Explanatory Memorandum to:

- **The Climate Change (Carbon Budget) (Wales) Regulations 2025**
- **The Climate Change (Net Welsh Emissions Account Credit Limit) (Wales) Regulations 2025**
- **The Carbon Accounting (Wales) (Amendment) Regulations 2025**

This Explanatory Memorandum has been prepared by the Climate Change and Rural Affairs Group and is laid before Senedd Cymru in conjunction with the above subordinate legislation and in accordance with Standing Order 27.1.

Cabinet Secretary's Declaration

In my view, this Explanatory Memorandum gives a fair and reasonable view of the expected impact of:

- The Climate Change (Carbon Budget) (Wales) Regulations 2025
- The Climate Change (Net Welsh Emissions Account Credit Limit) (Wales) Regulations 2025
- The Carbon Accounting (Wales) (Amendment) Regulations 2025

I am satisfied that the benefits justify the likely costs.

Huw Irranca-Davies MS
Deputy First Minister and Cabinet Secretary for Climate Change and Rural Affairs

14 October 2025

PART 1 – EXPLANATORY MEMORANDUM

Description

1. This Explanatory Memorandum covers three regulations that are referred to collectively as the Climate Change (Wales) Regulations 2025.

    i. The Climate Change (Carbon Budget) (Wales) Regulations 2025 set Carbon Budget 4 (2031-35).

    ii. The Climate Change (Net Welsh Emissions Account Credit Limit) (Wales) Regulations 2025 set the carbon credit limit for Carbon Budget 3 (2026-30).

    iii. The Carbon Accounting (Wales) (Amendment) Regulations 2025 amend the definition of a carbon unit.

Matters of special interest to the Legislation, Justice and Constitution Committee

2. None.

Legislative background

3. The purpose of Part 2 of the Act is to require the Welsh Ministers to meet targets for reducing net emissions of greenhouse gases in Wales. Part 2 establishes a target for 2050 and requires the Welsh Ministers to set interim targets for 2020, 2030, and 2040, and five-yearly carbon budgets, in regulations approved by the Senedd.

4. Specifically for the Climate Change (Carbon Budget) (Wales) Regulations 2025:

    a. section 31(1) of the Act requires the Welsh Ministers to set carbon budgets;

    b. section 32(1) requires the Welsh Ministers to set a carbon budget at a level that they are satisfied is consistent with meeting the

2050 target and the interim targets that fall within or after that budgetary period;

c. Section 32(3) further requires the Welsh Ministers when making regulations setting a carbon budget to have regard to the following:

   i. The most recent report under section 8 on the state of natural resources in relation to Wales

   ii. The most recent future trends report under section 11 of the Well-being of Future Generations (Wales) Act 2015

   iii. The most recent report (if any) under section 23 of that Act (Future Generations report)

   iv. Scientific knowledge about climate change

   v. Technology relevant to climate change

   vi. European Union and international law and policy relating to climate change (including international agreements on measures designed to limit increases in global average temperatures)

5. For the Climate Change (Net Welsh Emissions Account Credit Limit) (Wales) Regulations 2025, section 33 provides that the Welsh Ministers must limit how many traded carbon units can be credited to or debited from, the net Welsh emissions account in a given budgetary period.

6. For the Carbon Accounting (Wales) (Amendment) Regulations 2025, section 36 provides that the Welsh Ministers may by regulations define what type of carbon unit may be credited to or debited from the net Welsh emissions account.

7. Before laying draft regulations, section 49(1) requires the Welsh Ministers to request and take into account the advice of the advisory body. By virtue of no regulations being made by the Welsh Ministers establishing an advisory body, section 44(3) by default appoints the Committee on Climate Change (“CCC”) to exercise these functions.

8. Where regulations make different provision from that recommended by the CCC, section 49(6) requires the Welsh Ministers to lay a statement before the Senedd setting out the reasons why.

9. The Deputy First Minister requested the advice of the CCC on the matters contained in the Climate Change (Wales) Regulations 2025. On 14 May 2025 the CCC published its advice on ‘Wales’ Fourth Carbon Budget’ that contains its recommendation for the level of Carbon Budget 4 (“CB4”). On 24 July 2025, the CCC published its advice in relation to

the carbon credit limit for Carbon Budget 3 ("CB3") and the definition of a carbon unit.

10. The Climate Change (Wales) Regulations 2025 are subject to the approval of the Senedd via the draft affirmative procedure and are brought forward in accordance with sections 32(3) and 49 of the Act.

Purpose and intended effect of the legislation

- **The Climate Change (Carbon Budget) (Wales) Regulations 2025**

Purpose

11. A carbon budget sets a maximum limit on the total amount of net Welsh emissions permitted over a five-year budget period. Carbon Budget 3 period runs from 2026 to 2030, with subsequent budgets covering successive five-year periods to 2050.

12. The Welsh Ministers must request advice from the CCC and take it into account before setting carbon budgets in regulations. In May 2025, the CCC provided their advice to Welsh Ministers on the recommended level of Carbon Budget 4 (2031-35).

13. The purpose of these regulations is to accept the CCC's recommended level and set Carbon Budget 4 (2031-35) at an average of 73% lower than the baseline.

Intended effect

14. The combination of both targets and carbon budgets provides an effective response to limit global increases in temperature by setting out both a long-term pathway to 2050 (interim targets) and limiting the total cumulative emissions to the atmosphere in the intervening years (carbon budgets).

- **The Climate Change (Net Welsh Emissions Account Credit Limit) (Wales) Regulations 2025**

Purpose

15. The Act requires Welsh Ministers to set a limit on the total amount by which the net Welsh emissions account can be reduced through the use of carbon units. The Carbon Accounting (Wales) Regulations 2018 defines carbon units as the international offset credits known as Certified Emission Reduction (CER) units, issued under Article 12 of the Kyoto Protocol. Offset credits provide a means by which Wales can invest in emission reduction activities overseas and use the emission reductions achieved to offset domestic emissions within the Welsh targets.

16. The purpose of these regulations is to limit the amount of carbon units that may be credited to the net Welsh emissions account for Carbon Budget 3 (2026-30) to 0% of the total budget for that period, noting there is no legal barrier to the limit being amended through regulation during the CB3 period.

17. The level of permitted offsets provides a statement of the level to which Wales' targets are to be met through domestic action versus overseas offsetting. A limit is required in recognition of the need to ensure that business and wider sectors in Wales have certainty in the level of domestic emissions reduction to which we are committed.

Intended effect

18. This regulation is intended to set a limit on the use of offset credits for Carbon Budget 3 (2026-30), balancing issues of cost, clarity in domestic policy intent and the advice received from the CCC with the need to provide adequate flexibility to account for unexpected volatility in Welsh emissions.

19. In their 2025 advice[1], the CCC recommended that the maximum limit on the use of carbon units for the CB3 is set at 0% of the total emissions allowed over the CB3 period.

20. The Welsh Ministers have a statutory duty to set a specific limit on the use of offset credits in regulations for CB3 and have decided to set a limit of 0%. This limit, in conjunction with other flexibilities as laid out by the CCC in their advice, is expected to enable Wales to manage industrial sector variability, based upon a historical assessment of Welsh industrial sector emissions.

- **The Carbon Accounting (Wales) (Amendment) Regulations 2025**

Purpose

21. The net Welsh emissions account (NWEA) for each carbon budget period is the amount of net Welsh emissions of greenhouse gases minus any carbon units credited to the account, plus any carbon units debited from the account during the period. The NWEA is used to demonstrate whether the Welsh Ministers have met the carbon budgets, interim targets and the 2050 target. The Carbon Accounting (Wales) Regulations 2018 define carbon units for the purposes of calculating the NWEA. The current definition limits carbon units to those *issued under Article 12 of the Kyoto Protocol and the decisions adopted under the UNFCCC or the Kyoto Protocol.* This definition is redundant following international negotiations to operationalise Article 6 of the Paris Agreement. Article 6 enables countries to voluntarily cooperate with

[1] Wales' Fourth Carbon Budget - Climate Change Committee

each other to achieve emissions reduction targets. It supersedes arrangements established under the Kyoto Protocol.

22. The purpose of these regulations is to amend the 2018 definition, replacing the references to the Kyoto Protocol with the terminology used for Article 6 credits. These regulations will define the type of carbon unit which may be counted towards Wales' targets and budgets. This will be used to determine compliance with the targets and budgets established by the Act.

Intended effect

23. The updated definition will enable the Welsh Ministers to apply Article 6 carbon units to the NWEA, should they choose to do so.

Consultation

24. As required by the Act, the Welsh Ministers asked the CCC to provide advice to inform the development of these regulations. The CCC conducted a Call for Evidence to gather input from stakeholders ahead of its advice on Wales' Fourth Carbon Budget, which ran between November 2023 and January 2024.[2] The Call for Evidence asked for input on 13 questions on the CCC's proposed methodology, including one regarding any distinctive characteristics that should be considered when developing pathways and costs for Wales. 20 responses were submitted to this question, from trade associations, business and industry, and academia. The responses highlighted the potential for renewable and nuclear energy in Wales, agricultural practices and land use, industrial decarbonisation and carbon capture, socio-cultural considerations, and policy coherence.[3]

[2] Proposed methodology for the Seventh Carbon Budget advice - Climate Change Committee
[3] Summary of Responses to the Call for Evidence (PwC) - Climate Change Committee

PART 2 – REGULATORY IMPACT ASSESSMENT

- **The Carbon Accounting (Wales) (Amendment) Regulations 2025**

25. The Carbon Accounting (Wales) (Amendment) Regulations 2025 are intended as a technical amendment to update terminology in line with the most recent international climate agreement. This procedural change is designed to maintain the Welsh Ministers' ability to access international carbon credits. The purpose of these regulations is to amend the definition of carbon units in the Carbon Accounting (Wales) Regulations 2018, replacing references to the Kyoto Protocol with the terminology used for Article 6 credits issued under the Paris Agreement.

26. Given the technical nature of the amendment, a Regulatory Impact Assessment has not been undertaken for these Regulations.

- **The Climate Change (Carbon Budget) (Wales) Regulations 2025**

Introduction

27. The Welsh Ministers are required to set a target for each five-year carbon budget at a level that they are satisfied is consistent with meeting the 2050 target and the interim targets that fall within or after that budgetary period.

28. The CCC produced its latest balanced and cost-effective pathway to net zero[4], covering Carbon Budget 4 (CB4) in May 2025. This recommends a budget for CB4 of 73% below 1990 (and for some gases, 1995) emissions levels.

29. The Welsh Ministers are not required to accept the CCC's recommended rate of emissions reduction for CB4 but are required to set a rate, and to meet interim targets already set in law for 2040 (89% below 1990 levels) and 2050 (100% below 1990 levels).

