

Title: Credit limit of the fourth carbon budget IA No: BEIS018(F)-21-CG Lead department or agency: Department for Business, Energy and Industrial Strategy Other departments or agencies: NA	Impact Assessment (IA)			
	Date: 01/01/2020			
	Stage: Development/Options			
	Source of intervention: Domestic			
	Type of measure: Primary legislation			
Contact for enquiries: carbonbudgets@beis.gov.uk				
Summary: Intervention and Options				RPC Opinion: N/A

Cost of Preferred (or more likely) Option (in 2019 prices)			
Total Net Present Social Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status Qualifying provision
£m	£m	£m	

What is the problem under consideration? Why is government action or intervention necessary?

The Climate Change Act 2008 established a legal framework to cut greenhouse gas emissions in the UK. It requires the Government to set a series of five-year cumulative limits on net emissions, known as “carbon budgets” leading up to 2050. The fourth carbon budget covers the period 2023-2027. The Act also places a statutory duty on the Government to set a limit on the quantity of international carbon units (“credits”) that can be used to meet a carbon budget. This limit must be set 18 months ahead of the start of a budget period. The policy decision set out here concerns only the limit on credits over the fourth carbon budget period, and neither commits the UK to purchasing credits nor assesses the suitability of doing so.

What are the policy objectives of the action or intervention and the intended effects?

Credits can manage uncertainty in historic and future emissions, given that evolution in scientific knowledge may alter the measured quantum of greenhouse gas emissions by which performance against a carbon budget is assessed, and that the government must plan abatement several years in advance based on projections. Were the government required to find additional domestic abatement above that planned over the fourth carbon at short notice, this may significantly increase the costs of meeting carbon budgets. The level of the credit limit provides the extent to which abatement in other countries can be procured in place of abatement in the UK where more cost effective or otherwise beneficial.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

There is no alternative under the Act to setting a credit limit. Three options are considered:

- Option 1: Low flexibility - 0 Million Tonnes of CO₂-equivalent (0% of the fourth carbon budget).
- Option 2: Moderate flexibility - 55 MtCO₂e (around 2.8% of the fourth carbon budget)
- Option 3: High flexibility - 90 MtCO₂e (around 4.6% of the fourth carbon budget).

Option 2 is judged to provide sufficient flexibility to mitigate uncertainty in the level of abatement required to achieve the fourth carbon budget and ensure cost effectiveness of making the necessary abatement. It is also consistent with maintaining UK support for international carbon markets.

Will the policy be reviewed? It will/will not be reviewed. If applicable, set review date: Month/Year						
Does implementation go beyond minimum EU requirements?			N/A			
Is this measure likely to impact on international trade and investment?			Yes / No			
Are any of these organisations in scope?			Micro Yes/No	Small Yes/No	Medium Yes/No	Large Yes/No
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)			Traded: 0		Non-traded: 0	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister Trevelyan  Date: 12/05/2021

Summary: Analysis & Evidence

Policy Option 1

Description: Credit limit of 0 MtCO_{2e}

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years	Net Benefit (Present Value (PV)) (£m)			
			Low: £0	High: £0	Best Estimate: £0	
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)	
Low	£0		£0		£0	
High	£0		£0		£0	
Best Estimate	£0		£0		£0	
Description and scale of key monetised costs by 'main affected groups'						
The setting of the credit limit will not itself lead to any direct costs to government, business or consumers. Option 1 does not allow the purchase of credits to help meet the fourth carbon budget, so no costs of purchasing credits would arise.						
Other key non-monetised costs by 'main affected groups'						
A credit limit of 0 MtCO _{2e} would provide no scope to manage the uncertainty in emissions projections and inventory updates through the purchase of credits, or any flexibility via the carbon budgets system to support action in other countries through global carbon markets. Unexpected changes to emissions trends or data could expose the UK to substantially greater costs						
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)	
Low	£0		£0		£0	
High	£0		£0		£0	
Best Estimate	£0		£0		£0	
Description and scale of key monetised benefits by 'main affected groups'						
The setting of the credit limit will not itself lead to any benefits to government, business or consumers. Option 1 does not allow the purchase of credits to help meet the fourth carbon budget, so no benefits of purchasing credits would arise.						
Other key non-monetised benefits by 'main affected groups'						
A credit limit of 0 MtCO _{2e} would provide investors with a clearer signal that the government will deliver emissions reductions through domestic measures. This could reduce perceived short-term policy risk to investments in low-carbon infrastructure and supply chains in the UK.						
Key assumptions/sensitivities/risks					Discount rate (%)	3.5%
Based on central projections the fourth carbon budget is likely to be achieved through planned and known government policy. However, it's possible that a substantial change to the methodology underpinning the emissions inventory over the period 2023 to 2027, combined with unexpectedly high emissions relative to current projections, could still lead to emissions being higher than the level of the fourth carbon budget. The cost and benefits of this option in this hypothetical scenario are presented in section 6.						

