

The background features a blue sky with several grey wind turbine silhouettes. Below them is a large, grey, rounded mound composed of numerous overlapping pound sterling (£) symbols. The title text is centered over this mound.

CARBON FUTILITY

Five Essays on Climate Policy

Ruth Lea

The Global Warming Policy Foundation

GWPF Essay 9

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About the author

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Preface

I am not a climate scientist so I approach the subject of the UK's climate policy with due caution. However, one does not need to be a climate scientist to challenge the wisdom of the current policy of total decarbonisation by 2050. In these short essays, I make three especially concerning points, which lead me to question the current direction of UK policy.

The first is that the UK, responsible for about 1% of global carbon dioxide emissions, has embarked on a quasi-unilateral policy of decarbonisation when much of the rest of the world is simply not following our 'lead'. On the contrary, big emitters China and India are continuing to build coal-fired power stations. Moreover, global emissions rose by about 2% in 2018, putting our diminishing contribution into sharp perspective. Policies to tackle 'dangerous' global warming must be global, but they are far from that. Not without reason have our climate policies been described as 'futile gesture politics'.

Secondly, the IPCC's forecasts for global warming have been profoundly influential in justifying our current climate policies. But their forecasting record has been poor. A comparison of the IPCC's seminal 1990 projections with outturns to date clearly shows that the IPCC has significantly over-projected the degree of 'dangerous' global warming. At the very minimum, the soundness of policies based on poor forecasts should be questioned.

Thirdly, quasi-unilateral policies based on poor forecasts would not matter so much, if they were not costly in terms of higher energy prices. But our climate policies are stunningly costly, adding to household bills and undermining business competitiveness.

I initially wrote these five pieces, as stand-alone essays, in June–September 2019 for *The Conservative Woman* website. I was aided and encouraged by fellow GWPF trustee Kathy Gygell, whom I thank.

Ruth Lea
November 2019



Since we committed to the 2008 Climate Change Act, which insisted emissions should be 80% lower in 2050 than in 1990, few countries have followed our 'lead'. It is, moreover, most improbable that they will ever follow.

First essay: The UK's climate policies: a futile gesture

Much has already been written on the Government's June 2019 commitment to a 'net zero' greenhouse gas (GHG) emissions target by 2050,¹ in the wake of the Committee on Climate Change's 'net zero' recommendation as our 'contribution to stopping global warming'.² Doubtless, much more will be written. The then Chancellor warned of the costs, suggesting such a policy could cost £1 trillion.³ Others have argued this is an underestimate.⁴

But, putting aside the economics, the most obvious question is whether adopting this policy will actually have much impact on manmade GHG emissions, irrespective of the view one takes about the link between those emissions and climate change. Indeed, it risks just being a very expensive gesture, as the major emitters appear to have little intention of following our heroic example. It has not gone unobserved that, since we committed to the 2008 Climate Change Act, which insisted emissions should be 80% lower in 2050 than in 1990, few countries have followed our 'lead'. It is, moreover, most improbable that they will ever follow. Assuming this is the case, the Government's 'net zero' policy will have a miniscule impact on global GHG emissions. Our 'net zero' politicians are, arguably, pursuing a quasi-unilateral, low-carbon, high-cost, fantasy.

The UK accountable for 1.1% of CO₂ emissions in 2016

It is no secret that the UK is now a minor GHG emitter but, in the absence of a rational debate on our 'contribution' to GHG emissions, this point needs to be repeated over, and over, again. The direct impact of UK's decarbonising 'green' credentials on world emissions must be kept in perspective. We have all but shrunk into irrelevance as a GHG-emitting nation.

The most readily available data relevant to this debate are from the International Energy Agency (IEA). The IEA provides timely figures on emissions of carbon dioxide, the most important part of GHG emissions. According to the US Environmental Protection Agency, these account for around three quarters of the total, whilst methane accounts for around 15% and other gases, including nitrous oxide, the remaining 10%.⁵

Figure 1a shows that the UK, the 16th greatest emitter in 2016, accounted for just 1.1% of carbon dioxide emissions, having fallen from 2.7% in 1990. Our emissions were dwarfed by those of China, which contributed over a quarter of the total, the USA (still 15%, despite a drop in share) and India. Figure 1b looks at the actual volumes of carbon dioxide emitted (in million tonnes, MtCO₂). The UK accounted for 371 Mt in 2016, down from 550 Mt in 1990. Even if Britain's economy were to be completely decarbonised by 2050, the saving in global emissions, other things being equal, would therefore be less than 400 Mt. World emissions rose from 20,510 Mt in 1990 to 32,316 Mt in 2016, an annual average increase of

¹ BBC, 'Climate change: UK government to commit to 2050 target', BBC News, 12 June 2019. <https://www.bbc.co.uk/news/science-environment-48596775>.

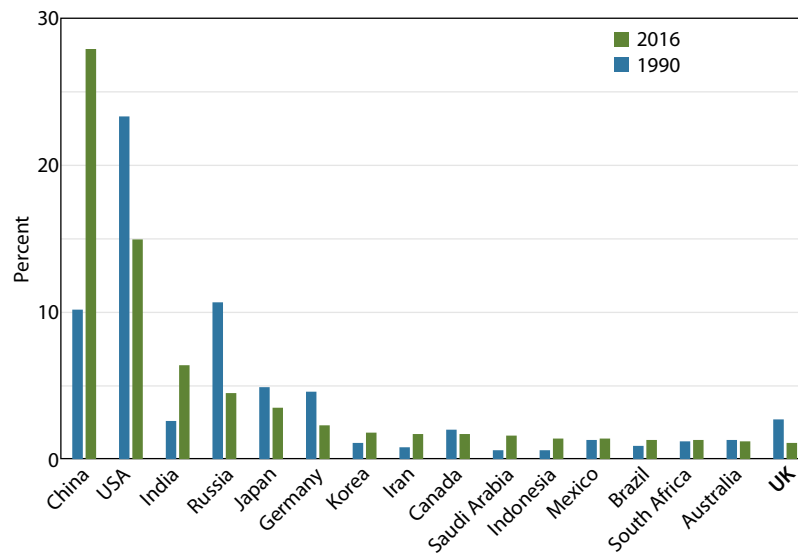
² CCC, *Net Zero: The UK's contribution to stopping global warming*, Committee on Climate Change, 2 May 2019. <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>.

³ BBC, 'Climate change: Emissions target could cost UK £1tn, warns Hammond', BBC News, 6 June 2019. <https://www.bbc.co.uk/news/uk-politics-48540004>.

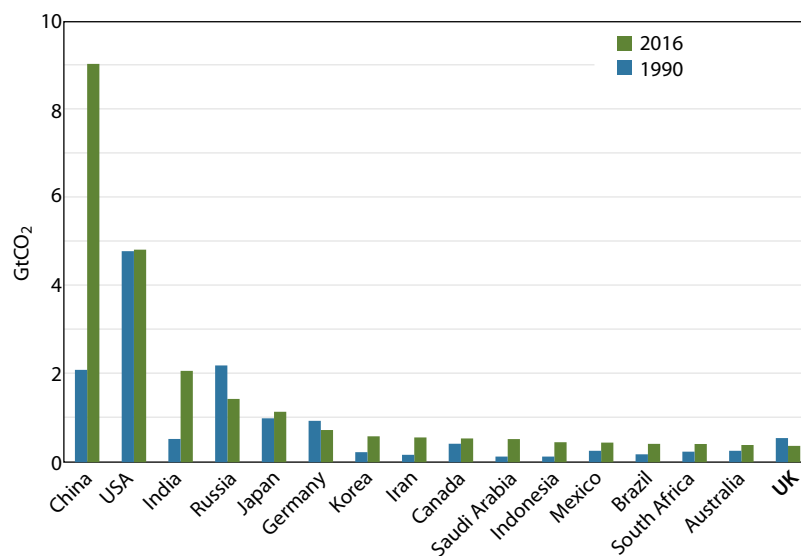
⁴ Andrew Montford, 'The cost of this net zero madness? Even a trillion is an underestimate', *Conservative Woman*, 14 June 2019. <https://www.conservativewoman.co.uk/the-cost-of-this-net-zero-madness-even-a-trillion-is-an-underestimate/>.