30. The CCC's recommendation is based on a combination of forecasting and assumptions which generates a level of uncertainty and risk. Based on our initial analysis of the CCC's advice, coupled with the latest real-world data, we currently believe the target may be credible, but only with urgent and consistent policy action from both Welsh and UK Governments.

31. Given the degree of uncertainty in future emissions reduction we have considered an alternative option of setting a less ambitious target for CB4 against a do-nothing baseline of no further decarbonisation. There is no available alternative comprehensive pathway for reaching net zero

[4] Wales' Fourth Carbon Budget - Climate Change Committee

(and meeting our already set interim target for 2040) to model the different impacts, so we have approximated costs and benefits based on previous CCC (2020) work using the 'headwinds' scenario.

32. In their 2020 advice[5], the CCC identified some alternative pathways to their headline Balanced pathway which moved more quickly or slowly than the balanced pathway. These included their slowest decarbonisation pathway, 'headwinds', and their most ambitious pathway, 'tailwinds'. We have not considered a tailwinds scenario of faster decarbonisation as the CB4 central target is already challenging and we believe it would be unrealistic and unnecessary to set a more ambitious target for CB4. Setting the target in line with the central scenario does not preclude further action being taken that would lead to overperformance, as was seen in CB1. However, additional sensitivity analysis using the 'tailwinds' scenario has been presented in the 'sensitivity' section below.

33. We have extrapolated and updated the CCC's 2020 headwinds scenario to construct an alternative to the 2025 pathway for the purposes of this analysis. These calculations have considerable limitations, in particular some material changes between 2020 and 2025 which have not been reflected in the pathway. However, they are intended to provide an illustration of the relative costs of pursuing a slower pathway than the cost-effective balanced pathway recommended by the CCC. The CCC's headwinds scenario, with a lower rate for CB4, does not ultimately reach the 2040 interim target or net zero by 2050 without commensurate acceleration to 'catch up' in CB5 and beyond.

34. This Impact Assessment does not put forward the government policies needed to meet the different fourth carbon budget options. It presents an illustrative assessment of possible pathways through the fourth carbon budget period to 2050, recognising the uncertainty whilst still allowing an assessment of the key costs, benefits, risks and opportunities of different budget levels.

Summary of options

Option	Description	Fourth carbon budget level (% reduction from 1990 base year)
Option 1	Do nothing baseline (non-binding fourth carbon budget)	40%
Option 2	Looser budget option, in line with CCC (2020) headwinds scenario	69%
Option 3	CCC (2025) recommended budget option	73%

[5] Advice-Report-The-path-to-a-Net-Zero-Wales.pdf

Option 1: Do nothing (baseline)

35. The do nothing (or business as usual) scenario involves no limit being set over CB4 and assumes no further decarbonisation action from now (2025) onwards. It is a hypothetical scenario produced for comparison purposes only to estimate the costs and benefits of alternative budget options.

36. In the absence of a target for CB4, Welsh Government would almost certainly miss the interim 2040 target of 89% emissions reduction from 1990 levels, and in turn miss the net zero target in 2050, both of which are set in law.

Option 2: CB4 target of 69% emissions reduction from 1990 levels (low mitigation scenario)

37. Based on an extrapolation of the CCC's 2020 headwinds scenario, a less ambitious option for CB4 would be to target emissions reduction of 69% from 1990 levels, rather than the 73% recommended by the CCC in their latest advice.

38. The main benefit of this option is that the CB4 target would be easier to meet, however this could come at considerable cost. Emissions reduction over CB4 would likely not exceed the target set by Welsh Government and, therefore, considerable additional emissions reduction would be needed over the subsequent Carbon Budget (CB5) to meet the interim 2040 target of 89% emissions reduction from 1990 levels. In reality, this would be very challenging without significant technological development beyond existing assumptions, so the interim target would likely be missed, with knock on effects for Wales's ability to meet net zero by 2050.

39. Delaying action has wider consequences in addition to underperforming the Welsh contribution to UK-wide climate targets. Decisions made while action is delayed may result in missed opportunities and a more difficult and costly overall transition. For example, interventions like heat pumps and electric vehicles replace carbon-intensive alternatives that have a lifespan of many years. Delaying their uptake could mean more gas boilers or fossil-fuelled cars are bought in the meantime, which then continue to emit carbon into future carbon budgets or require replacement before reaching the end of their lifespan in order to meet net zero targets.

40. Setting a lower target for CB4 would also send a signal that Welsh Government lacks confidence and commitment to meeting interim targets and net zero. This signal could reduce market confidence and disincentivise the private sector and individuals from taking action.

41. To illustrate the potential costs and benefits of this budget level, the headwinds scenario from CCC (2020) was extrapolated and updated to reflect many of the latest developments in the emissions profile as well as mitigation costs and benefits (**Table 1)**. In line with the CCC (2020), our low mitigation scenario assumes relatively modest societal behaviour change and innovation. Behaviours change somewhat and new technologies develop, but this does not occur at the scale or level of cost reduction assumed in the Balanced pathway. The emissions profile of this scenario is not consistent with meeting the 2030 interim target, the 2040 interim target, or the 2050 net zero target.

Option 3: CB4 target of 73% emissions reduction from 1990 levels (CCC balanced pathway)

42. Our preferred option is to set the CB4 target in line with the CCC's recommended rate, based on their balanced and cost-effective pathway. This option would reaffirm Welsh Government's commitment to reaching net zero by 2050 and would provide the best chance of meeting our statutory interim targets.

43. While the CB4 target is challenging, and subject to risks and uncertainty, the CCC's advice suggests that it is achievable with sufficient action from Welsh Government, UK Government, the private sector and individuals.

Preferred option

44. The impact assessment concludes that Option 3 (73%), the CCC's recommended option for the fourth carbon budget level, is the preferred option.

Costs and benefits

Table 1: Summary of costs and benefits

£2023 prices	Option 1 - BAU	Option 2 – 69%	Option 3 – 73%
NPV – central (PV base year: 2025)	**0**	**£47.0 billion**	**£56.5 billion**
Cumulative emissions over CB4 (2031-2035) (MtCO2e)	164	84	74
Cumulative emissions 2025-2050 (MtCO2e)	859	344	283

Financial net cost 2025-2050 (undiscounted)	0	-£14.9 billion	-£10 billion
Monetised co-impacts 2020-2050 (undiscounted)	0	£4.4 billion	£4.9 billion
Monetised carbon savings 2020-2050[6] (undiscounted)	0	£95.5 billion	£106.8 billion

Option 1: Do nothing (baseline)

45. There are no abatement costs or benefits associated with Option 1 (do nothing) because this is the business as usual (or reference) scenario against which alternative options are compared.

Option 2: CB4 target of 69% emissions reduction from 1990 levels (Low mitigation scenario)

46. This option and associated pathway is estimated to deliver a positive net present value of £47 billion. The main costs considered over the appraisal period are the additional financial costs incurred from deploying mitigation technologies relative to option 1. Although the in-year net cost falls to negative (becoming cost saving) in the early 2040s, this does not offset the additional investment costs in things such as low-carbon technologies and infrastructure required over the appraisal period. The net financial cost over the appraisal period (2025-2050) is £14.9 billion (note, these costs would fall across UK and Welsh Governments, the private sector as well as citizens). The main benefit is the monetised carbon savings, valued at £95.5 billion. There are also some monetised co-impacts which deliver a net societal benefit of £4.4 billion, with the main co-benefit being improved air quality.

Option 3: CB4 target of 73% emissions reduction from 1990 levels (CCC balanced pathway)

47. This option and associated pathway is estimated to deliver a positive net present value of £56.5 billion. The main costs considered over the appraisal period are the additional financial costs incurred from deploying mitigation technologies relative to option 1. Although the in-year net cost falls to negative (becoming cost saving) in the early 2040s, this does not offset the additional investment costs in things such as low-

[6] Monetised carbon savings are based on HMT Green Book carbon values. Valuation of greenhouse gas emissions: for policy appraisal and evaluation - GOV.UK

carbon technologies and infrastructure required over the appraisal period. The net financial cost over the appraisal period (2025-2050) is £10 billion (note, these costs would fall across UK and Welsh Governments, the private sector as well as citizens). The main benefit is the monetised carbon savings, valued at £106.8 billion. There are also some monetised co-impacts[7] which deliver a net societal benefit of £4.9 billion, with the main co-benefit being improved air quality.

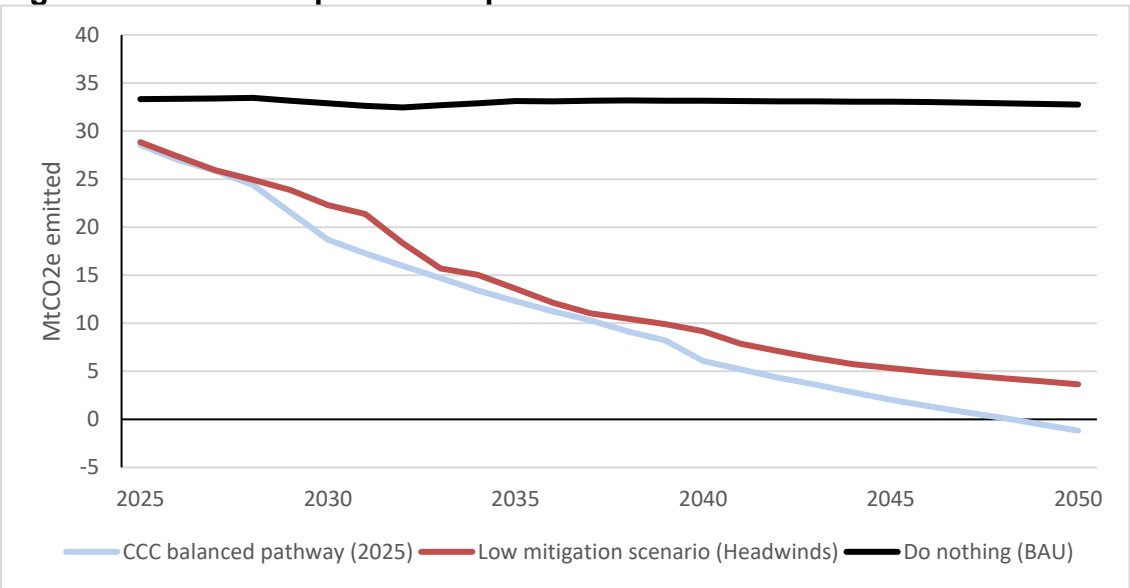
Methodology

Emissions

48. To assess the impacts of different budget levels over the fourth carbon budget, illustrative emissions pathways were used to explore the different options. The emissions profiles in Option 1 (do nothing) and Option 3 (73%) used the latest CCC (2025) balanced pathway and do-nothing scenario.

