

The Rt Hon Claire Perry MP
Minister of State for Energy and Clean Growth
1 Victoria Street
London SW1H 0ET

15 February 2019

Carry forward of surplus emissions from Carbon Budget 2

Dear Minister,

Final figures show that the second carbon budget, which covered 2013-2017, was met with emissions 384 MtCO₂e (14%) below the level of the budget. If a carbon budget has been met, section 17 of the Climate Change Act requires you to seek the advice of the Committee before making a decision on whether any resulting surplus emissions should be carried forward to meet future carbon budgets.

The Committee's unequivocal advice is that surplus emissions from the second carbon budget should not be carried forward. The carbon budgets have been set to meet the 2050 target at lowest cost, and on the basis that there would be no carry forward of surplus emissions from earlier periods. Previously, my Committee advised that surplus emissions from the first carbon budget should not be carried forward. The Government agreed with that advice.¹

Carry forward of the surplus undermines the integrity of the framework for emissions reduction under the Climate Change Act:

- The carbon budgets were set by Government, on the advice of the Committee which was provided on the basis that there would be no carry forward.
- The surplus in the second carbon budget is not due to policy. Policies failed to produce expected reductions in emissions. Table 1 shows that the majority of our policy indicators for the second carbon budget were not met and emissions in the non-traded sector have been flat. The surplus is not due to policy but very largely due to accounting changes in the EU Emissions Trading System and the lasting effects of the recession.
- Existing carbon budgets are already too loose compared to the cost-effective path for emissions reduction, mainly due to downward revisions to emissions projections that do not reflect policy achievements. Carrying forward surplus emissions would further loosen carbon budgets, leading to unnecessary costs in meeting the long-term target.

Our conclusion is made stronger in the context of the UK's commitment to the Paris Agreement and the possibility of a strengthened UK emissions target, on which you have

¹ Letter from Secretary of State for Energy and Climate Change (10 March 2015) *Preserving the integrity of the UK's climate change regime*. Available at <https://www.theccc.org.uk/publication/letter-preserving-the-integrity-of-the-uks-climate-change-regime>

asked my Committee for advice. Reducing ambition in Carbon Budgets 3-5 by carrying forward surplus emissions would not be consistent with the Paris Agreement. It makes the existing 80% target for 2050, and any more ambitious target(s) that might be set, more difficult and expensive to meet. It would also make the Government's commitment to clean growth harder to deliver at a time when even greater ambition is required.

The aim should be to meet and outperform carbon budgets through actions to reduce emissions, rather than relying on statistical revisions which can go both up and down. The previous Government confirmed their intention not to use surplus emissions from statistical accounting changes to meet carbon budgets.² We welcome your confirmation in the House that it is your intention to meet the carbon budgets through domestic action.³

Further changes in the emissions inventory are anticipated in the coming years, particularly through the inclusion of emissions from upland peat. The precise impact of these changes is not yet known. In the event they turn out to make a material difference to meeting carbon budgets it may be appropriate in future to revise carbon budgets, in order to maintain the amount of policy effort required to meet them. However, the timing and extent of any such decisions are not relevant to the decision on whether to carry forward emissions from the second to the third carbon budget. Any such changes would have to be linked to developments in scientific understanding that underpin the emissions inventory if they were to be credible.

Detail underpinning our assessment is set out in the annex to this letter.

Yours,

A handwritten signature in black ink, appearing to read 'Deben', with a horizontal line underneath.

Lord Deben

Chairman, Committee on Climate Change

² Letter from Secretary of State for Energy and Climate Change (19 March 2015) *Preserving the integrity of the UK's climate change regime – next steps*. Available at <https://www.theccc.org.uk/publication/letter-preserving-the-integrity-of-the-uks-climate-change-regime>

³ <https://hansard.parliament.uk/Commons/2017-10-12/debates/E9354BA9-5321-4630-9F93-1342E5246996/CleanGrowthStrategy>

Table 1. Assessment of key indicators required to meet Carbon Budget 2 (non-traded sectors)

