



Department for
Business, Energy
& Industrial Strategy

ANNUAL STATEMENT OF EMISSIONS

**Reporting UK 2015 emissions to Parliament under the
Climate Change Act 2008**

March 2017

Annual Statement of Emissions for 2015

Presented to Parliament pursuant to section 16 of the
Climate Change Act 2008

March 2017

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Introduction

1. The Climate Change Act 2008¹ requires that Government report annual emissions to Parliament. This is the eighth annual statement of emissions required under section 16 of the Climate Change Act 2008. It confirms emissions for 2015 – the third year of the second carbon budget.
2. Under the Act, this report sets out: the total amount of UK greenhouse gases (GHGs) emitted to and removed from the atmosphere in 2015; the methods used to calculate those figures; and whether there was an increase or a decrease in emissions from the previous year. It also sets out the steps taken to calculate the “net UK carbon account” which includes the effect of carbon trading. The net carbon account for the second carbon budget must be below the cap of 2,782 million tonnes of carbon dioxide equivalent (MtCO₂e).
3. Annual statements are based on national greenhouse gas emissions statistics which take two years to be finalised so this annual statement is for 2015 emissions. The annual statement of emissions for 2016 will not be published until March 2018.
4. We are now in the second budgetary period, which runs from 2013 to 2017 with an emissions cap of 2,782 MtCO₂e. The third budget will cover the period 2018–2022 (2,544 MtCO₂e) and the fourth budget 2023–2027 (1,950 MtCO₂e). In June 2016, the Government set the level for the fifth carbon budget (2028–2032) at 1,725 MtCO₂e.

UK 2015 Emissions

5. **Part one** of this statement shows that, in 2015, net UK emissions were 495.7 MtCO₂e. This is a 38% reduction in GHG emissions from 1990 year and includes 32% reduction in Carbon Dioxide and 61% in Methane.
6. **Part two** of this statement sets out the how we calculated the net carbon account for 2015. The net carbon account is the total UK emissions after we have taken into account carbon trading. This allows us to reflect the EU Emissions Trading System (EU ETS) in the carbon budget system and we call this the ‘traded sector’. When we set the second carbon budget, the rules around the EU ETS were not known

¹ Under Section 16 of the Climate Change Act 2008 Government must lay an annual statement of emissions: <http://www.legislation.gov.uk/ukpga/2008/27/contents>.

and therefore we estimated the size of the UK's share of the EU ETS. The rules are now known and so we are able to more accurately calculate the UK share of the cap in carbon budgets. This shows that after taking into account crediting or debiting of units due to the EU ETS and domestic aviation emissions, the net UK carbon account in 2015 was 467.5 MtCO₂e. This means that in 2015 the ETS cap was 72.4 MtCO₂e smaller than that included in the fixed cap approach².

