Emissions relapse

The Low Carbon Economy Index 2019
#LCEI

Tracking the progress G20 countries have made to decarbonise their economies.

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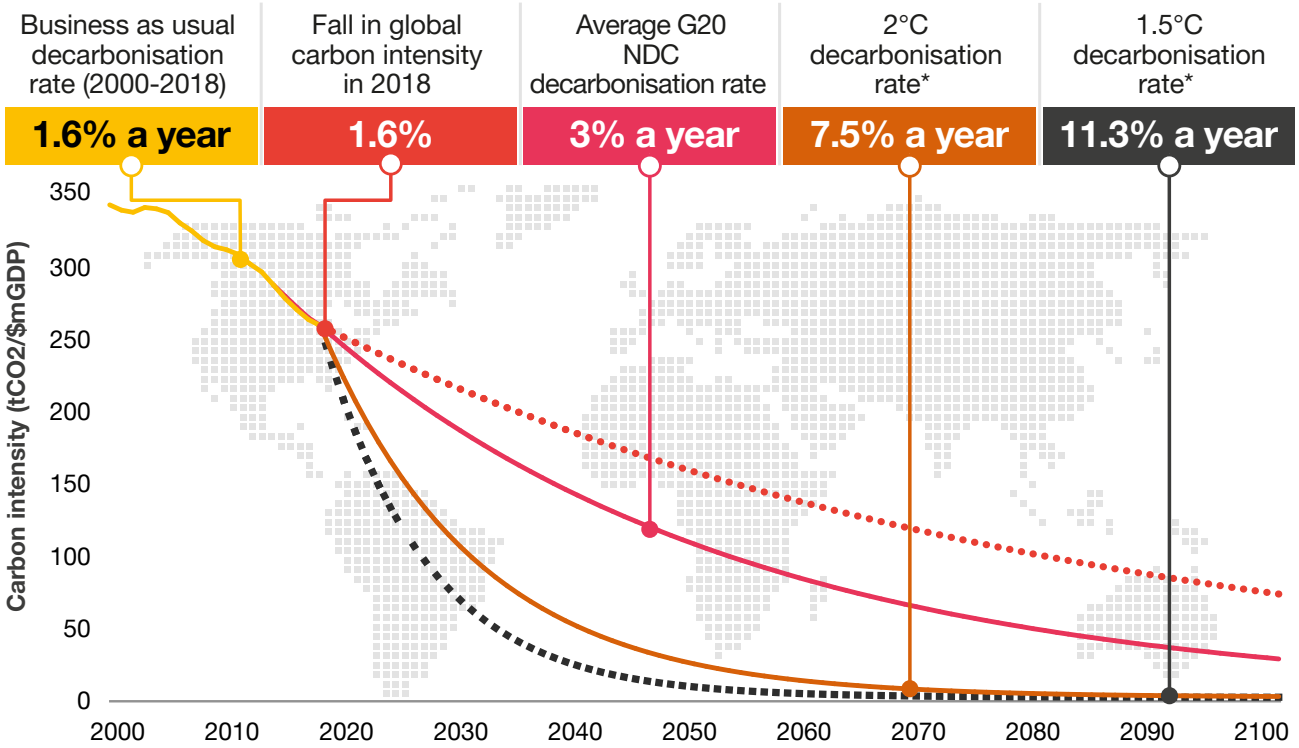
Global findings

Progress on climate stalls

After four years of moderate progress, in 2018 the pace of the low carbon transition slowed down to the long term average since 2000.

Despite significant increases in renewable energy, the gap between the Paris Agreement goal and the current pathway continues to grow.

Figure 1: Low Carbon Economy Index 2019: Transition pathways



*Global carbon budgets refer to the global estimated budget of fossil fuel emissions taken from the IPCC Special Report on Global Warming of 1.5C. A series of assumptions underpin these carbon budgets, including the likelihood and uncertainties of staying within the temperature limits, and the use of carbon dioxide removal (CDR) technologies.

Sources - BP, Energy Information Agency, World Bank, IMF, UNFCCC, National Government Agencies, PwC data and analytics

Notes – GDP is measured on a purchasing power parity (PPP) basis. The NDC pathway is an estimate of the decarbonisation rate needed to achieve the targets released by G20 countries. NDC's only cover the period to 2030, we extrapolate the trend in decarbonisation needed to meet the targets to 2100 for comparison.

