



Department for
Business, Energy
& Industrial Strategy

ANNUAL STATEMENT OF EMISSIONS FOR 2017

Reporting UK 2017 emissions to Parliament
under the Climate Change Act 2008

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

March 2019



Department for
Business, Energy
& Industrial Strategy

OGL

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Contents

Introduction	2
Structure of the report	2
Explaining the net UK carbon account	3
Effort Sharing Decision	4
Part 1 – UK greenhouse gas emissions	5
2017 and base year emissions by gas	5
Change of method	7
International aviation and shipping	11
Part 2 – the net UK carbon account	13
Total amount of units credited to and debited from the net UK carbon account	13
Units in the credit account	13
Accounting for the EU Emissions Trading System (EU ETS)	13
EU ETS notional cap	14
Domestic aviation emissions	15
Net UK carbon account for the year	18
Annex – 2017 emissions by gas	19

Introduction

The Climate Change Act 2008¹ requires that the Government reports annual greenhouse gas emissions to Parliament. This is the tenth annual statement of emissions required under section 16 of the Climate Change Act 2008. It confirms emissions for 2017 – the final year of the second carbon budget.

The second carbon budget period ran from 2013 to 2017 with an emissions cap of 2,782 million tonnes of carbon dioxide equivalent (MtCO_{2e}). The third budget will cover the period 2018-2022 (2,544 MtCO_{2e}), the fourth budget 2023-2027 (1,950 MtCO_{2e}) and the fifth budget 2028-2032 (1,725 MtCO_{2e}).

Annual statements are based on national greenhouse gas emissions statistics² which take two years to be compiled so this annual statement covers emissions for the year 2017. The National Statistics used to compile this statement show that UK emissions for the second carbon budget period were 2,398 MtCO_{2e}, 384 MtCO_{2e} below the cap of 2,782 MtCO_{2e} - confirming that the UK has met its second carbon budget.

The annual statement of emissions for 2018 will be published in March 2020.

Structure of the report

Part one of this statement shows the total amount of UK greenhouse gases emitted to and removed from the atmosphere in 2017; the methods used to calculate those figures; and whether there was an increase or a decrease in emissions from the previous year. In 2017, net UK emissions were 460 MtCO_{2e}. This is a 42% reduction in emissions from the 1990 base year.

Part two of this statement sets out the steps taken to calculate the “net UK carbon account” for 2017, the UK’s total emissions after we have taken into account the effect of carbon trading. The net carbon account for the second carbon budget must not exceed 2,782 MtCO_{2e}.

The net carbon account 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 operating rules around the EU ETS were not known and therefore we estimated the size of the UK’s share of the EU ETS. The operating rules are now known and so we are able to more accurately calculate the UK share of the EU ETS 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 2017 was 488 MtCO_{2e}. This means that in 2017 the UK’s notional EU ETS cap was approximately 49 MtCO_{2e} smaller than was estimated at the time of setting the second carbon budget³.

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>.

² The final 2017 estimates of UK greenhouse gas emissions were published on 5 February 2019. See: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017>

³ A full comparison of the traded sector cap approach will be made in the End of Budgetary Period Statement which will be laid in Parliament by the end of May 2019.

