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Framework Convention on Climate Change

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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 2017*

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 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 2017 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 25 to 30 September 2017 in Bonn, Germany.

* In the symbol for this document, 2017 refers to the year in which the inventory was submitted, not to the year of publication.

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Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A sources	source categories included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
BOD	biochemical oxygen demand
C	carbon
CD	Crown dependency
CER	certified emission reduction
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
DOC	degradable organic carbon
DUKES	Digest of United Kingdom Energy Statistics
EEMS	Environmental and Emissions Monitoring System
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU ETS	European Union Emissions Trading System
F-gases	fluorinated gases
FM	forest management
FMRL	forest management reference level
$Frac_{IND-COM}$	fraction of industrial and commercial co-discharged protein in the sewer system
$Frac_{NON-CON}$	fraction of non-consumed protein added to the wastewater
GDP	gross domestic product
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HGV	heavy goods vehicle
HWP	harvested wood products
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPC	Integrated Pollution Control
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
IPPU	industrial processes and product use
KP-LULUCF activities	activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
ktoe	kilotonne of oil equivalent
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*

LNG	liquefied natural gas
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
N	nitrogen
NA	not applicable
NE	not estimated
NFI	national forest inventory
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide
OECD	Organisation for Economic Co-operation and Development
OT	overseas territory
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
UNECE	United Nations Economic Commission for Europe
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"
UNFCCC review guidelines	"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"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction[1]

1. This report covers the review of the 2017 annual submission of the United Kingdom of Great Britain and Northern Ireland organized by the secretariat, in accordance with the Article 8 review guidelines (decision 22/CMP.1, as revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (decision 13/CP.20). The review took place from 25 to 30 September 2017 in Bonn, Germany, and was coordinated by Ms. Lisa Hanle, Ms. Alma Jean and Mr. Simon Wear (secretariat). Table 1 provides information on the composition of the 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

Area of expertise	*Name*	*Party*
Generalist	Ms. Mausami Desai	United States of America
	Ms. Jolanta Merkeliene	Lithuania
Energy	Mr. Naofumi Kosaka	Japan
	Ms. Brooke Perkins	Australia
	Mr. Michael Smith	New Zealand
IPPU	Mr. Kendal Blanco-Salas	Costa Rica
	Ms. Ils Moorkens	Belgium
	Mr. Ioannis Sempos	Greece
Agriculture	Ms. Marta Alfaro	Chile
	Ms. Fatou Gaye	Gambia
	Ms. Alice Ryan	New Zealand
LULUCF	Ms. Esther Mertens	Belgium
	Mr. Koki Okawa	Japan
	Mr. Igor Onopchuk	Ukraine
	Mr. Iordanis Tzamtzis	Greece
Waste	Mr. Mark Hunstone	Australia
	Mr. Gabor Kis-Kovacs	Hungary
	Mr. Phindile Mangwana	South Africa
Lead reviewers	Ms. Alfaro	
	Mr. Hunstone	

[1] 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.

2. The basis of the findings in this report is the assessment by the ERT of the consistency of the Party's 2017 annual submission with the Article 8 review guidelines. The ERT has made recommendations that the United Kingdom resolve the findings related to issues,[2] including issues designated as problems.[3] Other findings, and, if applicable, the encouragements of the ERT to the United Kingdom 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 GHG emissions for the United Kingdom, including totals excluding and including the LULUCF sector, indirect CO_2 emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, 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.

II. Summary and general assessment of the 2017 annual submission

6. Table 2 provides the assessment by the ERT 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.

Table 2
Summary of review results and general assessment of the inventory of the United Kingdom of Great Britain and Northern Ireland

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
Dates of submission	Original submission: 13 April 2017 (NIR), 14 April 2017, Version 1 (CRF tables), 13 April 2017 (SEF tables: SEF-CP2-2016) and 23 May 2017 (SEF tables: SEF-CP1-2016) Revised submission: 23 May 2017 (SEF tables: SEF-CP2-2016) Unless otherwise specified, the values from the latest submission are used in this report		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	1. Have any issues been identified in the following areas:		
	(a) Identification of key categories	Yes	G.2, L.15
	(b) Selection and use of methodologies and assumptions	Yes	E.5, A.2, L.9, L.32, W.20
	(c) Development and selection of EFs	Yes	L.22, L.23, KL.8
	(d) Collection and selection of AD	Yes	E.2, E.7, E.27, I.10, I.15, I.20, I.24, A.1, A.4, L.13, L.17, L.20,

[2] Issues are defined in decision 13/CP.20, annex, paragraph 81.
[3] Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
			W.10, W.15, W.17, W.19
	(e) Reporting of recalculations	Yes	G.10
	(f) Reporting of a consistent time series	Yes	L.19, KL.15
	(g) Reporting of uncertainties, including methodologies	Yes	I.17
	(h) QA/QC	QA/QC procedures were assessed in the context of the national system (see para. 2 in this table)	
	(i) Missing categories/completeness[b]	Yes	I.10, A.6, L.4, L.18, L.26, L.28, L.29, L.30, KL.5, KL.9, KL.17, KL.18, KL.24, KL.25
	(j) Application of corrections to the inventory	No	
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?	No	E.29, I.15, I.19, A.6
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	E.16, E.17
Supplementary information under the Kyoto Protocol	2. Have any issues been identified related to the national system:		
	(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	Yes	G.8
	(b) Performance of the national system functions	Yes	G.8
	3. Have any issues been identified related to the 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	
	4. Have any issues been identified related to reporting of information on ERUs, CERs, AAUs and RMUs and 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	
	5. Have any issues been identified in 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	No	

Assessment			*Issue or problem ID#(s) in table 3 and/or 5*[a]
	annual submission?		
	6. Have any issues been identified related to the reporting of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as follows:		
	(a) Reporting requirements in decision 2/CMP.8, annex II, paragraphs 1–5	Yes	KL.21, KL.4, KL.5, KL.11, KL.26
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14	Yes	KL.20
	(c) Reporting requirements of decision 6/CMP.9	Yes	KL.10, KL.21, KL.22
	(d) Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	Yes	KL.20
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.7
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Did the Party submit a revised estimate to replace a previously applied adjustment?	NA	The United Kingdom does not have a previously applied adjustment
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 a question of implementation?	No	

[a] The ERT identified additional issues and/or problems in the energy, IPPU, agriculture, LULUCF and waste sectors and for KP-LULUCF activities that are not listed in this table but are included in table 3 and/or 5.

[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

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

7. Table 3 compiles all the recommendations made in previous review reports that were included in the previous review report, published on 4 December 2017.[4] 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 2017 annual submission and provided the rationale for its determination, which takes 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

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Annual submission (G.3, 2016) (G.3, 2015) (15, 2014) Transparency	Improve the transparency of the NIR by including sufficient information in the annual submission.	Addressing. The United Kingdom improved the transparency of the methods and parameters used, including AD and EFs. Table 10.16 of the NIR notes that this recommendation from the 2014, 2015 and 2016 reviews has been addressed. Regarding the status of implementation of the specific transparency issues mentioned in the 2016 annual review report, the ERT notes that ID#s L.5 and W.1 below have not yet been resolved.
G.2	Key category analysis (G.8, 2016) (G.8, 2015) Transparency	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 2006 IPCC Guidelines.	Addressing. The United Kingdom has conducted a key category analysis for F-gases at the appropriate level (see ID# I.1 below). During the review the Party clarified the rationale for aggregating LULUCF categories, stating that it plans to include this information in the NIR in accordance with paragraph 50(d)(ii) of the UNFCCC Annex I inventory reporting guidelines, in particular its rationale for disaggregation choices, which are linked to the level at which individual methods or models are used. The NIR already includes a description of the key category ranking method to supplement the overall key category analysis and further inform the prioritization of improvements (annex A.1–5, pp.632 and 633) (see ID# L.15 in table 5).
G.3	Methods (G.7, 2016) (G.7, 2015) Transparency	Address the transparency issues identified in the previous review reports.	Addressing. The United Kingdom addressed many of the previous recommendations to improve the transparency of AD and other parameters as well as methods, but some issues remain (see ID#s G.1 above and L.5 and W.1 below).
G.4	Follow-up to previous reviews (G.7, 2016) (G.7,	Provide information in the NIR on the implementation of the recommendations on transparency.	Resolved. The United Kingdom reported on the implementation of recommendations to improve transparency in table 10.16 of the NIR.

[4] FCCC/ARR/2016/GBR.

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	2015) Transparency		
G.5	Uncertainty analysis (G.9, 2016) (G.9, 2015) Transparency	Include in the NIR a brief description of and reference to the information used to quantitatively assess the uncertainty for all categories where expert judgment was used.	Not resolved. The NIR does not include details at the category level on assumptions or references for inputs to the uncertainty analysis.
G.6	National registry (G.10, 2016) (G.10, 2015) Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol	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.	Resolved. This recommendation appeared in the SIAR, part 1, for the 2016 annual submission and relates to the requirement in decision 13/CMP.1, annex, paragraph 45. The SIAR, parts 1 and 2, for the 2017 annual submission does not report this as an issue.
G.7	Commitment period reserve (G.11, 2016) (G.11, 2015) Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol	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.	Not resolved. During the review, the United Kingdom explained this was resolved in the 2017 submission because the Party compared 90 per cent of the assigned amount with the emissions reported in 2014, excluding LULUCF, multiplied by eight. However, the ERT notes that for the calculation of the CPR for the 2017 submission, the Party should compare 90 per cent of its assigned amount with total 2015 emissions, excluding LULUCF, multiplied by eight, as this is the most recently reviewed value at the time the report was published.
G.8	National system (G.13, 2016) (G.13, 2015) Completeness	Strengthen the national system in order to ensure the completeness of the coverage of the LULUCF and KP-LULUCF estimates of emissions and removals, and report on improvements made in the NIR.	Not resolved. The United Kingdom's national system has not been strengthened to ensure the inventory is complete for the LULUCF sector and for activities under KP-LULUCF (see ID#s L.4 and KL.5 below).
Energy			
E.1	1. General (energy sector) – all fuels – CO_2, CH_4 and N_2O (E.20, 2016) (E.20, 2015) Transparency	Clearly indicate the geographical coverage of DUKES and demonstrate how fuel consumption data at the subcategory level for each OT and CD are obtained and incorporated into the national totals for that subcategory.	Not resolved. Neither a description of the coverage of DUKES (BEIS, 2016) nor fuel consumption data for the OTs and CDs is included in the NIR. During the previous review, the United Kingdom indicated that the geographical coverage of DUKES is the United Kingdom and its CDs, and that additional estimates are made for fuel consumption for each OT and CD using data provided by their respective government departments; however, this information is not included in the 2017 submission.
E.2	1. General (energy sector) – liquid and gaseous fuels – CO_2,	Rectify the stock data in the energy statistics and implement relevant recalculations in the CRF tables, as	Not resolved. The issue described by this recommendation is not included in the NIR under planned improvements; however, the

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	CH_4 and N_2O (E.21, 2016) (E.21, 2015) Accuracy	necessary, and explain all the recalculations in the NIR.	ERT notes that the United Kingdom indicated in the previous review that it would be resolved after July 2017 (i.e. after the 2017 inventory was submitted).
E.3	Feedstocks, reductants and other non-energy use of fuels – other fuels – CO_2 (E.22, 2016) (E.22, 2015) Comparability	Rectify the reporting of non-energy use of coking coal (coke oven/gas coke and coking coal) in CRF table 1.A(d).	Resolved. The notes in column J of CRF table 1.A(d) are in the correct cells.
E.4	Feedstocks, reductants and other non-energy use of fuels – liquid fuels – CO_2 (E.23, 2016) (E.23, 2015) Transparency	Rectify the reporting of carbon excluded and CO_2 emissions from non-energy use 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).	Resolved. The values in CRF table 1.A(d) and CRF table 1.A(b) are consistent for the fuels identified.
E.5	International navigation – liquid fuels – CO_2, CH_4 and N_2O (E.24, 2016) (E.24, 2015) Accuracy	Ensure the accuracy of the emission estimates for international navigation bunkers as well as the internal consistency between CRF tables 1.D and 1.A(b) by using the correct calorific values to convert activity from a mass basis to an energy basis.	Not resolved. The values reported in CRF table 1.D and CRF table 1.A(b) for international bunkers for jet kerosene, residual fuel oil and gas/diesel oil are not consistent (they differ by 0.03, 1.06 and 0.35 per cent, respectively). During the review, the United Kingdom indicated that this would be corrected in the 2018 submission.
E.6	1.A.1.c Manufacture of solid fuels and other energy industries – liquid fuels – CO_2, CH_4 and N_2O (E.25, 2016) (E.25, 2015) Transparency	Provide a clear and concise explanation that the estimates for AD and for CO_2, CH_4 and N_2O emissions from subcategory 1.A.1.c.ii (oil and gas extraction) are complete, including relevant information (i.e. that the gap in data reporting applies to onshore terminals only and that the data from the EU ETS are very closely consistent with other reporting of emissions from the same installations under parallel regulatory mechanisms).	Addressing. The United Kingdom described in the NIR (p.195) the data and sources used to calculate the AD for this subcategory; however, it did not adequately demonstrate that emissions from oil and gas extraction are complete. During the review, the Party provided information demonstrating that estimates for this category are complete, and this information should be included in the NIR.
E.7	1.A.1.c Manufacture of solid fuels and other energy industries – liquid fuels – CO_2, CH_4 and N_2O (E.25, 2016) (E.25, 2015) Accuracy	Provide in the NIR up-to-date information on the consideration of, or progress made in, efforts to improve the energy statistics collection system for LPG and other petroleum gas fuels abstracted from upstream oil and gas exploration and production sources.	Not resolved. This recommendation is not referenced in the NIR (section 10 on recalculations and improvements) or in Upstream oil and gas production – combustion (Method Statement 1.A.1cii) of the NIR (under the sections on improvements (completed and planned) and time-series consistency). During the review, the United Kingdom informed the ERT that the data capture mechanism (the Petroleum Producers Reporting System) used to compile DUKES has not been changed and, as

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
			such, this issue of inconsistency with the national statistics cannot yet be resolved.
E.8	1.A.2 Manufacturing industries and construction – other fuels – CO_2, CH_4 and N_2O (E.26, 2016) (E.26, 2015) Transparency	Provide 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 (i.e. the close collaboration among the EU ETS regulators, the national energy statistics team and environmental regulators regarding waste-derived fuels, and the extensive QC activities that have been conducted between the EU ETS data and the EU IPPC and industrial emissions directives, which provide no evidence to suggest a gap in or overestimation of emissions).	Resolved. The United Kingdom provided in the NIR information on data reporting mechanisms (section 1.2.2.3 and table 1.3) and on a stakeholder consultation conducted to check the data from parallel reporting systems (section 1.6).
E.9	1.A.2.b Non-ferrous metals – solid fuels – CO_2 (E.27, 2016) (E.27, 2015) Transparency	Investigate the underlying cause of the drop in the CO_2 EF for coal use in the Lynemouth aluminium smelter between 2003 and 2005 and report the findings of this investigation in the NIR.	Addressing. During the review, the United Kingdom informed the ERT that it had investigated the CO_2 EF for the Lynemouth smelter and had implemented improvements in the time series in response to recommendations made in previous reviews. Details of the Party's findings from the investigation are not adequately transparent in the NIR (i.e. the high-level summary in table 10.1 does not explicitly indicate that an investigation into the EF for coal use was undertaken) and the detailed explanation provided to the ERT about the Lynemouth plant was not included in the NIR.
E.10	1.B.1.a Coal mining and handling – solid fuels – CO_2 (E.28, 2016) (E.28, 2015) Comparability	Use the more appropriate notation key "NE" for CO_2 emissions from category 1.B.1.a if data are not available for an estimation.	Resolved. CRF table 1.A includes "NE" for CO_2 (see ID# E.22 in table 5).
IPPU			
I.1	2. General (IPPU) (I.2, 2016) (I.2, 2015) (52, 2014) Transparency	Conduct the key category analysis for F-gases at the subcategory level (e.g. HFCs from refrigeration and air-conditioning equipment).	Resolved. The NIR (tables A.1.3.3 and A.1.3.4) includes a key category analysis for F-gases at the subcategory level.
I.2	2.A.1 Cement production – CO_2 (I.10, 2016) (I.10, 2015) Consistency	Include information in the NIR on the different sources for AD and CO_2 EF and on all the assumptions used in the estimations.	Resolved. The United Kingdom included the requested information on the sources of the AD and the CO_2 EF and on the assumptions used in the estimations in the NIR (pp.209–212).