49. To illustrate Option 2 (69%) the headwinds emissions pathway from the CCC (2020) advice was extrapolated and updated using the same base year as CCC (2025) to ensure the pathways were comparable. In other words, the low mitigation scenario in this impact assessment follows the same emission reduction profile as the CCC headwinds (2020) in % reduction against base year terms, but the absolute values in MtCO2e have been updated to reflect the latest base year.

Figure 1: Emissions profile of Options 1 to 3



Costs and benefits:

[7] Co-impacts include non-financial costs and benefits which have an impact on society. For example, the air quality benefits from less greenhouse gas emissions or health effects from increased active travel.

50. To provide an illustration of the different costs and benefits associated with the different budget options, the costs and benefits from the different scenarios were quantified over their lifetime (2025-2050) to provide an indicative estimate. However, caution is required when interpreting these results as there is a significant amount of uncertainty inherent in estimating future costs and benefits, particularly due to the considerable uncertainty around the cost and development of future low-carbon technologies, as well as uncertainty around the future actions of government, business, other social groups, and individuals.

51. Included in this analysis are the following costs and benefits:

    a. Financial costs and benefits, including the additional capital investment and operating costs (or savings) associated with the net zero transition.

    b. Monetised societal co-impacts, such as air quality benefits or lost time costs.

    c. Valued emissions savings using HMT non-traded carbon values (low series).

Financial costs and benefits:

52. To illustrate the financial costs of option 3 (73%), the net costs in the CCC balanced pathway (2025) were used. The net costs included the sum of additional capital investment and operating costs in each year.

53. For Option 2 (69%), given the original scenario is a few years out of date the costs in the original scenario were considered to be too uncertain to be of use. Therefore, to estimate the net financial costs of option 2, the following approach was used:

    a. Using the CCC (2020) data, the net cost for the Balanced pathway (2020) and Headwinds (2020) scenarios was estimated.

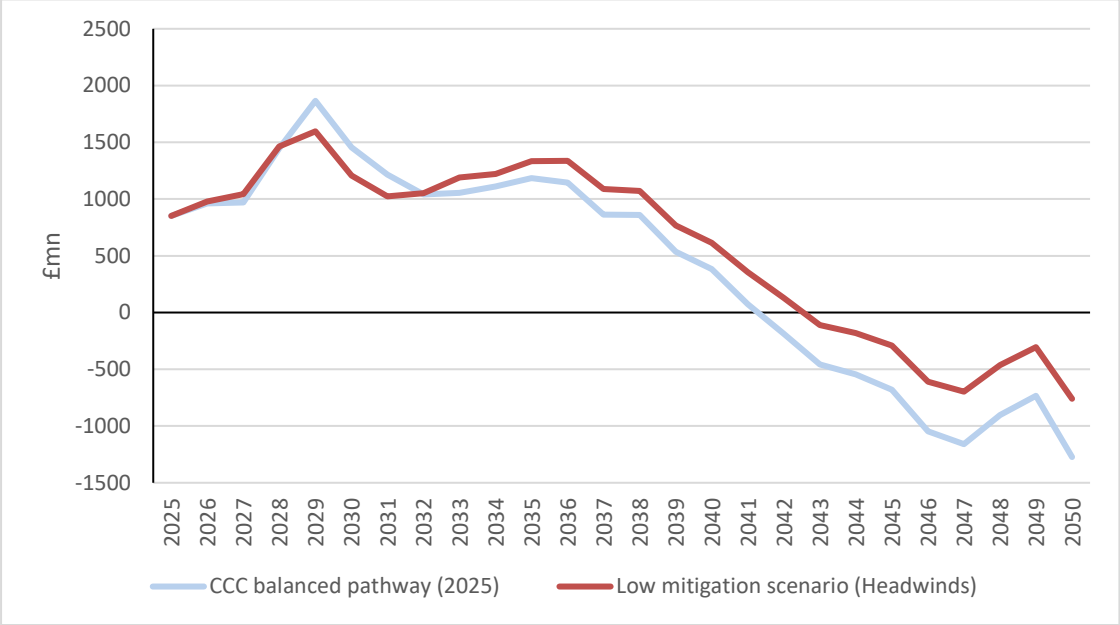
    b. Using the sum of net costs and the sum of CO2e abatement over the years 2020-2050, the average marginal abatement cost for each scenario over the full time period was calculated.

    c. The difference (in % terms) between the average marginal abatement cost for Headwinds (2020), and the Balanced pathway (2020) was assessed. Headwinds had an average marginal abatement cost of £104/tCO2e, whilst Balanced pathway had an average cost of £62/tCO2e. Over the 30-year period, headwinds was therefore 66% more costly per tonne of CO2e abatement compared to the Balanced pathway (2020). The higher cost of the headwinds scenario is driven in large part due to the higher costs of more expensive technologies like CCUS and hydrogen, and less action from businesses and individuals.

d. To construct a similar low mitigation scenario from 2025, we applied an adjustment to the average marginal abatement cost of the 2025 balanced pathway such that the relative cost of the low mitigation scenario would be in line with the relative cost of the headwinds scenario in 2020. In other words, since the headwinds pathway was 66% more costly per tonne of CO2e abatement than the balanced pathway in 2020, we have assumed the low mitigation scenario is also 66% more costly per tonne of CO2e abatement than the balanced pathway in 2025.

e. The adjusted marginal abatement costs are then applied to the CO2e abatement in the low mitigation scenario to produce the net cost.

Figure 2: Net financial cost of options 2 and 3



Non-financial/societal costs and benefits

54. To estimate and monetise the wider societal co-impacts of the options, data from the CCC (2025) UK-wide pathway was used. The CCC (2025) quantified UK-wide co-impacts at between £2.4-£8.2 billion per year in net benefit by 2050, with the lower bound figure constrained due to rebound effects in the net zero pathway which dampen some of the co-benefits, for example increased driving due to the driving cost reductions from electric vehicles. The co-impacts from the rebound scenario were used in this analysis as a conservative estimate of the co-impacts. However, it should be noted that the CCC were not able to quantify and monetize the full range of co-impacts arising from the low-carbon transition, so this figure should not be seen as an exhaustive analysis of the co-impacts. When using the 'rebound' scenario, the main societal

benefits are from air quality improvements, with the main societal costs being from increased travel time.

55. The CCC (2025) did not provide quantified co-impacts at the Welsh level, so an adjustment was applied to the UK-wide figure as an illustration of some of the co-impacts in Wales. We assume that the level of co-impacts is equivalent to the amount of mitigation delivered in the pathway in each year, so the UK-wide co-impacts were adjusted using a scalar which took the Welsh share of abatement relative to UK-wide abatement in each of the scenarios.

56. Finally, the benefits of abated greenhouse gas emissions compared to the do-nothing baseline are monetised using HMG's low carbon values series[8], and are applied to the different scenarios. The low series is used, given the possible uncertainty in using these values in carbon budget regulations which quantify impacts of an overall Wales-wide pathway rather than for specific policies. Had the central series been used, the monetised benefit of abated greenhouse gas emissions (and therefore the net present value) of each option would have been higher. The carbon values are considered further in sensitivity testing.

Discounting

57. Costs and benefits are discounted according to Green Book guidance of 3.5% p.a. The co-impacts are discounted using 1.5% p.a. as the majority of these impacts are health related.

Appraisal period

58. Due to the fact that the level of the fourth carbon budget will have a large bearing on the overall pathway to net zero, the appraisal considers costs and benefits of the overall pathway from 2025 to 2050. This is because achieving the fourth carbon budget depends on actions taken in earlier budget periods and will also impact actions in later budget periods. The appraisal does not represent the full period over which there will be costs or benefits from mitigating emissions.

Sensitivity

59. Central Net Present Value estimates have been presented in this impact assessment for illustrative purposes on the costs and benefits of different budget options. Due to possible robustness concerns in the quantified analysis, a full quantitative sensitivity analysis has not been presented on the costs and benefits of the different options. However, we have explored some sensitivities in this section. In addition, only a single, central estimate was provided in the CCC (2025) advice, and therefore the Headwinds scenario from CCC (2020) was extrapolated and used in this impact assessment as a method of sensitivity control.

[8] Valuation of greenhouse gas emissions: for policy appraisal and evaluation - GOV.UK

60. Whilst the NPV central estimate suggests that Option 3 (73%, represented by the Balanced pathway) is the societally optimal budget level, there might be certain instances where Option 2 (69%, represented by the low mitigation scenario) delivers a higher NPV. For example, the existing low mitigation scenario assumes reduced technological development and behavioral engagement than the Balanced pathway. However, this doesn't necessarily have to be the case - the looser pathway could follow similar cost and behavioral assumptions to the balanced pathway whilst avoiding the most expensive mitigation options. In this situation, this could result in lower overall mitigation costs, offsetting the benefits of additional emissions reduction and delivering a more favorable NPV. However, this option would still be unlikely to be consistent with the 2040 interim or 2050 net zero target.

61. A faster Decarbonisation scenario was also initially explored in the analysis, based on the CCC's (2020) Tailwinds scenario. In the CCC's (2020) advice, this scenario had very optimistic assumptions in terms of cost reductions of low-carbon technology and behavioral engagement among wider society. Using similar cost methodology as the other scenarios, this option could deliver a higher NPV than both options 2 and 3 because the additional monetised carbon savings it delivers could offset the additional financial costs in the pathway. Only when this high mitigation scenario had a significantly higher marginal cost of abatement did it deliver a lower NPV than option 2. However, given the speed of mitigation required in this scenario, and the proportion of Welsh emissions covered by reserved policy, this option was not considered a feasible option and was therefore not explored in the main body of the impact assessment.

62. As discussed in paragraph (55), the low HMT carbon values were used to value the carbon savings, in line with Green Book guidance. This is the largest monetised benefit (see table 1) and results in a positive overall NPV for both scenarios. As a sensitivity check, we explore what level the carbon values need to be for the preferred option (option 3) to deliver an overall societal cost (or negative NPV). The average carbon value over the full appraisal period in the central estimate is £178/tCO2e (in £2023 prices). For option 3 to deliver an overall societal cost (or negative NPV) the carbon values need to average £18/tCO2e over the period.

63. There are also a large number of uncertainties and risks when forecasting future emissions pathways in Wales. These include, but are not limited to:

    a. Uncertainty over the future development and cost profiles of existing technologies, and the impacts of possible technological innovations that do not currently exist, which are not possible to quantify. For example, the costs of low-carbon technology could fall faster or slower than expected by the CCC. To control for this the low mitigation scenario makes more pessimistic assumptions

around the cost and deployment of certain low-carbon technologies.

b. Uncertainty over future fuel prices, impacting the relative cost of switching to low-carbon fuels. For example, it might be the case that future fossil fuel prices are lower than the CCC expect, therefore making the net zero transition more costly than current estimates.

c. Uncertainty around future macroeconomic performance in Wales, impacting the level of emissions and thus changing the level of abatement technology deployment required to reach net zero.

d. Uncertainties over the future UK Government policy which may have a positive or adverse impact on Welsh climate targets.

e. Uncertainties over global developments in technology, climate ambition and the macroeconomy.