Sector	Measure	CB2 indicator	Actual	Unit	Met?
Buildings	Lofts insulated	2.0	0.0	Million installations	✗
	Cavity walls insulated	1.5	0.1	Million installations	✗
	Solid walls insulated	0.2	0.0	Million installations	✗
	Heat pumps installed*	>30,000	18,000	Installations	✗
	Low-carbon heat*	4	4.5	% of heat demand	✓
Transport	New car CO ₂ emissions	110	121	gCO ₂ /km	✗
	Electric car registrations	230,000	47,500	Vehicles per year	✗
	Biofuel uptake	7.9	3.1	% of fuel sales by volume in 2017	✗
	Car distance driven	419	425	Billion-kms	✗
Agriculture*	Non-CO ₂ emissions	39	41	MtCO ₂ e	✗
	Soil emissions	10	11	MtCO ₂ e	✗
	Enteric emissions	21	22	MtCO ₂ e	✗
	Nitrous oxide emissions	14	15	MtCO ₂ e	✗
	Methane emissions	25	26	MtCO ₂ e	✗
Land use & forestry	Afforestation	At least 21,000 from 2015	<7,000 in 2016/17	Hectares per year	✗
Waste*	Landfill emissions	25 to 37	63	% below 2007 levels	✓
	Biodegradable waste to landfill	38 to 84	53	% below 2007 levels	✓
F-gases*	Emissions	-23	+3	% change vs 2007 levels	✗

Source: CCC analysis.

Notes: *Data only available to 2016. Indicators and actuals shown for value in year at end of budget period, except building insulation installations which are shown on an annualised basis.

Assessment of the case to carry forward emissions from the second carbon budget

Introduction

This annex presents the evidence base underpinning our advice on whether to carry forward surplus emissions from the second carbon budget.

Our advice is set out in the accompanying letter, where we conclude that these surplus emissions should not be carried forward.

In formulating our advice we have considered a set of principles that reflect the role and value of carbon budgets. This is in line with the approach we adopted in 2014 when advising on whether to carry forward surplus emissions from the first carbon budget. Specifically, carrying forward emissions could be sensible if the following conditions were satisfied:

- The surplus was due to policy delivery being ahead of schedule.
- Carrying forward surplus emissions, thereby loosening the following carbon budget, would not undermine actions to prepare for subsequent carbon budgets and for meeting the 2050 target (including potentially more ambitious long-term commitments as required under the Paris Agreement).
- Loosening the following carbon budget would avoid incurring excessive costs.

We build on these principles to set out our assessment in the following five sections:

- (i) The UK net carbon account for the second carbon budget
- (ii) Was policy delivery ahead of schedule in the second carbon budget?
- (iii) Would a higher third carbon budget prepare effectively for the 2050 target?
- (iv) Would a higher third carbon budget avoid excessive costs?
- (v) Conclusions

(i) The UK net carbon account for the second carbon budget

The second carbon budget was legislated at 2,782 MtCO₂e, which sets the maximum level of the net carbon account for the UK over the period 2013-2017.

The net carbon account is defined as the level of UK greenhouse gas (GHG) emissions, excluding emissions from international aviation and shipping, and net of any trading in emissions allowances in the EU Emissions Trading System (EU ETS):

- For sectors covered by the EU ETS (primarily electricity generation, energy-intensive industry, and domestic aviation), their share of the net carbon account is defined by the UK's share of the EU ETS cap, not their actual level of emissions.
- For sectors not covered by the EU ETS, their share of the net carbon account is defined by their actual level of emissions.

Final emissions figures indicate that the second carbon budget has been met by 384 MtCO₂e (Table A1):

- The second carbon budget was legislated at 2,782 MtCO₂e.
- The net carbon account for the second carbon budget period was 2,398 MtCO₂e.
- The budget was therefore met by 384 MtCO₂e.

Table A1. The net carbon account for Carbon Budget 2 (2013-17)

MtCO ₂ e	2013	2014	2015	2016	2017	Total (2013-2017)
Total UK greenhouse gas emissions (excluding international aviation and shipping)	556	516	498	473	460	2,503
Net UK purchases/(sales) of emissions allowances	44	59	29	1	(28)	105
UK net carbon account	512	457	469	472	488	2,398
Legislated carbon budget						2,782
Difference between budget & net carbon account						384

Source: BEIS (2019) *2017 UK Greenhouse Gas Emissions, Final Figures*; CCC calculations.