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
I.3	2.A.2 Lime production – CO_2 (I.11, 2016) (I.11, 2015) Consistency	Include information in the NIR on the different sources for the AD and CO_2 EF and on all the assumptions used in the estimations.	Resolved. The United Kingdom included the requested information on the sources of the AD and the CO_2 EF and on the assumptions used in the estimations in the NIR (pp.213 and 214).
I.4	2.B.1 Ammonia production – CO_2 (I.12, 2016) (I.12, 2015) Transparency	Include information in the NIR that explains that in the records of the United Kingdom environment regulation and permitting of production plants (whereby individual plants operate under agreed permits, a system which was implemented in the United Kingdom from 1993 onward) there is no mention of urea production at ammonia plants in any permits under the EU IPC/IPPC or in industrial emissions directives.	Resolved. The United Kingdom included the requested information on urea production at ammonia plants in the NIR (pp.225 and 226).
I.5	2.B.1 Ammonia production – CO_2 (I.13, 2016) (I.13, 2015) Transparency	Include information on the methodology used, including types of fuel used, origin of emission data and tier level, and an explanation of the trends of EFs for the Severnside, Billingham, Ince and Hull plants.	Resolved. The United Kingdom included information on the methodology used, including types of fuel used, origin of emission data and tier level, and an explanation of the trends in the NIR (pp.225 and 226).
I.6	2.B.2 Nitric acid production – N_2O (I.14, 2016) (I.14, 2015) Transparency	Include information in the NIR on the AD and EFs used for the estimates for the entire time series.	Resolved. The United Kingdom included the requested information on the AD and EFs used for the estimates for the entire time series in the NIR (pp.228–231).
I.7	2.C.1 Iron and steel production – CO_2 (I.15, 2016) (I.15, 2015) Transparency	Include an appropriate explanation of how the non-energy use of coke oven coke is considered across different subcategories and throughout the time series in the NIR.	Resolved. The United Kingdom included an explanation of how the non-energy use of coke oven coke is considered across different subcategories of the energy and IPPU sectors in the NIR (pp.137–141, 219, 234–237, 247–251, 258 and 259).
I.8	2.D.1 Lubricant use – CO_2, CH_4 and N_2O (I.16, 2016) (I.16, 2015) Accuracy	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 (volume 3, chapter 5).	Resolved. The emissions of CH_4 and N_2O from lubricants associated with road transportation are included in hot exhaust emissions category 1.A.3.b. Non-transportation emissions have been reallocated to category 1.A.2. The United Kingdom's allocation of emissions is in accordance with the methodology in the 2006 IPCC Guidelines.
I.9	2.D.2 Paraffin wax use – CO_2 (I.17, 2016) (I.17, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Improve QA/QC procedures and review the NIR to include information on the methodology to estimate CO_2 emissions from paraffin wax, and correct the text as appropriate (i.e. change the reference in section 4.23 from lubricants to paraffin wax).	Resolved. The United Kingdom included the requested information on the methodology to estimate CO_2 emissions from paraffin wax in the NIR (pp.261 and 262) and corrected the text of the NIR, as appropriate, suggesting that QA/QC procedures have been improved.

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
I.10	2.D.2 Paraffin wax use – CO_2 (I.18, 2016) (I.18, 2015) Accuracy	Examine possible sources of AD, especially the IEA (OECD), Eurostat and UNECE questionnaires.	Not resolved. The United Kingdom did not report in the NIR any actions taken to examine the possible sources of AD, especially the IEA (OECD), Eurostat and UNECE questionnaires. During the review, the Party explained to the ERT that it has not identified improved data for paraffin wax AD for the country, and that this minor source is a low priority for improvement of the inventory. The ERT noted that data on gross inland consumption of paraffin wax in the United Kingdom are available on Eurostat's website (http://ec.europa.eu/eurostat), and are different to the data reported in the CRF tables (see ID# I.21 in table 5).
I.11	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.19, 2016) (I.19, 2015) Transparency	Include an explanation in the NIR of the methodology used to estimate CO_2 emissions from non-energy use of petroleum coke (reported in category 2.D.3).	Resolved. The United Kingdom included an explanation of the methodology used to estimate CO_2 emissions from category 2.D.3 in the NIR (pp.263 and 264).
I.12	2.F.1 Refrigeration and air conditioning – HFCs (I.20, 2016) (I.20, 2015) Transparency	Further update the refrigeration and air conditioning model in order to increase the accuracy of the reporting, and provide a more transparent explanation of the parameters applied in the NIR.	Resolved. The United Kingdom reviewed the refrigeration and air-conditioning model for the 2017 submission and based on this review it provided in the NIR (section 4.29) the requested explanation of the parameters applied, which clarified, in particular, the relationship between the methodology currently used by the Party and the 2006 IPCC Guidelines.
I.13	2.F.5 Solvents – HFCs (I.21, 2016) (I.21, 2015) Accuracy	Update the methodology for estimating HFC emissions from solvents (i.e. include the assumption that 90 per cent of solvents consumed are emitted and 10 per cent destroyed) in accordance with the 2006 IPCC Guidelines, or include a transparent explanation of the approach used to derive the destruction factor.	Resolved. During the review, the United Kingdom informed the ERT that the methodology applied in the previous annual submission (2016 submission), the same methodology as in the 2017 submission, was consistent with the 2006 IPCC Guidelines, which assumes that 100 per cent of solvents consumed are emitted within two years of initial use. The description of the methodology in the 2016 NIR was not consistent with the calculation undertaken; this description has been updated in the 2017 NIR.
Agriculture			
A.1	3.A Enteric fermentation – CH_4 (A.2, 2016) (A.2, 2015) (65, 2014) (55, 2013) Accuracy	Implement the planned improvement of digestible energy data through the commissioned research projects.	Addressing. During the review, the United Kingdom provided the ERT with improved digestible energy data, which will be incorporated in the 2018 submission.
A.2	3.A Enteric fermentation – CH_4 (A.3, 2016) (A.3, 2015) (66, 2014) (56,	Apply a methodology that more closely reflects the country-specific conditions, for instance by moving to the IPCC tier 2 methodology for	Addressing. The United Kingdom has developed country-specific methodologies for cattle and sheep that will be implemented in the 2018 submission.

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	2013) Accuracy	the sheep subcategory, in addition to documenting national circumstances leading to methodological choice.	
A.3	3.A.4 Other livestock – CH_4 and N_2O (A.5, 2016) (A.5, 2015) Transparency	Fully document in the NIR: (1) the method used to estimate the annual population of horses, deer 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).	Addressing. The United Kingdom provided the requested information to the ERT during the review; however, information is not included in the NIR.
A.4	3.B.4 Other livestock (horses) – N_2O (A.6, 2016) (A.6, 2015) Accuracy	Make efforts to determine the number of horses in stabling and the corresponding type of manure management in order to determine the fraction of the total amount of N excretion for each manure management system for category 3.B.4 (manure management – horses).	Addressing. The United Kingdom has developed estimates for population of horses in stabling and will include them in the 2018 submission.
A.5	3.D.a.3 Urine and dung deposited by grazing animals – N_2O (A.7, 2016) (A.7, 2015) Transparency	Provide complete references for the data sources, a clear description of the method, assumptions and calculations used, and an explanation for the difference between the country-specific EF and the default EF from the 2006 IPCC Guidelines.	Addressing. The United Kingdom provided the requested information to the ERT during the review; however, the information is not included in the NIR.
LULUCF			
L.1	4. General (LULUCF) 4.B Cropland 4.C Grassland – CO_2 (L.9, 2016) (L.9, 2015) Comparability	Report mineral and organic soils separately under cropland and grassland.	Not resolved. The United Kingdom continues to report mineral and organic soils together under cropland and grassland.
L.2	4. General (LULUCF) 4.B Cropland 4.C Grassland – CO_2 (L.9, 2016) (L.9, 2015) Transparency	Assess the use of notation keys for the reporting of organic cropland and grassland soils, as appropriate.	Addressing. The United Kingdom has not used notation keys consistently for organic soils in OTs and CDs (e.g. areas of organic soils are reported in CRF table 4.C but the notation key "NE" is used for OTs and CDs in CRF table 4(II)).
L.3	Land representation (L.10, 2016) (L.10, 2015) Transparency	Include detailed information in the NIR showing that undisturbed grassland is calculated as the difference between the total land area (from the official national statistics for land area of United	Resolved. The United Kingdom included the requested information in the NIR (p.386) (see ID# L.16 in table 5).

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
		Kingdom) and the sum of all other land-use areas (calculated from land-use matrices, afforestation areas, peat extraction areas, etc.) for each year.	
L.4	Land representation – CO_2 (L.19, 2016) (L.19, 2015) Completeness	Provide estimates of emissions and removals for the missing land areas (Bermuda, Cayman Islands, Gibraltar and Montserrat).	Not resolved. LULUCF estimates for Bermuda, the Cayman Islands and Gibraltar are still unavailable, as reported by the Party in the NIR (section 6.9).
L.5	4.A Forest land – CO_2 (L.2, 2016) (L.2, 2015) (76, 2014) Transparency	Continue efforts to gather information on the management of privately owned forests and include in the NIR information on the management prescriptions and rotation ranges.	Addressing. Some information on the assumptions regarding the management of privately owned forests is included in the NIR (annex 3.4.1), but this is not additional to what was provided in the 2016 submission. During the review, the United Kingdom informed the ERT that better data on the management of private woodlands from the second cycle of the NFI will be available in around 2020 (see ID# L.7 below).
L.6	4.A Forest land – CO_2 (L.3, 2016) (L.3, 2015) (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 of soil carbon dynamics associated with forest land.	Resolved. The United Kingdom provided information on an country-specific soil submodel of the CARBINE model in the NIR (annex A.3.4.1.1).
L.7	4.A Forest land – CO_2 (L.12, 2016) (L.12, 2015) Transparency	Include additional information on the management of privately owned forests in the NIR, specifically that: (a) 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; (b) 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); (c) 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; (d) The rotation lengths are based on the age of maximum mean	Not resolved. The requested information is not in the NIR; further, the ERT determined that some relevant information from the NIR 2016 (annex 3.4.2) has been omitted from the NIR 2017. During the review, the United Kingdom informed the ERT that a supplementary report containing all the necessary information related to the management of privately owned forests, including, in particular, transparent information on the management prescriptions and the methodology implemented for the growth models, will accompany the next NIR.

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
		annual increment, with a range to match the given age distribution and planting records.	
L.8	4.A Forest land (L.13, 2016) (L.13, 2015) Transparency	Include information in the NIR on how data for the areas of forest land remaining forest land and land converted to forest land for the period 1990–1999 were calculated, and provide a more concise description of how the areas for different categories (forest land remaining forest land and land converted to forest land) have been estimated for 1990 onward.	Not resolved. There is scattered information in the NIR on forest land representation. The United Kingdom did not report information additional to that in the NIR 2016 on how data for the areas of forest land remaining forest and land converted to forest land for 1990 onward were calculated. During the review, the Party informed the ERT that a supplementary report containing this information will accompany the next NIR.
L.9	4.A Forest land – CO_2 (L.15, 2016) (L.15, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Include information in the NIR on the verification of all carbon stock changes estimated using tier 3 methods and/or models (CARBINE, C-Flow and BSORT models).	Not resolved. The United Kingdom included some information on the CARBINE model in the NIR (annex 3.4.1) and during the review explained that further verification of the model as a whole will be accomplished through comparison with field-based estimates of above-ground biomass stock changes following a future round of the NFI, which is likely to report its results in 2020. The ERT considers the information provided is not sufficient to support the verification activities required according to paragraph 41 of the UNFCCC Annex I inventory reporting guidelines, because there is no detailed information on the magnitude and nature of the differences between estimates derived from the CARBINE model and other assessments, or information indicating whether all components of the model (living biomass, litter, deadwood, soil and HWP) have been verified. The ERT also considers that the functionality of the CARBINE model is broadly similar to that of the C-Flow model and thus an independent assessment in accordance with the 2006 IPCC Guidelines (e.g. applying lower-tier methods) is possible.
L.10	4.B Cropland – CO_2 (L.5, 2016) (L.5, 2015) (81, 2014) (83, 2013) Comparability	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. Documentation on the method used to estimate the carbon stock changes over time has not been provided in the NIR, and the correct assignment of orchards before 1984 has not been performed. During the review, the United Kingdom informed the ERT that a proposal to adjust the historical land-use change matrices used as inputs to the soil carbon model, to take into account the reclassification of orchards, will be provided.
L.11	4.B Cropland – CO_2 (L.16, 2016) (L.16, 2015)	Report CO_2 emissions from all organic cropland soils in CRF table 4.B.	Not resolved. The United Kingdom reported areas of organic and mineral soils together for the entire country in CRF table 4.B, while the

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	Comparability		area of drained organic soils of the United Kingdom only (excluding OTs and CDs) was reported in CRF table 4(II). Moreover, in CRF table 4.B the Party reported that CO_2 emissions from these organic soils are included under emissions from mineral soils, while CO_2 emissions from drained organic soils in the entire country were reported in CRF table 4(II) (see ID# L.21 in table 5).
L.12	4 (IV) Indirect N_2O emissions from managed soils – N_2O (L.17, 2016) (L.17, 2015) Completeness	Report indirect emissions of N_2O from managed soils in CRF table 4(IV) or provide a justification for the exclusion in terms of the likely level of emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The United Kingdom reported indirect N_2O emissions from managed soils in CRF table 4(IV).
L.13	4.G.3 Other (harvested wood products) – CO_2 (L.18, 2016) (L.18, 2015) Accuracy	Include verifiable production data from the CARBINE model and the corresponding factors used to convert the production data to carbon, and report those data in CRF table 4.Gs2 to enable a more thorough verification of the HWP estimates.	Addressing. The United Kingdom reported production data and factors used to convert the data from product units to carbon in CRF table 4.Gs2. However, the data the Party reported differ from FAOSTAT data of the Food and Agriculture Organization of the United Nations (http://www.fao.org/faostat/en/#data/FO) and no explanation for this difference has been provided in the NIR.
Waste			
W.1	5.A Solid waste disposal on land – CH_4 (W.2, 2016) (W.2, 2015) (91, 2014) (98, 2013) Transparency	Implement the proposed improvements of the emission estimates for solid waste disposal sites in the OTs and CDs 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.	Not resolved. The Party reported AD for the United Kingdom but included only emissions, not AD, for its OTs and CDs. In addition, the NIR (table A.3.5.3) provides some information but not on the parameters used, such as AD, MCF and DOC. During the review, the Party noted that it considers acting on this recommendation to be a low priority given the insignificance of landfill emissions from the OTs and CDs relative to the national totals.
W.2	5.A Solid waste disposal on land – CH_4 (W.5, 2016) (W.5, 2015) Transparency	Include in the NIR information on the parameters used in the MELMod model, including the exact figures and background information on their origin or method of derivation, and a weblink to the report on the review of landfill methane emissions modelling.	Addressing. The United Kingdom did not provide all the requested information in section 7.2.2 of or the annexes to the NIR. During the review, MELMod model parameters were provided to the ERT and the Party commented that this information would be included in the 2018 submission.
W.3	5.A Solid waste disposal on land – CH_4 (W.6, 2016) (W.6, 2015) Transparency	Modify the text in the NIR (section 7.2.3.4) to avoid inconsistency of the information on the estimation of CH_4 emissions from the Isle of Man (i.e. the landfill model is also used for the Isle of Man but with simplified parameters).	Resolved. The NIR (section 7.2.3.4) has been adapted to reflect the fact that the United Kingdom uses the IPCC model for all landfill estimates from its OTs and CDs. However, the transparency of the parameters and AD used for the OTs and CDs is still an issue (see ID# W.1 above).

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
W.4	5.B. Biological treatment of solid waste – CH_4 and N_2O (W.7, 2016) (W.7, 2015) Comparability	Report CH_4 and N_2O 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).	Resolved. CH_4 and N_2O emissions from the composting stage of mechanical–biological treatment are reported under composting in line with the 2006 IPCC Guidelines. The notation key "NO" is used for N_2O emissions from anaerobic digestion (see ID# W.14 in table 5).
W.5	5.D Wastewater treatment and discharge – CH_4 (W.3, 2016) (W.3, 2015) (92, 2014) (102, 2013) Transparency	Improve the transparency of the employed EFs by providing a more detailed explanation in the NIR.	Resolved. An additional section (7.5.2.1) with the required explanation has been added to the NIR.
W.6	5.D.1 Domestic wastewater – CH_4 (W.8, 2016) (W.8, 2015) Transparency	More clearly state in the NIR what paths are covered under category 5.D.1 and provide more information on the methodology applied by the water companies for their reporting in accordance with the Carbon Accounting Workbook.	Resolved. A detailed description of the United Kingdom's wastewater treatment industry is included in the NIR (section 7.5.2.1).
W.7	5.D.1 Domestic wastewater – CH_4 (W.8, 2016) (W.8, 2015) Transparency	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 in the sectoral chapter on QA/QC activities.	Resolved. The requested information is included in the extended QA/QC and verification chapter of the NIR (section 7.5.4).
W.8	5.D.1 Domestic wastewater – CH_4 (W.9, 2016) (W.9, 2015) Transparency	Include information in the NIR on population number connected to a septic system, as well as the BOD values applied.	Not resolved. The NIR does not contain the requested information.
W.9	5.D.1 Domestic wastewater – N_2O (W.10, 2016) (W.10, 2015) Transparency	In the NIR provide a detailed description and justification for the update of the fraction of N in protein (1.16) and the fraction of industrial and commercial co-discharged protein (1.25) and information on the consideration of sludge incineration and sludge spreading on agricultural lands, and update the CRF tables accordingly.	Addressing. The requested information is included in the NIR (section 7.5.2.3). However, the CRF table has not been updated yet (see ID# W.16 in table 5).
W.10	5.D.2 Industrial wastewater – CH_4 (W.11, 2016) (W.11, 2015) Accuracy	Report on any progress in collecting the data needed to report AD and emissions from industrial wastewater separately from domestic wastewater.	Addressing. The United Kingdom states in the NIR (p.441) that it is attempting to collect information on the domestic–industrial split in wastewater treatment from water companies in order to confidently build a time series from which double counting is eliminated.