⁵ USEPA, 'Global Greenhouse Gas Emissions Data'. United States Environmental Protection Agency website <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>.

454 Mt, greater than our 2016 total. Much of the global increase in emissions came from China, where there was an increase of 6,957 Mt over 26 years, or an annual average increase of 268 Mt, over 70% of our 2016 total. Given the likelihood that global emissions will continue to rise, our contribution to the diminution of global emissions will be more than offset by activities elsewhere, almost certainly several times over.



(a) National emissions as percentage of world total



(b) National emissions: absolute values (1 Gt = 1000 million tonnes)

Figure 1: Carbon dioxide emissions from fuel combustion, 1990 and 2016
Top 16 emitters (ranked in 2016). Sources: (i) IEA, *Atlas of Energy*; (ii) IEA, 'Key world energy statistics', 2018.

Figure 2 shows the percentage change in carbon dioxide emissions for the top 16 emitters between 1990 and 2016, as well as the global total. Over this period global emissions rose by nearly 60%, driven in particular by three-fold increases in China and India. With the exception of Russia, where the large fall in share reflects widespread industrial closures af-



Given the likelihood that global emissions will continue to rise, our contribution to the diminution of global emissions will be more than offset by activities elsewhere, almost certainly several times over.

ter the collapse of the USSR, the UK's cuts were proportionately the largest of the featured economies, followed by those of Germany.

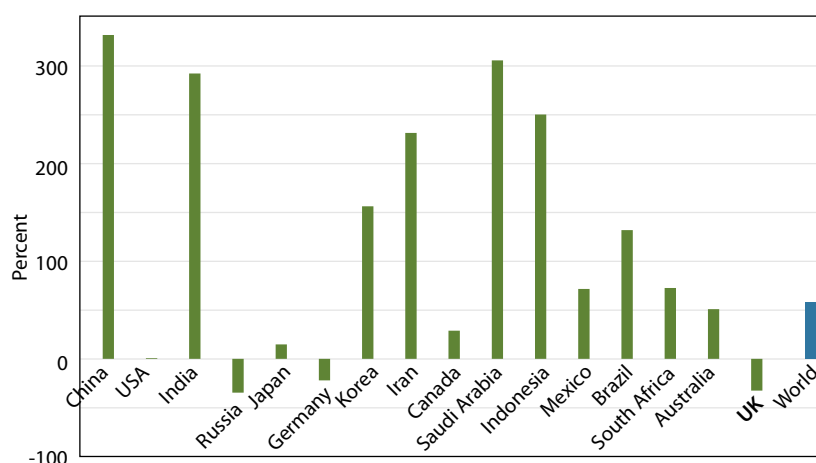


Figure 2: Changes in carbon dioxide emissions of major emitters
 Top 16 emitters, 1990–2016. Sources: (i) International Energy Agency (IEA), Atlas of energy; (ii) IEA, 'Key world energy statistics', 2018.

'Outsourced' CO₂ emissions

Traditional national inventories of carbon dioxide emissions do not, of course, include emissions associated with imported goods. In other words, they do not include emissions 'outsourced' from importing countries to exporting countries. They only consider emissions that occur within the borders of individual countries and the 'responsibility' for emissions associated with trade remains with the exporting nation. Whilst this approach has the benefit of being straightforward, it arguably 'penalises' countries for emissions associated with goods that they do not consume domestically, but export.

A study that estimated the emissions associated with trade has been released by *Carbon Brief*. It looked at the data for 2014, two years before the IEA data quoted above, but the conclusions are still highly likely to be valid.⁶ It concluded that the largest 'outsourcers' were the USA (352 Mt), followed by Japan (180 Mt) and the UK (158 Mt). At the other end of the scale, the countries held to account for carbon dioxide emissions of exported goods included China (1,369 Mt), followed by Russia (257 Mt) and India (195 Mt).

Carbon Brief estimated that the UK's domestically generated carbon dioxide emissions fell by around 27% between 1990 and 2014 (the IEA figure for UK emissions in 2014 was 408 Mt, so this figure is in the right 'ball park'). Allowing for the outsourced emissions, the decrease between 1990 and 2014 fell to just 11%.

Suffice it to say, the UK's zeal in clamping down on domestic emissions merely risks the raising of electricity prices, damaging the country's international competitiveness and trans-

⁶ Zeke Hausfather, 'Mapped: the world's largest CO₂ importers and exporters', *Carbon Brief*, 5 July 2017. <https://www.carbonbrief.org/mapped-worlds-largest-co2-importers-exporters>.

ferring economic activity to overseas exporters. Indeed, it is more than plausible that this has already occurred.⁷

CO₂ emissions are rising and can be expected to continue rising

The disaggregated IEA data quoted above relate to 2016, but there are some later estimates. BP, for example, has released data for 2018, which showed that global energy demand grew by 2.9% in the year and carbon emissions grew by around 2.0%, faster than at any time since 2010–2011.⁸ They said that their report highlighted ‘...the growing divergence between demands for action on climate change and the actual pace of progress on reducing carbon emissions.’ Indeed it does. Moreover, coal consumption and production increased at a faster rate than at any time in past five years, driven by India and China. Global carbon dioxide emissions were estimated to have risen by 645 Mt in 2018, 1.75 times the UK’s total of 370 Mt in 2016.⁹

BP’s findings confirm the doubts expressed over the efficacy of the UN’s 2015 Paris Climate Change Conference in curbing global emissions. Prior to the conference, participating countries were asked to submit their ‘Intended Nationally Determined Contributions’ (INDCs) covering their energy policies and emissions expectations for the 15 years to 2030. But, as reported by Christopher Booker, these INDCs showed that almost all of the high-emitting ‘developing’ economies expected to *raise* their emissions substantially over that period.¹⁰ Both China and India, for example, were intending to build large numbers of coal-fired power stations, resulting in a 100% increase in China’s emissions by 2030 and a 200% increase for India. The INDCs suggested that global emissions could be 50% higher in 2030 than in 2013. This certainly puts our contributions in perspective.

The BP report was timely. It really does confirm that China and India are pushing ahead with coal, and global emissions are rising. Moreover, emissions can be expected to continue rising, despite our government’s determination to ‘decarbonise’ the British economy.

⁷ Ruth Lea and Jeremy Nicholson, *British Energy Policy and the Threat to Manufacturing Industry*, Civitas, 2010. <https://www.civitas.org.uk/pdf/EnergyPolicyApril2010.pdf>.

⁸ *BP Statistical Review of World Energy 2019: an unsustainable path*, BP, 11 June 2019. https://www.bp.com/en_br/brazil/home/news/press-releases/bp-statistical-review-of-world-energy-2019.html

⁹ ‘In-depth: BP data reveals record CO₂ emissions in 2018 driven by surging use of gas’, *Carbon Brief*, 12 June 2019. <https://www.carbonbrief.org/in-depth-bp-data-reveals-record-co2-emissions-in-2018-driven-by-surging-use-of-gas>.

¹⁰ Christopher Booker, *Global Warming: A Case Study in Groupthink*, Global Warming Policy Foundation, February 2018. <https://www.thegwpf.org/content/uploads/2018/02/Groupthink.pdf>.