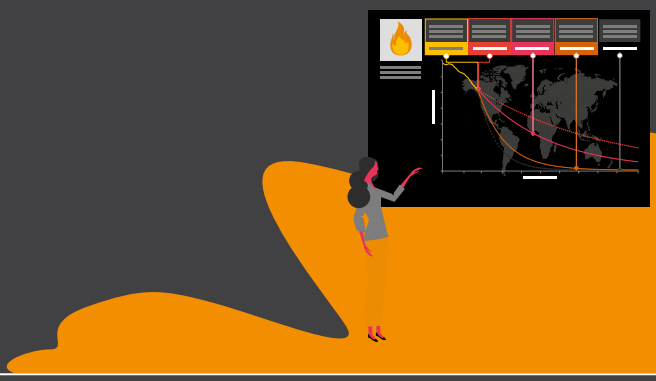
In 2018 global emissions grew by

2% ↗

Last year, global GDP grew by 3.7%. This was driven by emerging economies, with growth over 5% in China, India and Indonesia. Although the global economy is getting more energy efficient, energy consumption rose by 2.9% in 2018. Renewable energy[1] grew at the highest rate since 2010 at 7.2%, but is still less than 12% of the energy system. Most energy demand growth was met by fossil fuels, which increased global emissions by 2%. This is the fastest rise in emissions since 2011.

1.6% ↘

reduction in global carbon intensity in 2018



The carbon intensity of the global economy fell by 1.6% in 2018. This is less than half of the decarbonisation rate witnessed in 2015 (of 3.3%) when over 190 governments committed to the Paris Agreement. At this rate countries won't even achieve their own national targets (NDCs) let alone the much more ambitious global goal in that Agreement. We estimate that the average decarbonisation rate needed to meet the NDCs for the G20 economies is 3% per year to 2030.

7.5%

global decarbonisation rate required to limit global warming to 2˚C

11.3%

global decarbonisation rate required to limit global warming to 1.5˚C

A decarbonisation rate of 7.5% per year is required to give a two thirds probability of limiting warming to two degrees, while a rate of 11.3% is needed to keep warming to 1.5 degrees. For comparison, France decarbonised at 4% per year during the switch to nuclear power in the 1980's, and the US decarbonised at 3% per year in the shale gas revolution.

In 2019 - the year of raising ambition - a number of countries have revised their carbon reduction targets. The UK pledged in July to be net zero emissions by 2050, and the EU is signalling similar intentions. But the sliver of opportunity to meet the Paris Agreement targets continues to close.

The deployment of natural climate solutions are urgently required. The recent IPCC Special Report on Climate Change and Land highlighted the importance of land use in reducing emissions and mitigating the impacts of climate change. It concludes that the total technical mitigation potential from agroforestry, and crop and livestock activities, can reach as much as nearly 10 GtCO2e per year by 2050[2], which is equal to 20% of anthropogenic emissions. However, there will be difficult trade-offs between land-based measures to tackle climate change, providing low-carbon energy (such as biofuel) and addressing global food security.

Businesses are now having to deal with increasing intensity of climate impacts and extreme weather events, alongside an incoherent policy response around the world.

1 Renewable energy includes biofuels, biomass, geothermal, hydroelectricity, solar and wind.

2 The report suggests that the total technical mitigation potential from crop and livestock activities, and agroforestry is estimated as 2.3-9.6 GtCO2e.yr-1 by 2050 with medium confidence