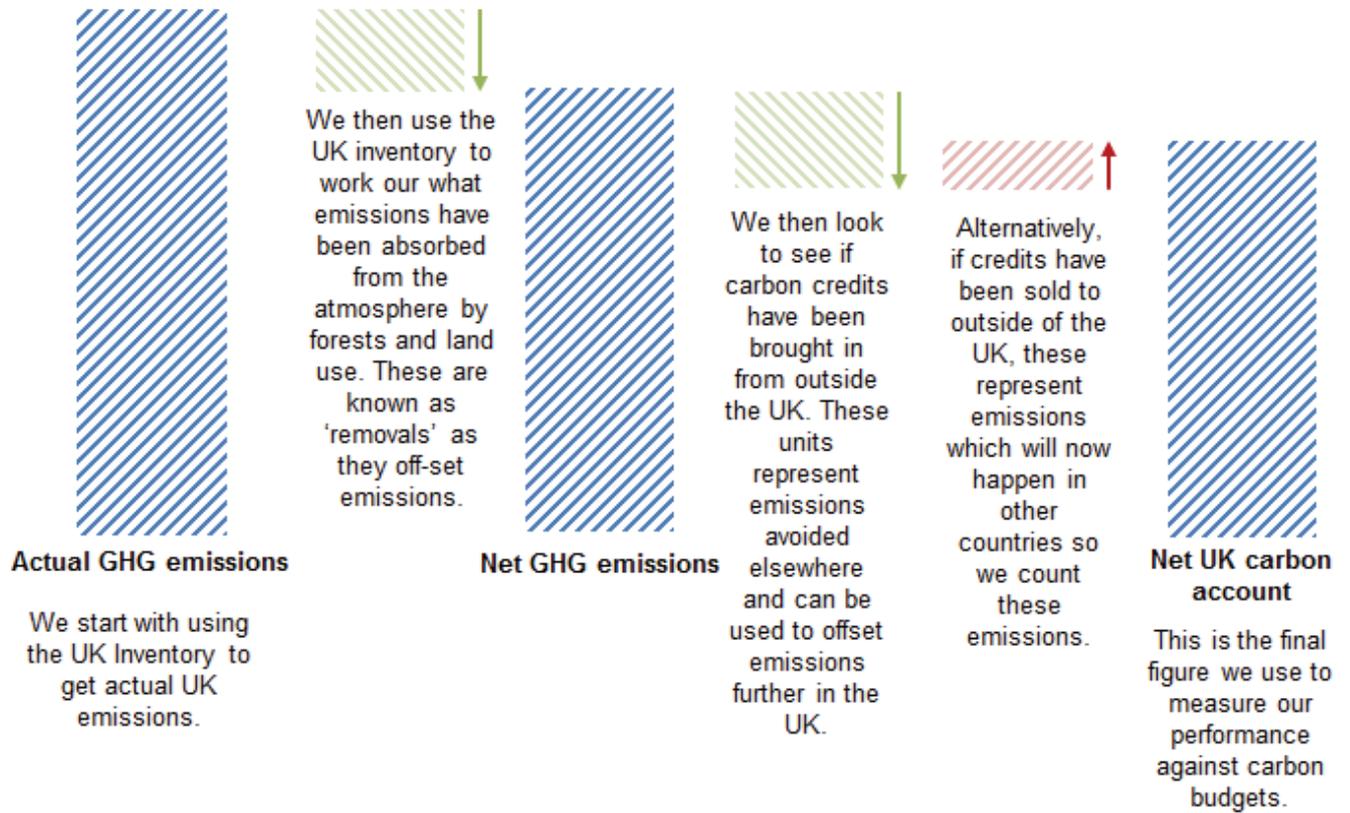
Calculating the net UK carbon account

7. Section 27 of the Climate Change Act defines the “net UK carbon account”. This is what we compare against carbon budgets to determine whether we are meeting them. The net UK carbon account must not exceed the level of the carbon budget at the end of each budgetary period. The process for determining the net UK carbon account in each year is summarised in Figure 1.
8. The starting point is UK emissions for the year, using data from the annual statistical release of UK greenhouse gas emissions published as National Statistics in February annually³. These emissions comprise aggregate gross emissions from sources in the UK, including emissions from land use, land use change and forestry (LULUCF), which are then adjusted to take into account removals of emissions from the atmosphere by carbon sinks associated with LULUCF activity.
9. This gives net UK emissions, which are adjusted to account for:
 - a. carbon units which have been brought in from overseas by Government and others (e.g. installations covered by the EU ETS) to offset UK emissions (“credits”), thereby reducing the net UK carbon account; and
 - b. UK carbon units which have been sold to a third party outside the UK or otherwise disposed of (“debits”), which increase the net UK carbon account as the recipient can use these units to offset their own emissions and it would lead to double counting if they were also used to offset UK emissions.

² A full comparison of the traded sector cap approach will be made in the End of Budgetary Statement in 2019.

³ The final 2015 estimates of UK greenhouse gas emissions were published on 7 February 2017. See: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015>.

Figure 1: The UK net carbon account



Effort Sharing Decision

10. The EU Effort Sharing Decision (ESD) establishes binding annual greenhouse gas emission targets for Member States for the period 2013–2020 and creates a new carbon unit to measure Member State compliance. The ESD covers emissions from most sectors not included in the EU ETS, such as transport (except aviation and international maritime shipping), buildings, agriculture and waste but excludes emissions from LULUCF.
11. While the ESD began operation in 2013, due to delays in the international reporting system no country has yet completed a full review and compliance process of any year of ESD reporting. It would not therefore be sensible to include ESD units in the calculation of the net carbon account for 2015. A separate statistical release provides an update on UK compliance under the ESD³. The Government will review this decision once we have completed the review and compliance process for the first year of the ESD.

Structure of the report

12. This report contains two sections:

- **Part 1** provides UK greenhouse gas emissions statistics for 2015, covering emissions, removals and net emissions of each of the greenhouse gases covered by carbon budgets, individually and collectively.
- **Part 2** sets out the amount of units which were credited to and debited from the net UK carbon account in 2015. The calculations in this part of the report are based on the methodologies established by the Carbon Accounting Regulations 2009 and the Carbon Accounting (2013–2017 Budgetary Period) Regulations 2015⁴.

⁴ SI 2009 No. 1257 is available from: www.opsi.gov.uk/si/si2009/uksi_20091257_en_1. Carbon Accounting (2013-2017 Budgetary Period) Regulations 2015 are accessible via the government website: <http://www.legislation.gov.uk/uksi/2015/775/contents/made>.