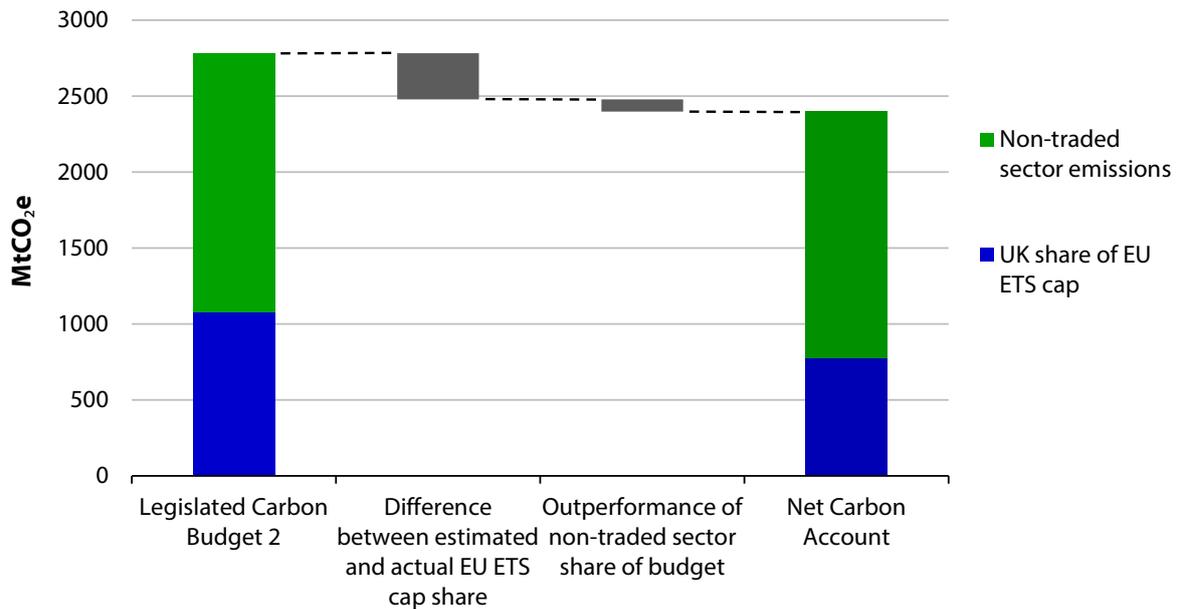
Figure A1 shows that the majority (around 80%) of the surplus has occurred due to changes in the UK's share of the EU ETS cap, rather than a reduction in actual emissions. This reflects a range of factors, including an initial mis-estimation of the UK's share of the cap and the 'backloading' policy agreed by member states at the EU level (Figure A2):

- The UK's actual share of the EU ETS cap in 2013 was around 40 million allowances lower than assumed when the budget was set. This reflects that the budget had to be set in advance of the rules for Phase III of the EU ETS being finalised. This difference is simply a mis-estimation, with these allowances actually allocated to other EU countries within the EU ETS under the final rules.
- The UK's share of the EU ETS cap fell further in 2014 due to the EU-wide 'backloading' policy, which limited auctioning of EU ETS allowances over 2014-16 (Figure A2a). These withheld allowances will be placed into the EU ETS' Market Stability Reserve, and are likely to be cancelled in 2024 under the rules of the reserve.
- Non-traded emissions are slightly below the level of the budget (Figure A2b). This is largely a result of entering the budget period at a lower emissions level than expected due to the recession. Emissions have hardly declined thereafter.

The EU ETS changes described above are purely accounting issues which do not relate to UK policy to reduce emissions in those sectors. As such, it would not be appropriate to carry forward any of the difference in the net carbon account which relate to changes in the EU ETS cap.

Given that compliance with carbon budgets is determined by the level of emissions in sectors not covered by the EU ETS, the remainder of this attachment focuses on performance in those sectors (the 'non-traded sector').