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
KP-LULUCF			
KL.1	General (KP-LULUCF) (KL.3, 2016) (KL.3, 2015) Transparency	Include specific information on how land under CM, GM and WDR is identified, especially related to the report developed as part of the ongoing project on areas of WDR.	Addressing. The United Kingdom provided limited information in the NIR (pp.485 and 486) indicating that lands under CM and GM are identified consistently with cropland and grassland under the Convention. Updated information on the ongoing project related to WDR is not included in the NIR (see ID# KL.25 in table 5).
KL.2	General (KP-LULUCF) (KL.4, 2016) (KL.4, 2015) Accuracy	Improve the QA/QC process and correct the inconsistency in the area of land converted to forest under the Convention and 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 AR (reported as 10.7 kha in table NIR-2)).	Not resolved. The same inconsistency is still present in the submission; that is, for 2014, the area of land converted to forest land reported in CRF table 4.1 (13.94 kha) does not match the area of AR reported in table NIR-2 (14.09 kha) (see ID# KL.15 in table 5).
KL.3	General (KP-LULUCF) (KL.5, 2016) (KL.5, 2015) Completeness	Ensure that emissions and removals from land-use change between cropland and grassland/grazing land and conversion of cropland and grassland/grazing land to settlements are included in accounting under the Kyoto Protocol.	Resolved. The United Kingdom reported net emissions/removals for CM and GM activities in OTs and CDs.
KL.4	General (KP-LULUCF) (KL.6, 2016) (KL.6, 2015) Transparency	Include information in the NIR in accordance with decision 2/CMP.8, annex II, paragraph 5(c) and (e).	Addressing. The United Kingdom provided the information required in accordance with decision 2/CMP.8, annex II, paragraph 5(c); however, information in accordance with decision 2/CMP.8, annex II, paragraph 5(e), is incomplete (see ID# KL.11 below and ID# KL.20 in table 5).
KL.5	General (KP-LULUCF) (KL.16, 2016) (KL.16, 2015) Completeness	Provide estimates of emissions and removals for the Cayman Islands and Gibraltar.	Not resolved. The United Kingdom did not report estimates of emissions and removals from KP-LULUCF activities for these land areas. The Party reported in the NIR (annex 3.4.11) that GHG emissions/removals were not estimated for the Cayman Islands owing to insufficient information, and for Gibraltar owing to the apparent insignificance of emissions/removals.
KL.6	Afforestation and reforestation – CO_2 (KL.7, 2016) (KL.7, 2015) Accuracy	Implement the new model to estimate the soil organic carbon pool under AR.	Resolved. The United Kingdom reported net emissions/removals from the soil organic carbon pool using the new soil submodel of the CARBINE model, and provided information on the model in the NIR (section 6.4.4 and annex A.3.4.1).
KL.7	Deforestation – CO_2 (KL.8, 2016) (KL.8, 2015)	Provide further information in the NIR on the drivers of deforestation and the associated carbon stock	Resolved. The United Kingdom provided the requested information in the NIR (section 11.1.3).

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	Transparency	changes.	
KL.8	Deforestation – CO_2 (KL.9, 2016) (KL.9, 2015) Accuracy	Find a method to verify that the carbon stocks in living biomass prior to deforestation are not underestimated.	Not resolved. The United Kingdom continues to use an average value for estimating living biomass prior to deforestation events. During the review, the Party informed the ERT that it is currently trying to identify a method for verifying that carbon stocks in areas prior to deforestation are not underestimated.
KL.9	Article 3.4 activities (KL.10, 2016) (KL.10, 2015) Completeness	Provide estimates of the carbon stock changes in: litter and deadwood for CM; litter, deadwood and organic soils for GM; and all carbon pools under WDR, and include a description of how these changes are estimated.	Addressing. The United Kingdom reported estimates of the carbon stock changes in organic soils for GM for the United Kingdom (excluding OTs and CDs). However, estimates for litter and deadwood for CM, litter and deadwood for GM, and all carbon pools under WDR are still missing (see ID# KL.25 in table 5).
KL.10	Forest management– CO_2, CH_4 and N_2O (KL.12, 2016) (KL.12, 2015) Accuracy	Correct the value of the FM cap in the CRF table "Accounting".	Not resolved. The United Kingdom did not report an updated FM cap. It reported in the CRF table "Accounting" a value based on 3.5 per cent of the base-year emissions, as reported in the 2017 annual submission. However, the FM cap is fixed for the second commitment period of the Kyoto Protocol, as contained in the report on the review of the report to facilitate the calculation of the assigned amount (FCCC/IRR/2016/GBR).
KL.11	Forest management – CO_2 (KL.11, 2016) (KL.11, 2015) Transparency	Include information in the NIR on the main changes in the inventory leading to the technical correction of the FMRL (including the inclusion of carbon emissions and removals from forest areas afforested prior to 1921, changes in the assumptions used for the species mix, growth rates and intensity of management).	Addressing. The United Kingdom reported information on the technical correction of the FMRL in the NIR (section 11.5.2.3). However, more detailed information is required: inclusion of carbon emissions and removals from forest areas afforested prior to 1921, changes in the assumptions used for the species mix and quantitative implications of changes in growth rates (see ID# KL.20 in table 5).
KL.12	Cropland management – CO_2, CH_4 and N_2O (KL.13, 2016) (KL.13, 2015) Completeness	Report emissions from drained organic soils under CM, and ensure that the reporting of CM under the Kyoto Protocol is consistent with the reporting of LULUCF and agriculture under the Convention.	Resolved. The United Kingdom reported emissions from drained organic soils in CRF table 4(KP-I)B.2. However, the ERT identified a new issue related to the consistency of reporting between the LULUCF and the agriculture sectors (see ID# L.21 in table 5).
KL.13	Harvested wood products – CO_2 (KL.14, 2016) (KL.14, 2015) Transparency	Include information in the NIR on the data used for the HWP calculation and also provide corresponding AD (harvest) for deforestation, AR and FM separately.	Resolved. The United Kingdom reported information on the data used for the HWP calculation and provided AD for harvest for deforestation, AR and FM separately in the NIR (section 11.5.2.5 and annex 3.4.10) and CRF tables 4.Gs2 and 4(KP-I)C. The Party reported that HWP are included for 2013 onward only because the FMRL is based on projected estimates.
KL.14	Direct and indirect N_2O emissions from	Include indirect emissions of N_2O for relevant activities under the	Resolved. The United Kingdom reported indirect emissions of N_2O in CRF table 4(KP-

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	N fertilization – N_2O (KL.15, 2016) (KL.15, 2015) Completeness	Kyoto Protocol.	II)3.

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue and/or problem was raised. Issues are identified in accordance with paragraphs 80–83 of the UNFCCC review guidelines and classified as per paragraph 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with paragraph 69 of the Article 8 review guidelines, in conjunction with decision 4/CMP.11.

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

8. 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 2017 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

ID#	Previous recommendation for the issue identified	Number of successive reviews issue not addressed[a]
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.1	Implement the planned improvement of digestible energy data through the commissioned research projects	4 (2013–2017)
A.2	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	4 (2013–2017)
LULUCF		
L.5	Continue efforts to gather information on the management of privately owned forests and include in the NIR information on the management prescriptions and rotation ranges	3 (2014–2017)
L.10	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	4 (2013–2017)

ID#	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed*[a]
Waste		
W.1	Implement the proposed improvements of the emission estimates for solid waste disposal sites in the OTs and CDs 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	4 (2013–2017)
KP-LULUCF		
	No such issues for KP-LULUCF activities were identified	

[a] The review of the 2016 annual submission was held in conjunction with the review of the 2015 annual submission. Since the reviews of the 2015 and 2016 annual submissions were not "successive" reviews, but were held in conjunction, for the purpose of counting successive years in table 4, 2015/2016 are considered as one year.

V. Additional findings made during the 2017 individual inventory review

9. Table 5 contains findings made by the ERT during the individual review of the 2017 annual submission of the United Kingdom that are additional to those identified in table 3.

Table 5
Additional findings made during the 2017 individual review of the annual submission of the United Kingdom of Great Britain and Northern Ireland

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
General			
G.9	QA/QC and verification	The ERT notes that the United Kingdom provided in table 10.16 of the NIR a mostly complete summary of changes made in the inventory in response to QA/QC recommendations in previous review reports. During the review, the Party informed the ERT that other QA activities were inadvertently excluded from the table. The ERT appreciates the summary table. The ERT encourages the United Kingdom to include in the NIR all of the changes made in the inventory in response to QA/QC recommendations in previous review reports as well as other QA activities implemented as part of its QA/QC plan.	Not an issue/problem
G.10	Recalculations	The ERT appreciates the detailed summary on recalculations relating to the previous submission provided in chapter 10 of the NIR, but notes that the explanations of and justifications for the recalculations are not sufficiently transparent or in line with the requirements of paragraph 44 of the UNFCCC Annex I inventory reporting guidelines. In addition, for a number of categories the recalculated estimates in chapter 10 of the NIR are inconsistent with the estimates reported in CRF table 8. For example, for LULUCF, the explanation for some of the recalculations in NIR table 10.3 (e.g. CH_4 emissions from forest land in 1990) is "not significant recalculations", yet these recalculations do result in changes to the categories in the LULUCF sector in the range of 4 to 12 per cent. During the review, the United Kingdom clarified that these recalculations were made as a result of improved AD, and also provided several reasons for the differences between the values in the NIR and in CRF table 8, one being that the NIR recalculation tables are based on geographical coverage under the Kyoto Protocol. The Party informed the ERT that it would review the reporting of recalculations in future submissions, and it was likely that some of the differences (e.g. those due to geographical coverage) would not be an issue in the 2018 submission. The ERT recommends that the United Kingdom continue to improve the transparency of reporting by providing explanations of recalculations in the NIR in accordance with paragraph 44 of the UNFCCC Annex I inventory reporting guidelines. The ERT also recommends that the Party improve the consistency in the reporting of recalculations between the NIR and CRF tables, providing in the NIR the explanations for differences therein shared with the ERT during the review (i.e. the differences in recalculations owing to different territorial coverage under the Convention and the Kyoto Protocol).	Yes. Transparency
G.11	National system	The ERT notes that according to decision 19/CMP.1, annex, paragraph 16(c), Parties shall respond to requests for clarifying information resulting from the different stages of the review process of the inventory information in a timely manner. Of 16 questions related to the energy sector submitted by the ERT to the Party on 31 August 2017, one response was not received until 25 September (Monday afternoon of the review week) and a further five responses were not received until 27 September 2017 (Wednesday afternoon of the review week). The six unanswered questions,	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		including the provision of EFs for fugitive emissions from oil and natural gas (which were not present anywhere in the submission), were the most substantial and detailed of the 16 questions raised. The ERT acknowledges that the United Kingdom generally responded to issues across all sectors in a timely manner, suggesting that there is not a problem with the ability of the national system to respond to requests for clarifying information; however it noted that these delayed responses in relation to the energy sector made the review difficult as the ERT could not adequately investigate responses and ask follow-up questions. The questions raised by the ERT on the Wednesday and Thursday of the review week were, however, promptly responded to (by 4.30 p.m. on the Friday of the review week). The ERT encourages the United Kingdom to ensure that sufficient capacity is allocated during the inventory reviews for responding to the questions raised by the ERT with clarifying data and information in a timely manner in order to enable the ERT to assess adherence to the UNFCCC Annex I inventory reporting guidelines.	
G.12	National registry	The ERT notes 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 and adheres to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol. The ERT also notes that the SIAR identifies the SEF for the first commitment period of the Kyoto Protocol as not being made publicly available on the website referenced for the public Kyoto Protocol reports for the United Kingdom. During the review, the United Kingdom informed the ERT that the information was posted on the European Commission Climate Action website (https://ets-registry.webgate.ec.europa.eu /euregistry/GB/public/reports/publicReports.xhtml) and is also available on the UNFCCC website (http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/10116.php). The ERT concludes that this potential problem has been resolved.	Not an issue/problem
Energy			
E.11	1. General (energy sector) – all fuels	During the review, the United Kingdom informed the ERT that through various activities possible improvements to the inventory have been identified and included in the Party's improvement programme, which comprises a series of 'watching briefs' that are reviewed annually by the National Inventory Steering Committee. The ERT noted, however, that the United Kingdom has not clearly presented all improvements in the NIR (see ID#s E.26 and E.31 below), which is a missed opportunity for demonstrating its comprehensive improvement programme. Exchanges with the Party during the review suggested to the ERT that there are potentially more categories in the energy sector included in the programme. The appendix to decision 24/CP.19 states the NIR should include information on anticipated future improvements: "3.2.4.6. Category-specific planned improvements, if applicable (e.g. methodologies, activity data, emission factors, etc.), including tracking of those identified in the review process". The ERT considers the watching briefs and the broader improvement programme to be planned improvements. The ERT encourages the United Kingdom to include in the NIR details on all energy categories and subcategories included in watching briefs and the broader improvement programme.	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
E.12	Comparison with international data – all fuels	The ERT noted discrepancies between the data reported to IEA and the data used in the annual inventory submission that were not explained in the NIR (e.g. large one-off differences occur in the data for petroleum coke (no data reported to IEA for 1990 and 1991), gasoline (2002, 2003), other oil (1992, 1994) and refinery feedstocks (2013)). During the review, the Party explained that the national energy statistics team prioritizes recalculating the most recent (three to five) years but that, in order to maintain time-series consistency, all years are recalculated for the GHG inventory. This can result in differences (some large) between IEA and inventory data in the earlier years of the time series. The Party further explained that distances travelled between the United Kingdom and its OTs and CDs are outside of the scope of the energy statistics and not included in IEA data but are non-trivial and therefore are included in the inventory. In addition, the Party explained that geographical coverage differs between data reported to IEA and to the UNFCCC. The ERT encourages the United Kingdom to enhance the transparency of the NIR by including explanations for and quantifications of known differences between the data submitted to IEA and those used in the GHG inventory.	Not an issue/problem
E.13	Feedstocks, reductants and other non-energy use of fuels – liquid fuels – CO_2	There are six blank rows in CRF tables 1.A(b) and 1.A(d) corresponding to cells that should be labelled as "NO". The ERT recommends that the United Kingdom ensure reporting is complete as well as consistent between CRF tables 1.A(b) and 1.A(d) by reporting data or notation keys for other gaseous fuels in CRF table 1.A(b) and by using the same data or notation keys for other liquid fossil fuels, other gaseous fuels, other fossil fuels and other fossil fuels in CRF table 1.A(b) in the corresponding cells in CRF table 1.A(d).	Yes. Comparability
E.14	Multilateral operations – all fuels	The United Kingdom reported "NE" for multilateral operations in CRF table 1.D. During the review, the Party clarified that data were not collected for this activity. Paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines states: "Where 'NE' is used in an inventory to report emissions or removals of CO_2, N_2O, CH_4, HFCs, PFCs, SF_6 and NF_3, the Annex I Party shall indicate in both the NIR and the CRF completeness table why such emissions or removals have not been estimated". The ERT encourages the United Kingdom to describe in the NIR and CRF tables why emissions from multilateral operations are reported as "NE".	Not an issue/problem
E.15	1.A.1.c Manufacture of solid fuels and other energy industries – liquid fuels – N_2O	The N_2O EFs used for this subcategory (ranging from 4.33 to 6.46 kg/TJ) are the highest of all reporting Parties and are higher than the IPCC default range (0.03–2.00 kg/TJ). Justification for the use of these high EFs was not included in the NIR. During the review, the United Kingdom explained that the EFs used are dominated by offshore combustion of natural gas (different EFs are used for upstream oil and natural gas sources) and are informed by operator-reported data. The Party further explained that the operator-reported data comprise the most authoritative and accurate data source available for this subcategory. The ERT agrees that operator-reported data are more accurate than default values. The ERT recommends that the United Kingdom justify in the NIR the application of high N_2O EFs (e.g. that they are informed by operator-reported data and are dominated by offshore combustion of natural gas).	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
E.16	1.A.2.b Non-ferrous metals – solid fuels – CH_4	The CH_4 IEF in this subcategory exhibited a unique variable trend between 2012 and 2015. In 2012 the IEF was 1.32 kg/TJ, and it increased by 352.4 per cent (to 5.95 kg/TJ) in 2013. The IEF increased again in 2014 (to 7.27 kg/TJ) before decreasing slightly in 2015 (to 7.04 kg/TJ). During the review, the United Kingdom explained this trend as being caused by the closure of an auto-generating aluminium plant and the consequent reallocation of the generator to subcategory 1.A.1 for 2013 onward.	Yes. Transparency
		The ERT recommends that the United Kingdom describe in the NIR the fluctuation in the CH_4 IEF over the time series, especially between 2012 and 2015.	
E.17	1.A.3.a Domestic aviation – liquid fuels – CH_4	The CH_4 IEF in this subcategory exhibited a unique variable trend: it decreased by 49.4 per cent between 2009 (31.14 t/TJ) and 2010 (15.72 t/TJ), while the rest of the time series was internally consistent (the values of the IEFs for 1990–2009 were similar and the values for 2010–2015 were similar). During the review, the Party explained this trend as being caused by there being few aircraft models in the United Kingdom that use aviation fuel (which comprises a small fraction of the fuel used in aviation) and by changing EF assumptions sometimes leading to significant changes in the reported IEF.	Yes. Transparency
		The ERT recommends that the United Kingdom describe in detail in the NIR any changes in assumptions for the CH_4 EF for aviation fuel to justify the unique trend in IEF between 2009 and 2010.	
E.18	1.A.4.a Commercial/ institutional – biomass – N_2O	In CRF table 1.A(a)s4, neither data nor notation key are reported for biomass. During the review, the United Kingdom explained that this source does not occur in the country.	Yes. Transparency
		The ERT recommends that the United Kingdom ensure that the notation key "NO" is used for biomass combustion in CRF table 1.A(a)s4, and that a brief mention in the corresponding method statement in the NIR is made about this source not occurring.	
E.19	1.A.II.1 Waste incineration with energy recovery – biomass – CO_2, CH_4 and N_2O	The United Kingdom reported the memo item biomass consumption in waste incineration with energy recovery as "NE" in CRF table 1.A(a)s4. During the review, the Party explained that it does not have data on the biogenic carbon content of waste, so it reports only total emissions from waste excluding biogenic CO_2 emissions. The ERT notes that details on the actual amounts of biogenic carbon reported for the subcategories and fuels should be included in the NIR.	Not an issue/problem
		The ERT encourages the United Kingdom to explain in the NIR that it reports the memo item biomass consumption in waste incineration with energy recovery as "NE" in CRF table 1.A(a)s4 because it does not have data on the biogenic carbon content of waste.	
E.20	1.B Fugitive emissions from fuels – all fuels –	In the submission, specific EFs and their sources, by category, are reported in an accompanying background data file rather than directly in the NIR. The ERT determined that the EFs for category 1.B are not included in this file or in the NIR. During the review, the Party provided another file that included, for category 1.B, EFs for fugitive emissions of CH_4 and N_2O but not of CO_2. The ERT noted that CH_4 EFs for subcategories 1.B.2.a.4 (oil refining/storage), 1.B.2.b.2	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
	CO_2, CH_4 and N_2O	(oil production), 1.B.2.c.i (oil venting) and 1.B.2.c.ii (gas venting) were identical to the CH_4 emissions (in kt) reported in CRF table 1.B.2 for the entire time series. The United Kingdom explained that, where operator-reported emission totals inform estimates (such as for 1.B.2.a.2 oil production, 1.B.2.b.3 gas production, and all venting emissions from oil and natural gas production under 1.B.2.c.1), underlying EFs are unable to be derived. The Party proposed that it could provide information in the NIR to clarify how estimates are compiled from operator-reported data. The ERT recommends that, where possible, the United Kingdom include all subcategory EFs for CO_2, CH_4 and N_2O and corresponding references for their sources for category 1.B (fugitive emissions from fuels) in the NIR or the accompanying background data file. Further, the ERT recommends that, for all subcategories where emissions are directly reported and EFs cannot be reported, the Party provide information in the NIR to clarify how the estimates are compiled from operator-reported data.	
E.21	1.B.1 Solid fuels – CH_4	The ERT noted that in the NIR (p.188) the United Kingdom states that emission data for deep-mined coal, coal storage and transport and open-cast coal were not available for 2015 and therefore mine-specific production data from DUKES (BEIS, 2016) were used to calculate emissions for that year. The Party did not transparently describe how the 2015 data were verified for completeness. The ERT considers that the 2015 emission estimates are as complete as possible given the circumstances, but that transparency in the NIR could be improved. The ERT recommends that the United Kingdom elaborate on the method description in the NIR to explain that the estimates are complete and that, although EF data are not available for 2015, the EFs for 2013 and 2014 were applied to the complete and consistent AD time series of coal production.	Yes. Transparency
E.22	1.B.1.a Coal mining and handling – solid fuels – CO_2	During the review, in response to ID# E.10 in table 3, the United Kingdom explained that data on the CO_2 content of coal in the country are not available (emissions for this subcategory are therefore reported as "NE"), and that it does not intend to investigate improvements for this subcategory as the level of emissions is low and sharply declining. The ERT notes that there are no IPCC default factors available for this category. The ERT encourages the United Kingdom to improve the transparency of the NIR by including the explanation provided to the ERT during the review as to why emissions from this source are reported as "NE" (i.e. data on the CO_2 content of coal in the United Kingdom are not available) and why the Party does not intend to investigate improvements (i.e. emissions from the category are at a low level and sharply declining).	Not an issue/problem
E.23	1.B.2 Oil and natural gas and other emissions from energy production – all fuels – CO_2 and CH_4	During the review, the United Kingdom informed the ERT that a countrywide weighted average of natural gas composition in transmission was used that did not have sufficient resolution to take into account the differences between LNG and natural gas or between upstream (higher in relative CO_2 content) and downstream (lower in relative CO_2 content, higher in relative CH_4 content) sources. The ERT encourages the United Kingdom to add to its improvement plan (e.g. through watching briefs) the necessity to continuously review data sources so as obtain data that allow a better understanding of the differences in relative CO_2 and CH_4 content in the Party's upstream and downstream sources and well as LNG, natural gas and	Not an issue/problem

