



Department for
Business, Energy
& Industrial Strategy

Annual Statement of Emissions for 2019

Reporting UK 2019 emissions to Parliament
under the Climate Change Act 2008

April 2021

Annual Statement of Emissions for 2019

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

April 2021



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Introduction

1. The Climate Change Act 2008¹ requires that the Government reports greenhouse gas (GHG) emissions to Parliament annually. This is the twelfth Annual Statement of Emissions required under section 16 of the Climate Change Act 2008. It confirms emissions for 2019 – the second year of the third carbon budget.
2. The third carbon budget covers the period 2018-2022, with an emissions cap of 2,544 million tonnes of carbon dioxide equivalent (MtCO₂e)².
3. GHG emissions reported in Annual Statements of Emissions are based on the latest final UK GHG emissions National Statistics³. Since they take two years to be compiled, this annual statement covers emissions for the year 2019. The National Statistics used to compile this statement show that net UK emissions for the second year of the third carbon budget period were 454,765,431 tCO₂e, a 44% reduction on net GHG emissions from the base year⁴.
4. After taking account of units credited to the UK net carbon account as a result of the EU Emissions Trading System (ETS), the 2019 net UK carbon account was 441,136,877 tCO₂e.
5. The net UK carbon account for 2019 will be revised and published in subsequent annual statements of emissions.

Structure of the report

6. **Part one** of this statement shows the total amount of UK GHGs emitted to and removed from the atmosphere in the base year, 2018, and 2019; the methods used to calculate those figures; and whether there was an increase or a decrease in emissions and removals between 2018 and 2019.
7. **Part two** of this statement sets out the steps taken to calculate the “net UK carbon account” for 2019, the UK’s total GHG emissions after we have taken into account the effect of carbon trading.

¹ <http://www.legislation.gov.uk/ukpga/2008/27/contents>.

² This is the level of the third carbon budget, as legislated in 2009:

<https://www.legislation.gov.uk/ukxi/2009/1259/contents/made>. The level of the budget was raised to 2,631,930,284tCO₂e, through the decision to carry forward 87,930,284tCO₂e of over-achievement from the second carbon budget period, as set out at: <https://www.theccc.org.uk/publication/letter-carry-forward-of-surplus-emissions-lord-deben-to-chris-skidmore-mp/>.

³ The final 2019 estimates of UK greenhouse gas emissions were published on 2 February 2021:

<https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019>

⁴ The base year varies by greenhouse gas (1990 for CO₂, CH₄ and N₂O; 1995 for Fluorinated gases):

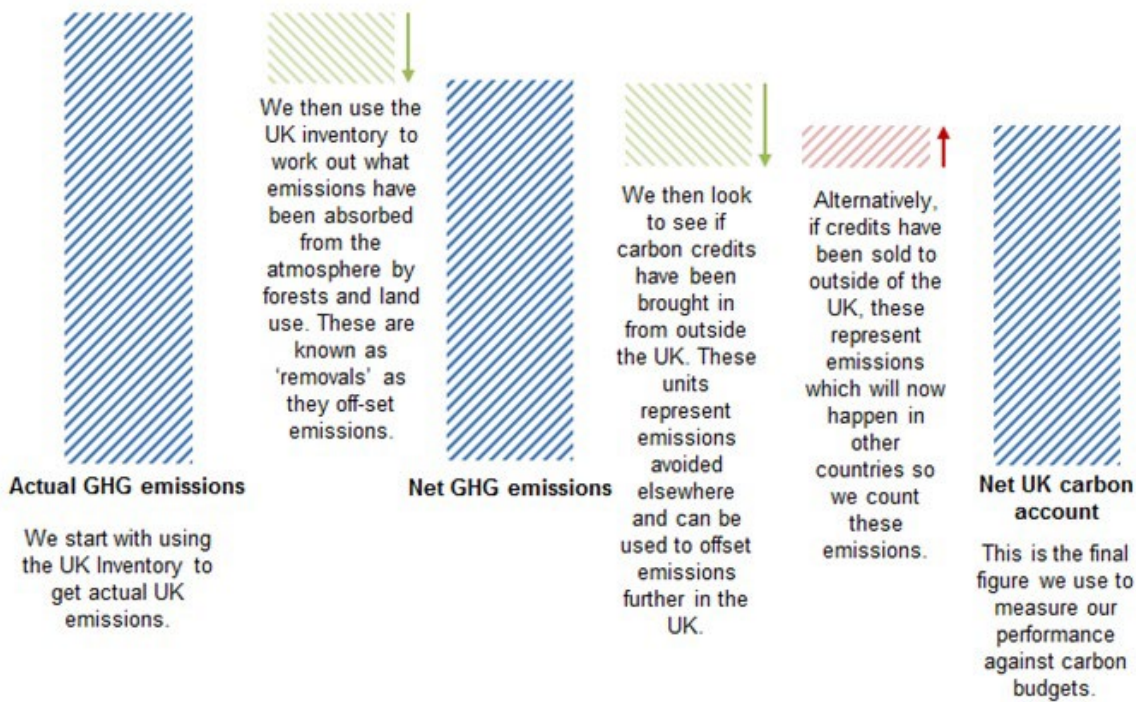
<http://www.legislation.gov.uk/ukpga/2008/27/part/1/crossheading/targeted-greenhouse-gases>