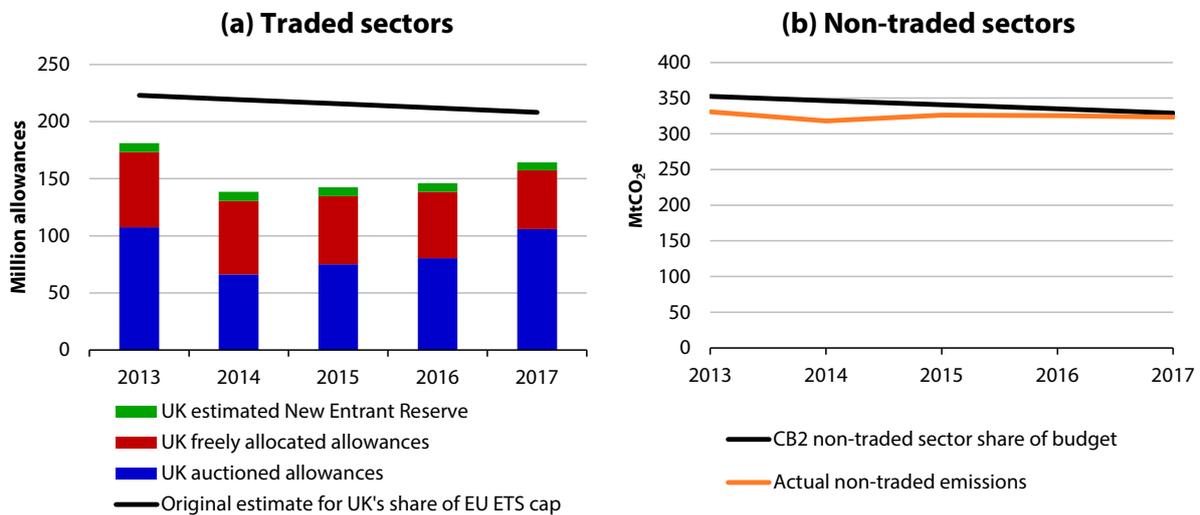
Figure A1. Difference between the legislated Carbon Budget 2 and the actual net carbon account



Source: BEIS (2019) *2017 UK Greenhouse Gas Emissions, Final Figures*; CCC analysis.

Notes: The net carbon account estimate for traded sectors includes domestic aviation; the net carbon account for non-traded sectors equals final gross emissions figures, net of surrendered EU ETS allowances.

Figure A2. Difference between the legislated Carbon Budget 2 by traded and non-traded sectors



Source: BEIS (2019) *2017 UK Greenhouse Gas Emissions, Final Figures*; EEA (2018) *EU Emissions Trading System (ETS) data viewer*; ICE Report Center (2018) *EUA UK Auctions*; HMG & HMT (2009) *Building a low-carbon economy: implementing the Climate Change Act 2008*; CCC analysis

Notes: The net carbon account for the non-traded sector is equal to final gross emissions figures net of surrendered EU ETS allowances.

(ii) Was policy delivery ahead of schedule in the second carbon budget?

The second carbon budget was legislated consistent - for the non-traded sector - with the level recommended by the Committee in our first report⁴ in 2008. Our analysis identified that the budget could be met by implementing a series of policy actions. In this section we assess policy performance over the second carbon budget period compared to these actions, and also assess the role of external factors on emissions reduction.

Assessment of policy performance

Underpinning our recommendation on the level of the second carbon budget, we developed a scenario in 2008 setting out the actions that would be required in each sector in order to meet the budget, given expected levels of economic growth and other socio-economic factors. We monitor progress against this as part of our annual Progress Reports to Parliament.

Available data do not suggest that policy delivery was ahead of schedule in the non-traded sectors over the second carbon budget period (Table 1):

- **Buildings.** Most of our high-level indicators have not been met. Insulation levels fell very significantly following the introduction of the Green Deal policy in 2013, and heat pumps were not taken up sufficiently through the Renewable Heat Incentive. Low-carbon heating is at the low levels envisaged for the second carbon budget period.
- **Transport.** None of our high-level indicators were met. New car emissions, registrations of electric vehicles, uptake of biofuels, and distances travelled were all behind schedule.
- **Agriculture, land use and forestry.** None of our indicators were met, reflecting the lack of firm government policy in this area.
- **Waste.** Good progress was made reducing waste emissions.
- **F-gases.** Our F-gas emissions indicator was not met. The main policy instrument, the EU F-gas Regulation, only came into effect in 2015.

This is consistent with the assessments in our annual Progress Reports to Parliament, which have repeatedly identified that progress in delivering key measures is not on track and that there is a 'policy gap' in achieving government ambition.

The evidence overall therefore suggests that low-carbon policy did not deliver ahead of schedule in the second carbon budget period.

Impact of other factors on emissions in the second carbon budget period

We have considered the key factors that may drive changes in emissions other than policy. This includes the level of economic growth, the number of UK households, fossil fuel prices, and weather conditions. We have also considered the effect of changes in the way the national emissions inventory is calculated.

Economic growth, the number of UK households and fossil fuel prices have all turned out to be lower than expected when the second carbon budget was set (Figure A3):

⁴ CCC (2008) *Building a low-carbon economy*.