Energy demand

There were two major drivers for the 2.9% growth in energy demand last year

2.9%

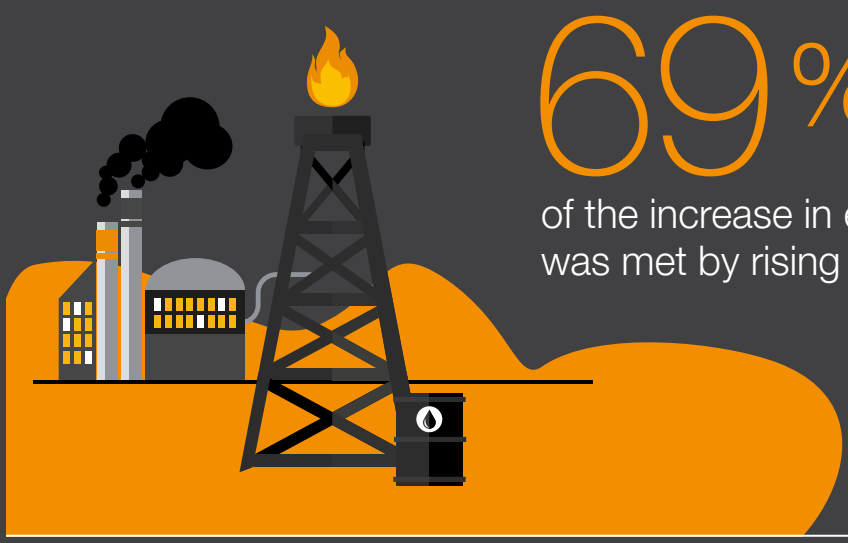
increase in global energy consumption in 2018

First, there has been a resurgence in the growth of energy intensive industries such as construction and steel across rapidly industrialising economies, such as China, India and Indonesia. According to data from the World Steel Association, global steel production grew 4.5% in 2018 - China and India accounted for over three-quarters of this growth. China's has invested several hundred billion dollars in large-scale construction and infrastructure projects across Asia, the Middle East, North Africa and Europe through its "One Belt, One Road" strategy. Elsewhere investments in infrastructure and real estate construction in emerging economies continue to grow, as countries seek to keep up with increases in wealth and standards of living.

Second, extreme heat and cold weather patterns seen globally last year led to a growth in demand for electricity and gas for heating and cooling. This is a stark warning of the potential feedback loops associated with the impacts of climate change. Currently there are more than 1.6 billion air conditioning units in use, which consume over 2,000 terawatt hours (TWh) of electricity each year. As heating periods become more frequent, and global wealth increases the market for air conditioning units, particularly in China, India and Indonesia, it is anticipated that demand could reach 15,500TWh by 2050.

Energy mix

Increasing energy demand continues to be met by greater consumption of fossil fuels



69%

of the increase in energy demand was met by rising fossil fuel consumption

Coal, natural gas and oil accounted for over two thirds of the increase in energy demand. While coal consumption remains lower than its 2013 peak, it has risen for the second year in a row. India recorded the most significant rise in coal consumption, increasing its use by 36.3 Mtoe (+8.7% increase) in 2018. This increase is equivalent to the coal consumption of the whole of Central and South America. Global consumption of natural gas also increased by 5.3% and makes up an increasing share of the global energy mix.

The lack of ambitious and more coordinated climate policies means that economics remains the dominant factor in determining energy mix and that low carbon alternatives are disadvantaged. In the US, shale gas is the cheapest source of energy, while coal is favoured in India and Indonesia. Although renewables grew by 7.2%, the largest percentage increase since 2010, this growth has been unable to offset the increase in fossil fuel consumption and represents less than 12% of total energy.

The Index

Our Low Carbon Economy Index tracks the rate of the low carbon transition in each of the G20 economies and compares this with their national targets

Top performers in 2018 are Germany, Mexico, France and Italy, as they exceeded their NDC targets. However, these countries are the exception rather than the rule – the rest of the G20 didn't do so well.

Table 2 shows the targets submitted by each of the G20 countries. Most G20 countries' targets will require a step change in effort to reduce their carbon intensity.

Table 1: Low Carbon Economy Index 2019 – country summary

	Change in carbon intensity 2017-2018	Annual average change in carbon intensity 2000-2018	Change in energy related emissions 2017-2018	Real GDP growth (PPP) 2017-2018	Carbon intensity (tCO2 / $m GDP) 2017-2018
World	**-1.6%**	**-1.6%**	**2.0%**	**3.7%**	**253**
G7	**-1.7%**	**-2.2%**	**0.3%**	**2.1%**	**214**
E7	**-2.2%**	**-1.7%**	**3.1%**	**5.4%**	**301**
Germany	-6.5%	-2.2%	-5.2%	1.4%	162
Mexico	-5.2%	-0.7%	-3.4%	2.0%	178
France	-4.2%	-2.5%	-2.6%	1.7%	107
Italy	-4.0%	-1.9%	-3.2%	0.9%	131
Saudi Arabia	-4.0%	1.1%	-1.8%	2.2%	365
China	-3.9%	-2.9%	2.4%	6.6%	378
EU	-3.7%	-2.3%	-1.8%	2.0%	156
Brazil	-3.5%	-0.3%	-2.4%	1.1%	137
UK	-3.5%	-3.7%	-2.1%	1.4%	128
Japan	-3.0%	-1.2%	-2.3%	0.8%	216
Canada	-2.2%	-1.7%	-0.4%	1.9%	326
Turkey	-2.2%	-1.2%	0.3%	2.6%	163
Australia	-1.8%	-2.1%	0.9%	2.8%	308
South Korea	-0.7%	-1.2%	2.0%	2.7%	387
US	-0.3%	-2.5%	2.5%	2.9%	255
Argentina	-0.1%	-0.1%	-2.6%	-2.5%	192
South Africa	0.0%	-1.8%	0.6%	0.6%	519
Indonesia	0.4%	-1.4%	5.6%	5.2%	154
India	0.7%	-1.4%	7.7%	7.0%	239
Russia	1.6%	-2.6%	3.9%	2.3%	402