- **The Climate Change (Net Welsh Emissions Account Credit Limit) (Wales) Regulations 2025**

64. An international carbon credit (or 'offset') allows Wales to pay for carbon abatement achieved by another country to count towards its own carbon reduction targets. Typically, the country that is paid will perform an activity such as tree planting to sequester carbon, with the resulting emission reductions credited to Wales rather than the country where the activity takes place.

65. The Welsh Ministers are legally required to set a credit limit to determine if offsets will be allowed to help meet Carbon Budget 3, and the maximum number of offsets that Wales can use for this purpose. This limit must be set for each carbon budget but can be amended in regulation at any point during the Carbon Budget.

66. The regulation provides the enabling legislation to allow for the possibility that offsets may be used from 2032. Setting a positive limit does not necessitate, or imply, that Wales will purchase or use offsets, it simply allows the flexibility to do so. The Welsh Ministers will not face the decision of whether to buy international offsets until 2032, when producing the final statement for CB3 and learning whether the budget has been met. Wales does not currently have a mechanism for purchasing offsets, meaning an additional cost of setting up the system to enable the purchase would be incurred if offsets were used to meet CB3. A 10% offset limit was set for CB1, but no credits were ever purchased. For CB2 a 0% offset limit was set, so credits cannot contribute to the statutory CB2 target.

67. Offsets can be seen as an option to achieve compliance with the statutory target. They do not address the problem that would cause us to miss a carbon budget in the first place: insufficient domestic abatement. The purchase of offsets allows for the option of performing this domestic action at a later date.

68. Using offsets to delay the required domestic action may, in some specific circumstances, create savings as technology cost reductions may reduce the cost of domestic action over time, but this domestic action must take place prior to the 2040 interim target. The cost-effectiveness of international offsets as a tool for meeting CB3 ultimately depends on the cost of domestic abatement, the level of cost reductions from technology improvements over time, and the cost of offsets. It is assumed that offsets will not be used as a planned way to meet CB3, but only as a means to potentially make up for an unexpected shortfall that may arise. It is also assumed that the most cost-effective solution will be pursued such that offsets would only be chosen over domestic mitigation if further unplanned domestic action would be more costly.

69. The Carbon Budget 3 (2026-2030) (CB3) is set in line with the Climate Change Committee's balanced pathway to net zero, but there is inevitable uncertainty about how emissions will actually evolve over time and, therefore, whether Wales will be on track to meet CB3 by the end of the period.

70. If risks and uncertainties materialise such that we miss our legal obligations in CB3, we would need to make up additional abatement in CB4. The outcome will be known in 2032, as this is when the necessary Green House Gas inventory numbers will be released.

71. Offsets allow for additional abatement to be made up by purchasing international carbon credits. If domestic abatement action fails to meet CB3, offsets could mean no (or less) additional abatement needs to be made up in CB4. However, in order to remain on the pathway to net zero, and our mandated target of 89% emissions reduction in 2040 relative to 1990 levels, additional action would likely be needed to compensate for lack of domestic action in CB3. This action would have to be taken in Carbon Budget 5 (2036 - 2040) ("CB5") if offsets are used in place of additional unplanned domestic mitigation over CB4. We will not get the final data relating to CB3 until we are already part way through CB4 meaning the decision to either purchase offsets or pursue unplanned domestic mitigation would take place in CB4. The next planned activity that could compensate for the CB3 shortfall would, therefore, be in CB5.

72. International offsets are costly and involve spending money to support mitigation elsewhere in the world, rather than domestic mitigation to progress our pathway to net zero and secure the co-benefits. Therefore, we would not propose using international offsets as part of the plan to meet CB3. However, given the level of uncertainty around future

emissions and abatement, offsets may prove cost-effective under certain conditions.

73. In most cases, the cost of offsets is prohibitive. However, in making the decision around whether to allow for the possibility for offsets to be used we are not making a judgement about whether they should be used. If we were to not set an offset limit at this time, we would be removing the option for future governments to choose to purchase offsets in the case of an expected shortfall in CB3. Conversely, setting too high a limit would send a signal to the market that Welsh Government is not taking its decarbonisation commitments seriously, or does not have confidence in its ability to meet CB3. This may disincentivise required action, discourage investment and potentially undermine government efforts to encourage action from the private sector and individuals.

74. The more offsets that are bought the higher the costs. With their main purpose to enable the meeting of CB3 in the case of an unexpected shortfall in abatement, the choice of limit is not determined primarily by cost but by a balance of risks and opportunities. It is assumed in each case that any cheaper domestic mitigation would be taken up as a first option to meet an unexpected shortfall and offsets would only be used when they are more cost-effective than domestic options available at the time. As such, further domestic mitigation when mentioned in the options appraisal is assumed to be more expensive than offsets.

75. The actions needed in CB3 are a combination of Welsh Government action in devolved policy areas, UK Government action in reserved policy areas, private sector action and individuals' behaviour. To identify and appraise options for what an offset limit should be for CB3, we identified realistic uncertainties that exist around aspects of the pathway and the scale of that uncertainty as a proportion of the total carbon budget in CB3.

76. These uncertainties are:

    - Greenhouse Gas (GHG) inventory changes (3%).
    - Higher energy usage from colder winters (3%).
    - Industry and power uncertainty (indicative risk: ~11%).

77. The uncertainties identified are largely outside of Welsh Government control but, nonetheless, have the potential to significantly affect emissions over CB3.

78. It is possible to carry forward overperformance for one carbon budget into the next one. Early analysis suggests the likely position at the end of the current carbon budget (CB2), could result in flexibility in the range of up to around 11 Mt, around **9% of CB3** (the early closure of Tata blast furnaces is a significant contributor to this overperformance). As with

offsets, there are risks with this. CB2 was set on the basis of the pathway to an 80% reduction in greenhouse gases by 2025, not net zero. This means the reduction required in CB2 is less ambitious than it would have been if it had been set to meet net zero. A decision to carry forward over- performance might be contentious in this context.

79. It is also possible for a future government to 'borrow' 1% of the subsequent carbon budget. For CB3, this would give flexibility of around 0.7Mt. Again, this could be contentious because it would increase the effort required in future carbon budgets.

80. Choosing a 0% offset limit could be perceived as overly restrictive and could tie the hands of a future government, given the scale of uncertainty in forecasting five years ahead. Putting the emphasis on domestic action may deliver more carbon reduction. Depending on the steps taken, it may also improve the energy performance of homes and buildings, reducing costs and bringing health benefits; or it may contribute to reducing air pollution and impacts on biodiversity and so on.

81. A higher offset limit would provide greater flexibility and could be seen as an insurance policy, providing an option rather an obligation. It is also arguable that carbon trading may reduce the global cost of decarbonisation and help finances flow towards developing countries where low-cost emissions reductions beyond their national targets are possible. This would be consistent with dealing with a global problem using global-based solutions. Unlike offsetting, carrying overperformance into CB3 would not stimulate any additional global decarbonisation.

82. Setting a higher offset limit could also be perceived as a lack of confidence in achieving CB3 through domestic action, potentially signalling an intention to rely on international offsets. This could undermine industry confidence and investment in the net zero pathway. It may raise ethical concerns, as offsetting can be viewed as transferring responsibility for emissions to other countries, often in the Global South and who have contributed least to climate change. In addition, concerns exist over the robustness of international carbon offset schemes. Furthermore, a higher offset limit, taken as a package with the other flexibilities available, could give scope to avoid climate action without recourse to legislation. Finally, based on the current estimates, the use of offsets is only cost effective in limited circumstances, for example where the cost of decarbonisation is very high. Offsets are very expensive at current prices, but carbon markets are volatile and expected to change considerably in the future.

83. International comparisons provide useful context: the UK Government set the offset limit for UKCB4 (2023–2027) at 2.8% based on the risk of changes to the greenhouse gas inventory. Scottish legislation sets a default limit of 0%, although Scottish and Northern Irish Ministers may specify a higher limit in regulations, of up to 20% and 25% respectively of the difference between budgetary periods. Wales may face greater exposure to delivery risks than other UK nations due to its emissions profile, particularly from large point sources in the Power and Industry sectors and from the disproportionate proportion of electricity we generate for the UK. As an example, Net Zero Industry Wales analysis suggests that the Green Steel Future project at Tata Steel could save over 6 MT of emissions per year (equivalent to around 40% of Welsh ETS (covers big point source power and industry emitters) emissions in 2023, and 6% of all UK ETS emissions).

84. **Options.** Given the need to balance these considerations (and noting the flexibility from CB2 carry forward could be up to 9%), three options have been identified for the offset limit providing insurance against the main risks as follows:

Risks covered – INCLUDING estimated maximum carryover from CB2	**Option 1 (0% offset limit)**	**Option 2 (3% offset limit)**	**Option 3 (8% offset limit)**
Estimated cost if fully used (2023 prices, £billions)	£0	£0.6	£1.7
Uncertainty in the Power and Industry sectors (11%)	(×)	(½)	(✓)
Revisions to the Greenhouse Gas Inventory (3%)	(✓)	(✓)	(✓)
Uncertainty in winter temperatures (2.6%)	(✓)	(✓)	(✓)

Option 1: No international credits allowed (Baseline)

85. If we do nothing, Welsh Government will not have the option to purchase international offsets in CB3 to make up for any unintended shortfall in domestic mitigation, unless regulation is subsequently made during Carbon Budget 3 to enable international offsets. While the CB3 plan is intended to deliver enough action to meet the required mitigation, there is always uncertainty about future outcomes. The Carbon Budgets set targets to incentivise action, and the further along the pathway to net zero we travel without sufficient progress, the more challenging the required changes become.

86. If there were an unplanned shortfall in domestic mitigation in CB3, that shortfall would need to be made up through further mitigation over the following Carbon Budget (CB4). By the time we knew of the shortfall, we would be part way through CB4 and would therefore need to take additional unplanned compensatory mitigation on top of the planned action of another challenging Carbon Budget. The CCC balanced pathway is a cost-effective pathway to net zero, so adding unplanned action into CB4 would be more costly than meeting the required decarbonisation in CB3.

87. There is a large amount of uncertainty around the cost of offsets, and of domestic mitigation, but offsets would only be used if they were more cost-effective than unplanned domestic mitigation. The do-nothing option would restrict the capability of a future government to choose between the two options if offsets turned out to be more cost-effective.

Option 2: International offset limit of 3%

88. Allowing international offsets of up to 3% of the carbon budget for CB3 would allow a future government to make up for an unexpected shortfall in abatement up to the identified uncertainty in GHG inventory changes or cold winters, or a combination of lower impacts from both, but would keep an ambitious target for domestic abatement and send a strong signal that Ministers are committed to Net Zero.