Part 1 – UK greenhouse gas emissions

13. The information contained in this part of the statement is derived from the UK greenhouse gas emissions statistics for 2015³, which were published on 7 February 2017. Emissions coverage under the Climate Change Act 2008 comprises UK territory only (i.e. England, Wales, Scotland and Northern Ireland)⁵. Unless otherwise stated, all figures in this section are stated in tonnes of carbon dioxide equivalent (tCO₂e)⁶.

1.1 2015 and base year emissions by gas

Section 16(3) and 16(8) of the Climate Change Act

14. Table 1 below sets out the base year figures – the emissions in the year against which progress is measured – for each greenhouse gas covered by the Climate Change Act. To ensure consistency with our international obligations, the same base year for each greenhouse gas is used under the Act. Table 1 also sets out the aggregate amount of total UK emissions, total UK removals and total net UK emissions for 2015.

15. Each year the UK greenhouse gas inventory is reviewed and updated to include methodological improvements, changes to international reporting guidelines or new data and this has the effect of changing base year emissions. Overseen by the National Inventory Steering Committee, this process increased the total emissions in 1990 by 0.3% when compared with the 2014 Annual Statement of Emissions. See section 1.2 for more details.

⁵ Section 89 of the Climate Change Act specifies that this includes UK coastal waters and the UK sector of the continental shelf.

⁶ This is the usual way of reporting greenhouse gases to account for the different global warming potentials of each gas. The global warming potential (GWP) of a gas is a measure of its impact on global warming relative to carbon dioxide. The GWP used for each gas in the UK inventory are based on those published in the Intergovernmental Panel on Climate Change's (IPCC's) 4th Assessment report: <http://www.ipcc.ch/report/ar4/>.

Greenhouse gas	Base year	Net base year emissions	2015 UK emissions excluding net emissions/removals from LULUCF (A)	2015 net UK emissions/removals from LULUCF (B)⁷	2015 UK emissions including net emissions/removals from LULUCF (A B)
Carbon dioxide CO₂	1990	595,742,249	412,761,609	8,913,768	403,847,841
Methane CH₄		134,800,557	52,169,428	-26,431	52,195,859
Nitrous oxide N₂O		51,157,971	21,575,911	-1,510,799	23,086,709
Hydrofluorocarbons HFCs	1995	19,088,085	15,833,294	0	15,833,294
Perfluorocarbons PFCs		596,760	327,229	0	327,229
Sulphur hexafluoride SF₆		1,264,370	457,481	0	457,481
TOTAL⁸		802,649,991	503,124,952	7,376,539	495,748,413

16. The Annex at the end of this annual statement provides data for each of the greenhouse gases covered by the Climate Change Act and carbon budgets framework. As required by the Act, this includes details of:

- The amount for 2015 of UK emissions, UK removals and net UK emissions of each gas.
- Whether any of those amounts represent an increase or decrease compared to the equivalent amount for the previous year.

⁷ A positive amount means the net effect is the removal of greenhouse gases from the atmosphere, while a negative figure means the net effect is emissions to the atmosphere.

⁸ Figures may not sum due to rounding.

17. Section 16 also requires that the annual statement includes details of the methods used to measure or calculate those amounts, and this is set out in section 1.2.

1.2 Change of method

Section 16(4) of the Climate Change Act

18. The UK's greenhouse gas inventory is compiled in line with international guidance from the Intergovernmental Panel on Climate Change⁹ (IPCC). Each year the inventory is updated to include the latest data available. Methodological changes are made to take account of new data sources, or new guidance from the IPCC, relevant work by CORINAIR¹⁰, and new research, sponsored by BEIS or otherwise. Improvements to the methodology are backdated as necessary to ensure a consistent time series. The United Kingdom's National Inventory Report¹¹ (NIR), which is submitted each year to the UNFCCC, provides details of the methods used to estimate emissions.
19. Emission inventories will always have some uncertainty. It is not possible to measure directly all the emissions from a country, so inventories are largely based on statistical activity data as well as on emission factors¹², both of which are subject to uncertainty. The UK Greenhouse Gas Inventory assesses uncertainties according to internationally agreed good practice guidance¹³, and this uncertainty information helps prioritise efforts to improve the accuracy of inventories in the future and guide decisions on methodological choice. The uncertainty analysis provides us with a high confidence that UK emissions of greenhouse gases have declined since 1990. The uncertainty associated with estimates of emissions of carbon dioxide (CO₂) is small, at approximately 2% based on 2014 emissions data. The uncertainty associated with the emissions of the other greenhouse gases is higher, and so uncertainty for the entire group of greenhouse gases is roughly 3%.

⁹ Further details on IPCC guidance is available from: www.ipcc-nggip.iges.or.jp.

¹⁰ The air pollutant emission inventory guidebook, which provides guidance on estimating emissions from both anthropogenic and natural emission sources, is available from: <http://www.eea.europa.eu/themes/air/emep-eea-air-pollutant-emission-inventory-guidebook>.