Explaining the net UK carbon account

8. 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.
9. The starting point is UK emissions for the year, using data from the annual statistical release of UK GHG emissions, published as National Statistics each February⁵. These comprise emissions from all sources in the UK, excluding those from land use, land use change and forestry (LULUCF). These are then adjusted to take account of emissions and removals by sources and sinks associated with LULUCF activity. The new total is referred to as net UK emissions.
10. Net UK emissions are then further 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.

⁵ The final 2019 estimates of UK greenhouse gas emissions were published on 2 February 2021: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019>

Figure 1: The UK net UK carbon account



Effort Sharing Decision

11. The EU Effort Sharing Decision (ESD), which was applicable to the UK during the 2019 emission period, established binding annual GHG emission targets for Member States for the period 2013–2020, and created a new carbon unit to measure Member State compliance (Annual Emissions Allocations). The ESD covers emissions from most sectors not included in the EU ETS, such as transport (excluding domestic aviation), buildings, agriculture and waste, but excludes emissions from LULUCF. Under the terms of the Withdrawal Agreement, the UK remains committed to its target under the EU ESD due to its shared target with the EU under the Kyoto Protocol.
12. The first formal confirmation of the UK's compliance with the ESD began in 2017. To date the European Commission has confirmed that UK ESD emissions for years 2013-18 were 139.7 MtCO₂e below the target for this period. Provisional 2019 ESD emissions⁶ suggest the UK will continue to increase this surplus with emissions of 24.9 MtCO₂e below its target for that year. The UK has not traded its 'Annual Emissions Allocation' units associated with this surplus with other countries. As such, ESD trading will not be included in the net UK carbon account calculation.

⁶ The final 2019 estimates of UK greenhouse gas emissions were published on 2 February 2021: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019>

Part 1 – UK greenhouse gas emissions

13. The information contained in this part of the statement is derived from the UK GHG emissions statistics for 2019⁷, which were published on 2 February 2021. Emissions coverage under the Climate Change Act 2008 comprises UK territory only (i.e. England, Wales, Scotland and Northern Ireland)⁸. Unless otherwise stated, all figures in this section are stated in tonnes of carbon dioxide equivalent (tCO_{2e})⁹.

1.1 Base year, 2018, and 2019 GHG emissions by gas

Section 16(2)(a), 16(2)(c), 16(3) and 16(8) of the Climate Change Act

14. Table 1 below sets out the base year¹⁰ emissions – the emissions in the year against which progress is measured – for each GHG covered by the Climate Change Act. The table also sets out the total UK emissions for 2019, and whether any of those amounts represent an increase or decrease compared to the equivalent amount for the previous year. Emissions are grouped into:

- a) emissions (excluding LULUCF)
- b) net LULUCF emissions/removals
- c) net emissions/removals

⁷ The final 2019 estimates of UK greenhouse gas emissions were published on 2 February 2021: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019>

⁸ Section 89 of the Climate Change Act specifies that this includes UK coastal waters and the UK sector of the continental shelf. <http://www.legislation.gov.uk/ukpga/2008/27/section/89>

⁹ 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 GWPs 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/>.