89. In combination with other potential offset measures, such as a carry forward of potential overperformance in CB2, or 'borrowing' from CB4, a 3% offset limit is seen as sufficient to cover the identified uncertainties in CB3 while maintaining a strong commitment to decarbonisation.

Option 3: International offset limit of 8%

90. Allowing international offsets of up to 8% of the carbon budget for CB3 would allow a future government to offset a larger shortfall in abatement over CB3, potentially including all of the identified uncertainties, when combined with other offset options such as a carry forward of over performance from CB2 and 'borrowing' from CB4. However, this level of offset limit risks signalling a lack of commitment and confidence in Wales's ability to decarbonise and could unintentionally discourage investment and buy-in from the private sector and individuals.

Preferred option

91. The impact assessment concludes that both Option 1 (0% offset limit) and Option 2 (3% offset limit) are credible options, with a decision finely balanced. However, a 0% limit provides maximum confidence to industry and wider stakeholders in the credibility of Wales' net zero pathway and takes into account other possible accounting flexibilities such as carrying overperformance from CB2 into CB3. As a consequence, Option 1 is the preferred option.

Costs and benefits

92. Setting a limit on the maximum purchase of offset credits permissible for CB3 does not commit the Welsh Ministers to the purchase, or use, of offset credits during this period. Costs will only be incurred if the Welsh Ministers decide to use them, which gives the opportunity for the choice to reflect the cost-effectiveness of offsets vs domestic mitigation when their relative prices are much clearer.

93. An illustrative analysis has been performed to highlight the potential costs and benefits of using offsets to meet a 3% shortfall in CB3 across a range of scenarios. The analysis should not be taken as a forecast as there is significant uncertainty around offset prices and domestic mitigation costs in future. Costs used were based on the latest data at the time the analysis was performed.

94. The following section assesses the possible cost of fully utilising the offset limit set by each option, with prices and net present values based on the potential net benefit of using offsets when conditions are such that they are cost-effective. The net present value of using offsets when they are not cost-effective has not been included here as we assume that, in this case, Welsh Government would simply choose to not purchase offsets. This results in a minimum net present value of £0 without considering the wider impact on incentives from a weaker commitment to targets.

95. The conditions that are favourable towards offsets are as follows:

    1. High cost of domestic action.

    2. High technology cost reductions post-CB4.

    3. Low international offset prices.

96. The methodology used to produce these cost estimates is outlined in the subsequent section.

Option 1: No international credits allowed (Baseline)

97. Offsets cannot be purchased under a zero limit, and so any shortfall must be covered through domestic action exclusively. This limits any potential value that could be gained from purchasing offsets, and so a strict 0% limit could be considered to come at the cost of any net present value accrued through an offset purchase when conditions are favourable towards offsets.

98. However, there are some possible wider savings from the stronger signal to domestic climate targets, which could spur private sector action

and reduce decarbonisation costs for Welsh Government.

Option 2: Set a 3% limit (~4 Mt)

99. If conditions are favourable towards offsets, an offset purchase to cover 3% of CB3 would cost ~£0.2 billion in 2023 prices and produce a net present value of £0.2 billion compared to undertaking unplanned domestic action over CB4. This value includes the cost of the necessary subsequent domestic action over CB5 required to place Wales back on the path to net zero after purchasing offsets

100. A relatively low limit of 3% could signal a stronger commitment to domestic decarbonisation than a higher offset limit, potentially offering some increased savings from a greater private sector incentive to decarbonise.

Option 3: Set an 8% limit (~9 Mt)

101. An offset purchase to cover 8% of CB3 would cost £0.7 billion in 2023 prices, producing a net present value of £0.5 billion when conditions are favourable towards offsets.

102. Setting an 8% offset limit can create greater savings than a 3% limit due to the increased capacity to take advantage of favourable offset conditions. This comes at the cost of a weaker signal of commitment to climate targets with a potentially negative impact on private decarbonisation investment.

Cost methodology

Domestic mitigation

103. The analysis assumes that if offsets are not used, additional domestic mitigation is used to cover the shortfall. This additional domestic mitigation occurs over CB4 (2031-2035). We proxy the costs of this domestic mitigation by taking the mean of:

a. The highest 3 positive sectoral marginal abatement costs as the high

b. All positive sectoral marginal abatement costs as the central

c. The lowest 3 positive sectoral marginal abatement costs as the low

104. A snapshot of the CCC's 2035 marginal abatement costs[9] is used to provide these sector costs. These are combined with cost reductions from technology improvements to estimate the saved costs over CB5

[9] Wales' Fourth Carbon Budget - Climate Change Committee

from choosing additional domestic action over CB4. These savings are incurred because in the counterfactual scenario of using offsets, the shortfall persists into CB5 where it must be covered again either through a repeated purchase of offsets or additional domestic abatement. This is because when we use offsets, no domestic action is taken, and the source of the shortfall continues to emit the same additional emissions into the future. Domestic action must be taken at least before 2040 regardless of whether offsets are used or not, as Wales is legally obligated to meet its 2040 interim target. We assume that 95% of additional domestic abatement is permanent, against the 0% permanence of offsets. Technology cost reductions are based on estimates from the CCC's forecast.

105. The analysis assumes that the cost of domestic mitigation would be met over CB5 if offsets are purchased for CB3, or during CB4 if additional domestic action is chosen in place of offsets.

Cost of offsets

106. Offset prices were chosen based on estimates of the UK's GloCaF model, which gives £176 per tonne in 2030 at 2023 prices if global action is consistent with the 1.5° target. GloCaF generates the most globally cost-effective carbon price by assuming 100% free trade with no friction and each region mitigating up to the same marginal cost to meet the global net zero target. The result is the most cost-effective carbon price at a global level, by which abatement is sufficient to meet the 1.5° target. A low and high offset price is used alongside this. The low offset price is the GloCaF value consistent with the 2° global warming target, which is £70 per tonne in 2023 prices, whilst the high offset price is the 1.5° price multiplied by 1.5. The offset price in 2030 is likely to be closer to the price of £70 per tonne consistent with the 2° target than the price consistent with the 1.5° target given the current trajectory of global climate action.

107. These values are for illustrative purposes and should not be taken as a factual representation of future costs of international offsets. Data to inform GloCaF is regularly updated and so estimates are subject to change. The GloCaF values used are given in USD in 2015 prices, so calculations for our analysis rely on converting the currency to GBP and inflating values to 2023 prices, adding to the uncertainty and caution needed in interpreting the data.

108. The Welsh Ministers will not face the decision of whether to buy international offsets until 2032, when producing the final statement for CB3 and learning whether the budget has been met. This is the point at which the cost of offsets would be incurred.

Funding offset purchases

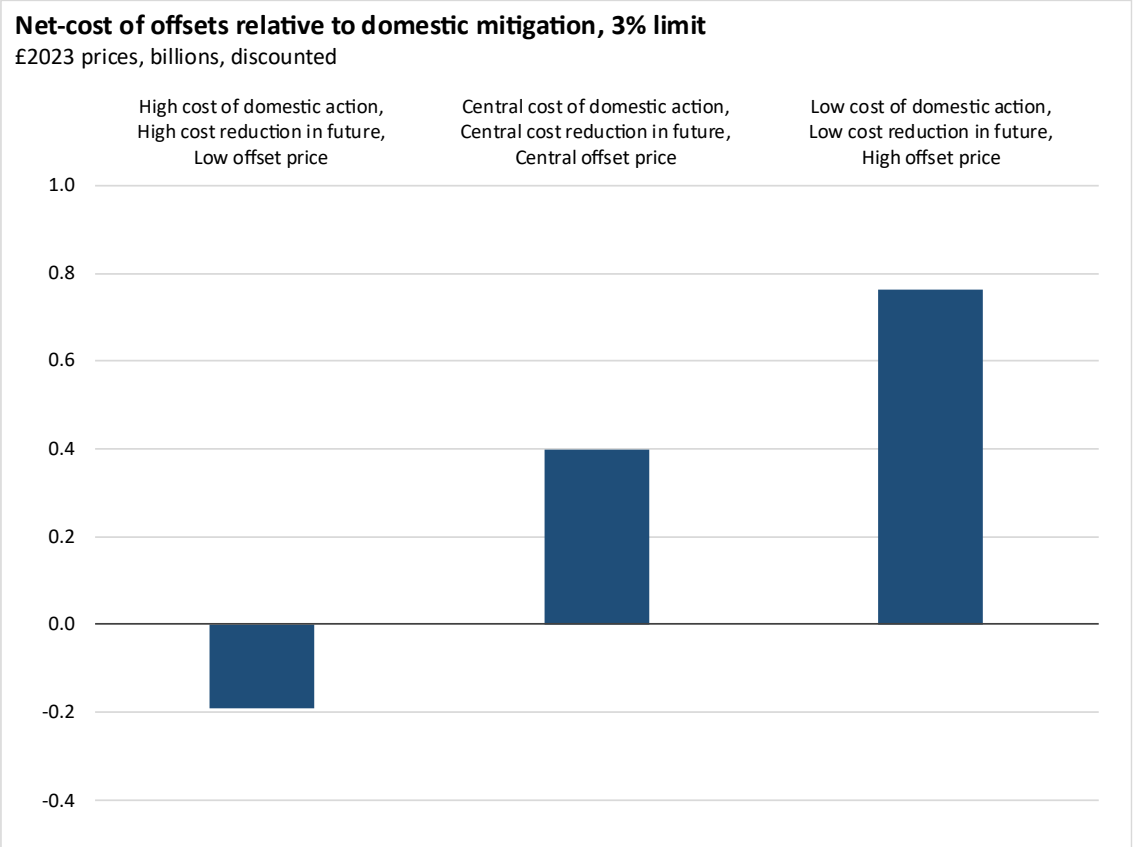
109. Offset purchases would be funded entirely through government, whilst the domestic mitigation costs could be shared between the public

and private sector. The ultimate cost to government depends on the type of domestic mitigation performed and any policies used to incentivise it. It is likely that if CB3 is missed, the cost of additional domestic action required to close the gap will fall more onto government as the private sector was not incentivised to take the action independently.

Illustrative results

110. Figure 3 shows the net cost of covering a shortfall, equivalent to 3% of CB3, with offsets relative to the cost of covering the same shortfall with additional domestic abatement. This net cost is shown over three different scenarios, with the left-most scenario consisting of factors that make offsets cheaper relative to domestic mitigation, and the right-most scenario showing the opposite.