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: £0	Benefits: £0	Net: £0	

Summary: Analysis & Evidence

Policy Option 2

Description: Credit limit of 55 MtCO₂e

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years	Net Benefit (Present Value (PV)) (£m)			
			Low: £0	High: £0	Best Estimate: £0	
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)	
Low	£0		£0		£0	
High	£0		£0		£0	
Best Estimate	£0		£0		£0	
Description and scale of key monetised costs by ‘main affected groups’						
The setting of the credit limit by itself will not lead to any direct costs to government, business or consumers. If a subsequent decision to purchase credits was made, it would result in a financial cost to the UK (see section 6 for illustrative scenarios).						
Other key non-monetised costs by ‘main affected groups’						
The scope for the government to use credits to meet the carbon budget could lead investors to expect that policy would target a slower rate of domestic emissions reduction in the near-term. This could affect investment decisions in low-carbon infrastructure and supply chains, although this impact is likely to be minimal. A limit of 55 MtCO ₂ e would have a lower risk around investment decisions compared to 90/tCO ₂ e as it is equal to the second carbon budget credit limit and places a greater constraint than option 3 on the Government’s ability to meet the carbon budget through credits.						
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)	
Low	£0		£0		£0	
High	£0		£0		£0	
Best Estimate	£0		£0		£0	
Description and scale of key monetised benefits by ‘main affected groups’						
The setting of the credit limit will not itself lead to any benefits to government, business or consumers as it does not commit the Government to purchasing any such credits. Were credits to be purchased, there could be an avoided cost of undertaking domestic emissions reductions						
Other key non-monetised benefits by ‘main affected groups’						
Setting a positive limit on the use of credits would provide the UK greater flexibility to meet the fourth carbon budget. Credits could manage the uncertainty in emissions projections and account for uncertain historic and future emissions. This could also increase long-term investor confidence by making the overall climate policy framework more resilient to unexpected changes in future emissions. A positive limit on the use of credits could signal the government’s continued support of global carbon markets. If credits were purchased, this would have a benefit of driving increased financial flows to low-carbon development projects that deliver cost-effective mitigation and also non-carbon benefits overseas.						
Key assumptions/sensitivities/risks					Discount rate (%)	3.5%
Based on central projections the fourth carbon budget is likely to be achieved through planned and known government policy. However, it’s possible that a substantial change to the methodology underpinning the emissions inventory over the period 2023 to 2027, combined with unexpectedly high emissions relative to current projections, could still lead to emissions being higher than the level of the fourth carbon budget. The cost and benefits of this option in this hypothetical scenario are presented in section 6.						

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: £0	Benefits: £0	Net: £0	

Summary: Analysis & Evidence

Policy Option 3

Description: Credit limit of 90 MtCO_{2e}

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years	Net Benefit (Present Value (PV)) (£m)			
			Low: £0	High: £0	Best Estimate: £0	
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)	
Low	£0		£0		£0	
High	£0		£0		£0	
Best Estimate	£0		£0		£0	
Description and scale of key monetised costs by ‘main affected groups’						
The setting of the credit limit by itself will not lead to any direct costs to government, business or consumers. If a subsequent decision to purchase credits was made, it would result in a financial cost to the UK (see section 6 for illustrative scenarios).						
Other key non-monetised costs by ‘main affected groups’						
The scope for the government to use credits to meet the carbon budget could lead investors to expect that policy would target a slower rate of domestic emissions reduction in the near-term. This could affect investment decisions in low-carbon infrastructure and supply chains, although this impact is likely to be minimal.						
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)	
Low	£0		£0		£0	
High	£0		£0		£0	
Best Estimate	£0		£0		£0	
Description and scale of key monetised benefits by ‘main affected groups’						
The setting of the credit limit will not itself lead to any benefits to government, business or consumers as it does not commit the government to purchasing any such credits. Were credits to be purchased, there could be an avoided cost of undertaking domestic emissions reductions						
Other key non-monetised benefits by ‘main affected groups’						
Setting a positive limit on the use of credits would provide the UK greater flexibility to meet the fourth carbon budget. Credits could manage the uncertainty in emissions projections and account for uncertain historic and future emissions. This could also increase long-term investor confidence by making the overall climate policy framework more resilient to unexpected changes in future emissions. A positive limit on the use of credits could signal the government’s continued support of global carbon markets. If credits were purchased, this would have a benefit of driving increased financial flows to low-carbon development projects that deliver cost-effective mitigation and also non-carbon benefits overseas.						
Key assumptions/sensitivities/risks					Discount rate (%)	3.5%
Based on central projections the fourth carbon budget is likely to be achieved through planned and known government policy. However, it’s possible that a substantial change to the methodology underpinning the emissions inventory over the period 2023 to 2027, combined with unexpectedly high emissions relative to current projections, could still lead to emissions being higher than the level of the fourth carbon budget. The cost and benefits of this option in this hypothetical scenario are presented in section 6.						

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: £0	Benefits: £0	Net: £0	

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Executive summary

1. The fourth carbon budget sets a limit on the UK’s net amount of greenhouse gas (GHG) emissions between 2023 and 2027. The 2008 Climate Change Act (“the Act”) requires the government to place a limit on the quantity of international carbon units (“credits”) that can be used to meet the budget. The credit limit must be set in secondary legislation by 30 June 2021. The level of the carbon budget is set at 1,950 million tonnes of carbon dioxide equivalent (MtCO_{2e}). In 2016, the Government set a credit limit of 55 MtCO_{2e} for the third carbon budget period covering 2018-2022. The credit limit set in 2011 for the second carbon budget covering 2013-2017 was also 55 MtCO_{2e}.
2. In setting the limit, the government is required under Section 10 of the Climate Change Act to take into account advice from the Climate Change Committee (CCC) and Devolved Administrations (DAs). The CCC has advised that a zero limit should be set on the use of international credits. The Scottish Government would support the adoption of a zero limit. The Welsh Government and Northern Ireland Executive stated that in an ideal scenario a zero limit would be adopted, although both noted that circumstances outside the government’s control could warrant a small positive limit as a contingency, provided the Government’s intention was to meet the budget through domestic action alone and only high quality credits were used.
3. Whilst the government has not used credits to meet the first two carbon budgets it has retained the ability to use international credits, in particular to manage uncertainty in the level of

abatement necessary to meet carbon budgets. This uncertainty arises because emissions statistics are subject to increases or decreases based on changes in how emissions are measured and reported. For example, the UK expects to adopt newer scientific consensus on the relative global warming potentials of each GHG, and recently included wetlands in its Greenhouse Gas Inventory.¹ Furthermore, projections of future emissions are based on economic and demographic factors which are difficult to predict.