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		unconventional gas streams with a view to adapting its methods to accommodate these differences.	
E.24	1.B.2 Oil and natural gas and other – all fuels – CO_2, CH_4 and N_2O	The ERT noted that in the NIR the United Kingdom states several times (e.g. p.195) that reporting to EEMS, which is used to collect data for many oil and natural gas fugitive emission subcategories, has been voluntary since 2010 and has been augmented with less comprehensive EU ETS data for the years since. Given this, the ERT considers that complete coverage for the period 2010–2015 may not have been assured. During the review, the Party described the situation in more detail: since 2010, EEMS has been voluntary only for onshore exploration and production wells. All offshore oil and gas exploration, platforms, floating production storage and offloading vessels and well testing rigs are still required to be reported in EEMS. The United Kingdom provided information about the regulatory bodies responsible for onshore terminals, and clarified that a two-tiered system and a series of QC measures have been used to ensure completeness of the inventory since 2010. The ERT recommends that the United Kingdom describe in more detail the QC measures in place to verify the completeness of the onshore exploration and production given the incomplete (voluntary) nature of EEMS and EU ETS data.	Yes. Transparency
E.25	1.B.2 Oil and natural gas and other – all fuels – CO_2, CH_4 and N_2O	In the NIR, the United Kingdom provided 'method statements' to group categories for which the data and methods are similar with a view to improving the clarity of the NIR by avoiding repetition of method descriptions. During the review, the ERT determined that some documentation of fugitive emissions from oil and natural gas lacks transparency, with a small number of subcategories being incorrectly listed in NIR table 3.5 ("Method statement scope: IPCC and source categories"). These subcategories should be reported as "IE" rather than being listed in NIR table 3.5 or should be described in the text of the NIR (see ID#s E.27 and E.28 below). The ERT recommends that the United Kingdom enhance the transparency of the reporting on the coverage and allocation of fugitive emissions from oil and natural gas by including all IPCC subcategories in NIR table 3.5 as they are reported in CRF table 1.B.2 (e.g. if a subcategory is reported as "IE" in CRF table 1.B.2, include the respective IPCC category in the appropriate row of NIR table 3.5 where the emissions are reported). Further, the ERT recommends that the Party review all fugitive emissions from oil and natural gas that are reported as "IE" in the NIR but not able to be distinguished in the CRF tables owing to aggregation levels (i.e. the United Kingdom reports in the NIR subcategories under natural gas exploration) or not transparent in the NIR and report its findings in the NIR.	Yes. Transparency
E.26	1.B.2 Oil and natural gas and other – all fuels – CO_2, CH_4 and N_2O	The ERT noted that the United Kingdom states in the NIR (p.195) that it intends to investigate available sources of AD for emissions from oil and gas blowouts (1.B.2.a.i and 1.B.2.b.i). The ERT noted, however, that this intention is not included in the improvements (completed or planned) listed under the corresponding method statements. The ERT encourages the United Kingdom to move the planned improvement for emissions from oil and gas blowouts listed on page 195 of the NIR to the planned improvements section of the NIR, and to include the information provided to the ERT during the review that the inclusion of oil and gas blowout AD in the submission is part of the	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		improvement programme.	
E.27	1.B.2 Oil and natural gas and other – all fuels – CO_2 and CH_4	The ERT could not assess the AD, methodologies and EFs for subcategories 1.B.2.a.1 (oil exploration) and 1.B.2.b.1 (natural gas exploration) as they were not adequately described in the NIR. Table 4.2.1 of the 2006 IPCC Guidelines (volume 2, chapter 4) includes methods for splitting between well drilling, well testing and well completion emissions; however, the United Kingdom referred only to well testing when discussing the AD, methods and EFs for these subcategories. This made it difficult for the ERT to assess completeness and accuracy, as the CRF tables do not have a fine enough resolution to discern what the Party has included when reporting emissions under these subcategories. The United Kingdom explained during the review that well drilling and well completions were included under well testing because the available data could not be disaggregated. The Party further explained that combustion and fugitive emissions from these subcategories were also reported together because they could not be disaggregated, although the split between combustion and fugitive emissions across the energy sector is not clear to the ERT. The ERT recommends that the United Kingdom describe in the NIR the coverage of the AD, methods and EFs for estimating emissions from well drilling, well testing and well completions in oil and natural gas exploration, and clarify whether these emissions are reported under category 1.A (fuel combustion activities) or 1.B (fugitive emissions from fuels).	Yes. Accuracy
E.28	1.B.2.a Oil – liquid and gaseous fuels – CO_2	During the review, the ERT asked the United Kingdom to clarify whether CO_2 emissions from refinery flaring are included in the inventory as the ERT could not determine this from the information provided in the NIR. In response, the Party explained that the fugitive and oil combustion emissions from refineries are from company reports submitted under the EU ETS but that to preserve confidentiality these emissions are reported in aggregate under subcategory 1.A.1.b (petroleum refining). The ERT recommends that the United Kingdom include in NIR table 3.17, under the methodological description for subcategory 1.B.2.c (flaring at upstream oil, gas facilities), the information that CO_2 emissions from refinery flaring are reported as "IE" under combustion-related emissions from petroleum refining (1.A.b). Further, the ERT recommends that the Party clearly note in the NIR under Method Statement 1 (Power stations, refineries and other energy industries (p.125)) – 1.A.1.b (petroleum refining) that fugitive CO_2 emissions from 1.B.2.a.4 (oil refining/storage) are reported with the corresponding combustion emissions from refining.	Yes. Transparency
E.29	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4	In the NIR (p.194) the United Kingdom states that there is no active exploration or production of shale gas in the country; however, the ERT noted references to exploration reports from 2010 and 2011 (see the United Kingdom's Oil and Gas Authority website for onshore reports and data (https://www.ogauthority.co.uk/onshore/onshore-reports-and-data/) – the basic onshore well data shows 10 shale gas wells being spudded in the United Kingdom between August 2010 and January 2018). During the review, the Party explained that these preliminary activities are not accounted for in the inventory. It reiterated the fact that no production of shale gas has occurred yet, and stated that any future production-scale activity would be covered by existing mechanisms that inform emission estimates in the inventory. The Party did not explain how exploration data would be captured or incorporated in the inventory. The ERT considers	Yes. Transparency

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		that it is likely that gas well drilling and drill stem testing occurred during these exploratory activities, and that the inventory is therefore not complete. The ERT noted that the 2006 IPCC Guidelines include a methodology to estimate these emissions. The ERT recommends that the United Kingdom estimate and report CO_2 and CH_4 emissions from exploratory activities or, if the Party considers them insignificant, report them as "NE" and justify that the likely level of emissions is below the significance threshold established in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. In addition, the ERT encourages the Party to describe in future NIRs the mechanisms it has in place to capture unconventional oil and gas exploration and production activities (including forthcoming shale gas exploration and production) as they occur.	
E.30	1.B.2.b Natural gas – gaseous fuels – CO_2	The NIR (p.202 and table 10.4) includes the information that recalculations for CO_2 emissions for 2012–2014 were made owing to a reduction in LNG storage activity. The ERT noted that, because of the nature of downstream LNG (there is little or no CO_2 entrained in the LNG), it is unlikely that there would be CO_2 reductions from a decrease in LNG-related AD. The United Kingdom explained during the review that the trend of decreasing fugitive CH_4 emissions resulting from the reduction in LNG AD was applied to the CO_2 time series as well, which it acknowledged may be somewhat inaccurate. The Party also stated that the revisions amounted to approximately 0.00002 per cent of total national CO_2 emissions, which is insignificant and below the threshold for commencement of adjustment procedures in accordance with decision 22/CMP.1, annex, paragraph 80(b). The ERT encourages the United Kingdom to reassess the assumptions behind future recalculations for LNG and to report any findings (and any resulting recalculations) in the NIR.	Not an issue/problem
E.31	1.C CO_2 transport and storage – gaseous fuels – CO_2	The United Kingdom currently reports carbon capture and storage as "NO". During the review, the ERT asked the Party to clarify how it would identify and collect AD for this source if it were to arise in the future. The United Kingdom explained that a watching brief on this issue is included in the improvement programme and is reviewed annually by the National Inventory Steering Committee. The appendix to the UNFCCC Annex I inventory reporting guidelines states that the NIR should include information on anticipated future improvements: "3.2.4.6. Category-specific planned improvements, if applicable (e.g. methodologies, activity data, emission factors, etc.), including tracking of those identified in the review process". The ERT encourages the United Kingdom to enhance the transparency of the NIR by stating that category 1.C is included in the Party's improvement programme and the occurrence of any related activities is reviewed annually.	Not an issue/problem
IPPU			
I.14	2.A.2 Lime production – CO_2	The lime production AD reported by the United Kingdom in CRF table2(I).A-Hs1 were back-calculated from the reported CO_2 emissions by using a default EF (121.5 t C/kt limestone or dolomite). The CO_2 emission data, obtained from EU ETS reports, were plant specific. The ERT notes that for the reported AD that were back-calculated from	Yes. Adherence to the UNFCCC Annex I inventory