¹⁰ The base year varies by greenhouse gas (1990 for CO₂, CH₄ and N₂O; 1995 for Fluorinated gases) <http://www.legislation.gov.uk/ukpga/2008/27/part/1/crossheading/targeted-greenhouse-gases>

Annual Statement of Emissions for 2019

Table 1: Net UK GHG emissions by gas, base year, 2018, 2019 (tCO ₂ e)								
Year	Emissions	Carbon dioxide (CO ₂)	Methane (CH ₄)	Nitrous oxide (N ₂ O)	Hydrofluorocarbons (HFC)	Perfluorocarbons (PFC)	Sulphur hexafluoride (SF ₆)	Total
Base year	Net emissions (including net LULUCF emissions)	608,288,719	133,899,840	49,564,616	18,559,478	596,760	1,313,790	812,223,204
2018	Emissions (excluding net LULUCF emissions)	379,090,958	49,423,967	19,983,810	13,128,403	256,839	615,423	462,499,399
	Net LULUCF emissions	-1,383,288	4,864,060	2,074,892	-	-	-	5,555,664
	Net emissions (including net LULUCF emissions)	377,707,670	54,288,027	22,058,703	13,128,403	256,839	615,423	468,055,063
2019	Emissions (excluding net LULUCF emissions)	366,105,113	49,118,323	20,161,741	12,500,027	344,686	589,389	448,819,279
	Net LULUCF emissions	-1,025,390	4,897,276	2,074,266	-	-	-	5,946,152
	Net emissions (including net LULUCF emissions)	365,079,724	54,015,599	22,236,006	12,500,027	344,686	589,389	454,765,431
2018 to 2019 change	Emissions (excluding net LULUCF emissions)	-12,985,845	-305,644	177,931	-628,375	87,847	-26,034	-13,680,120
	Net LULUCF emissions	357,899	33,216	-627	-	-	-	390,487
	Net emissions (including net LULUCF emissions)	-12,627,946	-272,428	177,304	-628,375	87,847	-26,034	-13,289,633

Note - A negative value in 2018 and 2019 means the net effect is the removal of GHGs from the atmosphere, whereas a positive figure means the net effect is emissions to the atmosphere.

1.2 Method used to calculate GHG emissions and removals

Section 16(2)(b) and 16(4) of the Climate Change Act

15. The UK GHG inventory is compiled in line with international guidance from the Intergovernmental Panel on Climate Change¹¹ (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, and new research, sponsored by BEIS or otherwise. Improvements to the methodology are backdated as required under the Climate Change Act. The United Kingdom's National Inventory Report¹² (NIR), which is submitted each year to the United Nations Framework Convention on Climate Change (UNFCCC), provides details of the methods used to estimate emissions.
16. 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 GHGs have declined since 1990. The uncertainty associated with estimates of emissions is small at approximately 3% based on 2018 emissions data published in 2020.
17. To ensure transparency and credibility in carbon budgets reporting, it is important that any changes to GHG reporting – made in accordance with international practice - are clearly stated. Section 16(4) of the Climate Change Act requires that, where adjustments in the emissions figures for an earlier year in the same budgetary period are required, the Annual Statement of Emissions must specify the adjustment required.
18. Detailed information on the impact of methodology changes on GHG emissions estimates is published annually with the latest covering the 1990-2019 UK GHG Inventory¹⁵. In the 1990-2019 GHG Inventory, a major change has been made to better represent emissions from drained and rewetted inland organic soils (peatlands) in the UK, consistent with the 2013 IPCC Wetlands Supplement¹⁶. This individual change has increased emissions by between 15 and 19 MtCO_{2e} each year. A

¹¹ Further details on IPCC guidance is available from: <https://www.ipcc-nggip.iges.or.jp>

¹² The NIR is accessible from the UNFCCC website:

<https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2019>

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 <https://www.gov.uk/government/publications/planned-methodology-changes-for-uk-greenhouse-gas-emissions>

¹⁶ <https://www.ipcc-nggip.iges.or.jp/public/wetlands/index.html>

summary of total adjustments made to emissions figures reported in the Annual Statement of Emissions 2018 can be found in Annex A.

1.3 International aviation and shipping

Section 16(5) of the Climate Change Act

19. Emissions from international aviation and shipping can be estimated from refuelling from bunkers at UK airports and ports, whether by UK or non-UK operators. Under international 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 UK GHG inventory. Table 2 below shows GHG emissions from these sources in the base year, 2018 and 2019.
20. Table 2 shows GHG emissions from international aviation and shipping totalled 44,540,729 tCO₂e in 2019.