4. Thus, despite having plans and policies which are expected to be sufficient to meet the fourth carbon budget, the UK may end up unexpectedly off-track. In this situation, the government would be forced to take short-term action to reduce emissions in order to comply with the Act. Short-term action through domestic policy is likely to cost more than decarbonisation actions planned and implemented over a longer period, and may not be consistent with long-term cost-effective emissions reductions. The option to use credits could reduce this additional cost and provide the government with the flexibility to manage the uncertainty about future emissions, but would not compel the government to use any credits.
5. The ability to purchase high quality credits for the purpose of meeting carbon budgets could also enable the UK to support climate action in developing countries while pursuing our own climate targets. A purchase of credits could contribute to the development of a global carbon market, which could reduce the global cost of action on climate change. If credits were purchased, this would have the benefit of driving increased financial flows to low carbon development projects that deliver cost-effective mitigation and also non-carbon benefits (e.g. biodiversity, sustainable development) overseas.
6. Setting the limit may affect the expectations of investors and businesses. We have identified two possible counteracting effects. A higher credit limit could reduce short-term investor confidence in the UK low-carbon sector by signalling that policy interventions to reduce domestic emissions may not be as strong in the future. However, a higher limit could also increase long-term investor confidence by making the broader policy framework more resilient to unexpected changes in underlying emissions data or projections. It is not clear that previous credit limits have had a significant impact on investors.
7. The existing evidence does not clearly point to a specific desirable level for the credit limit. Three options for the credit limit are considered within this impact assessment:
 - Option 1: No flexibility (0 MtCO_{2e}). The government would be unable to count credits towards the fourth carbon budget.
 - Option 2: A moderate degree of flexibility (55 MtCO_{2e}), representing around 2.8% of the fourth carbon budget. This is the same level as the second and third carbon budget credit limits.
 - Option 3: A high degree of flexibility (90 MtCO_{2e}), representing around 3.5% of the fourth carbon budget.
8. Option 1 could have a small positive impact on investor confidence in the short-term. However, it would also provide no flexibility to manage the uncertainty around future emissions using credits, which could lead to the UK being compelled to make short term abatement that is not cost effective, leading to a misallocation of resources and greater cost of reaching the 2050 net zero target. Were short term domestic abatement unavailable, the UK would alternatively have to use flexibilities such as carryover from CB3 or borrowing from CB5. This would reduce the level of abatement globally over the period.
9. Options 2 and 3 both mitigate this risk, providing flexibility to manage the uncertainty about future emissions using credits. Option 2 is in line with the credit limit for the second and third carbon budget, meaning relative to option 1 any negative impact on short-run investor confidence in the government's commitment to domestic climate action would likely be minimal. According to existing projections and the pipeline of potential accounting changes which may apply to the fourth carbon budget period in whole or in part, it is possible that the additional flexibility allowed under option 3 compared to option 2 could be needed in practice.

¹ See [2019 UK greenhouse gas emissions: final figures - statistical release](#) for more details

PART A: RATIONALE AND POLICY CONTEXT

1 Relevant legislation and targets

10. The impacts of climate change will result in significant economic costs to society. Government intervention to reduce emissions can help limit the overall costs associated with climate change and increase UK and global welfare.
11. The 2008 Climate Change Act (“the Act”) established a legal framework to cut GHG emissions in the UK. The framework requires setting a series of five-year carbon budgets leading up to 2050, when the Act requires that budgets must be set with a view of meeting the target of reducing net UK emissions by 100% (“net zero”) by 2050.
12. The Act provides that international carbon units (“credits”) can be used to meet carbon budgets. A credit represents the reduction, avoidance or removal of one tonne of carbon dioxide equivalent (tCO₂e) from the atmosphere and can have a financial value associated with it when traded.
13. Credits in this context can play an important role by: mitigating against the impacts of unforeseen circumstances; providing flexibility in how carbon budgets are met; and allowing the UK to contribute to the development of a global carbon market. The Act itself does not place an explicit restriction on the use of credits to meet carbon budgets; instead, the Act requires a limit on credits to be set through secondary legislation 18 months before the start of each carbon budget period, which is 30 June 2021.
14. The fourth carbon budget covers the period 2023-27 and is set at 1,950 million tonnes of carbon dioxide equivalent (MtCO₂e). The credit limit will define the maximum net number of credits that can be credited to the UK net carbon account.
15. The Carbon Accounting Regulations for the fourth carbon budget, to be put in place before the 2022 Annual Statement of Emissions due in March 2024, will define the net carbon account. The UK has now left the European Union and its emissions are no longer covered by the EU Emissions Trading Scheme² and a (currently standalone) UK Emissions Trading System (ETS) has been established in its place. This Impact Assessment assumes that emissions covered by the ETS (“traded emissions”) contribute in the same way as emissions outside the ETS (“non-traded sector emissions”) to the budget. This does not preclude any future decisions on the UK ETS or future carbon accounting regulations.
16. This Impact Assessment also assumes that only good quality credits compatible with applicable Paris Agreement guidance including on their generation, trade and accounting, would be used. Any credits purchased would need to represent climate action that is permanent, additional, independently verified, not counted towards another country’s targets, and (at the very least) have no negative biodiversity and sustainable development impacts. Allowances from the UK ETS (or any other ETS in which the UK or any part thereof participate in) would not count towards the credit limit.
17. The fourth carbon budget period runs until the end of 2027. The end of carbon budget period statement, which sets out the final position for the carbon budget, must be published by 31 May 2029. This statement will set out whether any use of credits under a positive limit is to be counted towards the final level of the carbon budget.

2 International Context

18. From 2021 onwards it is likely that the supply of international credits available to the UK for use towards climate targets will fall, as guidance on carbon accounting for country-to-country credit transfers, negotiated under Article 6 of the Paris Agreement, enters into force.
19. Prior to this, and during earlier carbon budgets, under the Kyoto Protocol countries hosting credit generating programmes generally had no national emissions reductions targets. The key difference now is that virtually all countries do have targets. Under the Paris Agreement all

² With the exception of electricity generation in Northern Ireland

countries are now required to have emissions reduction targets (termed Nationally Determined Contributions), and therefore when one country sells a credit that is used to meet another's target, the seller must add the abatement the credit represents to their own emissions levels. This 'corresponding adjustment' stops the abatement represented by the credit from being counted towards more than one target. It also requires the seller to ensure they are taking other steps to meet their climate target, and do not 'oversell' their abatement internationally.