Sources – BP, Energy Information Agency, World Bank, IMF, UNFCCC, National Government Agencies, PwC data and analysis.

Top 5 performers

Bottom 5 performers

Germany – 2019 Leader of the LCEI

In 2018, Germany led the Low Carbon Economy Index with a decarbonisation rate of 6.5%, reducing consumption of coal, oil and natural gas and growing solar and wind energy by 8.7%. However, these emission reductions were in part associated with warm weather patterns which curbed domestic energy demand for the year, and the country is still expected to miss its 2020 target to reduce emissions by 40% from 1990.

Top 5 performers

The other top performers in the LCEI this year - Mexico, France, Italy and Saudi Arabia - were all able to reduce emissions while growing their economies. Decarbonisation in the EU has been driven by coal-to-gas switching, particularly in Germany and France. The EU carbon price has risen dramatically, from less than €8 at the beginning of 2018 to around €25 today. This is forcing generators to manage their portfolios more carbon efficiently, and is encouraging the continued shift away from coal fired power generation.

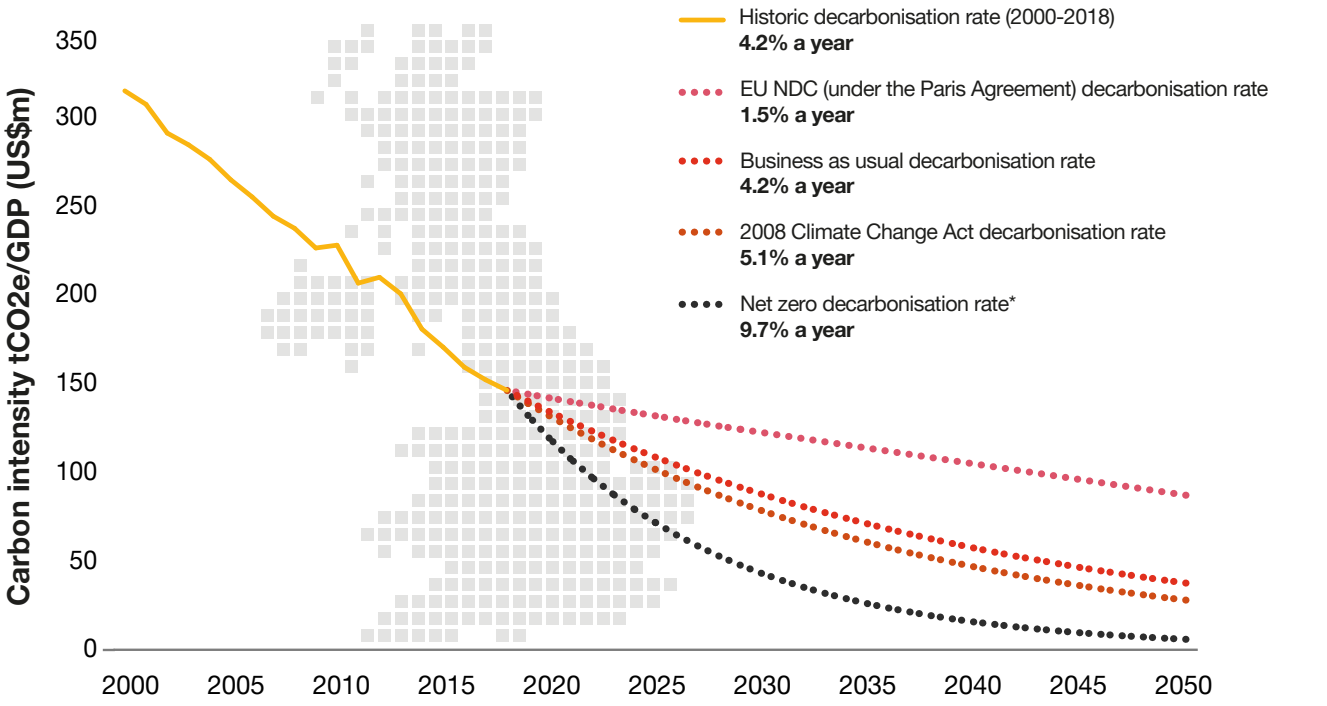
Table 2: NDC targets

	Target description
South Africa	22% reduction against baseline scenario by 2030
Mexico	130 MtCO2e reduction on annual dynamic baseline by 2030
Korea	60% to 65% reduction against 2005 carbon intensity by 2030
Canada	40% reduction against 1990 absolute emissions by 2030
Japan	37% reduction against 2005 absolute emissions by 2025 and indicative 43% against 2005 by 2030
Australia	26% reduction against 2013 absolute emissions by 2030
US	30% reduction against 2005 absolute emissions by 2030
India	21% reduction against business as usual scenario by 2030
China	26% to 28% reduction against 2005 absolute emissions by 2030
EU	37% reduction against baseline scenario by 2030
Brazil	26% to 28% reduction against 2005 absolute emissions by 2025
Russia	Emissions in a range between 398 and 614 MtCO2e by 2025-30
Indonesia	41% reduction against business as usual emissions by 2030
Turkey	33% to 35% reduction against 2005 carbon intensity by 2030
Saudi Arabia	25% to 30% reduction against 1990 absolute emissions by 2030

UK: Getting to net zero

In June 2019, the UK became the first major economy to set a legally binding commitment to reach net zero emissions by 2050. Surpassing the previous target to reduce emissions by 80% from 1990 levels as set out in the 2008 Climate Change Act.

Figure 2: Low Carbon Economy Index 2019: UK climate targets



