

# Carbon Budgets

Quick Guide

August 2014

## Introduction

**Climate change is a devolved issue** yet how it is addressed is also influenced by both EU and UK legislation and policy. At the EU level, the target is for a reduction of 20% in greenhouse gas (GHG) emissions by 2020 on 1990 levels. **The UK Government has set a target to reduce UK carbon emissions by at least 34% by 2020 and 80% by 2050.** The 2050 target is outlined in the *Climate Change Act 2008*<sup>1</sup> and is consistent with the UK's contribution to limiting global temperature rise to as little as possible above 2°C.

So as to monitor the UK's progress towards this long-term goal, **a system of five-year carbon budgets have been put in place.** These 'stepping stones' each restrict the total amount of GHGs the UK can emit over each period and provide benchmarks towards reaching the 2050 target.

Whilst the *Climate Change Act 2008* does not set specific targets for the devolved administrations, it places a duty on them to contribute to this long-term emission reduction goal. The governments of the devolved administrations have adopted different emission reduction policies as well as different strategies for monitoring their progress towards emission targets. Whilst some of these strategies resemble carbon budgeting (e.g. Scotland), the Welsh Government does not use statutory targets or carbon budgets.

## A framework for carbon reduction

### Climate Change

The Intergovernmental Panel on Climate Change (IPCC) has concluded that the overall risks of climate change can be restricted by reducing carbon emissions and limiting the rate and magnitude of climate change<sup>2</sup>. Recognising this, **the *Climate Change Act 2008* established a carbon reduction framework** with the aim of ensuring the UK met its contribution to the international collective agreement to tackle climate change, as established under the Kyoto Protocol.

The Committee on Climate Change (CCC) – a statutory independent body established under the *Climate Change Act 2008* – considers that an increase in global average temperature of more than 2°C is likely to have dangerous implications<sup>3</sup>. As a consequence, it recommends that global temperature increase be limited to 2°C above pre-industrial levels. To achieve this, GHG emissions would have to peak by 2020 and be halved by 2050<sup>4</sup>.

---

<sup>1</sup> *Climate Change Act 2008* [accessed 30 May 2014]

<sup>2</sup> Intergovernmental Panel on Climate Change (IPCC) (2014) *Climate Change 2014: Impacts, Adaptation, and Vulnerability: Working Group II Contribution to AR5 (summary for policymakers)*. IPCC.

<sup>3</sup> Committee on Climate Change, *Setting a target for emission reduction*, (website) [accessed 2 June 2014]



According to a report by the CCC<sup>5</sup>, after allowing for estimated population growth, the UK will have to decrease its GHG emissions by 80% in 2050 from 1990 levels to meet its international climate change obligations<sup>6</sup>. **Part 1 of the *Climate Change Act 2008* legally binds the UK to this target as well as a number of five-year carbon budgets**, which ensure that regular progress is made towards the overall target. The Act made the UK the first country in the world to have a legally binding long-term framework for emissions reduction. However, the Act does not include provisions for sanctions and penalties in the event that carbon budget targets are not met.

### Carbon budgets

Carbon budgeting refers to a system in which the total amount of greenhouse gas emissions over a certain period of time are constrained. Within the UK, **the *Climate Change Act 2008* introduced a carbon budgeting system whereby a cap is placed on the total emissions over a five-year period.**

Carbon budgets are measured in millions of tonnes of carbon dioxide (CO<sub>2</sub>) equivalent (MtCO<sub>2</sub>e), which is a standardised metric for measuring carbon footprints. This allows the total emissions from a range of GHGs to be expressed as a quantity of CO<sub>2</sub> that would lead to the same amount of warming. The various gases are converted into CO<sub>2</sub> equivalent using standard ratios based on their global warming potential (GWP), which describes their warming potential relative to CO<sub>2</sub>.

According to the CCC, **carbon budgets are a useful monitoring tool for ensuring that regular progress is being made towards long-term emission reduction targets**<sup>7</sup>. This is especially pertinent given that future climate predictions are based on cumulative emissions and, therefore, it is not just the level of emissions in a particular target year that is important<sup>8</sup>. Additionally, the CCC states that carbon budgets provide a level of predictability for businesses planning on investing in a low carbon economy<sup>9</sup>.

### Carbon budgets in UK legislation

**The first three UK carbon budgets were set in law in May 2009 and the fourth in June 2011**<sup>10</sup>. These four carbon budgets cover the period until 2023-27 (Table 1). The *Climate Change Act 2008* requires that the five-yearly carbon budgets be set three budget periods ahead so that it is always clear what the UK's emissions pathway will be for the next 15 years<sup>11</sup>.

Each carbon budget is split into the traded sector, which is based on the UK's share of the EU Emissions Trading System (EU ETS), and the non-traded sector, which covers everything else, including emissions from road transport, agriculture and buildings.