20. The UK's own Nationally Determined Contribution was set in December 2020 and commits to an at least 68% reduction in emissions by 2030, relative to 1990 levels. The UK intends to meet this 2030 target without the use of international credits. The CCC has indicated it would support the use of international credits if the UK were to increase its ambition beyond existing targets.
21. Supply of international credits is likely to be inhibited until more countries have better developed plans around what abatement they will realise domestically, and what might be sold on the international carbon market. Low supply may reduce the viability of international credits as a mechanism for managing uncertainty in domestic abatement, as it cannot be guaranteed that high quality credits will be available to fill any shortfall identified towards the end of a carbon budget.
22. Low supply may also increase the price of international credits. To address this a wide range of prices for international credits are considered whilst potential limits on supply also inform the choice of options...

3 Impact on carbon budgets of uncertainty in emissions projections

23. UK emissions fell by 44% between 1990 and 2019 and we met our first two carbon budgets. The government has recently announced significant policy to help meet future carbon budgets, including through the Energy White Paper and Ten Point Plan.³
24. However, planning to meet carbon budgets relies on projections of future emissions, which are inherently uncertain. This means that the required level of abatement to meet the fourth carbon budget could be greater (or lower) than expected, and requires identifying contingencies to ensure that emissions over the 2023-27 period do not exceed their legislated level. The main sources of this uncertainty are discussed below - inventory uncertainty and projections and policies uncertainty.
25. **Inventory uncertainty** relates to how emissions are measured. Scientific knowledge in relation to emissions sources develops continually over time, which can result in emissions for previous and future years being measured as higher or lower. We have considered potential developments in scientific knowledge in line with section 10 of the Climate Change Act.
26. For example, the UK expects to adopt updated definitions of global warming potentials (GWPs) in the near future. GWPs measure the potency of each greenhouse gas relative to carbon dioxide, and updates to their values may increase (or reduce) measured emissions given that a substantial fraction of UK emissions are non-CO₂ (with methane making up the most substantial proportion). The UK expects to adopt values from the IPCC Fifth Assessment Report (AR5 values), although further updates are possible before the fourth carbon budget is accounted: in particular, the IPCC Sixth Assessment Report will be published in 2022.
27. Likewise, measurements of existing emissions sources, and knowledge of different emissions sources that need to be included, improves over time. This contributed to a 17 Mt increase in annual emissions for 2018 in the most recent final GHG inventory statistics, largely due to better representing emissions from drained and rewetted inland organic soils (peatlands) consistent with the 2013 IPCC Wetlands Supplement.⁴
28. Future updates therefore could mean that emissions over the fourth carbon budget period will be higher than forecast. Whilst the Government is taking into account the known ways in which emissions could be higher in its planning, for example by considering the impact of adopting

³ See the [Energy White Paper](#) and [Ten Point Plan](#) for more details

⁴ For more details, see the [2019 UK greenhouse gas emissions: final figures - statistical release](#)

higher GWPs, there are limits on the foreseeability of these changes. The final emissions level over the fourth carbon budget will not be known until March 2029.

29. **Projections and policies uncertainty** relates to limits in the extent to which modelling can precisely forecast the future. Emissions depend on factors such as the level of economic activity, global commodity prices and temperatures (which influence demand for heating, for example) several years in the future, which cannot be known exactly in advance. Further, the future emissions savings associated with policies are also estimated and may depend for example on uncertain take-up rates of low carbon technologies. Therefore, it is possible that emissions are higher or lower than forecast.
30. The table below sets out potential sources of additional emissions over the fourth carbon budget period.⁵

Table 1: Uncertainty over CB4

Source	Potential Addition over 2023-27
Updates to GWPs – AR5 5 th Assessment Report values	15 to 85 MtCO ₂ e (without/with feedback)
Wetlands Uncertainty	30 MtCO ₂ e ⁶
Inventory Revisions	55 MtCO ₂ e ⁷
Projections uncertainty ⁸	125 MtCO ₂ e

Source: BEIS Analysis

31. The level of GHG emissions over the fourth carbon budget influences the extent to which the above uncertainty would require additional abatement to be undertaken in order to meet the budget, and therefore the likelihood that credits would be used. To assess this, we have drawn on the latest 2019 Energy and Emissions Projections which includes uncertainty analysis. We maintain the assumption that the traded sector contributes in the same way as the non-traded sector to the budget, eg because the UK is now part of a standalone ETS, and absent further linking, it is not necessary to account for cross-border flows of ETS allowances.
32. This analysis considers only the impact of policies which have been implemented, adopted or planned as at August 2019. Since then, the government has identified further savings through the Ten Point Plan and Sectoral Strategies, which will help ensure delivery of Carbon Budgets 4, 5 and 6, as well as the UK's 2030 NDC. These will be brought together in the government's Net Zero Strategy later this year.
33. Figure 1 below shows an indicative 95% uncertainty range for Carbon Budget 4 emissions, factoring in forthcoming changes to Global Warming Potentials. Based on central projections, it is unlikely that credits would be needed. Even without further policy, if the central projection is realised the government would overachieve the fourth carbon budget, were GWPs to be at the lower end of the possible values that may be adopted. Were GWPs at the higher end, further savings would be required but within the range that further domestic policy is expected to be able to fill. However, there remains the risk that unexpected increases in emissions would leave a shortfall to Carbon Budget 4.