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		reported CO_2 emissions, it cannot use the CO_2 IEF reported in the CRF tables to assess the accuracy, comparability and completeness of the emissions reported under this subcategory. During the review, the Party explained that lime production data are included in the Prodcom database of the Office for National Statistics but the inventory agency does not have access to these data – they are not publicly available because of confidentiality restrictions. The ERT recommends that the United Kingdom collect lime production data so that it may be made available upon request to future ERTs in order to enable them to assess the accuracy, comparability and completeness of the emissions reported under this subcategory in accordance with the UNFCCC review guidelines.	reporting guidelines
I.15	2.A.4 Other process uses of carbonates – CO_2	The United Kingdom reported in the NIR (p.220) that the inventory agency has no information on any use of soda ash in the country outside the glass industry, and so no emission estimates have been made for soda ash use apart from those from use in the glass industry. The ERT notes that CO_2 could also be emitted from soda ash use in the pulp and paper industry, during the desulfurization of fuels, as a pH and water hardness regulator, in detergents and in the production of chemicals (sodium phosphates, sodium silicates, chrome chemicals and photographic chemicals), as indicated in the 2006 IPCC Guidelines (volume 3, chapter 2). During the review, the Party informed the ERT that the primary sources that the ERT noted that may be occurring in the country are as a pH and water hardness regulator in hard water areas (e.g. the south-east of England (most other areas of the United Kingdom have soft water)) and in detergents. The Party does not have data for these sources. The ERT suggested that the Party could make a conservative estimation of the CO_2 emissions from soda ash use by using import–export and production data. The United Kingdom replied that data sources such as the Office for National Statistics Prodcom database and Her Majesty's Revenue and Customs import–export data do not provide information for individual chemicals. The Party also explained that in neighbouring countries with similar size economies, the level of emissions from non-glass use of soda ash is based on a national mass balance assuming 100 per cent emissions (which is likely therefore to be conservative) and in 2015 this is 0.017 per cent of the national total for Germany, 0.021 per cent for Denmark and 0.033 per cent for France. While acknowledging that this is not conclusive evidence, the United Kingdom considers that emissions from this category would most likely be approximately 0.02 per cent of the national total (the ERT notes that this is approximately equal to 101 kt CO_2 eq), which is below the threshold of significance defined in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. The ERT recommends that the United Kingdom either estimate and include in the inventory the CO_2 emissions associated with the non-glass use of soda ash or include in the NIR a justification, consistent with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, for these emissions being considered insignificant.	Yes. Accuracy
I.16	2.B.2 Nitric acid production – N_2O	The ERT noted that the IEF (kg N_2O/t nitric acid) for the years 2012 to 2015, which fluctuates from 0.000115 to 0.000142 t/t, is approximately half of the lowest IEF reported by all Parties (the range is from 0.0001 to 0.005 t/t). During the review, the United Kingdom explained that the inventory agency does not have any information on the technical details of the abatement systems in use. However, emission data are based on continuous monitoring at the two plants in the country and their operator has explained that the monitoring is subject to an uncertainty of 5–10 per	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		cent. The ERT recommends that the United Kingdom include information in the NIR on the abatement systems (e.g. information on efficiency, abatement technology, EF of the unabated process) of the nitric acid production plants that were in operation in the country during the years 2012 to 2015 that justifies the low IEFs.	
I.17	2.B.2 Nitric acid production – N_2O	The United Kingdom reported in NIR table A.2.1.1 that the uncertainty of AD and EFs for N_2O emissions is 10 and 100 per cent, respectively. During the review, the United Kingdom explained that the N_2O emissions are subject to an uncertainty of 5–10 per cent (see ID# I.16 above). Regarding the apparent discrepancy, the Party explained that the high uncertainty reported in table A.2.1.1 reflects the uncertainty in the base year (1990) emission estimates, for which continuous monitoring of emissions had not started. The ERT recommends that the United Kingdom update the uncertainty analysis to reflect that N_2O emissions from nitric acid production are based on continuous monitoring.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
I.18	2.C.1 Iron and steel production – CO_2	Figure 3.1 of the NIR (p.140) states that some CO_2 emissions from iron and steel production are reported under category 2.A.3. The ERT notes that this information contradicts that in section 4.16.2 of the NIR. During the review, the United Kingdom clarified that the labels on figure 3.1 are incorrect and should refer to category 2.C.1.d (in the case of the label for the sinter/blast furnace outputs) and 2.C.1.a (in the case of oxygen furnace outputs) and confirmed that all CO_2 emissions from iron and steel production are reported under category 2.C.1. The ERT recommends that the United Kingdom update figure 3.1 in the NIR to clarify the subcategories under which CO_2 emissions from sintering, blast furnaces and oxygen furnaces are reported.	Yes. Transparency
I.19	2.C.4 Magnesium production – HFCs and PFCs	The United Kingdom reported in the NIR (pp.256 and 257) that some magnesium dye casters have used a fluoroketone (FK 5-1-12) or HFC-134a rather than SF_6 as the cover gas. The ERT noted that, although the use of these gases leads to decomposition products that contain GHGs (e.g. PFCs), no emissions were reported from the use of these gases. During the review, the Party explained that it estimated that the decomposition of 1 t FK 5-1-12 generates about 400 t CO_2 eq PFCs. As this product is used only at one small magnesium production plant and has been trialled at one larger plant, total emissions in the United Kingdom due to the decomposition of FK 5-1-12 could be up to about 2 kt CO_2 eq per year since 2012 (i.e. up to 0.000004 per cent of national total emissions) and zero before 2012. The Party noted that these emissions could be considered insignificant according to paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. Regarding the decomposition products from HFC-134a use, the United Kingdom informed the ERT that only 10–20 per cent of HFC-134a consumption is emitted: the rest of the HFC-134a reacts with the magnesium and is broken down into other chemicals with very low global warming potentials. The emissions of these chemicals would be dwarfed by the Party's conservative estimate of the proportion of HFC-134a that is emitted and included in the national inventory (i.e. 20 per cent). The ERT recommends that the United Kingdom either estimate and include in the submission emissions of PFCs	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		and/or HFCs that are the decomposition products from the use of FK 5-1-12 and HFC-134a by magnesium dye casters or include in the next NIR the information presented to the ERT during the review that justifies, in accordance with the UNFCCC Annex I inventory reporting guidelines, these emissions being considered insignificant.	
I.20	2.D.2 Paraffin wax use – CO_2	The United Kingdom reported in the NIR that DUKES provides the total consumption of paraffin waxes for the years 1990–2009 only. For 2010 onward, paraffin wax consumption is available only as part of the much larger consumption category "miscellaneous petroleum products" and is estimated on the basis of the proportion of paraffin wax of the total consumption of miscellaneous petroleum products in the year 2009. The ERT determined that paraffin wax AD are available from Eurostat (2017 edition) (http://ec.europa.eu/eurostat/web/energy/data/energy-balances), but noted that the Eurostat data are different from the data used from DUKES for the inventory for the years 1990–2009. For example, in CRF table 2(I).A-Hs2, the consumption of paraffin wax in 2009 is 34.09 kt, while according to Eurostat data it is 26.9 kt (a difference of 27 per cent). During the review, the United Kingdom explained that the inventory agency is not responsible for the Eurostat returns data. The Party also explained that it will engage with the United Kingdom energy statistics team to determine whether there are more granular data the team could provide to the inventory agency or publish and the reasoning behind discontinuing publication of this granular data in the national statistics as well as the differences between DUKES and Eurostat data. The ERT recommends that the United Kingdom examine the availability of paraffin wax AD for the entire time series (1990–2015). The ERT also recommends that the Party explain the differences between the data used from DUKES for the inventory and Eurostat data.	Yes. Accuracy
I.21	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2	The United Kingdom reported in the NIR (p.264) that urea is used by HGVs and buses in the country that are manufactured to Euro IV and V standards. There is no mention in the NIR about the use of urea by Euro VI standard HGVs and buses. During the review, the Party clarified that it includes emissions from urea use in Euro VI HGVs and buses in the estimates of CO_2 emissions from urea use in road transport catalysts. The fuel consumption data are determined using the same approach as is described in the NIR for Euro IV and V HGVs and buses but, in accordance with the *EMEP/EEA air pollution emission inventory guidebook 2016*, a 3.5 per cent urea solution in fuel is considered. The United Kingdom also assumes that 100 per cent of Euro VI HGVs and buses are equipped with selective catalytic reduction abatement. The ERT recommends that the United Kingdom describe in the NIR that CO_2 emissions from urea use in Euro VI standard HGVs and buses are included in the reported estimates from urea use in road transport catalysts, that fuel consumption data are determined using the same approach as is described in the NIR for Euro IV and V HGVs and buses, but, in accordance with the *EMEP/EEA air pollution emission inventory guidebook 2016*, a 3.5 per cent urea solution in fuel is considered, and that 100 per cent of Euro VI HGVs and buses are equipped with selective catalytic reduction abatement.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
I.22	2.F.1 Refrigeration and air conditioning – HFCs	The United Kingdom reported in the NIR (p.275) that HFC emissions from refrigeration and air-conditioning equipment in OTs and CDs are calculated from the United Kingdom refrigeration and air-conditioning model by using a suitable scaling factor (e.g. population, GDP), without specifying which factor was used for each activity and OT or CD. During the review, the Party explained that the factors used are: GDP for refrigerated transport and commercial and industrial refrigeration; population for domestic refrigeration and stationary air conditioning; and number of vehicles for mobile air conditioning. The ERT recommends that the United Kingdom include in the NIR the scaling factors (e.g. population, GDP) used to calculate emissions from refrigeration and air-conditioning equipment in OTs and CDs.	Yes. Transparency
I.23	2.F.1 Refrigeration and air conditioning – HFCs	The United Kingdom reported in the NIR (p.271) that emissions from subcategory 2.F.1 are estimated by a tier 3 method. According to the 2006 IPCC Guidelines, the tier 3 approach is based on actual monitoring and measurement of emissions from point sources. The ERT noted that the method applied by the Party resembles a tier 2a (EF approach based on country-specific data and assumptions) rather than a tier 3 approach. During the review, the United Kingdom confirmed the ERT's interpretation. The ERT recommends that the United Kingdom improve the description in the NIR of the tier level of the methodology that is applied for the estimation of emissions from subcategory 2.F.1, noting a tier 2a method, in line with the 2006 IPCC Guidelines, has been implemented.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
I.24	2.G.2 SF_6 and PFCs from other product use – SF_6 and PFCs	The United Kingdom applied a method consistent with the tier 2a method from the 2006 IPCC Guidelines for estimating emissions from semiconductor manufacture (SF_6 emissions from semiconductor manufacturing are combined with emissions from the manufacture of training shoes and electrical insulation in this category to protect confidential information). The ERT noted that the AD required for this method are the annual consumption of SF_6 and PFCs. During the review, the Party explained that it estimates AD using assumed growth rates, with reference to the 2001 consumption data for the category. As described in the NIR (p.287), the United Kingdom attempted to update the consumption data, but it was not feasible to collect data for individual gases. The ERT acknowledges the attempts of the Party to improve the accuracy of the AD and consequently the estimated emissions for this subcategory. The ERT recommends that the United Kingdom continue to include in its improvement plan the need for an update of the AD, based on actual consumption, for the estimation of SF_6 and PFC emissions from semiconductor manufacture, and report any progress thereon in the NIR.	Yes. Accuracy
Agriculture			
A.6	3. General (agriculture)	The United Kingdom states in its NIR that it does not estimate emissions for the following categories for the OTs and CDs listed owing to a lack of available AD: 3.F (field burning of agricultural resides) for all OTs and CDs (p.343); 3.G (liming) for the Cayman Islands (p.345); and 3.H (urea application) for Bermuda and the Falkland Islands (p.347). When the ERT asked about the likely level of emissions from these categories, the Party provided emission estimates	Yes. Completeness

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		for category 3.F for CDs (estimated not to occur from 1994 onward and to be less than 0.00005 kt gas prior to 1994) using United Kingdom IEFs and cropland areas from the CDs. For the remaining categories, it explained that there is a lack of available data. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions from these activities. The ERT recommends that the United Kingdom estimate and report emissions from categories 3.F, 3.G and 3.H for OTs and CDs or, if the Party considers them insignificant, report them as "NE" and provide a detailed explanation in the NIR on the likely level of emissions from categories 3.F, 3.G and 3.H for OTs and CDs in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	
A.7	3.D.a – Direct N_2O emissions from managed soils – N_2O	The United Kingdom uses country-specific EFs to calculate direct N_2O emissions from managed soils, including for inorganic fertilizer, animal manure applied to soils, and urine and dung deposited by grazing animals. The NIR (p.334 and 703) references Defra projects AC0114 and AC0116 (see http://www.ghgplatform.org.uk/Projects/AC0114.aspx and http://www.ghgplatform.org.uk/Projects/AC0116.aspx) as the basis for these EFs, but it not clear how they were derived. During the review, the Party provided further information on the experiments that were carried out to develop the country-specific EFs. For each treatment site combination, the averages were calculated from a minimum of three, and a maximum of six, replicates. Fertilizer treatments were split into those applied to grassland and those applied to arable land, further subdivided by fertilizer type: (1) urea-based fertilizers and (2) other N fertilizers (predominantly ammonium nitrate). For manure applications to land, there were insufficient data to divide the farmyard manure and slurry applications by grassland and arable land, and therefore individual means for N source (farmyard manure and slurry) were calculated across both land types. The EFs for grazing returns were based on experiments where urine and dung from cattle had been applied to the grassland. The United Kingdom informed the ERT that final reports for the projects are being compiled and papers drafted for publication. The ERT commends the Party for its work on improving the quality of the inventory reporting through research into country-specific EFs. The ERT recommends that the United Kingdom provide in the NIR a complete reference to the data sources used, and a clear description of the method, assumptions and calculations used to calculate the country-specific EFs for inorganic fertilizer, animal manure applied to soils, and urine and dung deposited by grazing animals.	Yes. Transparency
A.8	3.D.a.6 – Cultivation of organic soils (i.e. histosols) – N_2O	The United Kingdom reported in CRF table 3.D the area of cultivated organic soils as 285,700 ha, with corresponding N_2O emissions of 1,070.31 kt CO_2 eq, for 2015. The reported area is consistent with the area of total cropland and grassland organic soils reported in CRF table 4(II) for the United Kingdom (excluding OTs and CDs). However, CRF tables 4.B and 4.C show that the United Kingdom's OTs and CDs also contain organic soils, with a total area of cultivated organic soils (cropland and grassland) of 1,214,680 ha for 2015. The ERT sought further information from the Party as to why this area of organic soils and the corresponding emissions were not included in subcategory 3.D.a.6. The United Kingdom advised the ERT that these organic soils are present only in the Falkland Islands, and explained that the area of grassland remaining grassland (organic soils) in the Falkland Islands can be described as "unmanaged rough grassland", which is used for sheep grazing. All of the grassland remaining grassland (organic	Yes. Transparency

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		soils) for OTs and CDs is therefore assumed by the United Kingdom to be unmanaged. The ERT initially accepted the explanation from the Party that, although sheep are present, owing to the low density of sheep and lack of management practices these lands can likely be considered unmanaged lands and therefore this area of organic soils is not a contributor to N_2O emissions from subcategory 3.D.a.6. The ERT recommends that the United Kingdom provide in its NIR an explanation and further supporting evidence for the classification of organic soils in the Falkland Islands as unmanaged, and explain why the areas of organic soils in OTs and CDs are not included as a contributing source to N_2O emissions from the cultivation of organic soils.	
LULUCF			
L.14	4. General (LULUCF)	The ERT identified several inconsistencies in the information reported within the NIR and between the NIR and the CRF tables, specifically: (a) The area of wetlands remaining wetlands in OTs and CDs for 2015 reported in the NIR (table 6.1) is 0.1 kha while "NO" is reported in CRF table 4.D; (b) The NIR (section 2.3.4) states that the LULUCF sector has been a net sink since 1996, with the forest land category a decreasing sink from 1990 to 2009 and net emissions from the cropland category decreasing by 19 per cent since 1990. However, this information contradicts that in the overview (section 6.1) for LULUCF and information reported in CRF table 10s1, which indicates that the sector has acted as a net sink since 2001, the forest land category is an increasing sink and net emissions/removals from cropland decreased by 24.0 per cent in the period 1990–2015; (c) The NIR (section 2.5) states that, for the second commitment period of the Kyoto Protocol, the United Kingdom has elected to report on CM and GM activities under Article 3, paragraph 4, while there is no reference to WDR, which the Party has also elected. In addition, CM and GM activities are stated as having been reported for the first time in the current submission although net emissions/removals from these activities were reported in the 2015 submission. The ERT recommends that the United Kingdom correct the inconsistencies identified within the NIR in the general and sector-specific sections and between the NIR and the CRF tables (i.e. ensure consistency in the reporting of the area of wetlands between NIR table 6.1 and CRF table 4.D and the reporting of the trends for the forest land and cropland categories, and include WDR among the activities elected under Article 3, paragraph 4, of the Kyoto Protocol).	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
L.15	4. General (LULUCF)	The United Kingdom conducted a key category analysis for the LULUCF sector following both IPCC approaches 1 and 2, and included the results in the NIR (annex I). However, no information is reported in the NIR on which carbon pools and subcategories are significant in each key category. The ERT notes that it is good practice to use the significance of carbon pools and subcategories to determine the level of the tier method that should be used to estimate GHG emissions and removals from sources and sinks. During the review, the Party explained that it examined the criteria for a category being identified as a key category, including the magnitude and trend of the fluxes of carbon	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		emissions and removals in subcategories. As a result of the analysis, the United Kingdom made improvements to the CARBINE carbon accounting model that it uses to estimate the carbon stocks of forests to increase the accuracy of both forest carbon stock changes and fluxes and carbon stock changes in soil and litter pools. The ERT acknowledges the Party's efforts to improve the accuracy of the inventory, and commends it for taking into account in its improvement plan the results of the analysis on the magnitude and trend of the fluxes in the various subcategories. The ERT recommends that the United Kingdom implement a significance analysis to determine which carbon pools and subcategories are significant in each key category using the guidance provided in the 2006 IPCC Guidelines, and provide in the NIR detailed information on the results of the analysis.	
L.16	Land representation	The United Kingdom compiles several data sources for the representation of land uses and land-use changes. Related information is provided in the NIR (e.g. section 6.1.1 and the annexes). The ERT identified several inconsistencies in land representation and the way the land-use conversion matrix has been developed. In particular: (a) In CRF table 4.1, for all land-use categories, final areas in one year do not equal the initial areas of the next year (e.g. final cropland area in 2013 is 4,886.01 kha while initial cropland area in 2014 is 4,922.64 kha, and final cropland area in 2014 is 4,876.90 kha while initial cropland area in 2015 is 4,909.62 kha); (b) Final areas for all land-use categories in CRF table 4.1 do not match total land areas reported in the background sectoral CRF tables 4.A–4.F (e.g. final area of forest land in CRF table 4.1 in 2015 is 3,464.12 kha while total forest land area in CRF table 4.A is 3,468.95 kha); (c) The total country area reported in the background sectoral CRF tables 4.A–4.F is not constant throughout the time series, it exhibits an increasing trend; (d) The total area of OTs and CDs reported for 2015 in NIR table 6.1 is 1,292.90 kha while for previous years in the time series the Party reported a total area of 1,292.80 kha. During the review, the United Kingdom explained that efforts have been made to minimize inconsistencies in land representation to the extent possible; however, owing to the fact that several data sources have been combined, it is not possible to reduce all inconsistencies to zero. The Party informed the ERT that the most reliable data sources (for the land-use transitions and the most recent land-use category areas) are used to back-calculate final and initial land-use areas for each year and the annual area of each land-use category remaining in the same category. The United Kingdom explained that, although land areas of OTs and CDs were included in the background CRF tables, they were omitted from CRF table 4.1, and non-emitting areas of wetlands and other land in the OTs and CDs were omitted from the sectoral background CRF tables. For OTs and CDs, the Party explained that the total area increase is due to an increase in the land area of Jersey from land reclamation (an increase from 11.91 kha in 2008 to 11.95 kha in 2009, 11.97 kha in 2011 and 12.03 kha in 2015). The United Kingdom also informed the ERT that it has already re-examined the land matrix compilation and revised the methodology in order for land representation and the land-use conversion matrix to be consistent in the 2018 inventory submission.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		The ERT recommends that the United Kingdom correct all inconsistencies with regard to the representation of land use and land-use changes. In particular, the ERT recommends that the Party: (a) Report, for all land-use categories, final land areas each year in CRF table 4.1 that equal initial land areas in the next year; (b) Report, for all land-use categories, final land areas for each year in CRF table 4.1 that equal the total land areas in the background sectoral CRF tables 4.A–4.F; (c) Report all land areas under their territorial coverage (United Kingdom, OTs and CDs) in CRF table 4.1 and the background sectoral CRF tables 4.A–4.F; (d) Ensure that the total country area reported in CRF table 4.1 and the background sectoral CRF tables 4.A–4.F remains constant throughout the time series. Further, the ERT recommends that the Party provide in the NIR detailed information on how the data sources have been combined to estimate land areas and on the methodology followed for the development of the land-use conversion matrix. The ERT encourages the United Kingdom to include in the NIR a complete set of both annual and 20-year land-use conversion matrices.	
L.17	4.A Forest land – CO_2	For estimating carbon stock changes in the forest land category, the United Kingdom uses the CARBINE carbon accounting model. Carbon uptake is calculated as the net change in the pools of carbon in standing trees, litter, soil and products from harvested material, for conifer and broadleaf forests. During the review, the Party clarified that for forest land in the OTs and CDs, the C-Flow model rather than the CARBINE model is used to estimate carbon stock changes, which provides similar results. The United Kingdom informed the ERT of its intention to use the CARBINE model for the OTs and CDs once improved input data on the forest areas are available for these lands. The ERT recommends that the United Kingdom obtain the necessary input data so as to be able to apply the CARBINE model for estimating carbon stock changes in forest land in OTs and CDs.	Yes. Accuracy
L.18	4.A Forest land – CO_2	The United Kingdom provided information in the NIR (table A.3.4.1) on forest AD and the management of forests. The management of forests is represented by one of four options: clear-fell with thinnings, clear-fell without thinnings, managed but not clear-felled, and not used for timber production. Based on the description of the CARBINE carbon accounting model, the forest area subject to harvesting interventions should be estimated using timber production statistics. The rotation period for each modelled species and yield class is adjusted in the model for both forests managed by the Forestry Commission/Natural Resources Wales and private forests to match timber production. During the review, the ERT sought more information on the magnitude of forests subject to management but not being used for timber production, and on how the carbon stock changes are estimated with the CARBINE model given that human interventions and the effects of disturbances are likely not to have been reflected in the timber production statistics. The Party explained that approximately 60 per cent of the forest area is assumed to not be used for timber production, with the majority of broadleaf woodlands not used for timber production and the majority of conifer woodlands in	Yes. Completeness