¹¹ The NIR is accessible from the UNFCCC website: http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/9492.php Alternatively, further details on how the UK's greenhouse gas inventory is compiled can be accessed from: <https://www.gov.uk/government/collections/uk-greenhouse-gas-emissions-statistics>.

¹² The emissions factor is the emissions per unit of activity. Emission factors are typically derived from measurements on a number of representative sources and the resulting factor applied to all similar sources in the UK.

¹³ Intergovernmental Panel on Climate Change guidelines, as adopted by the UNFCCC.

Further details regarding the calculation of inventory uncertainty are provided in the National Inventory Report¹⁴.

20. To ensure transparency and credibility in carbon budgets reporting, it is important that any methodological changes to greenhouse gas reporting – made in accordance with international practice - are clearly stated. Section 16(4) of the Climate Change Act requires that, where a change in methodology at the international level requires an adjustment in the emissions figures for an earlier year in the same budgetary period, the annual statement of emissions must specify the adjustment required and state the adjusted amount.
21. In preparing the 2015 emissions inventory, a number of revisions were made to the figures previously reported for earlier years, to take account of new methodologies which have been applied in respect of a number of specific sectors. These methodologies have been introduced in accordance with international reporting guidelines and the findings of the annual UNFCCC review of the UK inventory¹⁵, and the revised figures will be included in the UK's submission to the UNFCCC and the European Commission.
22. Tables 2 and 3 show the impacts of these revisions on 2014 emissions and the base-year emissions respectively. As a result of the changes 2014 emissions increased by 0.7 MtCO₂e, whilst base-year emissions increased by 2.4 MtCO₂e. The most significant of these revisions apply to the LULUCF, business and waste management sectors. See the list below for further details.
 - **Changes to estimates of emissions from harvested wood products**

A UNFCCC review recommendation to include more detailed forest area data for the UK has had knock on effects for emissions from harvested wood products. Improvements to forest land activity data, in particular improved alignment with annual wood production statistics, are estimated to decrease harvested wood products emissions by 0.2 MtCO₂e in 1990 and 0.4 MtCO₂e in 2014.
 - **Changes to ammonia and methanol feedstocks**

The 2006 IPCC guidelines indicated emissions from the manufacture of petrochemicals such as methanol should be reported in Industrial Processes and Product Use (IPPU). The changes mainly occur over the period from 1990 to 2001 when the UK produced methanol. These changes are estimated to decrease emissions in the Business sector and increase emissions in the Industrial Processes sector in 1990. Overall the changes to ammonia and

¹⁴ Uncertainties are based on 2014 data. For further information, see Annex 2 page 669:

http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/9492.php

¹⁵ The latest annual review can be found on the UNFCCC website:

http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/9916.php

methanol feedstocks are estimated to decrease emissions by around 0.7 MtCO₂e in 1990 and emissions are expected to remain unchanged for 2014.

- **Changes to estimates of emissions from grassland**

There have been several specific changes in this area. The largest change is due to using a new methodology for calculating biomass carbon stock change from hedges as a result of grassland management, which is estimated to decrease emissions in 1990 and slightly increase emissions in 2014. More minor updates include the correction of an error in the application of a conversion factor, inclusion of more detailed forest data using the National Forest Inventory, using updated activity data including changes to wildfire areas and revised peat extraction areas. Overall these changes to grassland are estimated to decrease emissions by around 1 MtCO₂e in 1990 and increase emissions by around 0.2 MtCO₂e in 2014.

- **New data for commercial and industrial waste in landfill and change of decay rates**

A new dataset from HM Revenue & Customs (HMRC) has been used which gives detail on inert wastes for 2008-2014 that was previously not available and makes the landfill model more complete. Due to the large increase in the percentage of methane captured from landfill following the use of this dataset, the country specific decay rate has been changed to the default IPCC decay rate. Emissions are estimated to decrease by around 2 MtCO₂e in 1990 and increase by 0.2 MtCO₂e in 2014.

- **Changes to estimates of emissions from forestland**

There have been several specific changes in this area. The largest change is due to a UNFCCC review recommendation to include more detailed forest area data and improved forest soil carbon stock change modelling for “Land converted to Forest Carbon stock change for the UK” which is estimated to increase emissions in 1990 and 2014. The emission source “Land converted to Forest Land Direct N₂O Emissions from Mineralisation” is also reported for the first time in this inventory which is estimated to slightly increase emissions in 1990 and 2014. More minor updates include the correction of an error in the application of a conversion factor, inclusion of more detailed forest data using the National Forest Inventory, using updated activity data including changes to wildfire areas and inclusion of an improved soil sub-model in the forest carbon model (CARBINE). Overall these changes to emissions from forest land are estimated to increase emissions by around 6 MtCO₂e in 1990 and by around 1 MtCO₂e in 2014.