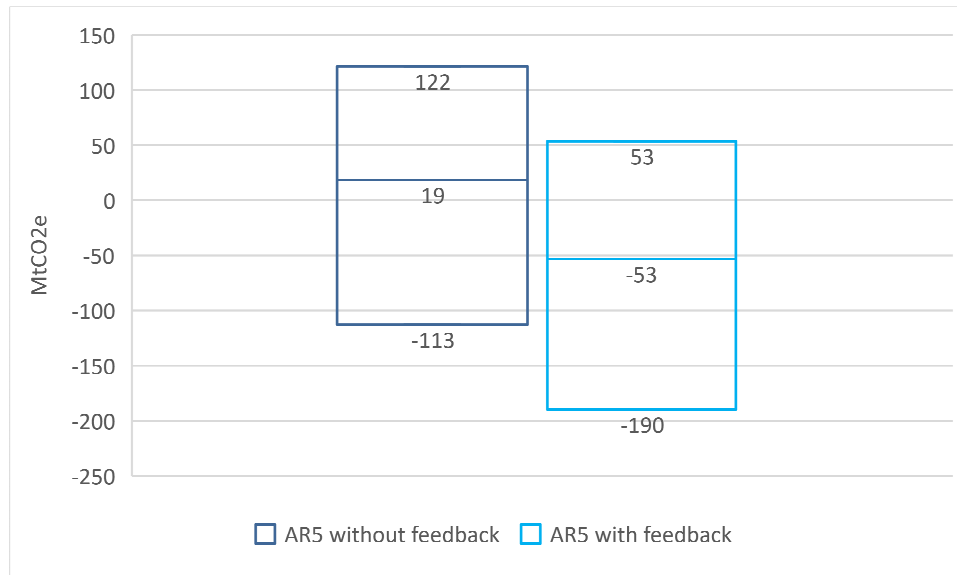
⁵ Figures are rounded to the nearest 5 MtCO₂e to avoid spurious accuracy.

⁶ Wetlands uncertainty is presented separately because they are a relatively new source of emissions in the inventory and as such were not fully included in 2018 inventory uncertainty analysis. Furthermore, recent CCC advice used comparatively high values of wetlands. We assume central wetlands values of around 16 MtCO₂e per year, with an upper range in line with the CCC assumptions (22 MtCO₂e per year, on average over the fourth carbon budget)

⁷ The range of uncertainty in 2018 emissions was 2.9% (Table 4.2, [BEIS Final Greenhouse Gas Emissions Statistics 1990 to 2019](#)). We have applied this range to the fourth carbon budget level to approximate an upper bound of inventory revisions that could apply in the 2022 Final Statement of Emissions.

⁸ We have applied the monte carlo analysis presented in the [Energy and Emissions Projections 2019](#), which is based on modelling conducted in 2018. In this analysis, historical distributions of the input values are first derived, and then the emissions projections model is run using samples from these distributions and recorded the resulting projections over a large number of simulations. The methodology is described further in Chapter 6 of the [Energy and Emissions Projections 2018](#)

Figure 1: Possible emissions relative to CB4 under forthcoming GWPs.



Source: BEIS Analysis of EEP 2018, EEP 2019, and EEP 2019 Covid Projections, including an adjustment to add Wetlands emissions and show the impacts of AR5 GWPs.

4 Review of the third carbon budget credit limit

34. When the third carbon budget credit limit was set in 2016, the Impact Assessment estimated that a credit limit of 55 MtCO₂e would be appropriate. The government is not aware of evidence that suggests any widespread negative impact on investor confidence resulting from this decision.
35. The third carbon budget period ends in 2022 and the final statement of emissions for the period will not be made until May 2024. It is therefore not possible to fully assess at this time whether the third carbon budget credit limit level is adequate or proportionate. However, when the limit was set it was noted that unanticipated revisions could lead to pressures on the budget and that a positive credit limit would help manage these. These reasons still appear valid for the third carbon budget period.

PART B: ASSESSMENT OF OPTIONS

36. The options considered are:
 - Option 1: No flexibility (0 MtCO₂e). The government would be unable to count credits towards the fourth carbon budget.
 - Option 2: A moderate degree of flexibility (55 MtCO₂e), representing around 2.8% of the fourth carbon budget. This is the same level as the second and third carbon budget credit limits.
 - Option 3: A high degree of flexibility (90 MtCO₂e), representing around 3.5% of the fourth carbon budget.

5 Impact of cost of complying with domestic carbon targets

37. The government intends to meet its carbon targets through domestic action, although has typically reserved the right to use provisions in the Climate Change Act to use international carbon credits in certain circumstances. These include the avoidance of significant costs to the UK taxpayer of undertaking urgent abatement necessitated by upwards revisions to the UK's GHG inventory. As the analysis in part 4 demonstrated, such upwards revisions can be significant.
38. The setting of the credit limit order does not in itself imply a cost of complying with carbon budgets, and if no credits are needed then the credit limit also has no cost. However, a positive credit limit provides the government with the opportunity to avoid high unanticipated costs, with positive fiscal implications, relevant to section 10 of the Climate Change Act. The benefits and costs of such a decision vary with different positive credit limits, but also depend on the scale of

any credit purchase deemed necessary to meet the carbon budget were domestic action not available.