- **Economic growth.** The long-lasting effects of the financial crisis are likely to have had a significant dampening effect on energy demand and emissions, compared to expected levels underpinning the recommended level of the second carbon budget. In our 2008 advice, we assumed the economy would grow in line with government projections, at an average annual rate of 2.5% and reaching 25% above 2008 levels by 2017. However, actual GDP growth was substantially lower, at 1.2% per year on average over the same period and reaching only 12% above 2008 levels by 2017.
- **Number of UK households.** The number of households has turned out to be lower than expected in 2008, and this will have led to a lower level of aggregate energy demand and therefore to lower emissions. In our 2008 advice, we assumed the number of households would grow in line with ONS projections and would be 9% higher compared to 2008 levels by 2017. However, the actual number of households was only around 5% higher than 2008 levels in 2017.
- **Fossil fuel prices.** Over the second carbon budget period, oil and gas prices have generally been slightly below expected levels. The effect of this would tend to increase emissions compared to expectations. Over the second carbon budget period, oil prices averaged \$63/barrel in real terms, compared to \$68 expected in 2008. Gas prices averaged 42p/therm compared to 45p/therm expected in 2008. On average, fossil fuel prices were 7% below expected levels.

Of the factors we have considered, GDP showed the largest change relative to expectations in 2008. Evidence suggests that GDP is the most important of these factors in driving changes in emissions.⁵ Together, these both imply that the lasting impacts of the recession were the primary reason why emissions were lower than expected over the second carbon budget period in the non-traded sector.

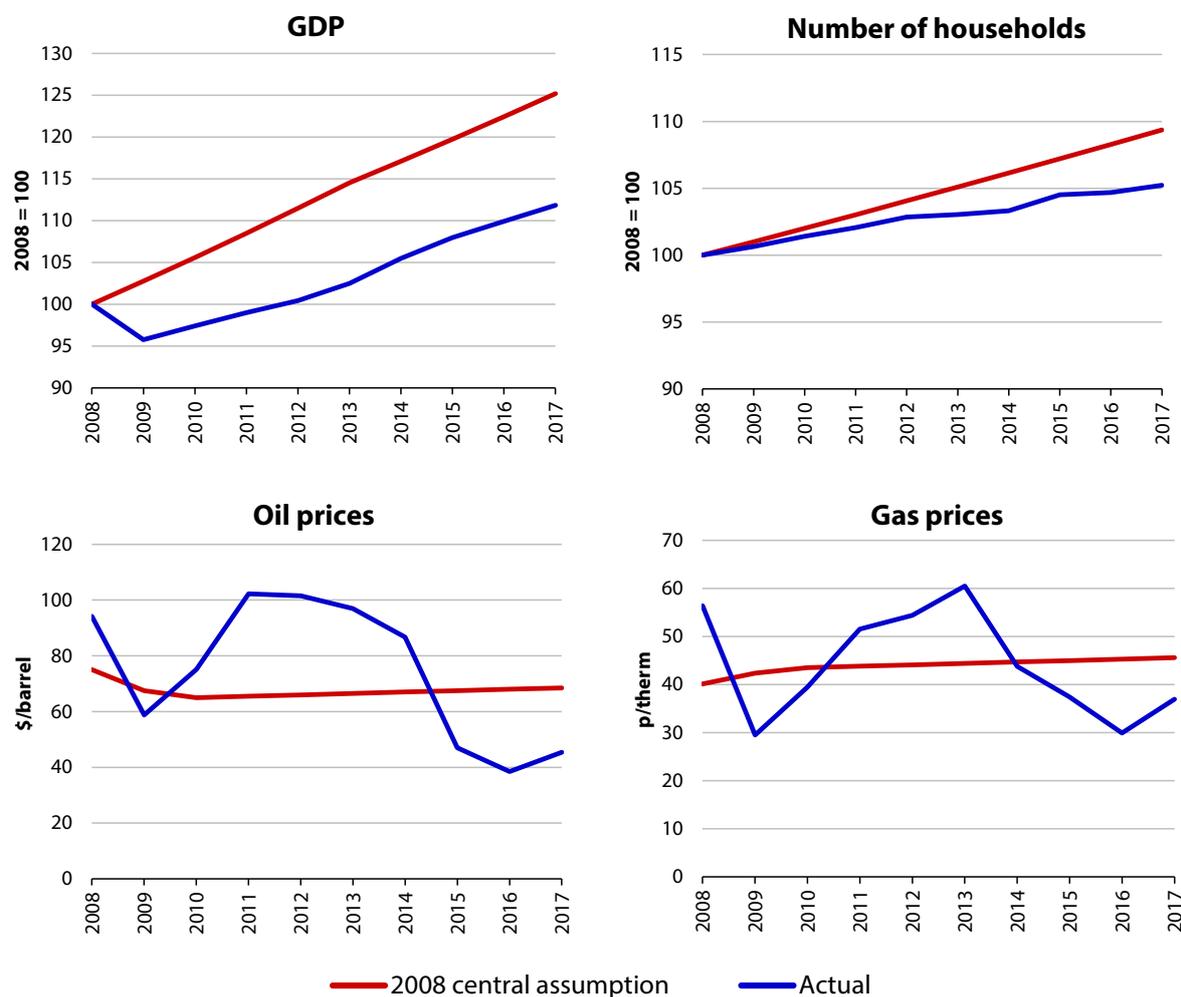
We have also considered the impact of weather conditions and modelling changes in the emissions inventory. The impacts of these two factors broadly offset each other:

- **Weather conditions.** Over the second carbon budget temperatures were warmer than the long-term average, leading to lower energy demand for heat and thus lower emissions from buildings. These temperature differences mean emissions in the non-traded sector were around 20 MtCO₂e lower than would have otherwise been the case.
- **Changes in the national emissions inventory.** The second and third carbon budgets were recommended on the basis of the latest emissions inventory, including data up to 2006. The historical series is subject to annual revision to reflect methodological improvements or new sources of emissions. As a result of these changes emissions in both 1990 and 2006 are now estimated to be about 20 MtCO₂e higher. Such changes could be a reason to carry forward the surplus, if they materially affected ability to meet the third carbon budget. However, given that the third carbon budget is projected to be significantly outperformed (see section iv), this is clearly not the case.

Overall, the evidence suggests that external factors and not policy – in particular the lasting effects of the recession – are very likely to have been responsible for emissions being lower than projected when the second carbon budget was set.

⁵ Cambridge Econometrics (2013) *Identifying the impact of economic and other conditions on UK GHG emissions during the first carbon budget period.*

Figure A3. Actual level of key external factors compared to expected levels underpinning Carbon Budget 2



Source: CCC (2008) *Building a low-carbon economy*; BEIS (2018) *Updated energy and emissions projections: 2017. Annex M: Growth Assumptions and prices*; ONS (2018) *Gross Domestic Product: chained volume measures*; ONS (2018) *Population estimates*.

Notes: Fossil fuel price figures are expressed in 2007 prices; GDP and households indexed to 2008.

(iii) Would a higher third carbon budget prepare effectively for the 2050 target?

In this section we consider whether carrying forward surplus emissions, and thereby loosening the third carbon budget (covering the period 2018-22), is consistent with preparing effectively to meet future carbon budgets and the 2050 target.

Carbon budgets have been set by Government, on the advice of the Committee which was provided on the basis that there would be no carry forward. The aim should be to meet and outperform carbon budgets through actions to reduce emissions, rather than relying on statistical revisions which can go both up and down. The previous Government confirmed their intention not to use surplus emissions from statistical accounting changes

to meet carbon budgets.⁶ The current Government have confirmed their intention to meet the carbon budgets through domestic action.⁷

Meeting the currently legislated 2050 target for at least an 80% reduction in emissions below 1990 levels requires a 3.5% annual reduction in emissions from 2017, and steady effort across budget periods. A stop-start approach to emissions reduction would undermine incentives and would increase costs.

Carrying forward the surplus would allow emissions to increase when they need to be decreasing, which would increase the scale of the challenge in future (Figure A4):

- Carrying forward the surplus would increase the third carbon budget by 15%, meaning it would be 5% higher than the second carbon budget and would require a 40% - rather than 30% - reduction to the fifth carbon budget.
- It would increase the annual rate of reduction required from the third carbon budget to 2050 from 4.5% to 5%.

Furthermore, carrying forward surplus emissions to the third carbon budget would not be consistent with the aims of the Paris Agreement:

- The Paris Agreement has a more stringent long-term temperature goal than was the basis of the 2050 target in the Climate Change Act, and commits the Paris Agreement parties to reaching global net-zero emissions in the second half of the century. Both of these imply that more – not less – ambition is needed.
- The ‘ratchet’ mechanism within the Paris Agreement requires that ambition increases over time.