- **Revisions to estimates of emissions from fluorinated gas use in aerosols**

The time series for estimates of emissions from fluorinated gas use in aerosols have been revised in the Business sector to reflect new data from the British Aerosol Manufacturers’ Association (BAMA) for 2009-2012 and BAMA industry insight on market behaviours in reaction to the new EU F gas regulations from 2012 to 2020. This has decreased Business 2014 emissions by a small amount.

- **Changes in the waste management sector**

Activity data for non-agricultural anaerobic digestion has been updated and rationalised between the greenhouse gas and ammonia inventories. UNFCCC review recommendations requested that nitrous oxide emissions from wastewater decomposition were recalculated to account for two new parameters. Additionally it was requested that the UK revises its approach to emissions from solvent use of HFCs and to review the lubricants emissions estimates. These changes have resulted in a slight increase of waste management sector emissions in 1990 and 2014.

- **Other minor changes in the LULUCF sector**

There have been other minor changes in the LULUCF sector including continuous improvement updates to activity data in emissions from croplands and wetlands, inclusion of more detailed forest data for cropland and settlement emissions, correction of an error in the application of a conversion factor in emissions from croplands and settlements and inclusion of a new emissions source in the inventory for emissions from indirect nitrous oxide. These minor changes have increased LULUCF sector emissions by less than 1 MtCO_{2e} in both 1990 and 2014.

Table 2: Inventory revisions affecting 2014 emissions, reported from 2015 inventory, by sector, tCO₂e			
Sector	2014 emissions as reported in the 2014 inventory (tCO₂e)	2014 emissions as reported in the 2015 inventory (tCO₂e)	Change in emissions reported for 2014 (tCO₂e)
Agriculture	49,060,027	49,130,414	70,388
Business	88,537,170	86,926,555	- 1,610,615
Energy supply	163,789,506	164,261,728	472,223
Industrial processes	12,983,211	12,964,912	- 18,299
Land Use Change, Land Use Change and Forestry (LULUCF)	- 8,956,508	- 7,430,319	1,526,189
Public	8,136,349	8,137,614	1,264
Residential	64,185,854	63,819,078	- 366,776
Transport	117,851,468	117,780,641	- 70,828
Waste management	18,836,742	19,540,493	703,751
TOTAL	514,423,819	515,131,116	707,297

Table 3: Inventory revisions affecting base year emissions, reported from 2015 inventory, by sector, tCO₂e			
Sector	Base year emissions as reported in the 2014 inventory (tCO₂e)	Base year emissions as reported in the 2015 inventory (tCO₂e)	Change in emissions reported for the base year (tCO₂e)
Agriculture	58,720,301	58,896,843	176,542
Business	116,215,372	115,192,013	- 1,023,359
Energy supply	277,900,172	277,911,416	11,245
Industrial processes	62,208,639	62,119,668	- 88,972
Land Use Change, Land Use Change and Forestry (LULUCF)	268,108	5,717,581	5,449,474
Public	13,497,002	13,496,852	- 150
Residential	80,797,474	80,797,704	231
Transport	121,869,285	121,871,200	1,915
Waste management	68,790,371	66,646,713	- 2,143,659
TOTAL	800,266,724	802,649,991	2,383,267

23. In line with the Climate Change Act, any adjustment to annual UK greenhouse gas emissions resulting from improved methodology from annual developments of the inventory is applied retrospectively to all preceding years at the end of the budgetary period. For the second carbon budget these will then be presented in the End of Budgetary Period Statement as final emissions in 2019.

1.3 International aviation and shipping

Section 16(5) of the Climate Change Act

24. Emissions from international aviation and international shipping can be estimated from refuelling from bunkers at UK airports and ports, whether by UK or non-UK operators. Under the reporting guidelines agreed by the UNFCCC, these emissions are not included in the UK's emissions total, but are reported as memo items in the national greenhouse gas inventory. Table 4 below shows greenhouse gas emissions from these sources in 2015.

Table 4: Greenhouse gas emissions from UK-based international aviation and shipping bunkers in 2015, tCO₂e	
International aviation total	33,262,046
Carbon dioxide	32,948,166
Methane	2,152
Nitrous oxide	311,728
International shipping total	7,414,016
Carbon dioxide	7,356,349
Methane	2,873
Nitrous oxide	54,793
TOTAL	40,676,061

Part 2 – the net UK carbon account

25. This part sets out the amount of carbon units which are to be credited to and debited from the net UK carbon account in 2015. Government must follow the rules set out in the regulations when working out the net UK carbon account and so the calculations in this part of the statement are based on the methodologies established by the Carbon Accounting Regulations 2009 and the Carbon Accounting (2013–2017 Budgetary Period) Regulations 2015.