*The emissions reduction for the net zero target uses a combination of Core and Further Ambition scenarios outlined in the Net Zero Report: The UK's contribution to stopping global warming report (CCC, 2019). This assumes a 96% reduction in GHG emissions against a 1990 baseline, with a range of highly uncertain speculative options outlined to cut emissions further.

Sources – BEIS, World Bank, PwC data and analysis.

Notes – GDP is measured on a purchasing power parity (PPP) basis. The EU NDC only covers the period to 2030, we have extrapolated the trend in decarbonisation needed to meet targets to 2050 for comparison.

UK performance to date

The UK has achieved the highest average decarbonisation rate throughout the 21st Century of any G20 country, at 3.7%. However, the rate of progress has slowed. The majority of the UK's emissions reductions have come from the phase-out of coal, which has declined by 78.8% since 2008. At the same time the UK has scaled up renewables and during the third quarter of 2019 renewables generated more electricity than fossil fuels for the first time.

However, this decarbonisation trend is neither sustainable nor sufficient. According to our analysis the UK will require an annual reduction in carbon intensity of 9.7% to achieve net zero emissions by 2050.

The emissions reductions achieved through the phase out of coal can only be banked once. Between 2012 and 2016, peak coal phaseout years, the UK achieved an average annual rate of decarbonisation of 6.9%, short of the rate required for net zero. It was only in 2014 that the UK achieved the 9.7% required decarbonisation rate.

The Committee on Climate Change's Progress Report showed that in 2018 the UK delivered on just one of the twenty-five emission reduction policy actions outlined for the year, with little to no progress outside of the power and industry sectors. Broader and stronger policy interventions will be required to deliver the net zero ambition.

Meeting the ambition

With the UK set to host the UNFCCC 26th Conference of Parties (COP26) in Glasgow in November 2020, the country's climate leadership will be under the spotlight. The Paris Agreement requires nations to submit updated and more ambitious national emissions reduction commitments (NDCs) in 2020. Glasgow will likely be the moment for this. The UK's announcement of its net zero commitment back in June was an important first step. But it must be followed by the development of ambitious policies and greater investment across all sectors of the economy to achieve the required 9.7% rate of decarbonisation.