Second essay: Kyoto and Paris do not reduce global CO₂ emissions

In the first of these essays, I suggested the UK's all but unilateral zero emissions target was futile gesture politics. Here I discuss the main international (UN) initiatives to 'control' climate change by curbing carbon dioxide emissions, concluding that neither the Kyoto Protocol nor the Paris Agreement have succeeded, or will succeed, in reducing global emissions, despite the rhetoric. In the next essay, I shall consider the UK's specific initiatives to decarbonise in a world that clearly shares little of our zeal.

A very brief historical background

According to the UN's own website, 'climate change is the defining issue of our time and we are at a defining moment'. It says it has strongly promoted policies to 'mitigate' climate change by controlling greenhouse gas emissions over the past 30 years.¹¹ The most important emitted greenhouse gas, by far, is carbon dioxide.

The first major UN initiative was, arguably, the establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1988 by the World Meteorological Organization and the UN Environment Programme. It was later endorsed by the UN General Assembly. The IPCC's remit was to provide 'objective' information on climate change, though its objectivity has been, to put it mildly, questioned.¹² Since then, three UN legal instruments relating to climate change have been agreed:¹³

- The UN Framework Convention on Climate Change (UNFCCC), produced by the UN's Rio 'Earth Summit' in 1992. This was a 'first step in addressing the climate change problem' and its ultimate objective was to stabilise greenhouse gas concentrations 'at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system.'
- The Kyoto Protocol, which 'binds developed country parties to emission reduction targets', was adopted at the Third Conference of the Parties to the UNFCCC (COP 3) in 1997. The protocol's first commitment period was from 2008 to 2012, whilst the second commitment period began in 2013 and will end in 2020.
- The Paris Agreement, finalised at COP 21 in 2015, aimed 'to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future.'

Now it is not the purpose of this paper to challenge the assumption of the causal link between greenhouse gas emissions and global warming; I am not a climate scientist. The purpose is to see if the Kyoto Protocol and the Paris Agreement have succeeded, or will succeed, in reducing, or even stabilising, emissions. As already indicated, it is clear that they have not, and indeed they will not.

¹¹ UN, 'Climate Change', website. <https://www.un.org/en/sections/issues-depth/climate-change/>.

¹² Christopher Booker, *Global Warming: A Case Study in Groupthink*, Global Warming Policy Foundation, February 2018. <https://www.thegwpf.org/content/uploads/2018/02/Groupthink.pdf>.

¹³ UN, 'Climate Change', website. <https://www.un.org/en/sections/issues-depth/climate-change/>.

The Kyoto Protocol of 1997

The Kyoto Protocol's objective was 'to strengthen the global response to climate change, by legally binding developed country parties to emission reduction targets', thus mitigating global warming.

At the heart of the protocol was the division between the Annex I countries – the industrialised west, included the EU15 (as it then was), the US and Canada – and the Annex II countries, representing the developing world and including China and India. Broadly speaking, most of the Annex I countries were expected to reduce their greenhouse gas emissions between the 1990 baseline and the 2008–2012 commitment period, whilst those in Annex II were exempt, so their economies could 'catch up' with the West. Developed countries were therefore expected to make significant cuts, whilst developing countries were free to increase emissions with impunity, which of course they have done. The EU agreed to an 8% decrease in emissions between 1990 and 2008–2012, but the US failed to ratify the protocol and Canada announced its withdrawal in 2011, leaving the EU as the only major emitter with an emissions reduction target. According to the European Commission, the EU and its member states met their commitments under the 2008–2012 commitment period.

A second commitment period for Annex I parties to the Kyoto Protocol was agreed at the Doha Conference in 2012. The EU countries (together with Iceland) agreed to meet, jointly, a 20% reduction target by 2020 compared with the 1990 baseline. This was in line with the EU's own target of 20% by 2020.¹⁴ The EU was joined by 'some other European countries (including Switzerland and Norway) and Australia' in curbing emissions, but not, of course, by the USA and Canada, whilst the Annex II countries remained exempt.

Carbon dioxide emissions have risen significantly since 1990, as I discussed in the first of these essays. Between 1990 and 2016, the global emissions total rose by nearly 60%, India's quadrupled and China's more than quadrupled. China and India are now the world's first and third largest emitters. Of course, these countries should be free to pursue growth, and in the ways in which they consider appropriate. But the rapid growth in their emissions has comprehensively undermined Kyoto's objective of 'strengthening the global response to climate change'.

The Paris Agreement of 2015

The hundred-dollar question concerning the Paris Agreement is whether it will be more successful in achieving its objective of 'combating climate change' by curbing GHG emissions than was Kyoto. The omens are not good. According to the UN, the agreement 'brings all nations into a common cause to undertake ambitious efforts to combat climate change and ...as such, charts a new course in the global climate effort'.¹⁵ Moreover, the agreement's 'central aim is to strengthen the global response to the threat of climate change by keeping the global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius'. These 'bold' ambitions seem adrift from reality.

As noted in the first of these essays, prior to the 2015 Paris Conference, participating countries were asked to submit their INDCs (now termed their 'Nationally Determined Con-

¹⁴ European Commission, 'Kyoto 2nd commitment period (2013–20)'. https://ec.europa.eu/clima/policies/strategies/progress/kyoto_2_en.

¹⁵ UN, 'Climate Change', website. <https://www.un.org/en/sections/issues-depth/climate-change/>.

Mitigation policy can only work if there are caps on global emissions. The Paris Agreement did not even do that. Its objective of 'combating climate change' is therefore doomed to failure.



tributions'). These were to be countries' individual 'Climate Action Plans', setting out in detail how they proposed to meet the aims of the proposed agreement in the years up to 2030. As with Kyoto, there were two groups of countries. The first category comprised the developed countries, which would agree to significant emissions cuts, as well as paying into a new 'Green Climate Fund' designed to assist the developing world, the second category. The developing world would do their best to curb their emissions from fossil fuels and expand 'renewables'.

Analysis of the INDCs showed that almost all of the high-emitting developing economies expected to raise their carbon dioxide emissions significantly by 2030.¹⁶ Both China and India, for example, were intending to build large numbers of coal-fired power stations, resulting in a doubling of and a trebling of emissions respectively. Moreover, Russia, the fourth largest emitter, was proposing to increase emissions substantially, whilst Japan, the fifth largest emitter, claimed it intended to cut emissions by around 15%, despite planning to build more coal-fired power plants. The INDCs suggested that global emissions could be nearly 50% more in 2030 than in 2013, though the actual increase could turn out to be far higher than this.

The countries prepared to cut their emissions principally comprised President Obama's USA, the EU, Canada and Australia. Following President Trump's decision to withdraw from the Paris Agreement in 2017, we are left with the EU (now less than 10% of total global emissions), and Canada and Australia (less than 3% together). Specifically, the EU committed to reduce greenhouse gas emissions by at least 40% by 2030 compared to 1990, under its wider *2030 Climate and Energy Framework*.¹⁷

Assuming a causal link between greenhouse gases and climate change, mitigation policy can only work if there are caps on global emissions. Whilst there have never been any caps on countries' emissions relating to a global target for emissions reduction, Kyoto did at least place some actual caps on the emissions of developed countries (as discussed above).¹⁸ The Paris Agreement did not even do that. Its objective of 'combating climate change' is therefore doomed to failure.

¹⁶ Christopher Booker, *Global Warming: A Case Study in Groupthink*, Global Warming Policy Foundation, February 2018. <https://www.thegwpcf.org/content/uploads/2018/02/Groupthink.pdf>.

¹⁷ European Commission, Paris Agreement. https://ec.europa.eu/clima/policies/international/negotiations/paris_en.

¹⁸ David Campbell, *The Paris Agreement and the Fifth Carbon Budget*, Global Warming Policy Foundation, May 2016. <https://www.thegwpcf.org/content/uploads/2016/05/Campbell.pdf>.

Third essay: The UK's climate change policies, including the Climate Change Act

In the first of these essays, I suggested the UK's effectively unilateral zero emissions target was futile gesture politics. Here, I discuss the main policy developments behind our 'decarbonisation' policies and how have we got to where we are now.