Explaining the net UK carbon account

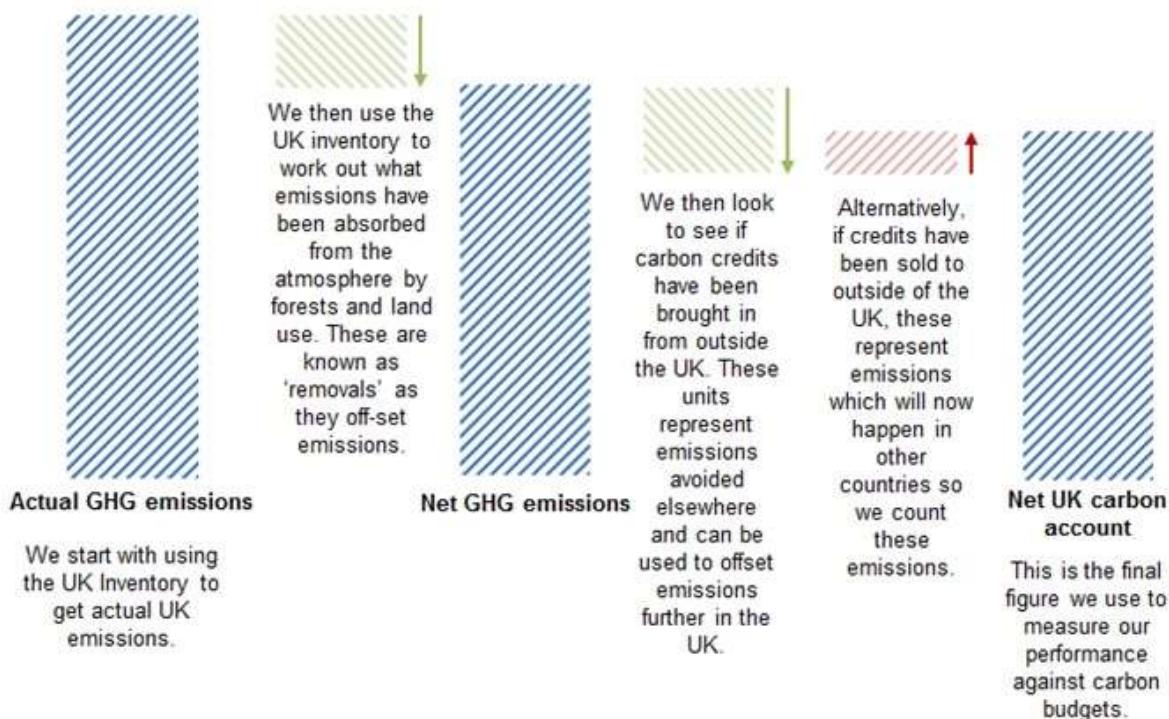
Section 27 of the Climate Change Act defines the “net UK carbon account”. This is what we compare against carbon budgets to determine whether we are meeting them. The net UK carbon account must not exceed the level of the carbon budget at the end of each budgetary period. The process for determining the net UK carbon account in each year is summarised in Figure 1.

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 each February⁴. These comprise emissions from all sources in the UK, including those from land use, land use change and forestry (LULUCF). These are then adjusted to take into account removals of carbon dioxide from the atmosphere by sinks associated with LULUCF activity. The new total is referred to as net UK emissions.

Net UK emissions are then further adjusted to account for:

- 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
- UK carbon units which have been sold to a third party outside the UK or otherwise disposed of (“debits”). These 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.

Figure 1: The net UK carbon account



⁴ The final 2017 estimates of UK greenhouse gas emissions were published on 5 February 2019. See: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017>

Effort Sharing Decision

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.

The first formal confirmation of the UK's compliance with the ESD began in 2017⁵. To date the European Commission has confirmed that UK ESD emissions for years 2013-16 were 84 MtCO_{2e} below the target for this period. Provisional 2017 ESD emissions suggest the UK will continue to increase this surplus with emissions 29 MtCO_{2e} below its target for that year. The UK does not intend to trade its 'Annual Emissions Allocation' units associated with this surplus with other countries. As such ESD trading will not be included in the net carbon account calculation.

⁵ All ESD emissions reported to the European Commission are reviewed before final performance is confirmed. We therefore expect final 2017 performance to be known towards the end of 2019.

Part 1 – UK greenhouse gas emissions

The information contained in this part of the statement is derived from the UK greenhouse gas emissions statistics for 2017², which were published on 5 February 2019. Emissions coverage under the Climate Change Act 2008 comprises UK territory only (i.e. England, Wales, Scotland and Northern Ireland)⁶. Unless otherwise stated, all figures in this section are stated in tonnes of carbon dioxide equivalent (tCO₂e)⁷.

2017 and base year emissions by gas

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

Table 1 below sets out the base year emissions – the emissions in the year against which progress is measured – for each greenhouse gas covered by the Climate Change Act. The table also sets out the total UK emissions for 2017.