Figure 3: Net cost of offsets relative to domestic mitigation, 3% limit



111. In the majority of cases, offsets are not cost-effective. Fully utilising offsets to cover a 3% shortfall costs £0.4 billion and £0.8 billion more than the equivalent amount of domestic abatement in the central and low domestic abatement cost scenarios respectively. The savings in CB5 from choosing additional domestic action to cover the shortfall are the primary factor driving this, resulting in long-term losses from choosing offsets even when the price of offsets per tonne is lower than the cost of abatement per tonne. Offsets must be significantly cheaper than domestic abatement to offer net-savings as a result, and additional

domestic policy should therefore be the first port of call when covering a shortfall.

112. However, there is potential for offsets to be cost saving under certain conditions, as shown by the high domestic abatement cost scenario, where they are £0.2 billion cheaper than taking additional domestic action. This scenario is more likely to occur when we have an unexpected shortfall, as in this case, the cost of additional domestic abatement would likely be high. This is because the most cost-effective options for domestic abatement will already have been utilised in the plan to meet CB3, and therefore the only choice for additional domestic abatement would be measures within the higher cost sectors.

113. This analysis suggests that offsets have a place as an option to cover unexpected shortfalls when the offset limit is sufficiently high to grant that flexibility. Table 2 highlights the estimated net present value (NPV) of purchasing offsets across the scenarios and offset limits considered.

Table 2: Net present values of offset purchases

NPVs of offset purchase, £2023 prices, millions		
Limit	**3%**	**8%**
Offset favourable	193	514
Offset central	-397	-1059
Offset unfavourable	-761	-2030

Wider costs and benefits

114. Choosing whether or not to purchase offsets ultimately has no impact on the total domestic mitigation performed, as Wales is legally obligated to meet the same 2040 interim target regardless. The difference between the options is when that decarbonisation occurs, with an offset purchase delaying domestic action from CB4 (2031 – 2035) to CB5 (2036 – 2040).

115. This means that any wider co-impacts experienced through domestic action (e.g. reduced air pollution, warmer homes, business closures etc.) would manifest earlier when domestic action is chosen over CB4 as opposed to purchasing offsets. This could differentiate the total co-impact of the two options. The co-benefits of any unplanned domestic action to meet a shortfall may be smaller than the co-benefits of planned domestic action as measures with high co-benefits will likely have already been utilised within the plan. Any co-benefits will depend entirely on what action is taken in each case so cannot be known at this time, have not been monetised within the analysis and are therefore not included in any NPV assessments.

Environment (Wales) Act 2016 factors

116. Section 32(3) of the Environment (Wales) Act 2016 lists several reports and factors that the Welsh Ministers must have regard to when setting a carbon budget. The reports and factors are:

- the most recent State of Natural Resources Report;
- the most recent Future Trends Report;
- the most recent Future Generations Report;
- scientific knowledge about climate change;
- technology relevant to climate change; and
- EU and international law and policy relating to climate change (including international agreements on measures designed to limit increases in global average temperatures).

State of Natural Resources Report

117. In December 2024, Natural Resources Wales (NRW) published the Interim Report ahead of SoNaRR2025[10], which is due for release in December 2025. The report provides an updated assessment of Wales' progress toward the four aims of the Sustainable Management of Natural Resources (SMNR). Building on the findings of SoNaRR2020, it places greater emphasis on the urgent challenges of climate change, biodiversity loss, and the need for systemic transformation noting: 'Four years on from the last SoNaRR, the global challenges of nature loss, climate change, pollution and waste have intensified.' In its assessment of SMNR Aim One—Safeguarding and enhancing stocks of natural resources, NRW reports that climate change continues to exert substantial pressure on biodiversity and ecosystems. Key impacts include:

- Shifting species ranges and localised extinctions.
- Changes to life-cycle events and seasonal patterns.
- Sea level rise and increased coastal erosion.
- Proliferation of invasive species and disease vectors.
- Altered abundance and distribution of native biodiversity.

118. The report also highlights that the increasing frequency and intensity of droughts, floods, and heatwaves is further undermining ecosystem resilience across Wales.

[10] Natural Resources Wales / State of Natural Resources Report 2025 - interim report summary (2024)

119. While Wales has made notable progress in reducing greenhouse gas emissions, with estimated emissions falling from 56 million tonnes of CO_2 equivalent ($MtCO_2e$) in 1990 to 36 $MtCO_2e$ in 2022 (National well-being indicator 41 (Welsh Government, 2022a)), the report stresses that further urgent and sustained action is still needed to address the associated risks to the natural environment, flooding, infrastructure, people's health and cultural heritage.

120. To support this NRW has updated its natural resource registers, which continue to illustrate how climate change is placing pressures across Wales's eight ecosystems. These registers will inform the full SoNaRR2025, which is expected to include new indicators and scenario modelling to explore the trade-offs and synergies between decarbonisation and ecosystem health.

121. The report identifies decarbonisation as a strategic opportunity for action – not only to mitigate climate change, but also to support nature recovery, community resilience, and the transition to a regenerative economy.

122. Despite progress, NRW concludes that Wales's natural resources are not yet safeguarded or enhanced to the extent required to achieve sustainable management. It emphasises that the challenges of nature loss, climate change, pollution and waste are interconnected and cannot be tackled in isolation.

123. The report calls for an integrated response capable of transforming social, economic and environmental systems in a more sustainable direction. NRW advocates for these challenges to be embedded into decision-making across government, businesses and society. This process often referred to as "mainstreaming" aims to ensure that environmental considerations are aligned with broader wellbeing and policy objectives.

Future Trends Report

124. The most recent Future Trends Report was published in 2021[11], with the next report due to be published in 2026. The report identifies key long-term social, economic, environmental, and cultural trends likely to affect Wales. It is structured around six overarching themes: planetary health and limits, people and population, inequalities, technology, public finances and public sector demand, and digital.

125. The report provides an overview of what a future Wales might look like if the trends included are realised and it encourages the reader to consider what impacts this could have.

People and Population

[11] Future Trends: 2021 | GOV.WALES

126. Wales' population, currently estimated at 3.17 million, is projected to grow until 2037. This growth is accompanied by a pronounced ageing trend, with more people living longer and having fewer children. By 2043, the number of people aged over 65 is projected to increase by 85,000, representing a 5% rise in their share of the population compared to 2020. This demographic shift is more pronounced in Wales than in the UK overall.

127. While life expectancy has increased, the rate of improvement has slowed. Healthy life expectancy—the years spent in good health—has declined slightly over the past decade, particularly in more deprived areas in Wales. An ageing population is associated with higher levels of chronic health conditions, although older people also contribute significantly to communities, including through unpaid care.

128. The number of households in Wales is expected to rise steadily over the next 20 years, with a notable increase in one-person households—projected to grow by over 10,000 between 2020 and 2043. Household structures are evolving, with a trend toward smaller units.

129. Migration remains a key driver of population change. Net migration has increased since 2019. While European Union (EU) migration has generally stabilised to levels lower than the period before 2016, non-EU migration has gradually increased since 2013.

Planetary Health and Limits

130. Wales is expected to experience more frequent and severe extreme weather events, including coastal storms, flooding, heatwaves, and droughts. Summers will become warmer and drier, winters milder and wetter, and sea levels could rise by up to 24 cm by 2050. Based on current trends, vulnerable communities will be disproportionately affected.

131. Globally, greenhouse gas emissions are increasing by 1.5% annually, though decarbonisation efforts may stabilise this trend. In Wales, emissions have fallen by nearly one-third since 1990, largely due to changes in the power sector. However, agricultural emissions have risen by 13% over the past decade.

132. The richest 10% of the UK population are responsible for 25% of total emissions, producing over four times more than the poorest 50%. Wales' resource consumption is unsustainable, equivalent to the use of 2.5 planets if replicated globally.

133. Air pollution remains a concern, particularly in south Wales. Biodiversity loss is accelerating, with 17% of species at risk of extinction. Climate change is expected to reduce global crop yields and increase food demand, posing risks to food security.

Technology

134. Internet usage continues to rise, with only 10% of adults in Wales not online. However, digital exclusion persists, especially among those aged 75 and over. Around 20% of people in Wales lack basic digital skills—the highest proportion in the UK

135. As technology becomes embedded across sectors, digital competencies will be essential for all job levels. Job automation is expected to continue, with 6.5% of jobs in Wales at high risk—particularly low-skilled roles. Women and younger people are more vulnerable to automation impacts

136. Remote working is expanding, though unevenly across industries. The adoption of artificial intelligence, cloud computing, and cybersecurity is accelerating, with future uptake dependent on societal readiness and ethical considerations.

Future Generations Report

137. The 2025 Future Generations Report[12], published in May 2025, dedicates a significant section (pages 27–47) to the interconnected challenges of climate change and nature loss. It presents a mixed picture of progress in Wales, highlighting both areas of improvement and persistent systemic barriers to achieving a low-carbon, climate-resilient future.

Challenges outlined in the Report

138. Wales continues to make progress in some areas, but significant challenges remain:

a. Air quality has improved at a national level, yet remains a concern in certain communities, particularly those already facing social and environmental inequalities.

b. Wales continues to lead globally in recycling but struggles with packaging waste and residual materials that undermine overall sustainability efforts.

c. Renewable energy capacity is steadily increasing, and the ecological footprint per person is decreasing. However, the report makes clear that Wales is still far from achieving its goal of living within its fair share of the planet's resources by 2050.

d. The report acknowledges the catalytic role of the Welsh Government's 2030 net zero aspiration, which has driven action across the public sector. Yet, many organisations express concern about their ability to meet emissions targets without significant additional resources and support.

[12] Future Generations Report 2025 - Future Generations Wales

e. While some public bodies have embedded climate risk into their well-being objectives, this is not yet consistent across the board. The report stresses that a whole-organisation approach to climate action is essential if Wales is to meet its long-term decarbonisation goals.

f. One of the most pressing concerns raised is the lack of integration between climate resilience, decarbonisation, and land and marine use planning. Decisions about how land and sea are managed often fail to prioritise climate and nature outcomes, despite their central importance to long-term sustainability. The report also highlights the need to empower communities to participate meaningfully in climate decision-making. Many citizens are eager to act but feel excluded from formal processes, while others remain disengaged or unheard.

g. The scale of investment currently available to support climate action is described as inadequate. Public bodies often lack the capacity to develop investment-ready proposals, and there is a need for stronger mechanisms to attract private finance aligned with sustainable development principles.

The Future Generations Commissioner for Wales' recommendations

139. The Commissioner recommends: establishing a statutory target for nature recovery by 2050, with the aim of helping elevate the importance of climate and nature in public sector priorities; the development of an integrated land and marine use framework that balances climate resilience with other national priorities such as food production, housing, and infrastructure; and strengthening the regulatory powers of NRW. The report proposes that the Welsh Revenue Authority be tasked with ringfencing environmental fines and charges to directly fund climate and nature action and proposes the creation of a cross-sector expert team to support public bodies in accessing sustainable finance to ensure that ambition is matched by delivery.