---

<sup>4</sup> *ibid*

<sup>5</sup> CCC (19 July 2010), *Building a low carbon economy*, [accessed 30 June 2014]

<sup>6</sup> Committee on Climate Change, *Setting a target for emission reduction*, (website) [accessed 2 June 2014]

<sup>7</sup> CCC, *Carbon Budgets and targets*, (website) [accessed 27 June 2014]

<sup>8</sup> *ibid*

<sup>9</sup> *ibid*

<sup>10</sup> UK Government (2011), *The Carbon Plan: Delivering our low carbon future*, [accessed 30 May 2014]

<sup>11</sup> UK Government (2011), *The Carbon Plan: Delivering our low carbon future*, [accessed 30 May 2014]



**Table 1: UK carbon budget and emission reduction targets for the first four five-year budgets, as set out in the *Climate Change Act 2008*.**

	First carbon budget (2008–12)	Second carbon budget (2013–17)	Third carbon budget (2018–22)	Fourth carbon budget (2023–27)
Carbon budget level (million tonnes carbon dioxide equivalent (MtCO <sub>2</sub> e))	3,018	2,782	2,544	1,950
Percentage reduction below base year levels	23%	29%	35%	50%

Source: UK Government (2011), *The Carbon Plan: Delivering our low carbon future*<sup>12</sup>.

When the *Climate Change Act 2008* was established it was agreed that the fourth carbon budget would be reviewed in 2014. The agreement stated that any changes to the budget would have to be based on advice from the CCC and that any changes could only be as a result of a significant change to the circumstances within which the budget was originally set.

The CCC published its review of the fourth carbon budget in two parts on 7 November<sup>13</sup> and 11 December 2013<sup>14</sup>. The advice of the CCC was that there had been no significant change in circumstance and, therefore, the fourth carbon budget should not, and could not, be changed under the terms of the Act. The CCC's continued advice is that there is no legal or economic case to loosen the budget and that if the UK Government is to achieve its EU objectives then the targets of the fourth carbon budget will in fact have to be tightened. The UK Government had stated that it would make its decision on the fourth carbon budget in the first quarter of 2014, but a decision has yet to be published. The Scottish Government, however, has commented that it endorses the CCC's view that there should not be a lowering of ambition of the fourth carbon budget<sup>15</sup>. The Welsh Government has not yet commented on the issue.

<sup>12</sup> *ibid*

<sup>13</sup> CCC, *Fourth Carbon Budget Review – part 1*, 7 November 2013, [accessed 27 June 2014]

<sup>14</sup> CCC, *Fourth Carbon Budget Review – par2*, 7 November 2013, [accessed 27 June 2014]

<sup>15</sup> Scottish Government, Press Release, *UK carbon budget response*, 11 December 2013 [accessed 27 June 2014]

## UK progress

**The UK met the first carbon budget target for 2008-12.** Projections of UK CO<sub>2</sub> emissions are published by the UK government and are based on the Department for Energy and Climate Change's (DECC) Energy and Emissions Model. According to this model, **the UK is projected to also meet the targets for the second and third budgets**<sup>16</sup>. However, **based on the assumption that there is no further policy effort to reduce emissions, the UK is projected to miss the fourth carbon budget target**<sup>17</sup>, with an expected shortfall of 205 MtCO<sub>2</sub>e over the fourth carbon budget.

**Table 2: UK projected emissions for the four carbon budget periods.**

	First carbon budget (2008-12)	Second carbon budget (2013-17)	Third carbon budget (2018-22)	Fourth carbon budget (2023-27)
Net Carbon Account (MtCO <sub>2</sub> e)	2,922	2,650	2,457	2,131
Carbon Budget (MtCO <sub>2</sub> e)	3,018	2,782	2,544	1,950
Shortfall (negative implies emissions under budget)	-96	-132	-87	181

Source: DECC (2012), Updated energy and emissions projections 2012<sup>18</sup>.

The CCC has stated that in order to meet future targets the UK will need to further reduce emissions through low-carbon measures, as previous reductions in carbon emissions were largely due to mild weather, rising energy prices and the recession contributing to a fall in real income<sup>19</sup>.

## Measuring emissions in Wales

The UK government's 80% target for the reduction of greenhouse gases includes emissions from the devolved administrations, which accounts for around 20% of the UK's total emissions<sup>20</sup>. Whilst covered by the UK *Climate Change Act 2008*, **the devolved administrations have also introduced their own climate change policies.**

<sup>16</sup> DECC, *Updated energy and emissions projections 2012*, 2012 [accessed 30 May 2014]

<sup>17</sup> *ibid*

<sup>18</sup> *ibid*

<sup>19</sup> Committee for Climate Change, *How is the UK progressing*, (website) [accessed 30 May 2014]

<sup>20</sup> Committee for Climate Change, *The Climate Change Act and UK regulations*, (website) [accessed 2 June 2014]



**Wales does not have in place a system of carbon budgets.** Instead, progress against Welsh emission reduction targets is assessed by a comparison between the level of emissions in any given year and a baseline<sup>21</sup>. The Welsh Government has aimed to reduce total GHG emissions in Wales by 40% by 2020<sup>22</sup>. Additionally, it is aiming to achieve an annual 3% reduction in emissions within devolved areas of competence<sup>23</sup>. Emissions savings required for each sector (e.g. transport, residential, agriculture and land use) in order for the 2020 target to be met are also set<sup>24</sup>.