Table 2: International aviation and shipping GHG emissions by gas (tCO₂e)

Emissions	Greenhouse gas	Base year	2018	2019	2018 to 2019 change
International aviation	Carbon dioxide (CO ₂)	15,370,614	36,291,159	36,663,176	372,017
	Methane (CH ₄)	8,814	2,596	2,550	47
	Nitrous oxide (N ₂ O)	145,408	343,344	346,858	3,514
	Total	15,524,836	36,637,099	37,012,584	375,484
International shipping	Carbon dioxide (CO ₂)	8,029,513	7,794,555	7,424,422	370,133
	Methane (CH ₄)	2,944	2,513	2,359	154
	Nitrous oxide (N ₂ O)	112,927	106,527	101,364	5,163
	Total	8,145,385	7,903,595	7,528,145	375,450
International aviation and shipping	Carbon dioxide (CO ₂)	23,400,127	44,085,714	44,087,598	1,884
	Methane (CH ₄)	11,758	5,109	4,909	201
	Nitrous oxide (N ₂ O)	258,335	449,871	448,222	1,649
	Total	23,670,220	44,540,694	44,540,729	34

Part 2 – the net UK carbon account

21. This part sets out the amount of carbon units which are to be credited to and debited from the net UK carbon account in 2019. 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 2009¹⁷, the Carbon Accounting (Provision for 2018) Regulations 2020¹⁸ and the Carbon Accounting (Provision for 2019) Regulations 2021¹⁹. Unless otherwise stated, all figures in this section are stated in tonnes of carbon dioxide equivalent (tCO_{2e}).

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

Section 16(6) of the Climate Change Act

22. 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 number of units to be credited to, and debited from, the UK net carbon 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 UK net carbon account.

23. The amounts of units to be counted as credits and debits in respect of 2019 should be calculated based on three elements:

- units in the credit account which have been declared as credits to the net UK carbon account in respect of 2019
- effect of the EU ETS (including domestic aviation)
- determining whether the Government disposed of any carbon units during 2019.

2.1.1 Units in the credit account

24. 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 2019, zero units are to be credited to the net UK carbon account under this mechanism.

¹⁷ <http://www.legislation.gov.uk/ukxi/2009/1257/contents/made>

¹⁸ <http://www.legislation.gov.uk/ukxi/2020/115/contents/made>

¹⁹ <https://www.legislation.gov.uk/ukxi/2021/189/contents/made>

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

25. The net UK carbon account reflects the operation of the EU ETS. We call the portion of emissions covered by the EU ETS the ‘traded sector’.
26. The UK was a participant in the EU ETS for the 2018 and 2019 scheme years. Following the UK’s exit from the European Union, the UK continued to participate in the EU ETS during the transition period for the 2020 scheme year.
27. The EU ETS is a cap and trade system that sets a limit on the total amount of GHGs that can be emitted by installations in the system²⁰. This cap is reduced over time so that emissions decrease across the EU. During 2019, the EU ETS was in its third phase, running from 2013 to 2020. In this phase Member States did not receive a fixed cap at the national level as was the case during the first UK carbon budget²¹; the ETS instead operated at installation level²². Therefore, within carbon budgets a share of this, a nominal UK cap, was calculated for the traded sector (see 2.1.3). If EU ETS participants in the UK collectively exceeded the nominal 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 or used previously retained units. If on the other hand EU ETS participants in the UK collectively reduced their emissions below the nominal 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 were not required to cover emissions in the UK.

2.1.3 UK share of the EU ETS cap (stationary installations)

28. The methodology for calculating the UK share of the EU-wide ETS cap is set out in table 3. The cap is created by adding together the volume of EU allowances freely allocated to UK stationary operators²³, the volume of allowances in the EU-wide auction pot auctioned by the UK to stationary operators²⁴, and the volume of EU allowances allocated to the UK from the New Entrants Reserve (NER)²⁵.

	2018	2019
Allowances freely allocated	49,449,564	47,667,411
Allowances auctioned	101,053,000	55,062,000
Allowances allocated under the New Entrants Reserve	1,808,943	1,694,795

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

²¹ 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.

²² Detailed guidance on Phase 3 of the ETS can be found here: <https://www.gov.uk/participating-in-the-eu-ets>.

²³ European Union Registry, verified emissions report 2018 (April 2019): https://ec.europa.eu/clima/policies/ets/registry_en#tab-0-1

²⁴ European Commission, correspondence with estimated volumes of general allowances to be auctioned, May 2020.

²⁵ European Union Registry, verified emissions report 2018 (April 2019): https://ec.europa.eu/clima/policies/ets/registry_en#tab-0-1

UK share of the EU ETS cap	152,311,507	104,424,206
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29. As shown in table 3, the UK share of the EU ETS cap for 2019 was 104,424,206 tCO₂e. Table 4 sets out the number of units surrendered in 2019 by UK operators, thus showing the effect of the EU ETS on the net UK carbon account in 2019.