Scientific knowledge about climate change

140. Two reports by the Intergovernmental Panel on Climate Change (IPCC) summarise the core of scientific knowledge about climate change: the sixth Assessment Report (IPCC-AR6, published March 2023)[13] and the Special Report on Global Warming of 1.5ºC (IPCC-SR1.5 published 2018)[14].

141. Key conclusions from IPCC-AR6:

[13] AR6 Synthesis Report: Climate Change 2023 — IPCC
[14] Global Warming of 1.5 ºC —

a. The climate is changing due to human activity: it is unequivocal that human influence, especially greenhouse gas emissions, has warmed the atmosphere, ocean, and land.

b. Global surface temperature has risen by 1.1°C since pre-industrial times.

c. Widespread climate impacts are being observed: changes in weather extremes, sea level rise, and ecosystem disruptions are already occurring globally. Heatwaves, floods and droughts are intensifying and affecting all regions.

d. Further emissions will cause further warming and intensify impacts. Without deep and sustained reductions, global warming will exceed 1.5°C or even 2°C within this century.

e. No single threshold defines “safe” climate change. Risks increase progressively with warming, and some systems may reach irreversible tipping points.

f. Cumulative CO_2 emissions are the key driver of long-term warming. Global net zero CO_2 emissions are required to stabilize global temperatures.

142. At COP21 in Paris, the IPCC was invited to provide a Special Report in 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways. The report found that:

a. Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C.

b. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (high confidence).

c. Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present. These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options (high confidence).

d. Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C. These differences include increases in: mean temperature in most land and ocean regions (high confidence), hot extremes in most inhabited regions (high confidence), heavy precipitation in several regions (medium confidence), and the probability of drought and precipitation deficits in some regions (medium confidence).

143. The IPCC's projected differences between global warming of 1.5°C and 2°C include:

a. Increased climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth.

b. Global mean sea level rise of around 0.1 metre lower by 2100 (medium confidence). A slower rate of sea level rise enables greater opportunities for adaptation in the human and ecological systems of small islands, low-lying coastal areas and deltas (medium confidence).

c. Lower impacts on biodiversity and ecosystems, including species loss and extinction, and lower impacts on terrestrial, freshwater and coastal ecosystems – enabling them to retain more of their services to humans (high confidence).

d. Reduced increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels (high confidence)

e. Consequently, reduced risks to marine biodiversity, fisheries, and ecosystems, and their functions and services to humans, as illustrated by recent changes to Arctic Sea ice and warm-water coral reef ecosystems (high confidence).

f. Most adaptation needs will be lower (high confidence).

New observations of climate change

144. In its February 2025 advice to the UK Government[15], the CCC also listed new observations of climate since its last advice on the UK's Sixth Carbon Budget in December 2020:

a. The CCC notes that recent years continue to rank among the warmest on record globally, reinforcing the trend observed in the 2020 advice.

b. The CCC reaffirms that human-induced warming has reached ~1.1°C, consistent with WMO and IPCC definitions. The rate of warming (~0.2°C per decade) remains consistent with IPCC projections. Human activities are still responsible for virtually all observed warming since 1850–1900.

c. Global sea levels have continued to rise, with acceleration in the rate of increase now exceeding 3.5 mm/year, up from ~3.3 mm/year reported in earlier assessments. The cumulative rise since 1900 is now estimated to be around 22–23 cm, reflecting continued warming and ice melt.

[15] The Seventh Carbon Budget - Climate Change Committee

d. The CCC highlights that UK coastal areas face growing risks to coastal infrastructure, with projections showing up to 1 metre of rise by 2100 under high emissions scenarios.

e. The UK has continued to experience record-breaking temperatures, with 2022 officially recognised as the hottest year on record. Notably, the UK recorded its first temperature above 40°C in July 2022—a significant milestone in observed climate extremes. The period from 2020 to 2024 has sustained this trend, with multiple months setting new temperature highs. According to the CCC, high temperature records now far outnumber low temperature records, reinforcing the warming trend first highlighted in 2020. UK winter temperatures have also remained elevated, with several of the warmest winter days on record occurring since 2020.

f. According to the CCC, climate models and observational data now offer greater confidence in attributing specific events to anthropogenic warming

Tipping points

145. While many climate impacts unfold gradually as global temperatures rise, the CCC's advice on the UK's Seventh Carbon Budget emphasises that parts of the Earth's system remain vulnerable to abrupt and potentially irreversible changes—known as climate tipping points. These thresholds, once crossed, can trigger dramatic shifts in climate systems that are difficult or impossible to reverse.

146. The concept of tipping points has evolved significantly since the IPCC first introduced it two decades ago. At that time, such "large-scale discontinuities" were considered likely only under extreme warming scenarios—above 5°C. However, recent scientific evidence, including from the IPCC's Sixth Assessment[16] Report and leading climate researchers, now suggests that some tipping points could be triggered between just 1.5°C and 2°C of warming.

147. The CCC highlights several systems at risk:

a. The Greenland and West Antarctic ice sheets, whose destabilisation could commit the world to multi-metre sea level rise over centuries or millennia.

b. The Amazon rainforest, which faces the threat of dieback, potentially shifting from a carbon sink to a carbon source.

c. The thawing of permafrost, which could release vast quantities of methane, a potent greenhouse gas, accelerating global warming.

[16] Sixth Assessment Report — IPCC

d. The potential weakening or collapse of the Atlantic Meridional Overturning Circulation (AMOC), which would have profound effects on weather patterns across Europe and Africa.

148. These risks are increasingly supported by emerging evidence. The CCC notes that early signals of tipping point activation are already being observed, particularly in polar regions and tropical ecosystems. Moreover, tipping points are interconnected—crossing one may increase the likelihood of triggering others, compounding global risks.

149. Importantly, the CCC warns that tipping points are not adequately reflected in most economic models or emissions pathways, meaning current projections may underestimate the urgency and scale of the threat. The CCC calls for a precautionary approach, urging faster emissions reductions and stronger adaptation planning to reduce the likelihood and severity of these irreversible changes.

Technology relevant to climate change

150. In discussing the role of technology and innovation in reaching net zero, the CCC's advice on the UK's Seventh Carbon Budget considered both established and emerging technologies. It also explored the role of digitalisation.

151. The CCC reaffirms that where established technology exists in sectors like power generation, technologies for near-full decarbonisation are already available and increasingly cost-effective. The rapid deployment of renewables, battery storage, and grid upgrades is driving down costs and improving efficiency. In other sectors, such as heating for buildings, technologies like heat pumps and district heating are viable but still face higher upfront costs and require policy support to scale. The CCC continues to recommend a portfolio approach where cost and scalability uncertainties exist, ensuring flexibility and resilience in the transition.

152. The advice identifies several areas where innovation is essential to support emerging technologies to go beyond the reach of current solutions. These include:

a. Hydrogen for industrial processes, heating, and transport.

b. Carbon capture and storage (CCS) for emissions-intensive sectors.

c. Direct air capture and engineered removals to offset residual emissions.

d. Decarbonisation of heavy goods vehicles and aviation, where viable alternatives are still in development.

153. The CCC emphasises the need for continued R&D investment, demonstration projects, and market creation mechanisms to accelerate these technologies.

154. Digitalisation is described as an important enabler of the net zero transition. The CCC highlights its role in:

a. Smart energy systems, including vehicle-to-grid and demand-side flexibility, which reduce the need for backup generation.

b. Predictive analytics to optimise energy use, reduce waste, and improve system efficiency.

c. Behavioural change tools, such as smart meters and apps, that empower consumers to reduce emissions.

d. Cross-sector integration, especially between transport, buildings, and energy, to enable coordinated decarbonisation.

155. Digital technologies are also expected to help reduce demand for materials, food, and water, and support remote working and virtual collaboration, contributing to emissions reductions.

156. The CCC notes that ambitious mitigation targets can help drive down costs of emerging technologies by stimulating demand and scaling production. This includes hydrogen, low-carbon heating, CCS, and CO_2 removal technologies. The advice stresses the importance of policy certainty, infrastructure investment, and skills development to unlock these benefits.

EU and international law and policy relating to climate change

Paris Agreement

157. The Paris Agreement, adopted in 2015 and entered into force in 2016, remains the most comprehensive and widely recognized legally binding international climate treaty to date. It commits nearly every country in the world to limit global warming to well below 2°C above pre-industrial levels, with efforts to cap it at 1.5°C. To achieve this, countries agreed on the need for global emissions to peak as soon as possible and to reach net zero emissions in the second half of the 21st century, “on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.” The global average temperature is already around 1.1ºC above pre-industrial levels.

158. The Paris Agreement requires countries to produce Nationally Determined Contributions (NDCs) every five years, reflecting their highest possible ambition toward the global temperature goal and aiming for progressively more ambitious climate action. The UK was initially part of the EU’s NDC agreed in 2015, which required an average reduction across Member States of at least 40% by 2030. On 12 December 2020,

ahead of the end of the Brexit transition period, the UK published its own independent NDC, committing to a 68% reduction in greenhouse gas emissions by 2030 compared to 1990 levels. This target was based on advice from the CCC, using the same scenario as the CCC's recommendations for Wales—the Balanced Pathway.

159. In January 2025, the UK submitted its updated NDC to the UNFCCC, increasing its ambition to a reduction of at least 81% by 2035, excluding international aviation and shipping. This aligns with the trajectory set out in the UK's Sixth Carbon Budget and anticipates the forthcoming Seventh Carbon Budget, which is due to be legislated by June 2026. The Seventh Carbon Budget will cover the period 2038–2042, and its development is informed by the UK's net zero strategy, sectoral decarbonisation pathways, and the need to close the delivery gap identified in the Carbon Budget Delivery Plan published in 2023. The UK Government have committed to publish an updated Carbon Budget Delivery Plan by October 2025.

Wales' contribution to the Paris Agreement and UK NDC

160. Countries agreed to implement the Paris Agreement in a way that would "reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances." Relative to many other countries, Wales is a wealthy country and has high historical emissions. While Wales currently accounts for around 0.1% of global annual emissions, the UK as a whole ranks fifth globally in cumulative emissions since 1750.

161. In 2023, it is estimated that Wales' territorial greenhouse gas emissions were 34.1 million tonnes of carbon dioxide equivalent[17] ($MtCO_2e$), representing a 38% reduction from 1990 levels [18]. Over half of this reduction has occurred since 2016, following the implementation of the Act. The CCC has advised[19] that Wales' Fourth Carbon Budget, covering the years 2031 to 2035 should include a target of a 73% average annual reduction in net Welsh emissions compared to 1990, including Wales' share of international aviation and shipping.