The 40% target relates to all GHG emissions in Wales and includes traded sector emissions<sup>25</sup>. Total annual emissions are compared to a base year that is calculated as the sum of emissions in 1990 for CO<sub>2</sub>, methane and nitrous oxide, and in 1995 for fluorinated gases. To measure performance against the 3% target, emissions of the six main GHGs in each year from 2011 onwards are compared to a baseline, which is defined as the average of the relevant emissions between 2006 and 2010.

A report on the Welsh Government's progress towards reducing emissions by the CCC assessed the suitability of the 3% annual emission reduction target<sup>26</sup>. The report stated that the methodology is appropriate but is at risk of producing misleading trends because it excludes emissions traded in the EU ETS and so it is possible for emissions to be relocated outside of the target. The report also recommended that the Welsh Government consider lengthening targets beyond 2020 and also legislate targets by introducing carbon budgets like the UK Government or annual emission targets like the Scottish Government. The report states that:

... statutory targets would provide certainty to policy-makers, businesses, investors, and wider society, and help to ensure that policies to meet targets are brought forward.

At the Committee for the Scrutiny of the First Minister on 26 June 2014, the First Minister stated that the Welsh Government were not considering changing the 40% target although a 'refresh' of the Climate Change Strategy for Wales<sup>27</sup> would take place in the coming months<sup>28</sup>.

With regards to carbon budgets, the **First Minister stated that the Welsh Government were reluctant to introduce statutory carbon budgets** because budgetary control of some high emission sectors, such as the railways and energy, is not fully devolved and so the Welsh Government might not be able to effectively deliver against the targets. Additionally, the First Minister stated that a failure to meet statutory carbon budgets would potentially lead to financial penalties but it would not be clear as to whether the Welsh or UK Governments would be responsible for any penalties<sup>29</sup>.

---

<sup>21</sup> Welsh Government, *Greenhouse Gas Emission Reduction Targets: An Analytical Method for Wales*, June 2013 [accessed 3 June 2014]

<sup>22</sup> Welsh Government, *Climate Change Strategy for Wales*, October 2010 [accessed 2 June 2014]

<sup>23</sup> *ibid*

<sup>24</sup> Welsh Government, *Climate Change Strategy for Wales Delivery Plan for Emission Reduction*, October 2010 [accessed 1 July 2017]

<sup>25</sup> Welsh Government, *Greenhouse Gas Emission Reduction Targets: An Analytical Method for Wales*, June 2013 [accessed 3 June 2014]

<sup>26</sup> CCC, *Progress on reducing emissions and preparing for climate change in Wales*, 15 January 2013 [accessed 1 July 2017]

<sup>27</sup> Welsh Government, *Climate Change Strategy for Wales*, October 2010 [accessed 2 June 2014]

<sup>28</sup> National Assembly for Wales, The Committee for the Scrutiny of the First Minister, *The Welsh Government's 2010 Climate Change Strategy for Wales*, 26 June 2014 [accessed 16 July 2014]

<sup>29</sup> *ibid*

## Other devolved administrations

### Scotland

The *Climate Change (Scotland) Act 2009*<sup>30</sup> was introduced on 4 August 2009 to set out the Scottish Government's commitments to tackling climate change. The Act sets the target of reducing emissions by 2050 by 80% compared to 1990 levels, with an interim 42% reduction target for 2020<sup>31</sup>. Additional targets include generating the equivalent of 100% of Scotland's gross annual electricity consumption through renewable sources by 2020 and for renewable sources to provide the equivalent of 11% of Scotland's heat demand by 2020<sup>32</sup>.

**Secondary legislation set annual targets for Scottish emissions**<sup>33</sup>. Whilst this is similar to the UK carbon budgeting system in that a cap on emissions is applied for a specific timeframe, emissions are reported annually rather than across multiple years. Annual targets were set for the period 2010-2022 in 2010 and 2023-2027 in 2011 and further batches will include five annual targets (e.g. 2028 to 2032 and so on)<sup>34</sup>. The Scottish Government stated that:

Multi-year emissions budgets would provide flexibility within the long-term emissions reduction trajectory. However, annual targets provide greater certainty as to the magnitude of emissions reductions that need to be made at any given time. A large number of the responses to the Bill consultation expressed a preference for annual targets.<sup>35</sup>

However, during the consultation process of the initial Climate Change (Scotland) bill it was pointed out to the Transport, Infrastructure and Climate Change Committee that there can be considerable delay in obtaining accurate emission data (up to 20 months) and may require substantial resources<sup>36</sup>. Furthermore, some respondents to the Committee's consultation raised concerns that annual targets are over-influenced by annual fluctuations caused by weather or other unforeseen factors and that multi-year carbon budgets should be favoured as they average out the effect of short-term fluctuations<sup>37</sup>.