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		production. The Party provided in a spreadsheet further information on the forest area per tree species and management prescriptions based on NFI data. The United Kingdom also explained that in the carbon stock change estimation process these forests are assumed to have no interventions that would remove woody material, unless they are deforested, with carbon increment estimated using the CARBINE model. The trees are assumed to grow according to the relevant yield model, with mortality contributing to the deadwood and litter, until they reach a steady state in terms of carbon stocks and emissions. The Party also estimates emissions from wildfires in forests not for timber production. However, the United Kingdom noted that by definition there is no harvesting on this land and that no reliable estimates are available on the quantity of wood removed by gathering or disturbance. Estimates are made of emissions from forest wildfires, but the effect on forest carbon stocks is not explicitly modelled. The ERT acknowledges that harvesting practices for timber production take place in the other management options; nevertheless, it notes that there are likely carbon losses occurring in the forest area not managed for timber production that are not reflected in the timber production statistics and that have not been estimated. The ERT recommends that the United Kingdom estimate and report carbon stock changes in biomass from forests not used for timber production in accordance with the 2006 IPCC Guidelines (volume 4, chapter 4) owing to biomass losses associated with harvesting and/or gathering (e.g. fuelwood) or provide transparent information justifying that such losses are not occurring.	
L.19	4.A.1 Forest land remaining forest land – CO_2	The ERT noted large inter-annual changes in the net carbon stock change in litter per area: a decrease of 50.1 per cent between 2012 and 2013 (from 0.06 t C/ha to 0.03 t C/ha) and an increase of 41.2 per cent between 2014 and 2015 (from 0.03 t C/ha to 0.04 t C/ha). Overall, between 1990 and 2015, the CO_2 IEF decreased by 24.0 per cent. During the review, the United Kingdom explained that the decline is due to the inclusion of stumps and harvesting residues in litter and to different sources of wood harvest data: prior to 2011, harvested wood production is constrained to match reported production; and after 2011, the harvesting of wood is simulated by rolling forward the rotations applied to forest areas that were determined to match the historically observed production. The Party informed the ERT that it is aware of this issue and is looking for possible solutions. The ERT recommends that the United Kingdom adjust wood harvest data derived from the modelling of the management of forests to take into account data from recent forest inventories (NFI in 2011 and an inventory of the Public Forest Estate in 2014) in order to avoid an inconsistent time series, using the overlap or any other method consistent with those described in the 2006 IPCC Guidelines (volume 1, chapter 5).	Yes. Consistency
L.20	4.A.2.5 Other land converted to forest land – CO_2	The United Kingdom reported net emissions/removals associated with other land converted to forest land (e.g. 5.37 kha in 2015). This conversion is based on the methodology applied for the development of the land-use conversion matrix (NIR, p.355). During the review, the Party clarified that this land-use change allocation was estimated during the development of the original land-use change methodology (pre-2006) to correct for the discrepancy between the total forest areas reported by the Forestry Commission and the Countryside Survey. As such, it is best described as a 'buffer' category as it is not possible to assess the original land-use category. However, the ERT notes that, according to the United Kingdom's methodology applied for the development of the land-use conversion matrix, the grassland	Yes. Accuracy

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		category is now used as the United Kingdom's buffer category to ensure a consistent total land area (NIR, p.354). The ERT recommends that the United Kingdom develop the necessary AD for the original land-use category currently reported in other land converted to forest land and allocate these land areas to the appropriate land-use conversion category when developing the land-use conversion matrix, or alternatively, if this is not possible, reclassify this land-use change as grassland converted to forest land, given that the grassland category is used as the buffer category.	
L.21	4.B Cropland 4.C Grassland – CO_2	The ERT noted that inconsistent information is reported with regard to organic soil management and drainage in cropland and grassland in the LULUCF sector (CRF tables 4.B, 4.C and 4(II)) and in the agriculture sector (CRF table 3.D). In CRF table 3.D, a constant area of cultivation of organic soils (histosols) of 285.70 kha is reported for the entire time series. This area is consistent with the total area of organic soils of cropland and grassland (92.83 kha and 192.87 kha, respectively) reported in CRF table 4(II). However, the ERT noted that, in CRF tables 4.B and 4.C, the areas of organic soils in OTs and CDs are, for 2015, 0.01 kha cropland remaining cropland, 1,213.51 kha grassland remaining grassland, 0.59 kha land converted to cropland and 0.57 kha cropland converted to grassland. The United Kingdom also reports 5.33 kha organic soils for wetlands converted to grassland in the United Kingdom (excluding OTs and CDs) in 2015. During the review, the Party explained that only the Falkland Islands has organic soils, which are dominantly "unmanaged rough grassland" used for sheep grazing. The ERT recommends that the United Kingdom enhance the transparency and comparability of reporting in the LULUCF and agriculture sectors by: (a) Providing information in the NIR about areas of organic soils for all lands, separating drained and undrained cropland and grassland; (b) Reporting organic soils separately from mineral soils in CRF tables 4.B, 4.C and 4(II) for the United Kingdom, including its OTs and CDs; (c) Reporting CO_2 emissions from organic soil drainage in CRF tables 4.B and 4.C, avoiding double counting of emissions in table 4(II); (d) Providing an explanation in the NIR for the discrepancies between areas of organic soils reported in CRF table 3.D and in CRF tables 4.B, 4.C and 4(II).	Yes. Comparability
L.22	4.B Cropland – CO_2	The United Kingdom reported that different carbon stocks were used when calculating carbon stock changes in living biomass from land conversions and from management change on cropland (NIR, annex 3.4.3). In particular, values from NIR table A.3.4.14 were used for land conversion calculations, and values from NIR table A.3.4.20 for management change calculations. The ERT noted that values from table A.3.4.14 are much lower than those in table A.3.4.20. For example, in table A.3.4.14, carbon density on cropland (0.15 kg C/m^2 (i.e. 1.5 t C/ha)) is lower than the lowest value reported in table A.3.4.20 (3.7 t C/ha for shrubby perennial crops). During the review, the Party explained that biomass carbon densities for land-use categories in table A.3.4.14 were derived 20 years ago from a limited amount of data in the literature along with expert judgment, but the biomass carbon stocks of different types of	Yes. Accuracy

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		cropland in table A.3.4.20 were derived more recently and draw on a larger body of literature. The Party also indicated that values from these two tables overlap to some extent if uncertainties are taken into account, particularly the lower end of values from table A.3.4.20 and the upper end from table A.3.4.14. The ERT considers that the more recent data from table A.3.4.20 better reflect new conditions than the data in table A.3.4.1. The ERT recommends that the United Kingdom incorporate data from NIR table A.3.4.20 into the tables NIR A.3.4.15–A.3.4.18 and revise carbon stock changes in living biomass from land conversions to and from cropland.	
L.23	4.B.1 Cropland remaining cropland – CO_2	The United Kingdom uses SOC stocks for 1 m layer soil to estimate carbon stock changes after management change on cropland together with default EFs from the 2006 IPCC Guidelines for manure and residue inputs. The ERT noted that the EFs for manure, residue input and tillage were developed for default values of SOC stocks for 0–30 cm layer soil (2006 IPCC Guidelines, volume 4, table 2.3). Application of default EFs to a reference SOC for a 1 m layer soil may lead to erroneous calculations. During the review, the Party informed the ERT that a project was carried out to assess the effect of manure and residue inputs on SOC stocks and that the IPCC default EFs for manure and residue inputs were appropriate for use with SOC stocks in the United Kingdom (Defra, 2012). The ERT found that the report from the study concluded that the default IPCC EFs for manure and residue inputs may not be applicable for the entire country owing to limited available data. The ERT recommends that the United Kingdom develop country-specific EFs for manure and residue inputs or continue to investigate the appropriateness of the application of default EFs to reference SOC stocks for 1 m layer soil.	Yes. Accuracy
L.24	4.B.1 Cropland remaining cropland – CO_2	The ERT noted significant increases in carbon gains in living biomass between 2013 (0.14 kt C) and 2014 (10.57 kt C) of 7,582.7 per cent, and between 2014 and 2015 (24.36 kt C) of 130.4 per cent. During the review, the United Kingdom acknowledged that there was an error in the calculation of total cropland areas and provided updated values for carbon gains. However, the ERT noted that there is still a significant increase (885 per cent) in carbon gains in living biomass between 2013 (0.14 kt C) and 2014 (1.38 kt C), and an increase of 571 per cent between 2014 (1.38 kt C) and 2015 (9.26 kt C). The Party explained that this is primarily due to an increase in the area of orchards in England reported in the agricultural census. The Party also explained that the inventory considers transitions among orchards, annual cropland and shrubby perennial crops as well as the change in the composition of annual crops. The ERT did not find information on the calculation of these different components under estimation of carbon stock changes in living biomass in the NIR. The ERT recommends that the United Kingdom include in the NIR information on the calculation of carbon stock changes of different components of living biomass of cropland (e.g. transitions among orchards, annual cropland and shrubby perennial crops).	Yes. Transparency
L.25	4.C Grassland – CO_2	The ERT noted that hedges are reported under grassland in the NIR (section 6.4.2). The ERT also noted that the settlements category contains boundary and linear geographic features such as hedgerows, walls, stone and earth banks, grass strips and dry ditches (NIR, section 6.6.3). Both grassland and settlements categories include hedge areas. During the review, the United Kingdom informed the ERT that hedges in rural areas are now included under grassland	Yes. Comparability

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		management, and so should have been subtracted from settlements and added to grassland. The Party acknowledged the issue and stated that it would be addressed as part of a coordinated programme of improvements to the land-use change matrices. The ERT recommends that the United Kingdom allocate rural hedges to settlements or grassland, ensuring time-series consistency of the accounting of these areas to a single land-use category, and clearly indicate in the NIR where they are included.	
L.26	4.C.2.1 Forest land converted to grassland – CO_2	The United Kingdom reported dead organic matter and mineral soil pools in OTs and CDs as "NE" for the period 2000–2015, providing a comment in CRF table 4.C that it is following a tier 1 methodology. The ERT noted that the 2006 IPCC Guidelines provide estimation methodologies for these conversions (volume 4, chapter 6). During the review, the Party acknowledged the error of carbon stock changes not having been reported. The ERT recommends that the United Kingdom report carbon stock changes from the dead organic matter and mineral soil pools.	Yes. Completeness
L.27	4.C.2.3 Wetlands converted to grassland – CO_2, CH_4 and N_2O	The United Kingdom uses Google Earth imagery to track the change in the area of individual peat extraction sites over time and classifies land areas where extraction is no longer visible as land converted to grassland (NIR, p.396). During the review, the ERT requested more information on the methodology used. The Party explained that, according to its land-use classification, the wetlands category includes only peat extraction, unrestored extraction sites and large water bodies, and that the post-extraction use of peat extraction sites in the United Kingdom is specified in the planning consents given to the sites by local authorities, according to which after extraction is complete land should be restored to a semi-natural state or for recreational use. Former commercial peat extraction sites that are no longer visible in the Google Earth imagery (e.g. semi-natural peatland vegetation, extensive grassland, reed beds, small ponds) are allocated to land converted to grassland because they fall under the grassland land-use classification. The ERT recommends that the United Kingdom include in the NIR detailed information on the methodology applied and assumptions used for classifying abandoned peat extraction sites as wetlands converted to grassland, noting that in accordance with the 2006 IPCC Guidelines (volume 4, section 7.2) GHG emissions from post-extraction lands continue and should be reported as long as the land is not converted to another use.	Yes. Transparency
L.28	4.D. Wetlands – CO_2, CH_4 and N_2O	In CRF table 4.D, net emissions/removals from peat extraction remaining peat extraction and from land converted to peat extraction are reported for the United Kingdom, excluding OTs and CDs; the notation key "NO" is used for OTs and CDs. However, the NIR (p.394) states that peat cutting is known to occur in the Falkland Islands. During the review, the United Kingdom provided further information on this matter, explaining that of the OTs and CDs that report LULUCF emissions, only the Falkland Islands and the Isle of Man have peat deposits. For the Falkland Islands, the information available until recently suggested there was no peat extraction. As a result of recent site visits by the Centre for Ecology and Hydrology, there is now evidence of peat extraction areas in this OT; however, at present, specific data on the areas or quantities of peat extracted are not available. The Party is also aware of small areas of historical peat extraction on the Isle of Man, although no commercial peat extraction is carried out at present according	Yes. Completeness

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		to the *Annual Minerals Monitoring Report* (MSATPG, 2015). The ERT requested information on whether land conversion to peat extraction applies to OTs and CDs. The United Kingdom explained that based on the *Annual Minerals Monitoring Report* and a report on issues and opportunities (Manx Uplands Steering Group, 2014), which were provided to the ERT, policies in place in the Isle of Man preclude land conversion to peat extraction on the island. For the Falkland Islands, the data are more limited, and it is uncertain whether land conversion to peat extraction is occurring. The ERT recommends that the United Kingdom collect the necessary data to enable it to report emissions/removals from peat extraction remaining peat extraction in OTs and CDs, and until then change the notation key in CRF table 4.D for the OTs and CDs from "NO" to "NE". Further, the ERT recommends that the United Kingdom provide in its NIR detailed information to describe that land conversion to peat extraction in OTs and CDs is not occurring.	
L.29	4.D.1 Wetlands remaining wetlands – CO_2, CH_4 and N_2O	The United Kingdom did not report areas of flooded land remaining flooded land for OTs and CDs, using "NE" and stating that there are no data available. During the review, the Party informed the ERT that efforts will be made to collect suitable data, including from Google Earth, to estimate emissions and removals from this subcategory for the OTs and CDs. The ERT welcomes the intention expressed by the United Kingdom. The ERT recommends that the United Kingdom report areas of flooded land remaining flooded land for OTs and CDs and the associated emissions, or, if that is not possible, report in the NIR on the progress in collecting suitable data in order to estimate emissions and removals from flooded land remaining flooded land for OTs and CDs.	Yes. Completeness
L.30	4 (V) Biomass burning – CO_2, CH_4 and N_2O	The United Kingdom did not estimate CO_2, CH_4 and N_2O emissions from wildfires on forest land remaining forest land, land converted to forest land, grassland remaining grassland and land converted to grassland for the OTs and CDs. During the review, the Party informed the ERT that there are no forests in the Falkland Islands and that information about wildfires from the fire and rescue services is limited for Jersey and Guernsey and absent for the Isle of Man. The United Kingdom stated that the fire and rescue services in Jersey, Guernsey and the Isle of Man would be contacted to establish what data they have available on wildfires and any suitable data would be used in future inventories. The ERT recommends that the United Kingdom assess the areas of and emissions from wildfires on forest land remaining forest land, land converted to forest land, grassland remaining grassland and land converted to grassland for all OTs and CDs.	Yes. Completeness
L.31	4.G Harvested wood products – CO_2	The ERT noted that the conversion factors for HWP reported in CRF table 4.Gs2 are different from the IPCC defaults (2006 IPCC Guidelines, volume 4, chapter 12), and there is no clear explanation in the NIR as to how they were derived. For example, CRF table 4.Gs2 reports conversion factors for sawn wood (0.20), wood panels (0.20) and paper and paperboard (0.50), whereas the 2006 default values for these products are 0.225, 0.294 and 0.450, respectively. During the review, the United Kingdom explained that for sawn wood and wood panels, the average wood density (0.4 oven-dry t/m^3) is used, and 50 per cent carbon percentage is used for all HWP. The ERT recommends that the United Kingdom include in the NIR information on how the conversion factors for	Yes. Transparency

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		HWP are derived.	
L.32	4.G Harvested wood products – CO_2	The CARBINE carbon accounting model is used to calculate the net changes in carbon stocks of HWP, following the IPCC production approach, under both the Convention and its Kyoto Protocol. The AD used are the annual forest planting rates. At thinning and harvest, the CARBINE model allocates merchantable stem volume to various wood products, which are then aggregated into the three HWP categories: sawn wood, wood panels, and paper and paper board. Using the AD and carbon conversion factors reported by the United Kingdom in CRF table 4.Gs2, the ERT estimated the contribution of paper and paper board to HWP using the IPCC Kyoto Protocol Supplement production approach and determined that net removals were overestimated by the CARBINE model for most of the years in the time series by approximately 13 to 450 per cent. In response to a request for clarification from the ERT during the review, the Party provided information explaining that the reason for the differences in estimations is twofold: first, in the CARBINE model, losses in the year the HWP are manufactured (taken to be the year of harvest) have been omitted from accounting; and second, HWP from deforestation and from OTs and CDs have been taken into account in the CARBINE model (see ID# L.9 in table 3). The ERT recommends that the United Kingdom correct the error in the HWP submodel in order to take into account the decay in HWP from the beginning of each year, and provide in the NIR detailed, transparent and verifiable information in the NIR in accordance with paragraph 41 of the UNFCCC Annex I inventory reporting guidelines.	Yes. Accuracy
Waste			
W.11	5.A Solid waste disposal on land – CH_4	In the NIR (section 7.2.2), the United Kingdom reported that it applies a first-order decay model (MELMod) for estimating methane generation in landfill sites. A methodology adapted from equations 3.1 to 3.6 of the 2006 IPCC Guidelines (volume 5) is used to calculate CH_4 generation. The NIR does not, however, transparently explain how these equations are adapted for use in the MELMod model. The ERT recommends that the United Kingdom include in section 7.2.2 of the NIR how equations 3.1 to 3.6 from the 2006 IPCC guidelines (volume 5) are adapted for use in the MELMod model (i.e. provide more information on equation parameters removed or added) and how the Party conducts model verification in line with paragraph 41 of the UNFCCC Annex I inventory reporting guidelines on the verification of higher-tier methods and models.	Yes. Transparency
W.12	5.A Solid waste disposal on land – CH_4	The ERT noted that in the NIR (p.414) the United Kingdom reported that the methodology for the calculation of CH_4 production in landfill sites (using the MELMod model) has been updated, which is a major improvement on the 2016 submission. The NIR does not, however, explicitly state which model parameters were updated to be brought in line with the IPCC default parameters, and the ERT noted that only IPCC default decay rates for a wet boreal and temperate climate zone have been updated. The ERT recommends that the United Kingdom change the text in NIR table 5.A (p.414), which shows the improvements in the waste sector estimates, from "The methodology for calculating methane production in landfill sites has been updated" to "The input data and parameters for the MELMod model were updated based on new data" to	Yes. Transparency