162. The IPCC[20] does not prescribe a single methodology for allocating emissions reductions across countries but instead reviews the academic literature on effort-sharing frameworks. These frameworks are typically grouped into the three broad categories:

[17] Greenhouse Gas Inventories for England, Scotland, Wales & Northern Ireland: 1990-2023 | National Atmospheric Emissions Inventory
[18] Wales' Fourth Carbon Budget - Climate Change Committee
[19] Wales' Fourth Carbon Budget - Climate Change Committee
[20] The Sixth Assessment Report of the IPCC | UNFCCC

a. Economically efficient – these achieve the required abatement at least global cost. This often results in more mitigation in countries with lower costs, typically developing nations.

b. Historical responsibility – these assign emissions commitments based on historic contribution to the climate emergency since 1990, reflecting their contribution to the climate crisis.

c. Forward-looking approaches – these assign emissions based on a country's projected capability (income) or on the basis of convergence in global emissions per capita.

163. The IPCC's AR6 synthesis report confirms that no single approach is universally accepted, and that equity, fairness, and feasibility are key considerations in national and international climate policy[21]. These frameworks are used to inform debates around what constitutes a "fair share" of global mitigation effort, including in the context of NDCs and net zero targets.

International considerations

Under 2 Coalition

164. Wales is a founding member of the Under2 Coalition, a global community of state and regional governments committed to ambitious climate action in line with the Paris Agreement. The coalition includes more than 220 governments who represent over 1.3 billion people and 43% of the global economy.

165. In 2023, 108 states and regional governments, representing 543 million people, disclosed their climate and environmental data through the CDP Annual Disclosure platform, as part of the Under2 Coalition's accountability framework[22]. The Under2 Coalition has expanded its reporting tools to include the Under2 Ambition Tracker, which monitors progress against the coalition's 2021 net zero Memorandum of Understanding[23].

166. Many Under2 Coalition governments have set net zero targets, with timelines ranging from 2035 (e.g. Mato Grosso, Brazil and Montgomery County, US) to 2040 (Prince Edward Island and Baden-Württemberg), and 2045 (including Hessen, California, and the Australian Capital Territory). Some are going further: Hawaii aims to be net-negative by 2045, while Pará, Brazil has committed to net zero deforestation by 2036, a sectoral target with significant climate impact. The Under2 Coalition supports alignment with the UNFCCC's Race to Zero campaign, with 52 member governments committed to rigorous action plans and near-term targets.

[21] Cooperation with the IPCC | UNFCCC
[22] Accountability | Climate Group
[23] Under2 Coalition 2023 impact report | Climate Group

Wider international comparisons

167. As of 2025, over 140 countries have announced net zero targets, collectively covering more than 90% of global GDP and emissions[24]. Of these, around 30 countries have enshrined their targets in legislation, including Sweden (2045), France, Germany, and the UK (2050). Many others have formalized their commitments through policy documents or long-term strategies submitted to the United Nations Framework Convention on Climate Change (UNFCCC). Notably, Japan has committed to net zero by 2050, China by 2060, and India by 2070.

168. At the federal level, the United States Government has initiated the process to withdraw the US from the Paris Agreement. Despite this federal shift, 24[25] US states have publicly reaffirmed their commitment to the Paris Agreement's goals through the US Climate Alliance, and many cities and private sector actors continue to pursue net zero targets independently.

European law and policy

169. In December 2019, the European Council endorsed the objective of achieving a climate-neutral EU by 2050, a goal previously supported by the European Parliament in March 2019. This objective was formally enshrined in law through the adoption of the European Climate Law[26] in June 2021, which sets a legally binding target for net zero greenhouse gas emissions by 2050 across all EU Member States.

170. The law also includes an intermediate target of at least a 55% reduction in net emissions by 2030, compared to 1990 levels, and establishes a framework for monitoring progress, ensuring fairness, and setting future targets—including a proposed 2040 target of a 90% reduction, currently under discussion[27].

171. EU climate legislation already in place includes the EU Emissions Trading System (ETS), the Effort Sharing Regulation (ESR)[28], and the Land Use, Land Use Change and Forestry Regulation (LULUCF)[29]. These have all been revised under the "Fit for 55" package to align with

---

[24] Climate Pledges Explorer – Data Tools - IEA

[25] U.S. Climate Alliance to the International Community: "We Will Continue America's Work to Achieve the Goals of the Paris Agreement" | U.S. Climate Alliance

[26] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999.

[27] European Climate Law - European Commission

[28] Regulation (EU) 2023/857 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, and Regulation (EU) 2018/1999.

[29] Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU.

the legally binding target of at least a 55% net reduction in greenhouse gas emissions by 2030, as set out in the European Climate Law[30].

172. The Renewable Energy Directive (RED III)[31], the Energy Efficiency Directive[32], and the Regulation on the Governance of the Energy Union and Climate Action[33] also contribute to achieving the EU's climate and energy targets. However, the European Commission has acknowledged that additional efforts are needed, particularly based on Member States' draft updated National Energy and Climate Plans (NECPs), which currently fall short of delivering the 2030 target.

173. To address these gaps, the EU has:

a. Expanded the ETS to cover maritime transport and introduced a new system (ETS2) for buildings, road transport, and small industry, starting in 2027[34].

b. Created a Social Climate Fund to support vulnerable households and micro-enterprises during the transition.

c. Strengthened the Market Stability Reserve and updated free allocation rules to advance sectoral decarbonisation.

d. Proposed a carbon border adjustment mechanism to mitigate carbon leakage risks.

e. Revised the LULUCF Regulation to increase land-based net removals by 42 Mt CO_2e by 2030, although current projections show the EU is not yet on track to meet this target.

174. In July 2025, the EU Commission proposed an amendment to the European Climate Law to set an EU climate target for 2040, which recommended reducing the EU's net greenhouse gas emissions by 90% by 2040, relative to 1990.

---

[30] Commission takes stock of how key pieces of climate legislation are operating - European Commission

[31] Directive of the European Parliament and of the Council amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources and repealing Council Directive (EU) 2015/652.

[32] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast) (Text with EEA relevance).

[33] Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council.

[34] the UK Emissions Trading Scheme (UK ETS) is set to expand to include domestic maritime emissions starting from 1 July 2026, UK ETS scope expansion: maritime sector - GOV.UK

Integrated Impact Assessment

175. Having considered the regulations against our mandatory and non-mandatory impact assessments, we do not believe it is possible to quantify their impact in a meaningful way.

176. The impact of meeting Carbon Budget 4 depends on the policies adopted by a future government, which must be set out in a report before the end of 2031. Policies to deliver carbon budgets are subject to an engagement process and impact assessments, including RIA where appropriate.

177. However, it is possible to use the CCC's advice to provide an indication of the kinds of impacts that may arise from meeting Carbon Budget 4.

What action is the Welsh Government considering and why?

178. The CCC has reaffirmed in its May 2025 advice on Wales' fourth carbon budget that net zero emissions by 2050 is both credible and necessary for Wales. Its May 2025 advice outlines a detailed and achievable pathway known as the Balanced Pathway, which represents their assessment of an ambitious but deliverable pathway for Wales to reach net zero by 2050, reflecting Wales' highest possible ambition under the Paris Agreement.

Economic and social well-being

179. The expected cost of achieving net zero in Wales has continued to fall since the CCC's 2019 advice. The latest analysis estimates the average annual net cost of the transition at around £390 million per year between 2025 and 2050—equivalent to approximately 0.4% of GDP. This reflects significant operational savings, particularly from the lower running costs of electric vehicles, heat pumps, and renewable electricity, which are expected to offset upfront investment costs by the early 2040s.

180. The CCC's Balanced Pathway for Wales shows that electrification of transport, heating, and industry delivers two-thirds of the emissions reductions needed by 2033. Supporting research detailed in the advice continues to suggest a potentially positive impact on GDP, and the CCC reaffirms that the benefits of net zero—including reduced climate risk, improved air quality, and enhanced energy security—outweigh the costs.

People and communities

181. The Future Trends Report identifies demographic shifts—including an ageing population and more people living alone—as relevant to climate policy. These trends imply higher per capita consumption of energy, resources, and goods. The CCC's advice acknowledges that behaviour change is fundamental to achieving net

zero, particularly in household choices around heating, transport, and diet. The CCC's distributional modelling shows that, with appropriate policy support, most households—including those in fuel poverty—can benefit from lower energy bills and healthier living environments.

Children's rights

182. The Future Generations Report draws attention to rising public concern about climate change, especially among children and young people. The CCC's advice confirms that the scientific case for urgent action has strengthened, with global warming now at 1.3°C above pre-industrial levels and rising at 0.26°C per decade. The IPCC's findings continue to show that limiting warming to 1.5°C significantly reduces risks to health, livelihoods, food security, and economic stability compared to a 2°C scenario. The CCC's Balanced Pathway is the only bottom-up scenario available that describes how Wales can meet its legislated targets. It reflects Wales's highest possible ambition within its capabilities and would reduce per-capita emissions to below 3 $MtCO_2e$ before 2040—consistent with global pathways aligned to the 1.5°C goal. The CCC also notes that the clarity of a net zero target stimulates innovation, reduces uncertainty, and lowers the cost of capital, thereby reducing the overall cost of mitigation.

Equality

183. Continuing to contribute to the global momentum towards net zero would demonstrate Wales's commitment to climate leadership, support the development of green industries, and attract investment and jobs. It would also align with Wales's well-being goal to be a globally responsible nation.

Environment

184. The latest State of Natural Resources Report (SoNaRR) highlights the substantial impact of climate change on biodiversity and ecosystems in Wales and identifies decarbonisation as a key opportunity to improve the sustainable management of natural resources and reduce pressures across all ecosystems. The CCC's Balanced Pathway includes nature-based solutions such as woodland creation and peatland restoration, which directly support ecosystem resilience and align with the goals of sustainable management.

Competition Assessment

185. This impact assessment does not include a Competition Assessment because the regulations do not provide for specific policies. It is not possible, therefore, to consider the specific impacts on competition within individual markets.

Post-implementation review

186. The Act 2016 requires the Welsh Ministers to prepare and lay a statement after each budgetary period setting out whether Wales has met the budget, whether they have debited or credited any carbon units and giving details on the type and number of units. The statement must explain what the Welsh Ministers consider to be the reasons why the carbon budget has, or has not, been met. It must include the Welsh Ministers' assessment of the extent to which their proposals and policies for meeting the carbon budget have been carried out and have contributed to the carbon budget being met or not. This statement must be laid before the end of the second year after the budgetary period.

187. The Act also provides for the CCC to monitor and report on progress. No later than six months after the Welsh Ministers lay the final progress statement for a budgetary period, the CCC must provide a report setting out their views on:

a. the way in which the carbon budget for the period was or was not met; and

b. the action taken by the Welsh Ministers to reduce net Welsh emissions of greenhouse gases during the period.

c. the progress that has been made towards meeting—

i. the carbon budgets that have been set under this Part,

ii. the interim emissions targets, and

iii. the 2050 emissions target,

d. whether those budgets and targets are likely to be met, and

e. any further measures that are needed to meet those budgets and targets.