Table 4: Net effect of the EU ETS (stationary installations) (tCO₂e)	2018	2019
Allowances surrendered	128,001,146	118,512,287
UK share of the EU ETS cap	152,311,507	104,424,206
Difference	24,310,361	-14,088,081

30. As the number of units surrendered by UK operators at stationary installations was more than the UK share of the EU ETS cap, a corresponding number of units must be counted as credits to the net UK carbon account. This means 14,088,081 units are to be deducted from the net UK carbon account in 2019 as a result of the EU ETS (stationary installations).

2.1.4 Domestic aviation accounting

31. Under the Climate Change Act, the net UK carbon account must include emissions from domestic aviation (flights between UK airports). Since 2012, carbon dioxide emissions from domestic aviation have been part of the EU ETS and so included in the “traded sector” part of the budgets.

32. In order to determine whether units should be credited to or debited from the net UK carbon account each year, domestic aviation emissions are compared with the domestic aviation emissions cap.

2.1.4.1 Methodology to estimate the domestic aviation cap

33. Using the latest available civil aviation data from the EU GHG inventory published on the European Environment Agency website²⁶, 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 shown in table 5.

34. This approach uses a **baseline** of total European Economic Area (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 during each year of the third phase of the EU ETS (2013-20) is equivalent to 95% of the baseline, reflecting the ambition to reduce emissions from aviation.

35. There are three steps to the calculation:

1. Calculate a baseline of total EU domestic aviation

²⁶ 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-15>.

The baseline is the average of 2004–06 EEA domestic aviation carbon dioxide emissions²⁷ (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 year (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 is 95% of this annual average.

2.1.4.2 Methodology to assess performance against the cap

36. The UK's carbon dioxide emissions from domestic aviation in 2019 are taken from the UK inventory.

37. To assess the UK's emissions 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

Table 5: Estimating the UK domestic aviation cap (tCO ₂ e)	2018	2019
Average 2004-06 EEA domestic aviation emissions	20,130,142	20,130,142
From 2013 onwards, the cap will be 95% of this average	19,123,635	19,123,635
UK share of 2010 EEA domestic aviation emissions	9.8%	9.8%

²⁷ 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 2019 UK domestic aviation emissions used to assess performance.

Domestic aviation cap	1,866,744	1,866,744
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38. As shown in table 5, the cap for domestic aviation in 2019 is estimated as 1,866,744 tCO₂e. Table 6 sets out domestic aviation emissions, thus showing the effect of domestic aviation accounting on the net UK carbon account in 2019.

Table 6: Net effect of EU ETS domestic aviation accounting (tCO₂e)	2018	2019
Domestic aviation emissions	1,482,420	1,407,217
Domestic aviation cap	1,866,744	1,866,744
Difference	384,323	459,527

39. As carbon dioxide emissions from domestic aviation were less than the domestic aviation cap for 2019, a corresponding amount of emissions will be counted as debits. This means that 459,527 tCO₂e will be debited from the net UK carbon account in 2019, as shown in table 6.

2.2 Net UK carbon account for the year

Section 16(7) of the Climate Change Act

40. The net UK carbon account is calculated by taking net UK emissions and adjusting them to account for units debited from and credited to the net UK carbon account. Table 7 shows how after taking account of units credited to the UK net carbon account (as a result of the EU ETS), the net UK carbon account in 2019 is 441,136,877 tCO₂e.

Table 7: Calculating the Net Carbon Account (tCO₂e)	2018	2019
Net emission (including net LULUCF emissions)	468,055,063	454,765,431
Amount of units to be credited/debited from EU ETS stationary installations	24,310,361	-14,088,081
Amount of units to be credited/debited from EU ETS domestic aviation accounting	384,323	459,527
Net Carbon Account	492,749,748	441,136,877

Annex A

Summary of total adjustments made to 2018 emissions figures reported in the Annual Statement of Emissions (ASE) 2018.

Table 8: adjustments to 2018 net UK carbon account calculation published in Annual Statement of Emissions 2018 (tCO₂e)			
	ASE 2018	ASE 2019	Difference
Emissions (excluding net LULUCF emissions)	461,735,951	462,499,399	763,448
Net LULUCF emissions	-10,272,382	5,555,664	15,828,046
Net emissions (including net LULUCF emissions)	451,463,569	468,055,063	16,591,494
Amount of units to be credited/debited from EU ETS stationary installations	24,310,361	24,310,361	-
Amount of units to be credited/debited from EU ETS domestic aviation accounting	385,355	384,323	-1,032
Net Carbon Account	476,159,284	492,749,748	16,590,464

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