39. The counterfactual for our analysis is where the UK is constrained to undertake additional abatement to address any shortfall domestically (via a credit limit of 0). A positive credit limit provides the option to meet some or all of any shortfall by purchasing international credits.
40. Illustrative analysis has been undertaken to demonstrate the possible costs and benefits, given that the costs of both domestic abatement and international credits are uncertain. This analysis reflects different assumptions about the technology available during the fourth and fifth carbon budgets, relevant to the section 10 criteria set out in the climate change act. Under all credit limit options (including 0) global emissions are assumed to be the same – reflecting that any credit purchases would be on the basis that they represent additional abatement by the selling country. We have therefore assumed carbon benefits are unchanged across options.
41. The cost of international credits is proxied both by current prices and the prices produced by BEIS's Global Carbon Finance (GLOCAF) model, with a range provided by considering scenarios where global ambition keeps global warming to 1.5 degrees below pre-industrial levels by 2100. GLOCAF is a scenario modelling tool that calculates emission prices using a global least cost (equal marginal cost) approach, also equivalent to a theoretical global carbon market approach: regions and sectors can freely trade abatement outcomes depending on their relative marginal costs, emissions projections and the stringency of the global decarbonisation target. The model solves for the most cost-effective allocation of abatement and equilibrium emissions prices given a global emissions targets scenario and a specification of the carbon market design. Whilst the model is capable of producing emission prices, it is not a forecasting tool of real-world outcomes. In particular, the model assumes an idealised global carbon market with frictionless trade across all countries and all sectors in the economy, which is a strong assumption for the fourth carbon budget and fifth carbon budget period here. Our estimates based on current prices using an independent standard are £8-£40/t. It is important to note that these current market prices do not reflect effects of the introduction of Paris Agreement guidance on carbon trading through the 2020s (see '2 International Context') which could cause prices to increase. Our estimates from GLOCAF are £93/t in 2025. We therefore use a range of credit prices to reflect the uncertainty.
42. Any unplanned domestic abatement is likely to be more costly than the average abatement cost of meeting the fourth carbon budget. We have used CCC cost data to assess domestic costs.⁹ We use the most expensive sector in the CCC data in 2025 to proxy the cost of urgent abatement action. This is £243/t in undiscounted terms.
43. The table below shows the potential savings over the fourth carbon budget period only from using credits, relative to domestic abatement. The calculation assumes illustrative shortfalls of 25 and 75 MtCO₂e and a range of credits prices of £8 to £93/t compared to domestic abatements costs of £243/t.¹⁰ A positive credit limit would allow the government to use credits to undertake the abatement: whether credits are at the top or the lower end of the range above, their use would reduce costs over the fourth carbon budget.

⁹ CCC costs do not necessarily represent the Government's view of costs over this period, but are a valuable sense-check here

¹⁰ Undiscounted values

Table 2: Net Present value (avoided abatement costs) over fourth carbon budget

£m, 2019 prices		Credit limits		
		Option 1 (counterfactual) 0 MtCO ₂ e	Option 2 55 MtCO ₂ e	Option 3 90 MtCO ₂ e
Shortfall scenario	0 Mt	N/A	0	0
	25 Mt	N/A	3.1 to 4.9	3.1 to 4.9
	75 Mt	N/A	6.9 to 10.9	9.4 to 14.8

44. The above table assumes that using credits rather than domestic abatement does not increase costs to meet subsequent budgets – for example because the shortfall in emissions abatement was temporary. The following section considers where this is not the case and additional abatement is also needed over the fifth carbon budget period. We assume that the abatement required over the fifth carbon budget is the same as the shortfall in the fourth carbon budget, for example because a new source of emissions with a flat emissions profile through time is added into the inventory.
45. We calculated switching values for the additional abatement costs in 2030. These are interpreted as the minimum cost per tonne (in undiscounted terms) that abatement over the fifth carbon budget period would have to be, in order for credit purchases to be more expensive than undertaking urgent domestic abatement over the fourth carbon budget. The switching values are £177/t if credits fall at the high end of the cost range and £279/t if credits fall at the low end of the range.
46. In order to compare these switching values, we have proxied the additional fifth carbon budget cost by using two comparators to inform a range of the possible costs. The high end of the range is the average abatement cost in the most expensive sector in the CCC data for 2030. This is £238/t and broadly aligns with HMG modelling using the system-wide UKTIMES model. We also consider a lower value, as the shortfall would not necessarily be met at the top end of costs. The low end of the range is the average abatement cost in the median sector in CCC data for 2030, which is £42/t.
47. We subtract these values in discounted terms from the switching values above to give adjusted present values in Table 2 below. The analysis shows that using credits in the fourth carbon budget could increase costs were fifth carbon budget costs and credit costs both at the top of the assumed ranges. However, were either credits or fifth carbon budget costs (or both) at the bottom of the ranges, the use of credits could reduce costs.

48. Table 3: Net Present value (avoided abatement costs) over the fourth and fifth carbon budgets

£bn, 2019 prices			Credit limits		
			Option 1 (counterfactual) 0 MtCO ₂ e	Option 2 55 MtCO ₂ e	Option 3 90 MtCO ₂ e
Shortfall scenario	High CB5 costs	0 Mt	N/A	0	0
		25 Mt	N/A	-2.4 to 0.7	-3.9 to 0.7
		75 Mt	N/A	-3.2 to 1.6	-3.9 to 2.2
	Low CB5 costs	0 Mt	N/A	0	0
		25 Mt	N/A	2.4 to 4.2	2.4 to 4.2
		75 Mt	N/A	5.3 to 9.3	7.2 to 12.6

49. **Overall, the above illustrative analysis suggests that a small positive credit limit would be unlikely to increase the costs of meeting Net Zero and could reduce it.** The size of the benefit depends on the circumstances leading to a shortfall and the scale of this shortfall, as well

as the cost of credits and the extent to which using credits in the fourth carbon budget period increases the costs of meeting the fifth carbon budget and the 2030 NDC, on which we have made assumptions above.

50. Were the UK government to undertake a purchase of credits, a full cost benefit analysis would be undertaken in the knowledge of the level of abatement being considered; the costs of abating domestically in the counterfactual; and greater information on the cost of credits.