The EU's climate change policies

As a member of the EU, the UK has, of course, been subject to the EU's climate policy. The EU has undertaken many climate-related initiatives since 1991, when it issued its first strategy to limit carbon dioxide emissions and improve energy efficiency.¹⁹ Later, the EU was an active participant in the Kyoto climate change conference in 1997, signing the Kyoto Protocol, which committed it to an 8% decrease in emissions between 1990 and 2008–2012 (see the second of these essays). The EU and its member states have met this commitment, according to the European Commission. The Kyoto Protocol's second commitment period was agreed at the Doha conference in 2012. The EU countries (together with Iceland) agreed to meet, jointly, a 20% reduction target by 2020 compared with the 1990 baseline.

This 20% reduction target was in line with the EU's own target of 20% by 2020, as set out in its *2020 Climate and Energy Package*, agreed in 2007.²⁰ This package set three key targets:

- The aforementioned 20% cut in greenhouse gas emissions, compared with 1990 levels.
- 20% of EU energy from renewables, a target arguably included under pressure from Germany, which was concerned its renewable energy policies would put its businesses at a competitive disadvantage.²¹ If the EU had just been concerned about climate change, it would not have specified how the GHG emissions target should be met. It would not have specified a renewables target. Incidentally, prime minister Tony Blair committed to a target of 15% of the UK's *energy* consumption (not just electricity generation) from renewable sources by 2020, which has significantly raised the costs of meeting the emissions targets.
- A 20% improvement in energy efficiency.

The EU's emissions trading system (EU ETS), its key tool for reducing greenhouse gas emissions, was established in 2005.²² The EU ETS works on the 'cap and trade' principle. A cap is set on the total amount of certain greenhouse gases that can be emitted by installations covered by the system. Within the cap, companies receive or buy emission allowances, which they can trade with one another as needed. Auctioning is currently the default method for allocating allowances. The cap is being reduced over time so that total emissions fall in line with the EU's targets. The Commission currently estimates that the policy covers around 45% of the EU's emissions.

The ETS has evolved since its introduction and is currently in 'Phase 3' (2013–2020). The first phase ran from 2005 to 2007 and Phase 2 ran from 2008 to 2012 (the initial Kyoto commitment period). One of the major changes introduced in Phase 3 was the single EU-wide

¹⁹ European Climate Change Programme. https://ec.europa.eu/clima/policies/eccp_en.

²⁰ European Commission, 2020 Climate and Energy Package. https://ec.europa.eu/clima/policies/strategies/2020_en.

²¹ Rupert Darwall, *The Climate Change Act at Ten: History's most expensive virtue signal*, Global Warming Policy Foundation, November 2018. <https://www.thegwpf.org/content/uploads/2018/11/10years-CCA.pdf>.

²² European Commission, EU Emissions Trading System. https://ec.europa.eu/clima/policies/ets_en.



The overall impact on the EU's total traded emissions of any UK cuts in traded emissions could well be zero

cap on emissions, in place of the previous system of national caps. Phase 4 is planned to run from 2021 to 2030 (in line with the 2015 Paris Agreement, under which the EU committed to reduce emissions by at least 40% by 2030 compared to 1990).

Suffice it to say, the UK remains subject to the EU’s climate change policies, including the ETS, if a member of the EU. Given the single EU-wide cap, this implies that the overall impact on the EU’s total traded emissions of any UK cuts in traded emissions could well be zero, other things being equal.

The 2008 Climate Change Act

In addition to our EU commitments, the UK introduced the Climate Change Act (CCA) in 2008. This unilaterally committed the UK to reduce GHG emissions by 80% from 1990 levels by 2050. Meeting these targets will be extremely expensive. The official impact assessments suggested total costs of £324–404 billion,²³ whilst any estimates of the benefits (by way of preventing ‘dangerous global warming’) will depend on effective global action. Suffice it to say, there is no effective global action. Global carbon emissions, driven by emerging economies, continue to rise. Under these circumstances, it can only be concluded the CCA’s real purpose was to demonstrate British climate leadership. This is futile gesture politics by any standards, especially as the UK’s share of global carbon emissions is just over 1%.

Under the CCA, the government must set five-year carbon budgets and ensure that emissions in each budget period do not exceed the carbon budget. The Climate Change Committee (CCC), which was formally established by the CCA, was given the role of advising the government on the level of each carbon budget and the government is required to take its advice into account when setting the budgets. Figure 3 shows the carbon budgets set to date.

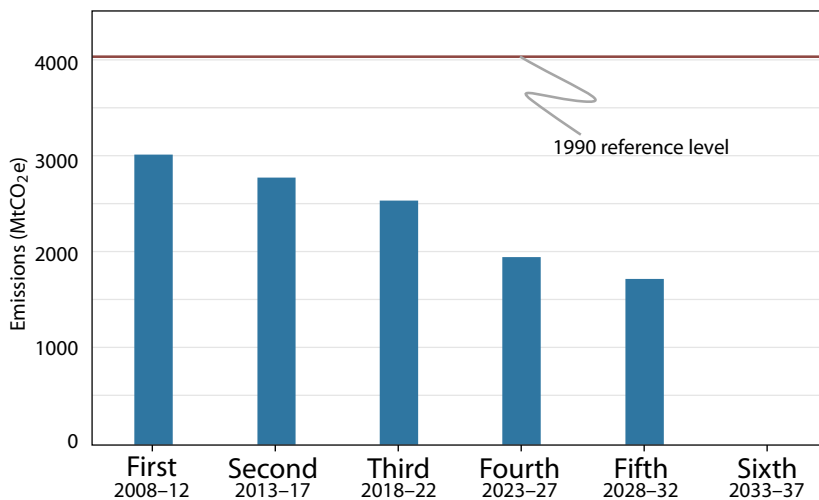


Figure 3: The UK’s carbon budgets

The Sixth Carbon Budget will be considered in 2020. Main source: BEIS, ‘Updated energy and emissions projections 2018’, April 2019, Table 2.1 (performance against carbon budgets).

MtCO₂e = million tonnes of carbon dioxide equivalent.

²³ In present-value terms.

Compliance with the budgets is assessed by comparing the UK 'Net Carbon Account' (NCA) against the carbon budget level. The NCA principally comprises:²⁴

- Traded emissions: crucially these do not refer to *actual* traded emissions but instead to emissions *allowances* allocated to the UK under the ETS (the 'cap'); actual emissions have been, in practice, lower than the allowances (see Table 1). They mainly relate to power generation and large energy-intensive industrial plants.
- Non-traded emissions: emissions not covered by the ETS. These include road transport, heating in buildings, agriculture, waste and some parts of industry.

In addition, any credits/debits from other international crediting systems are included, but these appear to be relatively small. The Department for Business, Energy and Industrial Strategy (BEIS) claims, therefore, that the calculated performance against carbon budgets 'primarily depends on the level of non-traded emissions', though it also depends on the relative 'strictness' of the ETS's goals compared with the UK's.

Table 1 shows the UK's emissions performance against the carbon budgets. The first and second carbon budgets were met with room to spare. Similarly, it is expected that the third budget will be met, but the fourth and fifth budgets are expected to be missed, even with the 80% decarbonisation by 2050 target. This implies ever-more draconian carbon-reduction policies will be required in order to meet the budgets. Given the new 'zero emissions' target, these budgets are likely to be tightened, making them even harder to achieve.