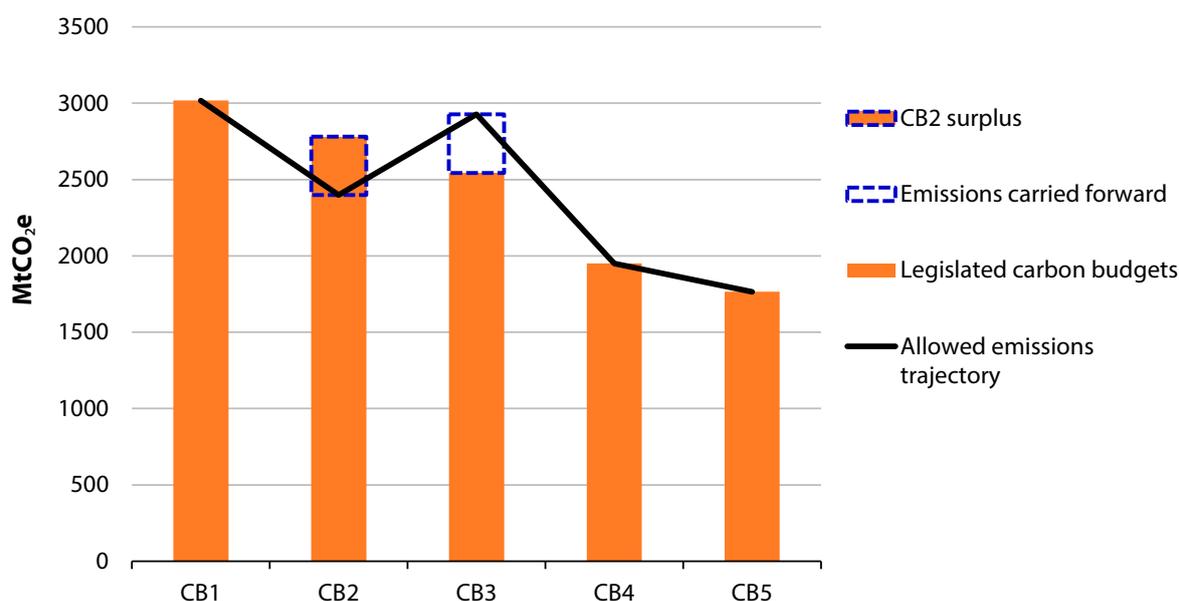
On the Committee’s advice, the first three carbon budgets were set at ‘Interim’ levels. As part of this advice, the Committee recommended that in the event of a global deal on climate change the budgets should be tightened to ‘Intended’ levels (in line with an EU commitment to tighten its emissions reduction target for 2020 from 20% to 30%). However, neither the UK carbon budgets nor the EU target have been tightened in response to the Paris Agreement.

Overall, carrying forward surplus emissions to the third carbon budget would not prepare effectively for meeting the 2050 target and would be inconsistent with the aims of the Paris Agreement.

⁶ Letter from Secretary of State for Energy and Climate Change (19 March 2015) *Preserving the integrity of the UK’s climate change regime – next steps*. Available at <https://www.theccc.org.uk/publication/letter-preserving-the-integrity-of-the-uks-climate-change-regime>

⁷ <https://hansard.parliament.uk/Commons/2017-10-12/debates/E9354BA9-5321-4630-9F93-1342E5246996/CleanGrowthStrategy>

Figure A4. Pathway for emissions if the second carbon budget surplus is carried forward



Source: BEIS (2019) 2017 UK Greenhouse Gas Emissions, Final Figures; CCC calculations.

(iv) Would a higher third carbon budget avoid excessive costs?

In this section we consider whether carrying forward surplus emissions, and thereby loosening the third carbon budget, is consistent with delivering the actions needed to prepare for 2050 and beyond at the lowest cost.