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		reflect that updates in the MELMod model focused on input data and parameters and not on the methodology itself.	
W.13	5.A Solid waste disposal on land – CH_4	In the NIR (section 7.2.3.1) and CRF table 5.A, the United Kingdom reported that it uses landfill gas recovery for combustion as a fuel source, predominantly in the energy sector for power generation, and that data on this practice are available from official sources. These data are referenced in table A.3.5.2 of the NIR, which shows the amount of CH_4 captured and used for power generation in the country. The Party did not, however, provide in the NIR a cross-reference to the category in the energy sector where the emissions are reported, or in CRF table 1.A(a) the level of disaggregation. The ERT recommends that the United Kingdom include in the NIR information on energy recovered from landfill gas and a cross-reference to the category in the energy sector where emissions from CH_4 recovered (from landfill gas) and used for power generation are reported.	Yes. Transparency
W.14	5.B. Biological treatment of solid waste – CH_4 and N_2O	Further to ID# W.4 in table 3, the United Kingdom explained during the review that emissions from the various stages of mechanical–biological treatment were separated in the 2017 submission and reported under the appropriate subcategories (5.B.1 and 5.B.2). However, the NIR does not include sufficient information on how the split of emissions was achieved, and on how it resulted in the reporting of "NO" for the N_2O IEF in CRF table 5.B for anaerobic digestion at biogas facilities compared with a value (0.12 g/kg) for the N_2O IEF reported in the 2016 submission. The Party explained that AD on the quantity of waste undergoing the anaerobic digestion and composting stages of mechanical–biological treatment are available, and the relevant EFs are applied to these AD, which are then reported separately under subcategories 5.B1 and 5.B.2. The United Kingdom noted that the 2006 IPCC Guidelines consider N_2O emissions from anaerobic digestion to be negligible and thus the Party reported "NO" for these emissions. The ERT recommends that the United Kingdom provide in sections 7.3.2 and 7.3.5 of the NIR details on how AD are collected to enable the split of mechanical–biological treatment process emissions between composting and anaerobic digestion at biogas facilities.	Yes. Transparency
W.15	5.D.1 Domestic wastewater – CH_4	The ERT noted that the AD for domestic wastewater (total amount of organically degradable material) are reported in total dissolved solids and not in BOD as required by footnote 6 to CRF table 5.D. During the review, the United Kingdom explained that it assumed that total dissolved solids and BOD were equivalent; the implied value for total dissolved solids per capita is within the range of the value for BOD per capita presented in the 2006 IPCC Guidelines for countries similar to the United Kingdom. The ERT notes that, in the annex to the NIR, AD are also reported in population equivalent, and these values could easily be converted to BOD. During the review it also became clear that BOD of private wastewater treatment is missing from the total organic product reported in CRF table 5.D although the corresponding CH_4 emissions are included. The ERT recommends that the United Kingdom report AD for domestic wastewater in BOD, and ensure that the organic product in private wastewater treatment systems is included in the total organic product.	Yes. Comparability

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W.16	5.D.1 Domestic wastewater – N_2O	The ERT identified an inconsistency between CRF table 5.D (additional information) and the NIR regarding $Frac_{NON-CON}$ and $Frac_{IND-COM}$. The NIR reports values for both these parameters, while in CRF table 5.D "NO" is used for both. During the review, the Party confirmed that the NIR is correct and that values of 1.16 and 1.25 for $Frac_{NON-CON}$ and $Frac_{IND-COM}$, respectively, were used for the United Kingdom's estimate of N_2O emissions. The ERT recommends that the United Kingdom include in CRF table 5.D the values of $Frac_{NON-CON}$ and $Frac_{IND-COM}$ applied.	Yes. Transparency
W.17	5.D.1 Domestic wastewater – N_2O	The ERT noted that the N_2O IEF (e.g. 0.0036 kg N_2O-N/kg N in 2015) is lower than the IPCC default value (0.005) (volume 5, table 6.11). During the review, the United Kingdom explained that this is due mainly to the AD (total amount of N in the wastewater effluent) reported in CRF table 5.D containing N removed with sludge and accounted for in subcategory 3.D.a.2.b (sewage sludge applied to soils) and category 5.C (sewage sludge incineration). The NIR states that the N_2O emissions reported in 5.D.1 are the difference between the United Kingdom's total emissions, as determined from the IPCC default method, and the emissions included in CRF tables 3.D and 5.C. The ERT notes that calculating the estimates in this way is not in line with the IPCC default method as: (1) N removed with sludge should not be included in the total amount of N in wastewater effluent; and (2) in the other categories different EFs are used. The ERT recommends that the United Kingdom exclude N removed with sludge in the calculation of the emission estimates for the waste sector, as suggested by equations 6.7 and 6.8 in the 2006 IPCC Guidelines, and report the AD in the relevant CRF table.	Yes. Accuracy
W.18	5.D.1 Domestic wastewater – N_2O	The NIR states that, in many wastewater treatment plants, tertiary treatment, which significantly reduces the N load of the effluent, is used. Eurostat data indicate 57 per cent of wastewater in the United Kingdom undergoes tertiary treatment. However, N removal is currently not taken into account in estimating N_2O emissions from effluent, which leads to an overestimation of emissions. The ERT encourages the United Kingdom to collect information on N removed in tertiary wastewater treatment systems and to reassess the total amount of N in effluent.	Not an issue/problem
W.19	5.D.1 Domestic wastewater – CH_4	The United Kingdom reported 1.33 kt CH_4 for energy recovery and 0.29 kt CH_4 for flaring for 2015. However, the ERT noted that 364 ktoe sewage gas was produced in 2015 and was derived from the United Kingdom's energy statistics, which indicates a much higher CH_4 recovery (the ERT's rough estimate is 300 kt CH_4). The ERT recommends that the United Kingdom report CH_4 recovery consistent with the United Kingdom's energy statistics.	Yes. Comparability
W.20	5.D.2 Industrial wastewater – CH_4	The ERT noted that the CH_4 IEF for industrial wastewater (0.175 kg/kg DOC) is one of the highest reported by Parties (the range of values reported is 0.001–1.48 kg CH_4/kg DOC). This means that an MCF value of 0.7 is used, which indicates a high proportion of anaerobic treatment. However, the NIR states that it is likely that aerobic treatment	Yes. Accuracy

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		systems will be used in many facilities in the United Kingdom. Moreover, the Party reports "NA" in CRF table 5.D for CH_4 recovery for industrial wastewater even though in many cases when anaerobic treatment is applied some of the CH_4 generated is recovered. The ERT recommends that the United Kingdom collect information on the proportions of aerobic and anaerobic treatment systems and revise the MCF used accordingly. Furthermore, the ERT recommends that the Party review whether the notation key "NA" is correctly used for CH_4 recovery.	
KP-LULUCF			
KL.15	General (KP-LULUCF)	The ERT noted that inconsistencies in the reporting of land areas found during the review of the 2016 submission (see ID# KL.2 in table 3) have not been corrected in the 2017 submission. Moreover, the ERT identified the following new inconsistencies in the reporting of land areas: (a) Areas reported in CRF table NIR-2 between years (e.g. the final area of CM in 2014 (4,582.67 kha) does not match the initial area of CM in 2015 (4,583.03 kha)); (b) Areas reported in the CRF tables (e.g. the total area of CM in CRF table NIR-2 is 4,534.68 kha, while in CRF table 4(KP-I)B.2 it is 4,533.85 kha); (c) The total country area reported in CRF table NIR-2 for 2015 (25,711.44 kha) is not equal to the total country area reported for the previous years of the commitment period (e.g. 25,711.38 kha for 2014); (d) The total country area for 2015 reported under the Kyoto Protocol is 25,711.44 kha, while the total country area reported under the Convention is 24,418.57 kha (CRF table 4.1); (e) The area for deforestation at the end of 2015 amounts to 60.39 kha if compiling data from CRF table 4.1, while in CRF table NIR-2 60.70 kha is reported; (f) The area for afforestation at the end of 2015 amounts to 654.08 kha if compiling data from CRF table 4.1, while in CRF table NIR-2 655.42 kha is reported. The ERT recommends that the United Kingdom revise the land areas reported in different CRF tables (in particular the areas of afforestation, deforestation and CM reported in CRF table NIR-2, the areas of CM and GM reported in CRF tables NIR-2, 4(KP-I)B.2 and 4(KP-I)B.3, and the total area of the country reported in CRF table NIR-2 as well as the total land area reported under the Convention and for KP-LULUCF activities) ensuring the consistency of the reported information among CRF tables as well as between the CRF tables and the NIR, and provide a transparent explanation for any differences remaining.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
KL.16	General (KP-LULUCF)	The ERT identified inconsistencies in the reporting of CO_2, CH_4 and N_2O emissions from biomass burning of AR and FM land areas between CRF table NIR-1 (reported as "reported") and CRF table 4(KP-II)4 (reported as "NO" and "NE"). During the review, the United Kingdom informed the ERT that the information in CRF table NIR-1 is reported	Yes. Adherence to the UNFCCC Annex I inventory

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		incorrectly because there were no forest wildfires during 2015. The ERT recommends that the United Kingdom report information in CRF table NIR-1 consistently with the information reported in other sectoral tables, and enhance QA/QC procedures to avoid inconsistencies in the reporting of information between CRF tables in future submissions.	reporting guidelines
KL.17	Deforestation – CO_2	The United Kingdom reported carbon stock changes from deforestation for OTs and CDs as "NO" in below-ground biomass, litter, deadwood and soil organic matter. During the review, the Party explained that a small amount of deforestation in the OTs and CDs on mineral soils was identified and included in the 2017 submission, but that owing to limited data availability only carbon stock changes in above-ground biomass, following the tier 1 approach, have been estimated. The ERT recommends that the United Kingdom estimate and report carbon stock changes from deforestation in below-ground biomass, litter, deadwood and soil organic matter in the OTs and CDs.	Yes. Completeness
KL.18	Forest management – CO_2	In the United Kingdom, approximately 60 per cent of the forest area is assumed to not be used for timber production, with the majority of broadleaf woodlands not used for timber production, and the majority of conifer woodlands in production. For the estimation of carbon stock changes in forest areas subject to this management prescription, the Party assumes that there are no interventions that would remove woody material, unless the areas are deforested, and that trees are assumed to grow according to the relevant yield model, with mortality contributing to the deadwood and litter, until they reach a steady state in terms of carbon stocks and emissions. The Party also estimates emissions from wildfires in forests not for timber production. However, the United Kingdom noted that by definition there is not any harvesting on this land and that no reliable estimates are available on the quantity of wood removed by gathering or disturbance (see ID# L.18 above). The ERT recommends that the United Kingdom estimate and report, in accordance with the 2006 IPCC Guidelines (volume 4, chapter 4), carbon stock changes in biomass from forests not used for timber production owing to biomass losses associated with harvesting and/or gathering (e.g. fuelwood) or provide transparent information justifying that such losses are not occurring.	Yes. Completeness
KL.19	Forest management – CO_2	The United Kingdom reported carbon stock changes in below-ground biomass as "IE" and included them with above-ground biomass. However, the forest carbon submodel used as part of the CARBINE carbon accounting model is further compartmentalized to represent fractions of roots (NIR, p.367), and the ERT considers that the Party is in a position to report the two living biomass pools separately. During the review, the United Kingdom confirmed that the CARBINE model would allow for the separate reporting of below-ground biomass, but currently this is not done by the Party so as to maintain consistency with reporting in previous submissions. The ERT recommends that United Kingdom report separately carbon stock changes for above-ground and below-ground biomass.	Yes. Comparability

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
KL.20	Forest management – natural disturbances	The ERT could not find any quantitative information in the NIR on how the background level of emissions and the margin associated with annual natural disturbances have been estimated, except for the aggregated information by activity in NIR table 11.3. During the review, the ERT requested more information from the Party on the application of the natural disturbances provision, more specifically on the extent of the time series of emissions used for the estimation of the background level and the margin, and the extent of the time series of emissions from the natural disturbance types included in the FMRL. The ERT also requested further information on whether through the technical correction of the FMRL applied by the United Kingdom in the current submission emissions from natural disturbances included in the FMRL and for which the Party intends to apply the natural disturbances provision have been substituted with the background level estimated. The United Kingdom explained that there were no significant natural disturbances in 2017 or in previous years for which it wishes to implement the natural disturbances provision, and that all the necessary information on the provision, including the calculation of the background level and margin, are provided in its report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol (tables 4.2 and 4.3). The Party clarified that the background level and margin were estimated for the time series 2000–2013, where information was available, for wildfires, insects, diseases and wind storms. The United Kingdom also confirmed that emissions from natural disturbances are implicit in the output of the CARBINE carbon accounting model rather than being accounted separately and explicitly and consequently embedded in the FMRL technical correction, and that emissions from natural disturbances included in the FMRL have not been substituted with the background level of emissions estimated. Further, the ERT noted the following: (a) The FMRL and emissions from natural disturbances embedded in it is estimated using the historical period 1990–2009, while the background level and margin have been estimated using a different time period; (b) In the estimation of the background level and margin, emissions associated with drought have not been taken into account owing to the lack of data; however, emissions from this natural disturbance type have been implicitly embedded in the FMRL, which leads to an expectation of net credits. The ERT concludes that methodological consistency between the FMRL and reporting for FM during the second commitment period, including the accounting of any emissions from natural disturbances, has not been achieved, and that the expectation of net credits or net debits has not been avoided. The ERT recommends that the United Kingdom: (a) Estimate the background level and margin using a consistent and initially complete time series containing emissions for the period 1990–2009, in accordance with decision 2/CMP.7, annex, paragraph 33, using, if appropriate, methodologies from the 2006 IPCC Guidelines (e.g. volume 1, chapter 5); (b) Report in the NIR detailed information on the background level of emissions associated with annual natural disturbances that have been included in the FMRL, on how the background levels and margins for AR and FM have been estimated, on how the Party avoids the expectation of net credits or net debits during the commitment period, and on how the FMRL technical correction addresses emissions from natural disturbances for which the Party	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		intends to apply the provision (e.g. substitution of natural disturbances emissions in the FMRL by the background level estimated); (c) Report the background level and margin estimated for AR and FM in CRF tables 4(KP-I)A.1.1 and 4(KP-I)B.1.3. Further, the ERT recommends that the United Kingdom provide detailed information on any recalculations performed in the time series of emissions from natural disturbance types for which the Party intends to apply the natural disturbances provision.	
KL.21	Cropland management Grazing land management	The United Kingdom states in the NIR that it considers CM and GM to be equivalent in the hierarchy established for elected activities under Article 3, paragraph 4. The ERT noted that rotational management is dominated in some regions of the country by crops with the occasional grass ley and in other regions the opposite situation occurs; therefore cropland–grassland land-use change is temporary (NIR, p.488). During the review the ERT requested more information on how double counting due to inconsistent attribution among those activities over time is avoided. The Party explained that it decided to report carbon stock changes separately for CM and GM instead of reporting all land under a single activity in order to strengthen internal QC mechanisms and improve comparability with reporting under the Convention. The ERT notes that, according to the Kyoto Protocol Supplement, if elected activities under Article 3, paragraph 4, overlap, it is good practice to apply consistently the specified hierarchy to determine under which activity the land is to be reported, and in the cases in which a land could fall into both CM and GM, it is good practice to report over time that land under only one activity according to the established hierarchy. The ERT recommends that the United Kingdom: establish a hierarchy of elected activities under Article 3, paragraph 4; apply consistently the specified hierarchy to determine under which activity the land is to be reported in accordance with the Kyoto Protocol Supplement (section 1.2); in the cases in which a land falls into two activities, report over time that land under only one activity according to the established hierarchy; and provide detailed information in the NIR on the hierarchy and how it is consistently applied. Alternatively, in the cases of rotation of land between CM and GM, the United Kingdom may report all land subject to CM and GM under a single activity.	Yes. Transparency
KL.22	Cropland management – CO_2	The net carbon stock change in mineral soils by area under CM reported for 2015 (–0.66 t C/ha) is the highest among reporting Parties (values reported by other Parties range from –0.15 to –0.04 t C/ha). The United Kingdom initially explained during the review that this might be connected to the inclusion of hedges in the estimation of emissions and removals from CM, and that hedges may be more widespread in the United Kingdom than in other countries. The ERT noted, however, that hedges are reported to be included under grassland (NIR, section 6.4.2). During the review, the Party clarified that emissions and removals from hedges in the United Kingdom are reported under GM rather than CM because the majority of hedges are planted for sheltering livestock. The ERT considers that areas of hedges need to be accounted for under a single land-use category to avoid double counting. The ERT recommends that the United Kingdom define the category of land under which hedges are to be accounted, ensure that corresponding GHG emissions and removals are estimated, and report consistently thereon for the entire	Yes. Consistency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		time series.	
KL.23	Grazing land management – CO_2	The ERT identified an inconsistency in the reported area of organic soils for grassland: in 2015, for the United Kingdom (excluding OTs and CDs), in CRF table 4(KP-I)B.3 the area of GM on organic soils is reported as 124.49 kha, and in CRF table 4(II) the area of grassland on organic soils is reported as 192.87 kha. During the review, the United Kingdom informed the ERT that, while there is an error in the area reported in CRF table 4(KP-I)B.3, in the calculation of GHG emissions the correct area of GM on organic soils (192.87 kha, as reported in CRF table 4(II)) has been used. The ERT recommends that the United Kingdom report the same area of organic soils in grassland and GM in CRF tables 4(II) and 4(KP-I)B.3, respectively.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
KL.24	Grazing land management – CO_2, CH_4 and N_2O	One of the data sources used by the United Kingdom for estimating CO_2 and non-CO_2 emissions from biomass burning is the Fire Information for Resource Management System. Thermal anomaly data are only collected by the system between March and August; however, controlled burning is permitted in the country between October and mid-April (NIR, p.745). During the review, the Party informed the ERT that data from the system do not have sufficient resolution to detect controlled burning on grassland, which occurs in very small (less than 1 ha) scattered patches and that there are no administrative AD sources that would make it possible to monitor this activity. The United Kingdom noted that only controlled burning that spreads out of control would be captured in the wildfire reporting statistics, and that there is no information on biomass burning in the OTs, thus the "NE" notation key has been used. The ERT recommends that the United Kingdom develop the necessary AD on controlled burning throughout the year and in land areas smaller than 1 ha, and estimate and report the associated CO_2 and non-CO_2 emissions for the entire territory.	Yes. Completeness
KL.25	Wetland drainage and rewetting – AD	The United Kingdom states in the NIR (p.37) that there are currently insufficient AD to allow reporting of areas and associated emissions from WDR, but a programme of research and development, commissioned by the Department for Business, Energy and Industrial Strategy, is under way to enable reporting and accounting before the end of the second commitment period. While the results from the programme are stated to be expected in mid-2017 (NIR, p.486), the ERT notes that the 2016 NIR (p.480) states that the results are to be available in 2016. The ERT also notes that it was pointed out in the previous review report (finding KL.3 in document FCCC/ARR/2016/GBR) that the report to be compiled as part of the work package contained in the programme plan was likely to contain the information needed for the Party to adequately identify lands subject to WDR, and that the report was due to be finalized in October 2014. The ERT further notes that the United Kingdom has still not reported associated emissions/removals for any carbon pools from WDR; it uses the notation key "NE" in CRF table 4(KP-I)B.5 (and also for CH_4 and N_2O emissions in CRF tables 4(KP-II)1, 4(KP-II)2 and 4(KP-II)4). The ERT requested an update on the progress of the programme, specifically whether there is a timetable according to which the results will be available to be used in the inventory, and clarification on whether the Party has proceeded with alternative approaches (data sources) in order to be able to provide estimates of emissions/removals from land areas subject to WDR before then. The United Kingdom informed	Yes. Completeness