Table 1: Performance against carbon budgets

Carbon budget Budget period	First 2008–12	Second 2013–17	Third 2018–22	Fourth 2023–27	Fifth 2028–32
Carbon budget ¹	3,018	2,782	2,544	1,950	1,725
NCA emissions (existing and new policies and proposals) ¹	2,982	2,398	2,456	2,059	1,890
Budget: surplus (–), missed (+)	–36	–384	–88	+109	+165
<i>Addendum on traded emissions:</i>					
Assumed allocated share of ETS allowances ²	—	1,078	985	690	590
Total traded ²	—	891	528	459	422

¹ BEIS, 'Updated energy and emissions projections 2018', April 2019, Table 2.1 (performance against carbon budgets);

² BEIS, 'Updated energy and emissions projections 2018', April 2019: web table 2014-2.3 (does not include CB1).

More to come: zero emissions by 2050

There is, however, more to come. The Climate Change Committee's latest annual report (May 2019) recommended that the UK should adopt a 'net zero' target for greenhouse gases by 2050.²⁵ Granted, they acknowledged that '...globally, current pledges of effort do not go far

²⁴ BEIS, 'Updated energy and emissions projections 2018', April 2019. <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2018>.

²⁵ Committee on Climate Change, Net Zero: the UK's contribution to stopping global warming, 2 May 2019. <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>



The then Chancellor Philip Hammond suggested the cost of net zero could be £1 trillion, whilst other commentators have suggested that even this could be a gross underestimate.

enough' in limiting global warming to 'well below 2°C by the end of the century' (the 2015 Paris Agreement). But, they suggested '...the UK can credibly adopt a higher ambition now, which can help influence those countries considering increased effort in the future'. Well, we shall see.

On costs, they said the '...net-zero GHG target can be met at an annual resource cost of up to 1–2% of GDP to 2050, the same cost as the previous expectation for an 80% reduction from 1990'. But this estimate has been criticised as over-optimistic. It was reported in June 2019 that the then Chancellor Philip Hammond had suggested the costs could be £1 trillion, whilst other commentators have suggested that even this could be a gross underestimate.²⁶ But, whatever the costs, former Prime Minister Theresa May committed the UK to the zero emissions target in June 2019, as part of her 'legacy'.²⁷

²⁶ Andrew Montford, 'The cost of this net zero madness? Even a trillion is an underestimate', *Conservative Woman*, 14 July 2019. <https://www.conservativewoman.co.uk/the-cost-of-this-net-zero-madness-even-a-trillion-is-an-underestimate/>.

²⁷ BBC, 'Climate change: UK government to commit to 2050 target', BBC News, 12 June 2019. <https://www.bbc.co.uk/news/science-environment-48596775>

Fourth essay: The IPCC's 1990 climate change forecast to date: grossly inaccurate and far too warm

In the previous essays, I have discussed the UK's relatively tiny contribution to global carbon dioxide emissions and outlined the development of our climate change policies. In this section, I assess the accuracy of the IPCC's initial 1990 forecasts of global warming, which proved to be so profoundly influential in shaping our current 'climate change' policies. Briefly, the IPCC's forecasting record has been poor, overestimating the degree of global warming. Yet the UK government has, apparently uncritically, adopted some very expensive decarbonisation policies on the back of the IPCC's analysis and subsequent developments.

The Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and UN Environment Programme (UNEP), to provide 'objective' scientific information on climate change. Its objectivity, however, has been, to put it mildly, questioned.²⁸ Its function, arguably, would seem to be to provide scientific justifications for 'mitigating' the putative damaging effects of anthropogenic global warming, by curbing anthropogenic greenhouse gas (GHG) emissions.

Moreover, the IPCC, arguably, appears to play down what can broadly be described as the natural fluctuations in climate that have characterised our planet through the centuries, if not the millennia. I am not a climate scientist. But I understand from those who are that, even over the last 10,000 years, there have been significant temperature fluctuations which are clearly attributable to natural phenomena. Very briefly, the following, in particular, have been identified: the relatively warm Holocene Climate Optimum (c. 7000 BC–c. 3000 BC), the Minoan Warm period (c. 1500 BC), the Roman Warm Period (c. 250 BC–c. 400 AD), the Medieval Warm Period (c. 950–c. 1250) and the Little Ice Age (16th to 19th centuries).

The IPCC has produced five climate change assessment reports to date and is in the process of producing a sixth. The five assessments were released in 1990, 1996 (prior to the Kyoto Protocol of 1997), 2001, 2007 and 2014 (prior to the Paris Agreement of 2015).²⁹ But this note concentrates on the First Assessment Report, which made a huge contribution to the perception of climate change as a challenge with global consequences and requiring international cooperation. It played a decisive role in the creation of the UN Framework Convention on Climate Change (UNFCCC), produced by the UN's Rio 'Earth Summit' in 1992. The UNFCCC is the key international treaty intended to 'reduce' global warming and cope with the consequences of climate change.

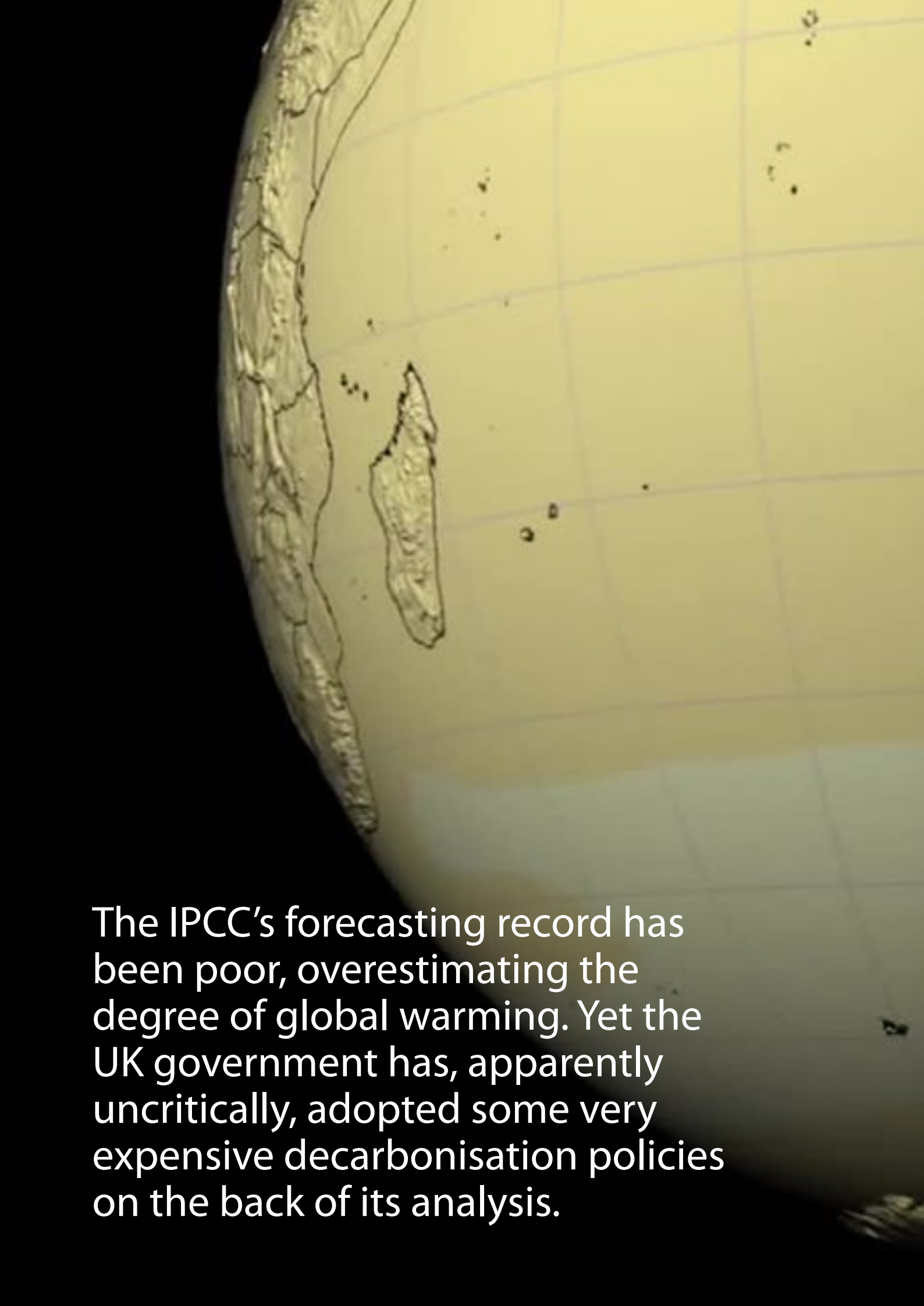
A key part of the IPCC assessments has, of course, been the climate change forecasts. In the First Assessment Report the IPCC concluded:³⁰

- There would be '...an average rate of increase of global mean temperature during the next century of about 0.3°C per decade (with an uncertainty range of 0.2–0.5°C per

²⁸ Christopher Booker, *Global Warming: A Case Study in Groupthink*, Global Warming Policy Foundation, February 2018. <https://www.thegwpf.org/content/uploads/2018/02/Groupthink.pdf>.