Each year the UK greenhouse gas inventory is reviewed and updated to include methodological improvements, changes to international reporting guidelines or new data, all of which may change base year emissions. Overseen by the National Inventory Steering Committee, this process led to a small increase in the total emissions in 1990 by 0.02% when compared with the 2016 Annual Statement of Emissions. See the ‘change of method’ section for more details.

⁶ Section 89 of the Climate Change Act specifies that this includes UK coastal waters and the UK sector of the continental shelf.

⁷ 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/>.

Annual Statement of Emissions for 2017

Table 1: Base year and 2017 emissions for each greenhouse gas, tCO₂e

Greenhouse gas	Base year	Net base year emissions	2017 UK emissions excluding net emissions/removals from LULUCF (A)	2017 net UK emissions/removals from LULUCF (B) ⁸	2017 UK emissions including net emissions/removals from LULUCF (A + B)
Carbon dioxide CO ₂	1990	596,346,168	384,558,419	-11,323,438	373,234,981
Methane CH ₄		132,458,345	51,454,887	28,367	51,483,254
Nitrous oxide N ₂ O		48,206,709	19,129,829	1,402,303	20,532,132
Hydrofluorocarbons HFCs	1995	19,088,085	14,074,987	0	14,074,987
Perfluorocarbons PFCs		596,760	371,474	0	371,474
Sulphur hexafluoride SF ₆		1,299,960	525,407	0	525,407
TOTAL⁹		797,996,026	470,115,003	-9,892,768	460,222,235

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

- The amount for 2017 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.

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 the 'change of method' section.

⁸ A negative amount means the net effect is the removal of greenhouse gases from the atmosphere, while a positive figure means the net effect is emissions to the atmosphere.

⁹ Figures may not sum due to rounding.

Change of method

Section 16(4) of the Climate Change Act

The UK's greenhouse gas inventory is compiled in line with international guidance from the Intergovernmental Panel on Climate Change¹⁰ (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 CORINAIR¹¹, 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 Report¹², which is submitted each year to the UNFCCC, provides details of the methods used to estimate emissions.

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 factors¹³, both of which are subject to uncertainty. The UK Greenhouse Gas Inventory assesses uncertainties according to internationally agreed good practice guidance¹⁴, 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 3% based on 2016 emissions data. The uncertainty associated with the emissions of the other greenhouse gases is higher, although they make up a much smaller proportion of the total, so uncertainty for the entire group of greenhouse gases is also roughly 3%. Further details regarding the calculation of inventory uncertainty are provided in the National Inventory Report¹⁵.

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.

In preparing the 2017 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

¹⁰ Further details on IPCC guidance are available from: <https://www.ipcc-nggip.iges.or.jp>

¹¹ 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>.

¹² The NIR is accessible from the UNFCCC website: <https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2018>

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>.

¹³ 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.

¹⁴ Intergovernmental Panel on Climate Change guidelines, as adopted by the UNFCCC.

¹⁵ Uncertainties are based on 2016 data. For further information, see Annex 2 page 632: <https://unfccc.int/documents/65762>

review of the UK inventory¹⁶, and the revised figures will be included in the UK's submission to the UNFCCC and the European Commission. Revisions are also made to take into account revisions to the datasets which have been used in the compilation of the inventory.

Tables 2 and 3 show the impacts of these revisions on 2016 emissions and the base-year emissions respectively. As a result of the changes 2016 emissions increased by 5.2 MtCO_{2e}, whilst base-year emissions increased by 0.2 MtCO_{2e}. The most significant of these revisions apply to the land use, energy supply and agriculture sectors. See the list below for further details.

Change in fossil-carbon factors used for Municipal Solid Waste (MSW)

Previously, a UK-specific set of emission factors for MSW were used. These were derived using a limited set of UK-specific waste composition data. However, the factors were very uncertain as UK data only covered the period 1990-2011. Factors for later years were assumed to be equal to the figure for 2011.

Given the increasing uncertainty associated with the UK-specific data, the emissions factors have been updated to use the IPCC 2006 inventory guidelines' default values. This has resulted in more conservative estimates and ensures consistency with the inventory's methodology for estimating the biogenic carbon content of MSW. This is because the old approach applied emission factors to the sum of biodegradable and non-biodegradable wastes in the UK energy statistics whereas the new approach applies factors to just the non-biodegradable wastes. The ratio of non-biodegradable to biodegradable waste in the energy statistics is quite different in different years so the impact of the new methodology also changes from year to year.

