



## Net zero: why?

A number of countries including the UK are making commitments to move to a net zero emissions economy. This is in response to climate science showing that in order to halt climate change, carbon emissions have to stop – reducing them is not sufficient. 'Net zero' means that any emissions are balanced by absorbing an equivalent amount from the atmosphere.

In order to meet the global warming target in the Paris Agreement, global carbon emissions should reach net zero around mid-century. For developed nations such as the UK, the date may need to be earlier. Some have already set such dates.

### The science of 'carbon budgets'

Climate science is clear that to a close approximation, the eventual extent of global warming is [proportional to the total amount of carbon dioxide](#) that human activities add to the atmosphere.

So, in order to stabilise climate change, CO<sub>2</sub> emissions need to fall to zero. The longer it takes to do so, the more the climate will change. Emissions of other greenhouse gases also need to be constrained. In [the Paris Agreement](#), governments agreed to keep global warming 'well below' 2 degrees Celsius, and to 'make efforts' to keep it below 1.5°C. The Intergovernmental Panel on Climate Change (IPCC) released [a report](#) in October 2018 on the 1.5°C target; it concluded that global emissions need to reach net zero around mid-century to give a reasonable chance of limiting warming to 1.5°C.

## Why 'net zero'?

In many sectors of the economy, technologies exist that can bring emissions to zero. In electricity, it can be done using renewable and nuclear generation. A transport system that runs on electricity or hydrogen, well-insulated homes and industrial processes based on electricity rather than gas can all help to bring sectoral emissions to absolute zero.

However, in industries such as aviation the technological options are limited; in agriculture too it is highly unlikely that emissions will be brought to zero. Therefore some emissions from these sectors will likely remain; and in order to offset these, an equivalent amount of CO<sub>2</sub> will need to be taken out of the atmosphere – negative emissions. Thus the target becomes 'net zero' for the economy as a whole. The term 'carbon neutrality' is also used.

Sometimes a net zero target is expressed in terms of greenhouse gas emissions overall, sometimes of CO<sub>2</sub> only. The [UK Climate Change Act](#) expresses its current target of an 80% emissions cut in terms of greenhouse gases overall.

## Negative emissions

The only greenhouse gas that can easily be absorbed from the atmosphere is carbon dioxide. There are two basic approaches to extracting it: by stimulating nature to absorb more, and by building technology that does the job.

Plants absorb CO<sub>2</sub> as they grow, through photosynthesis. Therefore, all other things being equal, having more plants growing, or having plants growing faster, will remove more from the atmosphere. Two of the easiest and most effective approaches for negative emissions, then, are afforestation – planting more forest – and reforestation – replacing forest that has been lost or thinned. Technical options include BioEnergy with Carbon Capture and Storage (BECCS) (see our [Negative Emissions briefing](#).)



*Increasing forest cover can help absorb carbon dioxide emissions. Image: Jon Sullivan, creative commons licence*

## Who is moving to net zero?

A number of countries have already set targets, or committed to do so, for reaching net zero emissions on timescales compatible with the Paris Agreement temperature goals. They include [France](#), [Norway](#) and [New Zealand](#) (2050), [Sweden](#) (2045), [Iceland](#) (2040)

and [Costa Rica](#) (2021). The tiny Himalayan Kingdom of Bhutan [is already carbon-negative](#) – it absorbs more CO2 than it emits.

In addition, the European Union recently agreed measures that are likely to result in the bloc adopting a net zero target by 2050 at the latest.

The principle that rich nations should lead on climate change is enshrined in the UN climate convention that dates back to 1992, and was reconfirmed in the Paris Agreement. Therefore, if the science says 'global net zero by mid-century', there is a strong moral case for developed countries adopting an earlier date.

So far, Sweden is the only nation to enshrine its net zero target in national law. Other nations including New Zealand and Iceland are looking to do so. More countries are likely to begin the process of setting net zero targets following the publication of the IPCC report.

### **In the UK**

In April 2018, [the government announced](#) that after the IPCC report is published, it will formally ask its official advisors, the Committee on Climate Change (CCC), to provide new advice on the UK's climate targets.

Currently, the long-term target is to reduce emissions by 80% from 1990 levels by 2050. The CCC [has previously indicated](#) that the UK should be aiming for net zero emissions by 2045-2050 in order to be compatible with the 1.5°C Paris Agreement goal.

In 2016, [then Energy Minister Andrea Leadsom indicated](#) that the government would set a net zero target in law, but no date was specified.

The Scottish government has separately discussed updating its 2050 emissions-cutting target from 80%. So far, ministers are minded to pursue a 90% target; as part of this, [CO2 emissions would fall to 'around zero'](#). In any case, Scotland would be covered by a UK target.

The government will make its formal request to the CCC shortly; the CCC would then be expected to publish its formal advice in the first half of 2019.

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*Swedish deputy prime minister Isabella Lövin says it is incumbent on all nations to adopt a net zero target. Image: UN Geneva, creative commons licence*