6. Wider impacts

51. The Climate Change Act 2008 provides direction on how the credit limit should be set, including a minimum set of factors that must be taken into account by the Secretary of State when making the decision. These factors are set out in section 10 (“Matters to be taken into account in connection with carbon budgets”) of the Act. Of these, we consider that scientific knowledge, economic and fiscal circumstances, and circumstances at the international level are of particular importance – these factors are considered in the assessment above, while Annex 1 contains a summary of our assessment of each of the factors on a systematic basis. Overall, the factors do not point to any specific level of the credit limit, although some indicate that a positive limit would be beneficial.
52. In relation to investor confidence, the setting of the credit limit level provides a signal to investors in the UK around the long-term commitment of the government to implementing decarbonisation policies to reduce domestic emissions. A higher credit limit could be interpreted by investors as a signal that future climate policy on domestic reductions would be weaker. In theory this could impact the level of investment in UK low carbon industries and supply chains and increase the cost of capital for low carbon investments (due to higher perceived policy risk).
53. However, investor expectations about future policy will be determined by a wide range of factors, including the wider energy and climate policy framework, of which the fourth carbon budget credit limit is only one component. Anecdotal evidence suggests specific decarbonisation delivery policies provide a much stronger signal to investors than carbon budget credit limits. In addition, having a policy framework that is more resilient to unexpected changes (such as unexpectedly high emissions) could provide greater confidence to investors. By providing more scope for the government to manage the uncertainties in future emissions, a higher credit limit could give additional assurance that policies would not be changed at short notice. If the government were forced to take urgent action to reduce emissions, or were at risk of missing a carbon budget, this could have a lasting negative impact on investor confidence.
54. In relation to carbon markets, the development of an effective global carbon market is likely to help reduce the costs of global action to reduce carbon emissions, due to differences in mitigation costs between countries. Carbon trading can reduce the overall global cost of decarbonisation as it will be cheaper for some countries to purchase credits rather than undertaking domestic abatement, and for countries with low costs of abatement there will be a financial advantage in undertaking low-cost emissions reductions beyond their own national targets and selling the resulting credits. A positive credit limit would also provide the UK with the option of supporting emissions reductions in developing countries through the carbon budgets framework. If used, credits would lead to financial flows to low carbon development projects that deliver cost-effective mitigation, and non-carbon benefits, and help to develop a global market for carbon that would likely reduce the cost of meeting the goals of the Paris Agreement. The academic literature suggests that the development and use of effective carbon markets could substantially reduce the global costs of reducing GHG emissions, by channelling finance to the most cost-effective opportunities to reduce emissions. The level of cost saving will depend on the exact distribution of global commitments (relative to the distribution of low-cost mitigation opportunities) and the design of the market mechanisms. A World Bank analysis suggested that an international carbon market may reduce the cost of delivering climate targets by 32% in 2030 and 54% in 2050.¹⁹
55. Under Section 149 of the Equality Act 2010, public authorities have a duty to consider how their policies and decisions affect individuals who are protected under the Equality Act (2010). The Act 2010 identifies the following as protected characteristics for the duty:
 - a. Age

- b. Disability
- c. Gender reassignment
- d. Marriage and civil partnership
- e. Pregnancy and maternity
- f. Race (including ethnicity)
- g. Religion or belief
- h. Sex
- i. Sexual orientation

56. As this Impact Assessment concerns only the decision on the credit limit, rather than the policies needed to meet the fourth carbon budget (including whether credits are purchased and what domestic action would otherwise be undertaken), there are no differential impacts across these groups. It is not yet possible to identify specific equalities impacts in scenarios even on an indicative basis were credits purchased. Where appropriate, the government will consider equalities impacts further as policies and proposals are developed to meet the fourth carbon budget.

57. On balance, we conclude that a small positive credit limit would not have detrimental effects given these wider factors, and is consistent with HMG's stated position on international credits and carbon markets which provides valuable continuity, as well as further routes to support mitigation globally.

7 Impact on businesses and trade

58. Setting the credit limit for the fourth carbon budget, as required under the Act, is a public sector regulation, and will not lead to any direct costs on business. In the unlikely event that emissions are higher than expected and exceed the fourth carbon budget by more than the limit set, extra domestic abatement would be required which could result in additional costs to businesses (and which purchasing credits would help avoid or reduce). As such, any potential cost to business would be a result of subsequent decisions on undertaking extra domestic abatement, rather than as a result of the statutory instrument setting the credit limit itself. As appropriate, these decisions would be accompanied with their own Impact Assessments.

8 Committee on Climate Change's recommendation and views of the Devolved Administrations

59. The CCC advised that the use of international carbon credits in place of domestic action poses several risks including that the use of credits would detract from UK climate leadership and reduce clarity on the steps required in the UK to meet Net Zero. The CCC therefore recommended that international emissions credits are not allowed to contribute to meeting the Fourth Carbon Budget (i.e. that a limit of zero is set on their use). The CCC also reiterated in the strongest terms that the expected large outperformance of the Third Carbon Budget should not be carried forward to help meet the fourth and subsequent budgets.

60. The UK Government sought representations from the Devolved Administrations on the recommended level for fourth carbon budget credit limit. The representations of the Devolved Administrations have been taken into consideration alongside the recommendations of the CCC. The Committee would, however, support the purchase of international carbon credits as an additional lever to support climate mitigation action internationally, in addition to domestic delivery of the legislated carbon budgets

61. The Scottish Government would support the adoption of a zero limit and is of the view that the clear and unambiguous signalling of commitment to domestic emissions reductions is itself very important. The Welsh Government would in principle support a 0% reduction given that further domestic action through reserved policy in Wales is an important factor in determining whether Wales will meet the statutory targets. The Northern Ireland Executive also highlighted the need to

demonstrate global leadership through domestic action and that use international credits could detract from domestic action.

62. The Welsh Government and Northern Ireland Executive also said however that circumstances beyond government's control for which some small contingency is sensible, such as changes to the greenhouse gas emissions inventory, provided the intention remains to achieve the fourth carbon budget through domestic action alone and any credits purchased were high quality. The Northern Ireland Executive added that credits should ideally represent additional international action in addition to domestic action.

9 Assessment of options

63. This Impact Assessment has considered multiple criteria in assessing the different options, including the likelihood of each level providing sufficient flexibility to manage uncertainty in emissions projections; the relative costs of credits and domestic abatement; the impact on investors; and the wider considerations including those set out in section 10 of the Climate Change Act. The recommended option is 55 MtCO₂e, which is likely to provide sufficient flexibility to manage the uncertainty in emissions projections.
64. Option 1 is in line the Climate Change Committee's (CCC) recommendation and the views of the Devolved Administrations, and could have a small positive impact on investor confidence in the short term. However, it would also provide no flexibility to manage the uncertainty about future emissions using international credits. Were actual emissions to turn out significantly higher than currently projected, the government would be unable to use credits to fill any shortfall, which may as an alternative require expensive and urgent domestic emissions reductions.
65. Options 2 and 3 both mitigate this risk, providing flexibility to manage the uncertainty about future emissions. Option 3 provides greater flexibility than option 2, although the full level may not be needed and it may reduce confidence in the government's ability to hit its ambitious NDC in 2030. Option 2 still provides flexibility, and is in line with the credit limit for the second and third carbon budget period which may have benefits of continuity in investor expectations. Any negative impact on short-run investor confidence in the government's commitment to domestic climate relative to option 1 would likely be minimal.
66. The Government does not have specific plans to monitor and evaluate the decision, although its planning to meet current and future carbon budgets, and monitoring of emissions statistics, will naturally establish the merit of this decision.