Overall this change had a negligible impact on our estimate of emissions in 1990 but increased our estimate for 2016 by 1.1 MtCO_{2e}.

Adjustments to Forest Land inventory processes

As part of the process of generating the greenhouse gas emissions inventory for Forest Land, a programme called "Reconcile" is used to take information from the forest inventories for the private sector forest and the public forest estate and assigns the forest areas to either afforestation or restocking.

Parameters are optimised to achieve a volume production forecast from CARBINE, a land use model, that matches as closely as possible the published wood production statistics. In previous greenhouse gas inventory forecasts this was done manually. The process has now been automated and some adjustments made to the parameters used in the model as a result.

Overall these changes increased our estimate of emissions in 1990 by 0.3 MtCO_{2e} and our estimate for 2016 by 0.9 MtCO_{2e}.

Landfill methane corrections

A correction was applied to misreported methane flaring data for England and Wales for the years 2008 to 2016 inclusive, provided by the Environment Agency. The misreport involved presenting data in incorrect units for 2015, and misallocating gas between flaring and

¹⁶ The latest annual review can be found on the UNFCCC website:
<https://unfccc.int/node/65982>

combustion in engines. This impacted the volume of methane calculated as being emitted from landfill in England and Wales between 2008 and 2016.

Additionally, in 2016 the quantity of waste landfilled in Northern Ireland was estimated as data were not available from the Northern Ireland Environment Agency (NIEA) in time for the compilation of the National Atmospheric Emissions Inventory (NAEI). During compilation of the 2017 inventory, 2016 data was obtained from NIEA and consequently waste estimates and CH₄ emissions were recalculated.

Overall these changes had no impact on our estimate of emissions in 1990 but increased our estimate for 2016 by 0.1 MtCO_{2e}.

Implementation of biofuels carbon factors research

Biofuel carbon factors have been reviewed, including reassessing the fossil content of mixed fossil/biogenic fuels. This includes:

- Fossil carbon factors for FAME (Fatty Acid Methyl Ester, which is the main constituent of UK biodiesel), which was previously assumed to be 100% biogenic. Recent analysis indicates that it contains around 5% fossil carbon content;
- Fossil carbon factors for bio-MTBE, which is a minor road fuel not previously included in the NAEI; and,
- Revised fossil carbon factors for natural gas to account for the increasing contribution of biogas injected into the national grid.

These changes to fossil carbon factors affect most emissions sectors. Biogenic carbon emissions are accounted for via LULUCF carbon stock balances rather than at the point of emission, so revisions to the biogenic carbon factors will not impact the national total.

Overall these changes had no impact on our estimate of emissions in 1990 but reduced our estimate for 2016 by 0.2 MtCO_{2e}.

Updated agriculture data

There were some revisions to activity data, including decreasing the 2016 value for urea fertiliser use. Minor error corrections throughout the inventory have resulted in a small decrease to the estimate of total greenhouse gas emissions from UK agriculture across the time series by 0.8 MtCO_{2e} in both 1990 and 2016.

Update to EMEP/EEA Guidebook N₂O emission factors

The N₂O emissions factor for inland waterways using gas oil and diesel has been changed to align with the latest version of the European Monitoring and Evaluation Programme/European Environment Agency (EMEP/EEA) Guidebook. The factors for diesel-fuelled machinery were reduced by a factor of 10 in the latest 2016 Guidebook, compared with the 2005 version.

In addition, the factor used for shipping was increased by a factor of 1.9 to bring it in line with the N₂O factors currently used for coastal shipping engines using gas oil, and the factors for diesel-fuelled machinery were reduced by a factor of 10. This brings the factors more in line with factors used for other types of diesel machinery (e.g. rail).

Overall these changes reduced our estimate of emissions in 1990 by 1.3 MtCO_{2e} and our estimate for 2016 by 1.1 MtCO_{2e}.

