2 599 565
3.4 Grazing land management for the base year	105 422			105 422
3.4 Wetland drainage and rewetting for 2014	NE			NE
3.4 Wetland drainage and rewetting in the base year	NE			NE

*Abbreviations:* Annex A sources = sources included in Annex A to the Kyoto Protocol, NE = not estimated, NO = not occurring.

<sup>a</sup> "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

<sup>b</sup> "Final" includes revised estimates, if any, and/or adjustments, if any.

<sup>c</sup> United Kingdom did not report indirect CO<sub>2</sub> emissions in common reporting format table 6.

Table 12

**Information to be included in the compilation and accounting database for 2013, for the United Kingdom of Great Britain and Northern Ireland**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised estimates</i>	<i>Adjustment<sup>a</sup></i>	<i>Final<sup>b</sup></i>
<b>Annex A emissions for 2013</b>				
CO <sub>2</sub> <sup>c</sup>	475 832 051	475 129 176		475 129 176
CH <sub>4</sub>	56 195 512	56 159 769		56 159 769
N <sub>2</sub> O	20 777 597	21 063 866		21 063 866
HFCs	16 177 983	16 154 637		16 154 637
PFCs	318 739	318 735		318 735
Unspecified mix of HFCs and PFCs	NO, NE			NO, NE
SF <sub>6</sub>	481 196	481 196		481 196
NF <sub>3</sub>	362	362		362
<b>Total Annex A sources</b>	<b>569 783 439</b>	<b>569 307 740</b>		<b>569 307 740</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013</b>				
3.3 Afforestation and reforestation	-3 148 156			-3 148 156
3.3 Deforestation	1 025 473			1 025 473
<b>Forest management and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013</b>				
3.4 Forest management for 2013	-17 637 452			-17 637 452
3.4 Cropland management for 2013	8 074 211			8 074 211
3.4 Cropland management for the base year	401 854			401 854
3.4 Grazing land management for 2013	-2 470 124			-2 470 124
3.4 Grazing land management for the base year	105 422			105 422
3.4 Wetland drainage and rewetting for 2013	NE			NE
3.4 Wetland drainage and rewetting in the base year	NE			NE

*Abbreviations:* Annex A sources = sources included in Annex A to the Kyoto Protocol, NE = not estimated, NO = not occurring.

<sup>a</sup> "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

<sup>b</sup> "Final" includes revised estimates, if any, and/or adjustments, if any.

<sup>c</sup> United Kingdom did not report indirect CO<sub>2</sub> emissions in common reporting format table 6.



## Annex III

### Additional information to support findings in table 2

#### Missing categories that may affect completeness

The categories for which methods are included in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* were reported as “NE” (not estimated) or for which the expert review team otherwise determined that there may be an issue with the completeness of reporting in the Party’s inventory are the following:

- (a) Indirect nitrous oxide (N<sub>2</sub>O) emissions from managed soils (see L.17 in table 5);
- (b) Land areas (Montserrat, Bermuda, Cayman Islands and Gibraltar) (see L.19 in table 5);
- (c) Cropland management and grassland management in overseas territories and Crown dependencies (see KL.5 in table 5);
- (d) Information in accordance with decision 2/CMP.8, annex II, paragraph 5(c) and 5(e) (see KL.6 in table 5);
- (e) Litter and deadwood pools for cropland management; litter, deadwood and organic soil pools for grazing land management; and all carbon pools under wetland drainage and rewetting (see KL.10 in table 5);
- (f) Carbon dioxide emissions from drained organic soils under cropland management (see KL.13 in table 5);
- (g) Indirect nitrous oxide emissions from nitrogen fertilization (see KL.15 in table 5);
- (h) Land areas (Cayman Islands and Gibraltar) (see KL.16 in table 5).

## Annex IV

### Documents and information used during the review

#### A. Reference documents

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at <<http://unfccc.int/resource/webdocs/agi/2015.pdf>>.