²⁹ Will Dietrich-Egensteiner, 'A beginner's guide to the IPCC climate change reports', *Popular Mechanics*, 2 October 2013. <https://www.popularmechanics.com/science/environment/a9460/a-beginners-guide-to-the-ipcc-climate-change-reports-15991849/>.

³⁰ IPCC, First Assessment Report, Intergovernmental Panel on Climate Change, 1990. <https://www.ipcc.ch/assessment-report/ar1/>



The IPCC's forecasting record has been poor, overestimating the degree of global warming. Yet the UK government has, apparently uncritically, adopted some very expensive decarbonisation policies on the back of its analysis.

decade) assuming the IPCC Scenario A (business-as usual) emissions of greenhouse gases’.

- ‘This will result in a likely increase in the global mean temperature of about 1 °C above the present value (1990) by 2025 (and about 2 °C above that in the pre-industrial period), and 3 °C above today’s value (1990) before the end of the next (21st) century (and about 4 °C above pre-industrial)’.

The IPCC, therefore, estimated that temperatures in the then ‘present’ (1990) were about 1 °C higher than in the pre-industrial period, which was then broadly identified as pre-1750. (Estimating pre-industrial temperatures is fraught with difficulties.) Note that the IPCC’s claim that by 2025, temperatures would be about 1 °C higher than in 1990, and 3 °C higher than in 1990 before the end of the 21st century, implies that the IPCC expected the rate of warming in the 1990s to be similar to that in the 21st century.

The IPCC has modified its forecasts since 1990. In, for example, the Fifth Assessment (2014), it chose to compare temperatures with 1850–1900 (rather than ‘pre-industrial’), although it is unclear what difference this makes. One recent assessment suggested that the pre-industrial period was ‘likely cooler’ than 1850–1900, possibly by 0.1–0.3 °C.³¹

The IPCC’s Fifth Assessment concluded that the global surface temperature increase by the end of the 21st century was ‘likely’ to exceed 1.5 °C relative to the 1850–1900 period, but was ‘likely’ to stay below 2.0 °C in a few scenarios, and below 3 °C in most scenarios.³² This is effectively a downgrade of their forecasts of the ‘warming’ to be expected by the end of the 21st century, compared with their 1990 assessment.

Putting aside revised assessments, however, the key question is whether the IPCC’s crucial, seminal 1990 forecasts have stood the test of time. After all, they were issued nearly 30 years ago, long enough to judge their accuracy.

Temperature measurements

To complicate matters there are two main ways of collating data relating to temperatures:³³

- *Surface temperatures* These include data series known as:
 - HADCRUT (from the Met Office’s Hadley Centre and the UEA’s Climatic Research Unit)
 - GISTEMP (from NASA’s Goddard Institute for Space Studies)
 - NOAA (from the US National Oceanic and Atmospheric Administration).
- *Satellite temperatures* These include data from the University of Alabama at Huntsville (UAH) and from Remote Sensing Systems (RSS).

Significantly, there still appear to be systematic differences between average global air temperatures estimated by surface stations and by satellites. Surface temperatures tend to be ‘warmer’ than satellite temperatures. The data in Figure 4 below refer to surface temperatures.

³¹ Ed Hawkins, ‘Global temperature change: where do we start?’, 2017. <https://composite-indicators.jrc.ec.europa.eu/sites/default/files/03%20-%20Global%20temperature%20change%20where%20do%20we%20start%20-%20Ed%20Hawkins.pdf>

³² IPCC, AR5, summary for policy makers, 2014. https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf.

³³ Ole Humlum, *The State of the Climate 2018*, Global Warming Policy Foundation, 2019. <https://www.thegwpf.org/content/uploads/2019/04/StateofClimate2018.pdf>.

The IPCC's 1990 projections

Figure 4 combines extrapolations for warming of 0.3°C a decade (the IPCC's business-as-usual scenario in 1990) and for warming of 0.2°C and 0.5°C a decade (the IPCC's uncertainty range in 1990) with surface temperature outturns from the Met Office from 1990 to 2018. The following provisional conclusions are:

- There was a global warming slowdown ('temperature pause', 'hiatus') during the period from 1998 to 2013, after the warm 1998, which was associated with the strong 1997–98 El Niño event. (El Niño is the Pacific oceanographic phenomenon associated with warming in the Pacific. La Niña is the equivalent phenomenon associated with cooling.)
- Temperatures rose from 2014 to 2016, associated with the strong 2015–16 El Niño event.
- Since 2016, temperatures have fallen back quite sharply. Climate scientist Ole Humlum has even suggested that '...what has been termed "the temperature pause", "hiatus", or similar terms, may re-establish itself in the future.'³⁴
- The 1990 IPCC projections clearly overestimated the degree of global warming.

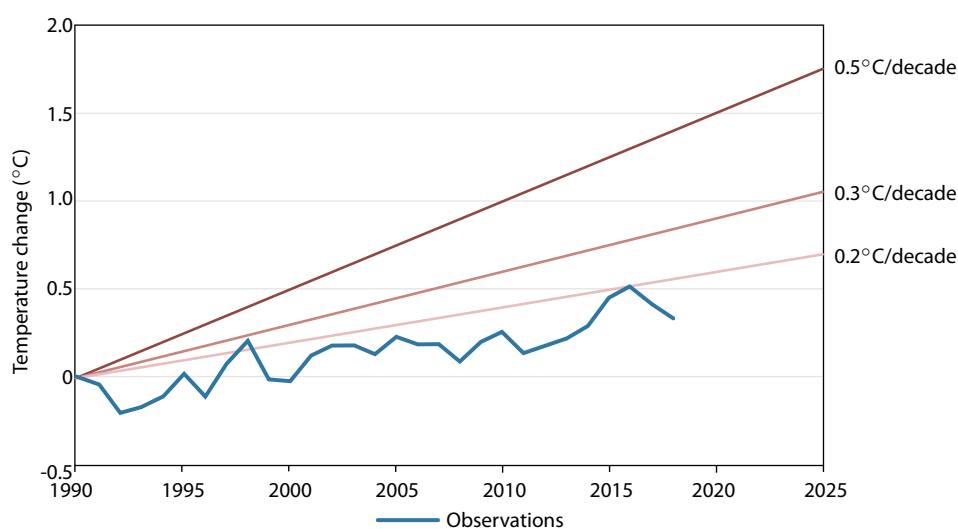


Figure 4: Global temperature changes

1990 = 0°C, extrapolations for decadal rises of 0.2°C, 0.3°C and 0.5°C and outturns. Source of outturns: Met Office, '2019: close to record-breaking year', 20 December 2018 (2018 data based on Jan–Oct). These were average global surface temperatures, using HadCRUT4, GISTEMP and NOAA data sets. Data rebased on 1990 by the author.