Correction of error in recording of deadwood in forests

A double-counting of carbon in litter due to turnover and harvest was identified. Deadwood had previously been counted in both felled and restocked stands; e.g. carbon for deciduous foliage could enter the litter pool as both turnover at senescence and as residue from harvest. This had exaggerated the size of the sink provided by LULUCF and has since been corrected. As a result, the estimate of the size of the LULUCF sink has reduced by 2.1 MtCO_{2e} in 1990 and 3.5 MtCO_{2e} in 2016.

Other model upgrades

There have been a range of other minor changes made to the estimates, predominantly to the LULUCF models. A large range of minor improvements have been made including updates to the average living biomass densities for cropland and grassland, updates to the average forest biomass densities used in estimating wildfire and controlled burning emissions and changes to the way land is modelled in overseas territories and crown dependencies. Estimates of the amount of nitrous oxide used for recreational purposes have also now been included in the NAEI for the first time.

Table 2: Inventory revisions affecting 2016 emissions, reported from 2017 inventory, by sector, tCO_{2e}

Sector	2016 emissions as reported in the 2016 inventory (tCO _{2e})	2016 emissions as reported in the 2017 inventory (tCO _{2e})	Change in emissions reported for 2016 (tCO _{2e})
Agriculture	46,457,006	45,195,098	-1,261,908
Business	81,541,251	81,367,140	-174,112
Energy supply	120,208,817	121,777,881	1,569,064
Industrial processes	10,541,080	10,578,989	37,908
Land Use, Land Use Change and Forestry (LULUCF)	-14,557,474	-9,802,510	4,754,965
Public	8,175,478	8,154,906	-20,572
Residential	69,831,605	69,837,633	6,028
Transport	125,753,853	125,921,390	167,537
Waste management	19,932,489	20,026,752	94,263
TOTAL	467,884,106	473,057,279	5,173,174

Table 3: Inventory revisions affecting base year emissions, reported from 2017 inventory, by sector, tCO₂e

Sector	Base year emissions as reported in the 2016 inventory (tCO ₂ e)	Base year emissions as reported in the 2017 inventory (tCO ₂ e)	Change in emissions reported for the base year (tCO ₂ e)
Agriculture	55,321,070	53,972,071	-1,349,000
Business	115,503,352	114,781,079	-722,273
Energy supply	277,886,443	277,922,921	36,478
Industrial processes	62,116,650	62,098,540	-18,110
Land Use, Land Use Change and Forestry (LULUCF)	-2,111,191	270,008	2,381,199
Public	13,497,384	13,497,538	154
Residential	80,823,282	80,717,619	-105,662
Transport	128,107,323	128,122,527	15,204
Waste management	66,679,793	66,613,722	-66,071
TOTAL	797,824,107	797,996,026	171,919

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.

International aviation and shipping

Section 16(5) of the Climate Change Act

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 2017.

Annual Statement of Emissions for 2017

Table 4: Greenhouse gas emissions from UK-based international aviation and shipping bunkers in 2017, tCO₂e

International aviation total	34,950,943
Carbon dioxide	34,620,774
Methane	2,615
Nitrous oxide	327,554
International shipping total	7,847,526
Carbon dioxide	7,739,304
Methane	2,473
Nitrous oxide	105,749
TOTAL	42,798,469

Part 2 – the net UK carbon account

This part sets out the amount of carbon units which are to be credited to and debited from the net UK carbon account in 2017. 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.

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

Section 16(6) of the Climate Change Act

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.

The amounts of units to be counted as credits and debits in respect of 2017 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 2017
- effect of the EU ETS (including emissions arising from domestic aviation)
- determining whether the Government disposed of any carbon units during the course of 2017.

Units in the credit account

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 2017, zero units are to be credited to the net UK carbon account under this mechanism.

Accounting for the EU Emissions Trading System (EU ETS)

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

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 system¹⁷. This cap is reduced over time so that emissions decrease across the EU. 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

¹⁷ http://ec.europa.eu/clima/policies/ets/index_en.htm.

must be considered a 'debit', as operators must have sold or retained excess units which are not required to cover emissions in the UK.