Annual status report for the United Kingdom of Great Britain and Northern Ireland for 2016. Available at <<http://unfccc.int/resource/docs/2016/asr/gbr.pdf>>.

FCCC/ARR/2014/GBR. Report on the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2014. Available at <<http://unfccc.int/resource/docs/2015/arr/gbr.pdf>>.

FCCC/ARR/2013/GBR. Report of the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2013. Available at <<http://unfccc.int/resource/docs/2014/arr/gbr.pdf>>.

FCCC/ARR/2012/GBR. Report of the individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland submitted in 2012. Available at <<http://unfccc.int/resource/docs/2013/arr/gbr.pdf>>.

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

“Guidelines for 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>>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”. Annex to decision 24/CP.19. Available at <<http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf#page=4>>.

“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 the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”. Annex to decision 13/CP.20. Available at <<http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf#page=6>>.

“Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, part I: implications related to accounting and reporting and other related issues”. Decision 3/CMP.11. Available at <<http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=5>>.

“Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, part II: implications related to review and adjustments and other related issues”. Decision 4/CMP.11. Available at <<http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=30>>.

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

Intergovernmental Panel on Climate Change. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/kpsg>>.

Intergovernmental Panel on Climate Change. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/wetlands/index.html>>.

Standard independent assessment report, part 1, for the United Kingdom of Great Britain and Northern Ireland for 2016. Available at <[http://unfccc.int/files/kyoto\\_mechanisms/application/pdf/siar\\_2016\\_gbr\\_1\\_2.pdf](http://unfccc.int/files/kyoto_mechanisms/application/pdf/siar_2016_gbr_1_2.pdf)>.

Standard independent assessment report, part 2, for the United Kingdom of Great Britain and Northern Ireland for 2016. Available at <[http://unfccc.int/files/kyoto\\_mechanisms/application/pdf/siar\\_2016\\_gbr\\_2\\_2.pdf](http://unfccc.int/files/kyoto_mechanisms/application/pdf/siar_2016_gbr_2_2.pdf)>.

## **B. Additional information provided by the Party**

Responses to questions during the review were received from Mr. Stephen Forden, United Kingdom GHG Inventory, Department for Business, Energy and Industrial Strategy, including additional material on the methodology and assumptions used.

## Annex V

### Acronyms and abbreviations

AD	activity data
AAU	assigned amount unit
BGS	British Geological Survey
BOD	biological oxygen demand
CD	Crown dependency
CER	certified emission reduction
CH <sub>4</sub>	methane
CM	cropland management
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
COP	Conference of the Parties
CPR	commitment period reserve
CRF	common reporting format
Defra	Department for Environment, Food and Rural Affairs
DOC	degradable organic carbon
DOCf	fraction of degradable organic carbon
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
F <sub>IND-COM</sub>	fraction of industrial and co-discharged protein into the sewer system
FM	forest management
FMRL	forest management reference level
F <sub>NON-COM</sub>	fraction of non-consumed protein added to wastewater
F <sub>NPR</sub>	fraction of nitrogen in protein
g	gram
GHG	greenhouse gas
GM	grazing land management
ha	hectare
IE	industrial directive
IPC	integrated pollution control
IPPC	integrated pollution prevention and control
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
kg	kilogram (1 kg = 1,000 grams)
kha	kilohectare (1 kha = 1,000 ha)
KP-LULUCF	LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kt	kilotonne
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
Mt	million tonnes
N	nitrogen
N <sub>2</sub> O	nitrous oxide
NA	not applicable

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NE	not estimated
NEU	non-energy use
NF <sub>3</sub>	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
NO <sub>x</sub>	nitrogen oxide
OECD	Organisation for Economic Co-operation and Development
OPG	other petroleum gas
OT	overseas territory
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF <sub>6</sub>	sulphur hexafluoride
SIAR	standard independent assessment report
t	tonne (1 t = 1,000 kg)
TJ	terajoule (1 TJ = 10 <sup>12</sup> joule)
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
US EPA	United States Environmental Protection Agency
WDR	wetland drainage and rewetting

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