It should, moreover, be noted that the weaker-than-IPCC-projected warming has been at a time when global emissions have risen significantly (Figure 2). IEA data suggest that carbon dioxide emissions were provisionally about 60% higher in 2017 than in 1990, and 80% higher in 2017 than in 1985. Moreover, they appear to have risen quicker than assumed in the IPCC's 1990 report. According to a chart in the annex of the IPCC's *Climate Change: Scientific Assessment* 'man-made CO₂ emissions' were assumed to increase by around 70% (it is very difficult

³⁴ Ole Humlum, *The State of the Climate 2018*, Global Warming Policy Foundation, 2018. <https://www.thegwpf.org/content/uploads/2019/04/StateofClimate2018.pdf>.

to assess the precise figure) between 1985 and 2020 for the aforementioned 'business-as-usual' scenario.³⁵ The actual cumulative emissions over this period would, moreover, appear to be broadly in line with those assumed by the IPCC, if not higher.

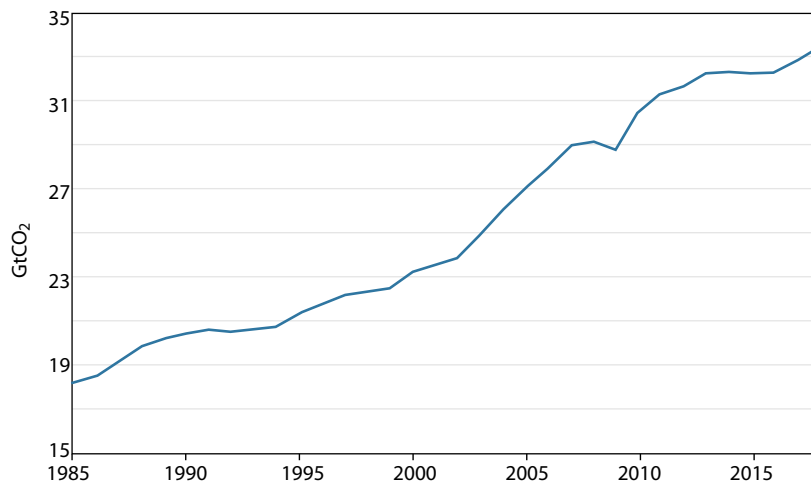


Figure 5: Global CO₂ emissions from fuel consumption

1 Gt = 1000 million tonnes. Sources: (i) International Energy Agency website (2017 provisional); (ii) BP estimate of around 2.0% increase for 2018.

IPCC's climate models: running too hot

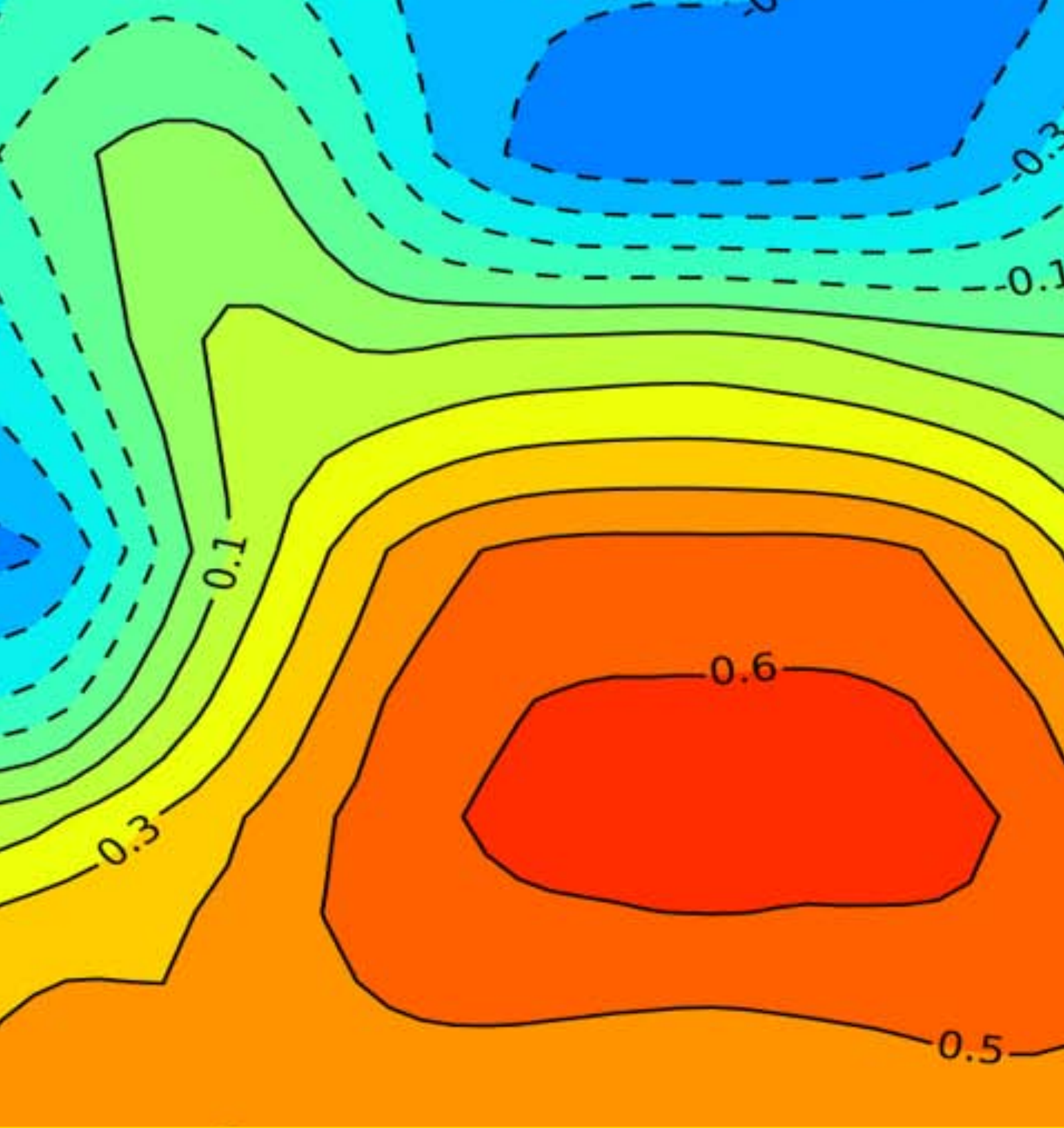
Climate models, like economic models, are crucially sensitive to the estimated relationships between interacting variables within enormously complicated systems. Specifically, in the case of climate models, a key relationship is between manmade emissions of carbon dioxide (and other greenhouse gases) as an explanatory variable for temperature change. And a key question is the sensitivity of climate to increasing concentrations of greenhouse gases. If climate sensitivity is high, then substantial warming can be expected in the coming century if greenhouse gas emissions are not severely reduced. If climate sensitivity is low, then future warming will be substantially lower.

Climate scientist Nicholas Lewis and science writer Marcel Crok argue that climate sensitivity is significantly lower than assumed by the IPCC. They have, moreover, concluded (in 2014):³⁶

A lot of the recent public attention has been focussed on the slowdown of global warming in the last 15 years, which the climate models failed to predict. Defenders of the models tend to admit that models have difficulties with natural fluctuations in the climate that last for 10 to 15 years. However, the situation is much worse. Virtually all the models that the IPCC uses in its report have been running too hot over the last 35 years as well, long enough to judge them on a climatic time scale.

³⁵ IPCC, *Climate Change: Scientific Assessment*, 1990. https://www.ipcc.ch/site/assets/uploads/2018/03/ipcc_far_wg_i_full_report.pdf.

³⁶ Nic Lewis and Marcel Crok, *Oversensitive: How the IPCC hid the good news on global warming*, Global Warming Policy Foundation, 2014. <https://www.thegwpf.org/content/uploads/2014/02/Oversensitive-How-The-IPCC-hid-the-Good-News-on-Global-Warming.pdf>.