The EU ETS is currently in its third phase, which runs from 2013 to 2020. In this phase Member States do not receive a fixed cap at the national level as was the case during the first carbon budget¹⁸; the ETS instead operates at installation level¹⁹. 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.

EU ETS notional cap

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

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).

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 operators²⁰.

The volume of allowances in the EU-wide auction pot to be auctioned by the UK to stationary operators each year is captured through the UK's auctioning platform²¹.

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).

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 phase III (and thus, over the second and third carbon budget periods), and to which Member States. An indicative annual split of the NER allowances will be estimated for each year of the second carbon budget for the purpose of calculating the notional cap. 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 2017. An indicative estimate of the UK share of the NER for 2017 is arrived at by assuming that the UK share of the NER will mirror the UK share of free allowances in that year. 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 website²².

¹⁸ 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.

¹⁹ Detailed guidance on Phase 3 of the ETS can be found here: <https://www.gov.uk/participating-in-the-eu-ets>.

²⁰ Free allocation data based on NIMs are updated annually and can be found in two locations: <https://www.gov.uk/guidance/participating-in-the-eu-ets> and https://ec.europa.eu/clima/policies/ets/registry_en

²¹ ICE futures Europe: <https://www.theice.com/emissions/auctions>

²² http://ec.europa.eu/clima/policies/ets/cap/index_en.htm.

Annual Statement of Emissions for 2017

Table 5: UK Notional Allocation of New Entrants Reserve for 2017, tCO₂e

Total EU ETS cap for fixed installations in 2017 (A)	1,931,244,872
New Entrants Reserve 2017 as 5% of total cap [(A) x 0.05=(B)]	96,562,244
UK share of free allowances in 2017 (C)	7.2%
UK notional share of NER in 2017 [(C) x (B)=(D)]	6,929,366

Table 6: UK Notional EU ETS cap for 2017, tCO₂e

Amount of free allowances allocated to the UK in 2017 (E)	51,512,664
Amount of auctioned allowances allocated to the UK in 2017 (F)	105,960,000
Estimated amount of New Entrants Reserve for the UK in 2017 (D)*	6,929,366
UK Notional Cap for 2017 [(D)+(E)+(F)]	164,402,030

* See table 5

For 2017 the resulting UK notional cap will be 164,402,030 tCO₂e, as shown in table 6. Table 7 sets out the number of units surrendered in 2017 by UK operators, thus showing the effect of the EU ETS on the net UK carbon account in 2017.

Table 7: The effect of the EU ETS on the net UK carbon account in 2017, tCO₂e

UK's EU ETS annual allocation for 2017 (A)	164,402,030
Total amount of units surrendered by UK operators (B)	136,800,098
Difference between 2017 annual allocation and amount of units surrendered (A - B)	27,601,932

As the amount of units surrendered by UK operators was less than the (notional) annual allocation for 2017, a corresponding amount of units must be counted as debits to the net carbon account. This means 27,601,932 units are to be debited to the net UK carbon account in 2017 as a result of the EU ETS.

Domestic aviation emissions

Under the Climate Change Act, the net carbon account must contain emissions generated by domestic aviation (flights between UK airports). Historically these have 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.

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 cap²³.

Methodology to calculate domestic aviation cap

Using the latest available civil aviation data from the UK greenhouse gas inventory submitted under the EEA, and published on the EEA website²⁴, 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.

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 5% in 2013–2020), reflecting the ambition to reduce emissions from aviation.

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 emissions (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 emissions in this year²⁵ (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.

Methodology to assess performance against the cap

The UK’s carbon dioxide emissions from domestic aviation in 2017 (performance) are taken from the UK inventory.

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

²³ 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>.

²⁴ EEA website: <https://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-14>

²⁵ 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 2017 UK domestic aviation emissions used to assess performance.

Annual Statement of Emissions for 2017

- 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.