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		the ERT that a Wetlands Supplement implementation project is undergoing revisions following peer review. The findings from the research and the need for further research will be considered by the Party and a timetable for the implementation of any methodological changes to the inventory will be agreed by the National Inventory Steering Committee. The United Kingdom explained that a key and challenging component of the research and development project is the compilation of country-specific AD so it would not be possible to proceed with alternative approaches (see ID# KL.9 in table 3). The ERT recommends that the United Kingdom: (a) Report the timetable for the ongoing project to incorporate WDR into the annual submission, including when the final results will be available for use in estimating CO_2 and non-CO_2 emissions from lands in the entire territory subject to WDR; (b) Follow, until the final results from the project are available, an interim approach (using alternative data sources) to obtain the necessary AD and use appropriate methodologies from the Wetlands Supplement to estimate CO_2 and non-CO_2 emissions for all the carbon pools from lands in the entire territory subject to WDR, noting the provisions of decision 2/CMP.7, annex, paragraph 26, decision 2/CMP.8, annex II, paragraph 2(a), (d) and (e), and decision 6/CMP.9, paragraph 10; (c) Report CO_2 and non-CO_2 emissions in CRF tables 4(KP-I)B.5, 4(KP-II)1, 4(KP-II)2 and 4(KP-II)4, and explain in the NIR how it has estimated them.	
KL.26	Harvested wood products – CO_2	The ERT noted that the CARBINE carbon accounting model is used to calculate the net changes in carbon stocks of HWP, following the IPCC production approach, under both the Convention and the Kyoto Protocol. This issue, described in ID# L.32 above, is also relevant to KP-LULUCF reporting. In addition to the recommendation included in ID# L.32 above, the ERT recommends that the United Kingdom estimate the HWP contribution for HWP from deforestation on the basis of instantaneous oxidation.	Yes. Accuracy

[a] Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

VI. Application of adjustments

10. The ERT has not identified the need to apply any adjustments to the 2017 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

11. The United Kingdom has elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF activities is not applicable for the 2017 review.

VIII. Questions of implementation

12. 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 2017 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by the United Kingdom of Great Britain and Northern Ireland

1. Tables 6–9 provide an overview of total GHG 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[a]–2015

(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions[b]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c]*	*KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)[d]*	*KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*	*FM*
FMRL								–8 268.00
Base year	805 394.87	799 694.76	NA	NA	246.05		7 737.72	
1990	801 760.75	796 060.64	NA	NA				
1995	751 346.20	748 313.58	NA	NA				
2000	712 844.71	712 353.95	NA	NA				
2010	608 991.82	614 813.11	NA	NA				
2011	560 703.36	566 684.89	NA	NA				
2012	578 298.73	583 522.01	NA	NA				
2013	561 501.63	568 043.81	NA	NA		939.14	7 268.72	–19 504.76
2014	518 224.75	525 650.91	NA	NA		473.34	6 981.85	–19 337.00
2015	498 675.45	506 044.11	NA	NA		128.75	6 800.07	–18 661.79

Note: Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs, SF_6 and NF_3. The base year for CM, GM and WDR 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 FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The Party has not reported indirect CO_2 emissions in CRF table 6.

[c] The value reported in this column refers to 1990.

[d] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely AR 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, 1990–2015
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	594 632.23	135 248.36	48 857.65	14 391.43	1 651.50	NO, NE	1 279.06	0.42
1995	559 119.56	128 750.73	39 486.78	19 094.41	596.91	NO, NE	1 264.37	0.83
2000	559 908.30	110 971.68	29 183.51	9 874.36	596.78	NO, NE	1 817.61	1.69
2010	506 680.94	68 187.66	22 484.76	16 485.32	287.71	NO, NE	686.45	0.27
2011	464 007.54	65 298.97	21 428.87	14 924.97	416.93	NO, NE	607.30	0.30
2012	483 571.67	62 362.18	21 293.64	15 450.53	255.04	NO, NE	588.61	0.33
2013	473 045.79	57 156.04	21 255.69	15 773.88	318.73	NO, NE	493.30	0.36
2014	432 716.49	54 322.35	21 897.11	15 959.72	278.31	NO	476.54	0.40
2015	415 064.42	52 555.44	21 696.90	15 942.21	327.23	NO	457.48	0.44
Per cent change 1990–2015	**–30.2**	**–61.1**	**–55.6**	**10.8**	**–80.2**	**NA**	**–64.2**	**5.6**

Note: Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.
[a] The United Kingdom did not report indirect CO_2 emissions in CRF table 6.

Table 8
Greenhouse gas emissions by sector for the United Kingdom of Great Britain and Northern Ireland, 1990–2015
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	609 060.67	66 538.01	53 572.20	5 700.11	66 889.76	–
1995	565 323.67	60 824.27	52 873.77	3 032.62	69 291.87	–
2000	558 846.48	40 575.82	49 947.49	490.77	62 984.16	–
2010	502 914.28	35 520.68	44 424.11	–5 821.29	31 954.04	–
2011	460 760.50	31 987.93	44 321.17	–5 981.53	29 615.28	–
2012	480 604.40	32 304.42	43 823.67	–5 223.29	26 789.52	–
2013	466 898.12	34 370.45	44 086.12	–6 542.18	22 689.12	–
2014	426 733.10	34 115.84	44 989.00	–7 426.16	19 812.96	–
2015	409 138.92	33 574.12	44 901.00	–7 368.66	18 430.06	–
Per cent change 1990–2015	**–32.8**	**–49.5**	**–16.2**	**–229.3**	**–72.4**	**–**

Notes: (1) "Other" is reported as blank in the Party's submission. (2) The United Kingdom did not report indirect CO_2 emissions in CRF table 6.

Table 9

Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year[a]–2015, for the United Kingdom of Great Britain and Northern Ireland

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	*Article 3.3 of the Kyoto Protocol*		*FM and elected Article 3.4 activities of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR[c]*
FMRL				–8 268.00				
Technical correction				–7 566.00				
Base year	246.05				15 224.97	–7 487.25	NA	–
2013		–400.01	1 339.15	–19 504.76	13 645.11	–6 376.38	NA	NE
2014		–774.72	1 248.06	–19 337.00	13 410.77	–6 428.92	NA	NE
2015		–1 252.83	1 381.58	–18 661.79	13 292.41	–6 492.34	NA	NE
Per cent change base year–2015					**–12.7**	**–13.3**	**NA**	**NA**

Note: Values in this table include emissions on lands subject to natural disturbances, if applicable.

[a] The base year for CM, GM, and WDR 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 FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The value reported in this column refers to 1990.

[c] WDR is blank for 1990 in the Party's submission.

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

Key parameters	*Values*
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: commitment period accounting (e) GM: commitment period accounting (f) RV: not elected (g) WDR: commitment period accounting
Election of activities under Article 3, paragraph 4	CM, GM and WDR
Election of application of provisions for natural disturbances	Yes, for AR and FM
3.5% of total base-year GHG emissions, excluding LULUCF	28 103.084 kt CO_2 eq (224 824.677 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. AR in 2015	NA
2. Deforestation in 2015	NA
3. FM in 2015	NA
4. CM in 2015	NA
5. GM in 2015	NA
6. RV in 2015	NA
7. WDR in 2015	NA

Annex II

Information to be included in the compilation and accounting database

Tables 11–13 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 2015, including on the commitment period reserve, for the United Kingdom of Great Britain and Northern Ireland
(t CO_2 eq)

	Original submission	*Revised estimates*	*Adjustment*	*Final*
CPR	2 470 443 599			2 470 443 599
Annex A emissions for 2015				
CO_2	415 064 416			415 064 416
CH_4	52 555 440			52 555 440
N_2O	21 696 900			21 696 900
HFCs	15 942 206			15 942 206
PFCs	327 229			327 229
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	457 481			457 481
NF_3	438			438
Total Annex A sources	**506 044 111**			**506 044 111**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2015				
3.3 AR	–1 252 834			–1 252 834
3.3 Deforestation	1 381 584			1 381 584
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2015				
3.4 FM	–18 661 791			–18 661 791
3.4 CM	13 292 408			13 292 408
3.4 CM for the base year	15 224 974			15 224 974
3.4 GM	–6 492 343			–6 492 343
3.4 GM for the base year	–7 487 251			–7 487 251
3.4 WDR	NE			NE
3.4 WDR in the base year	NE			NE

Table 12
Information to be included in the compilation and accounting database for 2014 for the United Kingdom of Great Britain and Northern Ireland
(t CO_2 eq)

	Original submission	*Revised estimates*	*Adjustment*	*Final*
Annex A emissions for 2014				
CO_2	432 716 486			432 716 486
CH_4	54 322 348			54 322 348
N_2O	21 897 107			21 897 107
HFCs	15 959 719			15 959 719
PFCs	278 315			278 315
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	476 539			476 539
NF_3	399			399
Total Annex A sources	**525 650 912**			**525 650 912**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014				
3.3 AR	–774 717			–774 717
3.3 Deforestation	1 248 057			1 248 057
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014				
3.4 FM	–19 337 002			–19 337 002
3.4 CM	13 410 771			13 410 771
3.4 CM for the base year	15 224 974			15 224 974
3.4 GM	–6 428 919			–6 428 919
3.4 GM for the base year	–7 487 251			–7 487 251
3.4 WDR	NE			NE
3.4 WDR in the base year	NE			NE

Table 13
Information to be included in the compilation and accounting database for 2013 for the United Kingdom of Great Britain and Northern Ireland
($t\ CO_2\ eq$)

	Original submission	*Revised estimates*	*Adjustment*	*Final*
Annex A emissions for 2013				
CO_2	473 045 791			473 045 791
CH_4	57 156 043			57 156 043
N_2O	21 255 692			21 255 692
HFCs	15 773 881			15 773 881
PFCs	318 735			318 735
Unspecified mix of HFCs and PFCs	NE, NO			NE, NO
SF_6	493 304			493 304
NF_3	362			362
Total Annex A sources	**568 043 809**			**568 043 809**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013				
3.3 AR	–400 013			–400 013
3.3 Deforestation	1 339 153			1 339 153
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013				
3.4 FM	–19 504 760			–19 504 760
3.4 CM	13 645 105			13 645 105
3.4 CM for the base year	15 224 974			15 224 974
3.4 GM	–6 376 384			–6 376 384
3.4 GM for the base year	–7 487 251			–7 487 251
3.4 WDR	NE			NE
3.4 WDR in the base year	NE			NE

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 that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of reporting in the Party's inventory are the following:

(a) CO_2 and CH_4 emissions from categories 3.F, 3.G and 3.H for OTs and CDs (see ID# A.6 in table 5);

(b) CO_2 emissions and removals for the missing land areas (Bermuda, Cayman Islands, Gibraltar and Montserrat) (see ID# L.4 in table 3);

(c) Carbon stock changes in biomass in forests not used for timber production owing to biomass losses associated with harvesting and/or gathering (see ID# L.18 in table 5);

(d) Carbon stock changes in the dead organic matter and mineral soils pools on forest land converted to grassland (see ID# L.26 in table 5);

(e) CO_2, CH_4 and N_2O emissions/removals from peat extraction remaining peat extraction in OTs and CDs (see ID# L.28 in table 5);

(f) CO_2, CH_4 and N_2O emissions/removals from flooded land remaining flooded land in OTs and CDs (see ID# L.29 in table 5);

(g) CO_2, CH_4 and N_2O emissions from wildfires on forest land remaining forest land, land converted to forest land, grassland remaining grassland and land converted to grassland in OTs and CDs (see ID# L.30 in table 5);

(h) CO_2 emissions and removals for the Cayman Islands and Gibraltar (see ID# KL.5 in table 3);

(i) Carbon stock changes in the litter and deadwood pools for CM, the litter, deadwood and organic soils pools for GM, and all carbon pools under WDR (see ID# KL.9 in table 3);

(j) Carbon stock changes from deforestation in below-ground biomass, litter, deadwood and soil organic matter (see ID# KL.17 in table 5);

(k) Carbon stock changes in biomass in forests not used for timber production owing to biomass losses associated with harvesting and/or gathering (see ID# KL.18 in table 5);

(l) CO_2, CH_4 and N_2O emissions from controlled burning (see ID# KL.24 in table 5);

(m) CO_2, CH_4 and N_2O emissions from WDR (see ID# KL.25 in table 5).

Annex IV

Documents and information used during the review

A. Reference documents

Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

IPCC. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/kpsg.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at http://www.ipcc-nggip.iges.or.jp/public/wetlands/.

Annual review reports

Reports on the individual review of the 2013, 2014, 2015 and 2016 annual submissions of the United Kingdom of Great Britain and Northern Ireland, contained in documents FCCC/ARR/2013/GBR, FCCC/ARR/2014/GBR, FCCC/ARR/2015/GBR and FCCC/ARR/2016/GBR, respectively.

Other

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/2017.pdf.

Annual status report for the United Kingdom of Great Britain and Northern Ireland for 2017. Available at http://unfccc.int/resource/docs/2017/asr/GBR.pdf.

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DEFRA (Department for Environment, Food and Rurul Affairs). 2012. *Capturing cropland and grassland management impacts on soil carbon in the UK Land Use, Land Use Change and Forestry (LULUCF) inventory.* Available at http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=18355.

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Manx Uplands Steering Group. 2014. *Issues and Opportunities*. Available at https://www.gov.im/media/1126055/issues_and_opportunities_supporting_document_final_draft.pdf.

MSATPG (Minerals and Secondary Aggregate Technical Planning Group). 2015. *Annual Minerals Monitoring Report 2015*. Available at https://www.gov.im/media/1350502/ammr-2015.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Sam Bradley (United Kingdom GHG Inventory, Department for Business, Energy and Industrial

Strategy), including additional material on the methodology and assumptions used. The following documents[1] were also provided by the United Kingdom of Great Britain and Northern Ireland:

AEA Group. 2008. UK emissions of HFCs, PFCs and SF_6. Report to the Environment, Food & Rural Affairs.

AEA Technology. 2004. Emissions and Projections of HFCs, PFCs and SF_6 for the UK and Constituent Countries. Final report prepared for the Department for Environment, Food and Rural Affairs. AEAT/ED50090/R02.

Eunomia research and consulting. 2011. Inventory Improvement Project – UK Landfill Methane Emissions Model (MELMOD) Final Report to Defra and DECC. Available at http://sciencesearch.defra.gov.uk/Document.aspx?Document=9887_WR1124Finalreportincludingappendices.pdf.

Eurostat (2017). Energy Balances in the MS Excel File Format. 2017 Edition. Available at http://ec.europa.eu/eurostat/web/energy/data/energy-balances.

Gluckman Consulting. 2015. Revision to ICF Model for Refrigeration, air-conditioning and heat pumps. Prepared by Gluckman Consulting for Ricardo AEA.

ICF (2014), Review of data and methodologies used in the calculation of UK emissions from F-Gases.

Preese-Hall-1, Shale gas: fifth report of session 2010-12, Volume 1, 2014 (Barton Moss, energy-pedia news).

Matthews, R. *et al.* 2017. *The Carbine model. A Techincal Description*. Version 5. The Research Agency of the Forestry Commission.

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