Virtually all the models that the IPCC uses in its report have been running too hot over the last 35 years.

Fifth essay: UK climate policies: not just futile but very expensive too

In the first of these essays, I argued that the UK's climate change policies, involving uniquely aggressive energy decarbonisation policies, represent futile gesture politics. The UK is accountable for just 1% of global carbon dioxide emissions, whilst other major economies, not least of all China (nearly 30% of global emissions) and India (over 6% of global emissions) are powering ahead with coal-fired power stations, with resultant increases in emissions.

The UK's decarbonisation policies are, however, not just futile in terms of controlling global emissions; they are also expensive. Stating the obvious, the decarbonisation of energy supplies, whether for electricity generation, heating or transport, involves replacing relatively inexpensive carbon-based fossil fuels by relatively expensive carbon-free sources (including renewables and nuclear power). Moreover, the increased costs are very considerable. This essay focuses on the costs originally envisaged at the time of Climate Change Act 2008, with some follow-up developments.

Suffice it to say, these extra energy costs are borne by users, whether households or businesses, as well by taxpayers. The higher costs result in squeezed household budgets, disproportionately so for the less well-off, and worsened business competitiveness. Moreover, insofar as the higher business costs are passed through to households in the form of higher prices for goods and services, household budgets are doubly affected.

Costs of the Climate Change Act 2008

The UK introduced the Climate Change Act (CCA) in 2008, unilaterally committing the UK to reduce GHG emissions by 80% from 1990 levels by 2050. The Department of Energy and Climate Change (DECC) provided a cost-benefit analysis, the 'impact assessment', for the Act.³⁷ It estimated that the total costs over the then 43 years to 2050 amounted to £324–404 billion (in discounted present value terms). Moreover, it qualified the estimates by saying the 'figures presented are a partial measure of the long-run costs of tackling climate change and are based on estimates of the reduction in GDP over the period to 2020,' adding that the figures 'do not include the full range of costs, in particular the short-term transition costs.' So even these huge values were underestimates.

DECC also helpfully provided estimates of the 'average annual cost' to 2050, amounting to £14.7–18.3 billion. The UK's population was around 66 million in 2018, whilst the number of households was nearly 28 million. Very approximately, these annual averages translate into £220–280 per capita and £525–655 per UK household.

Meanwhile the climate benefits of the CCA in reducing greenhouse gas emissions, and thus avoiding 'dangerous anthropogenic global warming', over the period to 2050 were estimated to be £404–964 billion, with the upper bound assuming effective global action.³⁸ Suffice it to say, effective global action is singularly absent. And, insofar as there would be any mitigation of dangerous global warming, the benefits would be global, not national, with the UK arguably getting little in return from its enormous investment.

³⁷ DECC, Climate Change Act 2008, Impact Assessment, Department of Energy and Climate Change, March 2009. https://www.legislation.gov.uk/ukia/2009/70/pdfs/ukia_20090070_en.pdf.

³⁸ Rupert Darwall, *The Climate Change Act at Ten: History's most expensive virtue signal*, Global Warming Policy Foundation, November 2018. <https://www.thegwpf.org/content/uploads/2018/11/10years-CCA.pdf>.



Excessive energy costs are not only an unnecessary burden on households and businesses, they also risk undermining the broader democratic support for decarbonisation.

There have been several studies, official and non-official, into the costs of the CCA since its implementation. A comprehensive exercise was undertaken by Lord (Peter) Lilley in 2016, using data from DECC,³⁹ the Office for Budget Responsibility (OBR) and the Climate Change Committee (CCC).⁴⁰ He concluded that ‘the average cost of decarbonising electricity to meet the CCA’s targets was, or will be, per household (in 2014 prices): £327 in 2014, £584 in 2020, £875 in 2030, £1390 by 2050’. Not merely were these numbers very substantial, they principally cover electricity decarbonisation, whilst excluding heating and transport.

Dieter Helm’s Cost of Energy Review

It is not only the requirements of the CCA that are driving up energy costs, as explained by Dieter Helm in his mammoth *Cost of Energy Review*.⁴¹ It is also the current sub-optimal state of UK energy policy.

Helm’s findings included:

The cost of energy is too high, and higher than necessary to meet the CCA target and the carbon budgets.

The scale of the multiple interventions in the electricity market is now so great that few if any could even list them all, and their interactions are poorly understood. Complexity is itself a major cause of rising costs...and it should be a central aim of government to radically simplify the interventions and to get government back out of many of its current detailed roles.

[The excessive energy costs] are not only an unnecessary burden on households and businesses, they also risk undermining the broader democratic support for decarbonisation. In electricity, the costs of decarbonisation are already estimated by the CCC to be around 20% of typical electricity bills.

More to come: zero emissions by 2050

There is, however, more to come. The CCC’s last annual report (May 2019) recommended that the UK should adopt a ‘net zero’ target for greenhouse gases by 2050.⁴² Granted, they acknowledged that ‘...globally, current pledges of effort do not go far enough’ in limiting global warming to ‘well below 2°C by the end of the century’ (the 2015 Paris Agreement). But, they suggested, ‘...the UK can credibly adopt a higher ambition now, which can help influence those countries considering increased effort in the future’. Some would suggest this was a forlorn hope. On costs, the CCC said ‘...we estimate total costs of meeting a net-zero GHG target at around 1–2% of GDP in 2050 based on a conservative set of assumptions.’ But this looks extraordinarily over-optimistic.

More realistically, the potential costs of this ‘total decarbonisation’ policy look eye wateringly high. It was reported in June 2019 that the then Chancellor Philip Hammond thought the costs could be about £1 trillion, whilst other commentators have suggested that even

³⁹ Since absorbed into the Department of Business, Energy and Industrial Strategy (BEIS) in July 2016

⁴⁰ Peter Lilley, *£300 Billion: The Cost of the Climate Change Act*, Global Warming Policy Foundation, December 2016. <https://www.thegwpcf.org/content/uploads/2016/12/CCACost-Dec16.pdf>

⁴¹ Dieter Helm, *Cost of Energy Review*, October 2017. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/654902/Cost_of_Energy_Review.pdf

⁴² Net Zero: the UK’s contribution to stopping global warming, Committee on Climate Change, 2 May 2019. <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

this could be a gross underestimate.⁴³ But whatever the costs, former Prime Minister Theresa May committed the UK to the zero emissions target in June 2019, as part of her legacy.⁴⁴

⁴³ Andrew Montford, 'The cost of this net zero madness? Even a trillion is an underestimate', *Conservative Woman*, 14 July 2019. <https://www.conservativewoman.co.uk/the-cost-of-this-net-zero-madness-even-a-trillion-is-an-underestimate/>.

⁴⁴ BBC, 'Climate change: UK government to commit to 2050 target', BBC News, 12 June 2019. <https://www.bbc.co.uk/news/science-environment-48596775>.

About the Global Warming Policy Foundation

The Global Warming Policy Foundation is an all-party and non-party think tank and a registered educational charity which, while openminded on the contested science of global warming, is deeply concerned about the costs and other implications of many of the policies currently being advocated.

Our main focus is to analyse global warming policies and their economic and other implications. Our aim is to provide the most robust and reliable economic analysis and advice. Above all we seek to inform the media, politicians and the public, in a newsworthy way, on the subject in general and on the misinformation to which they are all too frequently being subjected at the present time.

The key to the success of the GWPF is the trust and credibility that we have earned in the eyes of a growing number of policy makers, journalists and the interested public. The GWPF is funded overwhelmingly by voluntary donations from a number of private individuals and charitable trusts. In order to make clear its complete independence, it does not accept gifts from either energy companies or anyone with a significant interest in an energy company.

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