Calculations

Table 8: Estimate of 2017 domestic aviation emissions cap, tCO₂e

1	Average 2004–06 EEA domestic aviation CO ₂ emissions (A)	20,370,507
2	UK's share of 2010 EEA domestic aviation CO ₂ emissions (B)	9.4%
3	UK as a proportion of the 2004–06 EEA average (C) = (A x B)	1,906,735
4	For 2017, the cap will be 95% of this annual average (C) x 0.95	1,811,398

Table 9: Performance against the domestic aviation emissions cap, tCO₂e

Domestic aviation cap (A)	1,811,398
2017 domestic aviation CO ₂ emissions (B)	1,530,006
Difference between 2017 cap and performance (A - B)	281,392

In 2017 the cap for domestic aviation is estimated as 1,811,398 tCO₂e. Emissions for domestic aviation (taken from the inventory) in 2017 were 1,530,006 tCO₂e.

As carbon dioxide emissions from domestic aviation were less than the cap for 2017, a corresponding amount of emissions will be counted as debits. This means that 281,392 tCO₂e will be debited from the net UK carbon account in 2017, as shown in table 9.

Net UK carbon account for the year

Section 16(7) of the Climate Change Act

As described above, the net UK carbon account is calculated by taking net UK emissions and adjusting these to account for the amount of units to be debited from and credited to the net UK carbon account.

The information in table 10 is taken from preceding tables in this report and provides an amount for the net UK carbon account of 488,105,559 tCO₂e.

The final net carbon account for the second carbon budget will be presented in the End of Budgetary Period Statement which will be laid in Parliament by the end of May 2019.

Table 10: Summary of how the net UK carbon account for 2017 is calculated, tCO₂e

2017 net UK emissions – see table 1 (A)	460,222,235
Amount of units to be credited (B):	0
from EU ETS Fixed Installations	0
from EU ETS Domestic Aviation	0
Amount of units to be debited (C):	27,883,324
from EU ETS Fixed Installations	27,601,932
from EU ETS Domestic Aviation	281,392
2017 Net UK carbon account, tCO ₂ e (A - B + C)	488,105,559

Annex – 2017 emissions by gas

Section 16(2) of the Climate Change Act

The emissions and removals data included in table 11 below are taken from the greenhouse gas emissions data published on 5 February 2019²⁶, derived from the UK's 1990–2017 National Greenhouse Gas Emissions Inventory. The methodologies used to calculate and compile these data are in line with 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 modelling²⁶.

²⁶ Further details on the methods used in specific sectors are set out in table 13 of the data tables published alongside the 2017 emissions data, available from:
<https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017>

Annual Statement of Emissions for 2017

Table 11: 2017 emissions by gas, tCO₂e

	Carbon dioxide	Methane	Nitrous oxide	HFCs ²⁷	PFCs ²⁸	SF ₆ ²⁹
2017 UK emissions excluding net emissions/ removals from LULUCF (A)	384,558,419	51,454,887	19,129,829	14,074,987	371,474	525,407
2016 UK emissions excluding net emissions/ removals from LULUCF (B)	397,064,132	51,078,809	18,774,099	15,098,218	353,941	490,590
Change from previous year (A – B)	-12,505,712	376,078	355,729	-1,023,231	17,533	34,817
2017 UK emissions/ removals from LULUCF³⁰ (C)	-11,323,438	28,367	1,402,303	0	0	0
2016 UK emissions/ removals from LULUCF (D)	-11,263,343	33,394	1,427,440	0	0	0
Change from previous year (C – D)	-60,095	-5,026	-25,137	N/A	N/A	N/A
2017 UK emissions including net emissions/ removals from LULUCF³¹ (E = A + C)	373,234,981	51,483,254	20,532,132	14,074,987	371,474	525,407
2016 UK emissions including net emissions/ removals from LULUCF (F = B + D)	385,800,788	51,112,203	20,201,539	15,098,218	353,941	490,590
Change from previous year (E – F)	-12,565,807	371,051	330,593	-1,023,231	17,533	34,817

²⁷ Hydrofluorocarbons.

²⁸ Perfluorocarbons.

²⁹ Sulphur hexafluoride.

³⁰ A negative amount means the net effect is the removal of greenhouse gases from the atmosphere, while a positive figure means the net effect is emissions to the atmosphere.

³¹ Removals of greenhouse gas from the atmosphere do not apply to HFCs, PFCs or SF₆.

This publication is available from: www.gov.uk/government/collections/annual-statements-of-emissions

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