2.1 Total amount of units credited to and debited from the net UK carbon account

Section 16(6) of the Climate Change Act

26. The net UK carbon account for a given year is calculated by taking net UK emissions for that year, with an adjustment made to reflect the amount of units to be credited to, and debited from, the net UK account for that year. Carbon units that are counted as credits reduce the level of the net UK carbon account, while carbon units that are counted as debits increase the level of the net UK carbon account.

27. The amounts of units to be counted as credits and debits in respect of 2015 should be calculated based on three elements:

- amount of units in the credit account which have been declared as credits to the net UK carbon account in respect of 2015
- effect of the EU ETS (including emissions arising from domestic aviation)
- determining whether the Government disposed of any carbon units during the course of 2015.

2.1.1 Units in the credit account

28. The Government set up a “credit account” in the UK Registry in 2009 which is the dedicated route through which carbon units can be credited voluntarily to the net UK carbon account. In 2015, zero units are to be credited to the net UK carbon account under this mechanism.

2.1.2 Accounting for the EU Emissions Trading System (EU ETS)

29. The net carbon account reflects the operation of the EU ETS.

30. The EU ETS is a cap and trade system that sets a limit on the total amount of greenhouse gases that can be emitted by installations in the system¹⁶. This cap is reduced over time so that emissions fall. If EU ETS participants in the UK collectively exceed the UK cap, the amount of emissions in excess of the cap must be considered as a 'credit', as operators must have bought units from other EU ETS participants to cover these emissions. If on the other hand EU ETS participants in the UK collectively reduce their emissions below the UK cap, then the difference between reported emissions from the EU ETS sector and the cap must be considered a 'debit', as operators must have sold or retained excess units which are not required to cover emissions in the UK.
31. This mechanism is reflected in the calculation of the net carbon account, by comparing the number of allowances surrendered against the UK ETS cap for the reporting year.
32. During the first carbon budget period, the ETS cap was calculated by taking the total amount of allowances to be allocated by the UK to in-scope installations in the period 2008–2012, whether for free, by auction/sale or via the new entrant reserve and dividing by five to give an annual figure for each year of the budget¹⁷.
33. From 2013, the EU ETS entered its third phase, which will end in 2020. This new phase brought changes to the rules governing operation of the ETS, and Member States no longer receive a national fixed cap as the ETS now operates at installation level¹⁸. As the net carbon account calculation relies on a cap for the traded sector, for the second budgetary period a 'notional' cap will be estimated. This notional cap estimates the UK share of a given EU-wide cap, replicating the components of the previous cap as defined in EU regulations.

2.1.3 EU ETS notional cap

34. The methodology for estimating the UK's notional share of the EU-wide cap is set out in tables 5 and 6.

¹⁶ http://ec.europa.eu/clima/policies/ets/index_en.htm.

¹⁷ Details of this calculation can be found in the end of budgetary statement found here: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/310648/final_statement_first_carbon_budget_period.pdf.

¹⁸ Detailed guidance on Phase 3 of the ETS can be found here: <https://www.gov.uk/participating-in-the-eu-ets>.

35. The notional cap is created by adding together the volume of EU allowances freely allocated to stationary UK operators, the volume of allowances in the EU-wide auction pot to be auctioned by the UK to stationary operators, and an estimated share of the New Entrants Reserve (NER).
36. The volume of EU allowances freely allocated to stationary UK operators, for the purposes of this calculation, is taken from the UK's finalised NIMs (National Implementation Measures). The NIMs are the installation level list of free EU ETS allocations to stationary UK operators¹⁹.
37. The volume of allowances in the EU-wide auction pot to be auctioned by the UK to stationary operators is estimated using the latest available estimates of the total volume of allowances to be auctioned by the EU in each year and the UK's percentage share of this total volume of allowances.
38. The NER is an additional amount of free allowances set aside for new installations that are covered by the scope of the ETS Directive, and installations that increase capacity, covering the whole of Phase III (years 2013–20).
39. The UK's share of NER allowances will only be known once these allowances have been allocated. This means that it is unknown how allowances will be allocated in total over the phase III (and thus, over the second carbon budget period), and to which Member States. An indicative annual split of the NER allowances will be estimated for each year of the second carbon budget. The total NER represents 5% of the 2013-20 total fixed installation cap; therefore the annual split will reflect this proportion by taking 5% of the annual fixed installation cap for 2015. Further, an indicative estimate of the UK share of the NER for 2015 is arrived at by assuming that the UK share of the NER will mirror the UK share of free allowances. This method is demonstrated in table 5. Further guidance on participation in the EU ETS, including information on these various types of allowances, is published on the European Commission website²⁰.

¹⁹ The NIMs are updated on an annual basis and can be found here:

<https://www.gov.uk/guidance/participating-in-the-eu-ets>.