The Scottish Government publishes annually their assessment of GHG emissions associated with draft budget plans. This requires the application of a model (Environmental Input-Output (EIO) analysis) which estimates emissions in tonnes of CO<sub>2</sub>e per £1m of industrial output<sup>38</sup>. This allows the Scottish Government to trace emissions from different industries and estimate the potential carbon impact of future budgets.

---

<sup>30</sup> *Climate Change (Scotland) Act* [accessed 5 June 2014]

<sup>31</sup> Scottish Government, *Scotland's Action*, (website) [accessed 5 June 2014]

<sup>32</sup> *ibid*

<sup>33</sup> *ibid*

<sup>34</sup> *Climate Change (Scotland) Act* [accessed 5 June 2014]

<sup>35</sup> Scottish Government (4 December 2008), *Policy Memorandum: Climate Change Scotland Bill*. [accessed 30 June 2014]

<sup>36</sup> The Scottish Parliament, Transport, Infrastructure and Climate Change Committee, *Stage 1 report on the Climate Change (Scotland) Bill*, [accessed 30 June 2014]

<sup>37</sup> *ibid*

<sup>38</sup> Scottish Government, *Greenhouse Gas Estimation*, (website) [accessed 30 June 2014]



## Northern Ireland

**Northern Ireland does not have a system of carbon budgets in place.** The Northern Ireland Executive has set a target of reducing emissions by at least 35% on 1990 levels by 2025<sup>39</sup> for which all departments bear a collective responsibility to work towards.

In May 2010, the Executive established a cross-departmental working group on climate change and an Action Plan was published in 2011<sup>40</sup> which examined how each department will contribute to meeting the overall target for long-term emission reduction<sup>41</sup>. The report highlighted the steps currently being taken and recommended areas where commitments need to be stepped up to 2025<sup>42</sup>.

In addition, following the guidance of the CCC, the Executive is currently taking forward proposals for a Northern Ireland Climate Change Act<sup>43</sup>. A Bill has not yet been brought forward and it is not known if this will contain measures for carbon budgeting. However, in response to a consultation seeking views on the need for a Northern Ireland Climate Change Bill, 58% of respondents said interim targets to reduce emissions should be included whilst 31% of respondents said interim targets should be set in legislation<sup>44</sup>.

---

<sup>39</sup> Department of the Environment Northern Ireland, *Climate Change*, (website) [accessed 5 June 2014]

<sup>40</sup> Cross-departmental Working Group on Greenhouse Gas Emissions (February 2011), *Northern Ireland Greenhouse Gas Emissions Reduction Action Plan*, [accessed 30 June 2014]

<sup>41</sup> CCC, *Northern Ireland*, (website) [accessed 5 June 2014]

<sup>42</sup> Cross-departmental Working Group on Greenhouse Gas Emissions (February 2011), *Northern Ireland Greenhouse Gas Emissions Reduction Action Plan*, [accessed 30 June 2014]

<sup>43</sup> CCC, *Northern Ireland*, (website) [accessed 5 June 2014]

<sup>44</sup> Department of the Environment (June 2013) *Synopsis of Responses to the Department's pre-consultation seeking views on the need for a Northern Ireland Climate Change Bill*, [accessed 30 June 2014]

## Further information

For further information about **Carbon Budgets**, please contact **Nia Seaton** ([Nia.Seaton@Wales.gov.uk](mailto:Nia.Seaton@Wales.gov.uk)), Research Service.

### See also:

- Committee on Climate Change [website](#)
- UK Government climate change [website](#)
- Welsh Government, reducing Welsh emissions [website](#)

View our [full range of publications](#) on the Assembly website: [assemblywales.org/research](http://assemblywales.org/research)

You can also follow us on Twitter: [@SeneddResearch](https://twitter.com/SeneddResearch)

We welcome your comments. These should be sent to: **Research Service, National Assembly for Wales, Cardiff, CF99 1NA** or e-mailed to [Research.Service@wales.gov.uk](mailto:Research.Service@wales.gov.uk)

The Research Service has produced this Quick Guide for the benefit of Assembly Members and their support staff. Authors are available to discuss the contents of these papers with Members and their staff but cannot advise members of the general public.

**Enquiry no: 14/1789**

**Author name** Alexander Royan