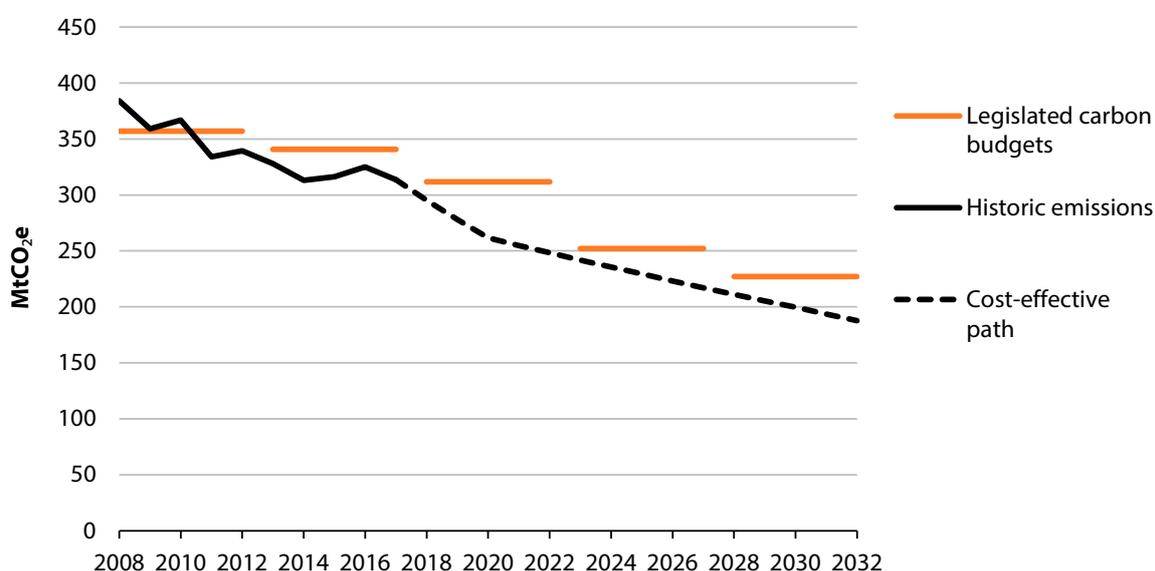
There is no argument for carrying forward surplus emissions to avoid excessive costs, given that existing budgets are already too loose compared to the cost-effective path, that the third carbon budget is projected to be met, and taking into account known changes to the emissions inventory:

- **Existing budgets are already too loose compared to the cost-effective path to 2050**, following downward revisions to emission projections (Figure A5). Carrying forward surplus emissions would loosen existing legislated budgets further, and would require a faster rate of reduction in later years. Both of these will increase costs of meeting the 2050 target compared to following the cost-effective path.
- **The third carbon budget is projected to be met.** On the basis of government emission projections, we estimate that the third carbon budget will be met by at least 300 MtCO₂e based on the current emissions inventory. The surplus is therefore not needed to meet the following budget, and there is no additional benefit from this flexibility in order to avoid excessive costs.

- **Anticipated changes to the emissions inventory.** In the coming years these include the addition of emissions from all sources of peat, and the use of revised global warming potentials.
 - Emissions from all sources of peat are required to be added to the emissions inventory by 2022.
 - The Paris Agreement’s transparency framework (agreed at COP24) requires that countries move to using global warming potentials from the IPCC’s Fifth Assessment Report to report emissions inventories by 2024.
 - The precise impact of these changes is not yet known. In the event they turn out to make a material difference to meeting carbon budgets it may be appropriate in future to revise carbon budgets, in order to maintain the amount of policy effort required to meet them. However, the timing and extent of any such decisions are not relevant to the decision on whether to carry forward emissions from the second to the third carbon budget. Any such changes would have to be linked to developments in scientific understanding that underpin the emissions inventory if they were to be credible.

Overall, the evidence does not suggest that carrying forward surplus emissions would help avoid excessive costs. By loosening future budgets it could increase costs, and is not needed to meet the next budget.

Figure A5. Legislated carbon budgets compared to the cost-effective path (non-traded sector)



Source: CCC (2018) *Reducing UK emissions - 2018 Progress Report to Parliament*.

(v) Conclusions

Final figures show that the second carbon budget, which covered 2013-2017, was met with emissions 384 MtCO₂e (14%) below the level of the budget. This was not due to policy. Carrying forward these surplus emissions would loosen future carbon budgets and should not be done.

Carbon Budgets 3-5 have been set on the basis that there is no carry forward; doing so would not be consistent with the Paris Agreement. It would undermine the Government's commitment to clean growth at a time when even greater ambition is required.

The aim should be to meet and outperform carbon budgets through actions to reduce emissions, rather than relying on statistical revisions which will increase costs and risks in meeting the longer-term targets under the Climate Change Act.