²⁰ http://ec.europa.eu/clima/policies/ets/cap/index_en.htm.

Table 5: UK Notional Allocation of New Entrants Reserve for 2015, tCO₂e	
Total EU ETS cap for fixed installations in 2015 (A)	2,007,773,364
New Entrants Reserve 2015 as 5% of total cap [(A) x 0.05=(B)]	100,388,668
UK share of free allowances in 2015 (C)	7.77%
UK notional share of NER in 2015 [(C) x (B)=(D)]	7,796,345

Table 6: UK Notional EU ETS cap for 2015, tCO₂e	
Amount of free allowances allocated to the UK in 2015 (E)	60,480,634
Amount of auctioned allowances allocated to the UK in 2015 (F)	74,958,000
Estimated amount of New Entrants Reserve for the UK in 2015 (D)*	7,796,345
UK Notional Cap for 2015 [(D)+(E)+(F)]	143,234,979

* See table 5

40. For 2015 the resulting UK notional cap will be 143.2 MtCO₂e, as shown in table 6.

Table 7 sets out the number of units surrendered in 2015 by UK operators, thus showing the effect of the EU ETS on the net UK carbon account in 2015.

Table 7: The effect of the EU ETS on the net UK carbon account in 2015, tCO₂e	
Total amount of units surrendered by UK operators (A)	171,722,483
UK's EU ETS annual allocation for 2015 (B)	143,234,979
Difference between 2015 annual allocation and amount of units surrendered (A - B)	28,487,504

41. As the amount of units surrendered by UK operators was greater than the (notional) annual allocation for 2015, a corresponding amount of units must be counted as credits to the net carbon account. **This means 28,487,504 units are to be credited to the net UK carbon account in 2015** as a result of the EU ETS.

2.1.4 Domestic aviation emissions

42. Under the Climate Change Act, the net carbon account must contain emissions generated by domestic aviation (flights between UK airports). Historically this has been reported in the “non-traded” sector of the UK’s emissions, but are now included in the EU ETS. As a result domestic aviation carbon dioxide emissions are included in the “traded sector” of the budgets.
43. In order to determine whether units should be credited to or debited from the net UK carbon account in each year, the number of allowances surrendered is compared with “the annual allocation”, i.e. the domestic aviation emissions cap²¹.

2.1.4.1 Methodology to calculate domestic aviation cap

44. Using the latest available civil aviation data from the UK greenhouse gas inventory submitted under the EEA, and published on the EEA website²², the steps listed below set out how we estimate a cap against which we report carbon dioxide emissions from UK domestic aviation. The calculation is then summarised in table 8.
45. This approach uses a **baseline** of total EEA domestic flights (i.e. total flights within individual EU countries plus Norway, Liechtenstein and Iceland), and an estimate of what **share of this total** can be attributed to the UK. The cap declines through time (by 95% in 2013–2020), reflecting the ambition to reduce emissions from aviation.
46. There are three steps to the calculation

1. Calculate a baseline of total EU domestic aviation

The baseline is the average of 2004–06 EEA domestic aviation carbon dioxide emissions²³ (flights within individual EEA countries). 2004–06 is used as this is a common baseline used for EU environmental targets.

2. Calculate UK share and apply to the baseline

The UK’s share of EEA domestic aviation carbon dioxide emissions is taken from 2010. The UK’s domestic aviation emissions are compared to total EEA domestic aviation

²¹ Please refer to section 2.1.4 in the Annual statement of emissions for 2014 for a full explanation of domestic aviation emissions:

<https://www.gov.uk/government/publications/annual-statement-of-emissions-for-2014>.

²² <http://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-12>.

²³ The total EEA figure will differ slightly from that published on the EEA website due to the removal of emissions attributable to UK flights to and from Gibraltar, which are included in the UK submission for the EU inventory, but which are not applicable to UK domestic aviation emissions under the Climate Change Act. This ensures that the UK figures used within the cap are calculated on an equivalent basis to that used for the 2015 UK domestic aviation emissions used to assess performance.

emissions in this year²³ (data for both are taken from the EU inventories as reported by EEA). 2010 is used because this was the benchmarking year for the allocation of free allowances to aircraft operators. This UK share of EEA domestic aviation is then applied to the 2004–06 EEA average.

3. Set a declining trajectory in line with ambitions to reduce emissions

For 2013-20, the cap will be 95% of this annual average.

2.1.4.2 Methodology to assess performance against the cap

47. The UK’s carbon dioxide emissions from domestic aviation in 2015 (performance) are taken from the UK inventory.

48. To assess the UK’s performance against this cap, the following methodology is used:

- Compare the national inventory figure for annual UK domestic aviation carbon dioxide emissions with the domestic aviation cap, then
- If emissions exceed the cap then the difference is counted as a credit to the net UK carbon account.
- If emissions are below the cap then the difference is counted as a debit to the net UK carbon account.