Annex 1: Summary table of Climate Change Act Section 10 factors

Section 10 factor	Implication for the fourth carbon budget credit limit	Assessment
Scientific knowledge about climate change	Mixed	Climate science underpins the UK's 2050 target to reach net zero emissions. The CCC consider the fourth carbon budget is on the net zero pathway. The credit limit does not directly impact on the level of global emissions reductions, just how these reductions could be delivered. The evolution of scientific knowledge in the inventory is one reason increased abatement could be required over the fourth carbon budget. See section 3 of the above impact assessment in particular.
Technology relevant to climate change	Does not point to a particular credit limit	Technological development influences the relative costs of abatement over the fourth and fifth carbon budgets. The illustrative costs analysis considers a range of different proxies to test assumptions on technology costs. The credit limit itself is not expected to have any material impact on development of technology relevant to climate change. See section 5 of the impact assessment in particular.
Economic circumstances	Positive limit	Setting a positive limit does not imply the use of credits, therefore any direct impact on the economy would be through investor expectations. Given the UK's clearly legislated pathway to net zero and strong commitments through its NDC and the Paris Agreement, slight variations in the pathway of achieving net zero are not expected to have a significant impact.
Fiscal circumstances	Positive limit	There is no direct fiscal impact of setting the credit limit, although a positive limit may provide more cost-effective abatement options if needed over the fourth carbon budget, see section 5 of the impact assessment in particular.
Social circumstances	Does not point to a particular credit limit	The impact, including on fuel poverty, depends on whether credits are actually used and other policies implemented over this period.
Energy policy	Does not point to a particular credit limit	The impact depends on whether credits are actually used and other policies implemented over this period.
Differences between England, Scotland, Wales and Northern Ireland	Mixed	The decision is not devolved. To set the credit limit is a reserved matter. The UK Government consulted the Devolved Administrations (DAs) before a decision on the fourth carbon budget credit limit was made, in accordance with the Act. The Scottish Government would support the adoption of a zero limit. The Welsh Government and Northern Ireland Executive stated that in an ideal scenario a zero limit would be adopted, although both noted that circumstances outside the government's control could warrant a small positive limit as a contingency, provided the Government's intention was to meet the budget through domestic action alone and only high quality credits were used. See section 9 of the impact assessment in particular.

International and European circumstances	Does not point to a particular credit limit	A non-zero credit limit could signal UK support to international credit markets and provide scope to support mitigation actions in other countries through the carbon budget framework. However, deviating from CCC advice could also have a negative impact on the UK's reputation, particularly if this is interpreted as reduced commitment to domestic action on reducing emissions. See section 6 of the impact assessment in particular.
International aviation and shipping	Does not point to a particular credit limit	The impact depends on whether credits are actually used and other policies implemented over this period.

Annex 2: Outline of relevant modelling

GLOCAF

1. Analysis of international credit pricing scenarios has been conducted using BEIS Global Carbon Finance model – GLOCAF. The model allows the user to evaluate the impacts of different global emission reduction targets as well as various specifications of the carbon market design. It covers the years 2025, 2030, 2035, 2040 and 2050.
2. GLOCAF is a scenario modelling tool based on Business As Usual (BAU) emissions and Marginal Abatement Cost (MAC) curves for different regions and sectors providing global economy-wide coverage. GLOCAF uses data from:
 - a. The POLES energy model: this is a partial equilibrium energy model, which takes into account the costs of different technologies as well as the potential demand feedback effects within the energy system.
 - b. IIASA's G4M and GLOBIOM models for forestry and non-CO2 agriculture emissions; these are partial equilibrium models of the forest sector; incorporating the opportunity costs of abatement from forestry.
3. All datasets are at a sector level and apply to a number of regions. GLOCAF models 25 world regions and 24 sectors although a different level of disaggregation is possible if the data supports it.
4. At the heart of GLOCAF is a model of global carbon markets. It compares the supply of carbon abatement or International Carbon Units (driven largely by MAC curves) to the demand for mitigation, (determined by the difference between BAU and regional targets). The model finds the market clearing carbon price where the demand for carbon permits matches their supply for each market. This is done through an iterative process around the carbon price. These curves are constrained by trade restrictions around, for example, complementarity (the requirement for a certain part of a target to be met domestically) and/or participation.
5. GLOCAF uses the market clearing carbon price to determine how much abatement each region and sector carries out and the associated incremental cost. Using the carbon price and associated trading of carbon permits GLOCAF also determines the resulting international financial flows.
6. There are a number of limitations of GLOCAF modelling:
 - a. GLOCAF only models specific years, and as such GLOCAF results focus on 2025 rather than the whole fourth carbon budget period
 - b. GLOCAF marginal abatement cost curves only include direct costs of mitigation, and exclude wider impacts such as co-benefits of mitigation or avoided costs of emissions.
 - c. Although GLOCAF models most major emitters individually, it aggregates many smaller emitters into regions.
 - d. GLOCAF assumes that countries will always choose least-cost mitigation options. This may not always happen in practice.
7. These limitations mean that GLOCAF results should always be considered to be illustrative rather than as forecast of real-world outcomes.
8. GLOCAF data includes BAU projections which are calibrated to the International Energy Agency's World Energy Outlook 2019 Current Policies Scenario.