2.1.4.3 Calculations

1	Average 2004–06 EEA domestic aviation CO ₂ emissions (A)	20,229,689
2	UK’s share of 2010 EEA domestic aviation CO ₂ emissions (B)	9.41%
3	UK as a proportion of the 2004–06 EEA average (C) =(A x B)	1,903,491
4	For 2015, the cap will be 95% of this annual average (C) x 0.95	1,808,316

Domestic aviation cap (A)	1,808,316
2015 domestic aviation CO ₂ emissions (B)	1,521,266
Difference between 2015 cap and performance (A - B)	287,051

49. In 2015 the cap for domestic aviation is estimated as 1.81 MtCO₂e. Emissions for domestic aviation (taken from the inventory) in 2015 were 1.52 MtCO₂e.

50. As carbon dioxide emissions from domestic aviation were less than the cap for 2015, a corresponding amount of emissions will be counted as debits. This means that 0.29 MtCO₂e will be debited from the net UK carbon account in 2015, as shown in table 9.

2.2 Net UK carbon account for the year

Section 16(7) of the Climate Change Act

51. As described above, the net UK carbon account is calculated by taking net UK emissions, which are then adjusted to account for the amount of units to be debited from and credited to the net UK carbon account.

52. The information in table 10 is taken from preceding tables in this report and provides an amount for the net UK carbon account of 467.5 MtCO₂e.

53. The final net carbon account for the second carbon budget will be presented in the End of Budgetary Period Statement in 2019.

Table 10: Summary of how the net UK carbon account for 2015 is calculated, tCO₂e	
2015 net UK emissions – see table 1 (A)	495,748,413
Amount of units to be credited (B)	28,487,504
EU ETS Fixed Installations	28,487,504
EU ETS Domestic Aviation	0
Amount of units to be debited (C)	287,051
EU ETS Fixed Installations	0
EU ETS Domestic Aviation	287,051
2015 Net UK carbon account, tCO₂e ((A - B) + C)	467,547,960

Annex – 2015 emissions by gas

Section 16(2) of the Climate Change Act

54. The emissions and removals data included in table 11 below are taken from the greenhouse gas emissions data published on 7 February 2017³, derived from the UK's 1990–2015 National Greenhouse Gas Emissions Inventory. The methodologies used to calculate and compile these data are in line with United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines on annual inventories. These methods include emissions factors (country specific, plant specific and the default emissions factors used under the international framework), as well as emissions and production data reported by operators and regulators, and modelling²⁴.

²⁴ Further details on the methods used in specific sectors are set out in table 13 of the data tables published alongside the final 2015 emissions data, available from:

<https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015>.

Table 11: 2015 emissions by gas, tCO₂e

	Carbon dioxide	Methane	Nitrous oxide	HFC ²⁵	PFC ²⁶	SF ₆ ²⁷
2015 UK emissions excluding net emissions/removals from LULUCF (A)	412,761,609	52,169,428	21,575,911	15,833,294	327,229	457,481
2014 UK emissions excluding net emissions/removals from LULUCF (B)	430,256,060	53,925,636	21,774,961	15,849,526	278,315	476,539
Increase or decrease on previous year (A – B)	Decrease of 17,494,451	Decrease of 1,756,208	Decrease of 199,050	Decrease of 16,232	Increase of 48,914	Decrease of 19,058
2015 UK emissions/removals from LULUCF²⁸ (C)	8,913,768	-26,431	-1,510,799	0	0	0
2014 UK emissions/removals from LULUCF (D)	9,014,818	-32,490	-1,552,010	0	0	0
Increase or decrease on previous year (C – D)	Decrease of 101,050	Increase of 6,059	Increase of 41,211	N/A	N/A	N/A
2015 UK emissions including net emissions/removals from LULUCF²⁹ (E = A – C)	403,847,841	52,195,859	23,086,709	15,833,294	327,229	457,481
2014 UK emissions including net emissions/removals from LULUCF (F = B – D)	421,241,242	53,958,125	23,326,970	15,849,526	278,315	476,539
Increase or decrease on previous year (E – F)	Decrease of 17,393,401	Decrease of 1,762,267	Decrease of 240,261	Decrease of 16,232	Increase of 48,914	Decrease of 19,058

²⁵ Hydrofluorocarbons.²⁶ Perfluorocarbons.²⁷ Sulphur hexafluoride.²⁸ A positive amount means the net effect is the removal of greenhouse gases from the atmosphere, while a negative figure means the net effect is emissions to the atmosphere.²⁹ Removals of greenhouse gas from the atmosphere do not apply to HFCs, PFCs or SF₆.



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