Achieving net zero requires every sector of the UK economy to make the low carbon transition. The electrification of sectors such as transport and heating needs to be met by the scaling up of renewables, investment in clean energy sources, advanced storage solutions, and smart grids. Across heavy industry, the development and uptake of broader carbon removal and carbon conversion - so called negative emissions technologies - will need to be developed. Scalable carbon capture and storage, and innovation around clean steel, aluminium, cement and heavy duty vehicles will all be vital for bringing emissions down. As will changes to existing agricultural systems and land use. Smart, productive and regenerative agriculture, reforestation and restoration of peatlands will be required to increase the UK's natural carbon sinks and stores.

The UK government recently published their response to the CCC recommendations, outlining plans to support decarbonisation across all sectors of the economy. However, there is a clear lack of action to put this plan into motion and current efforts remain insufficient to deliver decarbonisation at the pace required.

For the UK to achieve net zero, the government needs to create an enabling policy environment to support businesses to play their role in delivering the transition. Businesses are increasingly adopting ambitious climate commitments and demonstrating climate leadership. Over 1000 leading companies have signed up initiatives such Science Based Targets and RE100, while nearly 100 companies have committed to more ambitious decarbonisation to reach net zero by 2050, showing their willingness to both align with, and drive, the low carbon transition.

However, in an uncertain and changing political environment, the course is not clear. Governments have an important role to play to stimulate market solutions for clean technologies. From electric vehicles to decentralised clean energy grids, government support to enable technologies to reach critical lift-off point, scale and replace higher emission traditional counterparts is vital. Investment in R&D, clean infrastructure, carbon pricing, tax incentives, redirecting of subsidies and public procurement will all be key for catalysing change.

The UK can act as a leader, demonstrating that net zero is possible, and spurring greater action. However, it needs to act fast and match stated ambition with a robust and broad roadmap for change.

What next?

Focus and engagement on climate change issues intensified in 2019. The year has been characterised by several devastating extreme weather events. Heatwaves in June and July broke local and national temperature records across Europe, while forest fires have caused billions in damages across the world. Ten countries so far, including the UK, France, Canada and Ireland, and a number of sub-national authorities have declared a 'climate emergency' in their respective jurisdictions. The UK became the first major economy to legislate a net zero emissions target.

Norway, Sweden, France and New Zealand have all since adopted net zero emissions targets, with several other countries having proposed legislation or policy to this effect. Civil society action has been at an all-time high with the "Greta Effect" mobilising a new wave of climate activism across the world.

The world is in a race to limit climate change. In an effort to address this urgent need the UN Secretary General convened a Summit in New York in September to raise global ambition and action on climate change.

Of the numerous pledges made at the Summit 65 countries expressed their intention to enhance their climate plans by the end of next year (2020); 66 countries stated that they plan to achieve carbon neutrality by 2050; and around 100 businesses committed to implement the 1.5˚C target across their operations and value chains. The most ambitious commitments came from the least developed and climate vulnerable countries, those who contributed least to global emissions. The largest emitters, including many G20 countries, failed to commit to more ambitious targets.

The Marshall Islands remains the only country to have formally updated and submitted a more ambitious NDC.

With the UK ready to host COP26 and the Paris Agreement ambition “ratchet” mechanism set to come into play, there is anticipation that 2020 needs to be a “super year” for climate. Similar to 2015 where countries came together in Paris to deliver a global climate agreement. Many major economies are expected to publish enhanced NDCs next year and we will be analysing these throughout the year in the build up to COP26.

Methodology

The Low Carbon Economy Index

The purpose of our model is to calculate carbon intensity (tCO2/$m GDP) for different countries and the world, and the rate of carbon intensity change needed in the future to limit warming to two degrees by 2100.

The countries the study focuses on are individual G20 economies, as well as world totals. The G20 is also portioned into 3 blocks: G7 economies (US, Japan, Germany, UK, France, Italy, Canada), E7 economies which covers the BRICs (Brazil, Russia, India and China), and Indonesia, Mexico and Turkey and other G20 (Australia, Korea, EU, South Africa, Saudi Arabia, Argentina).

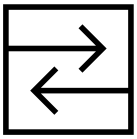
For GDP data, the study draws on World Bank historic data. For long-term GDP projections the study draws on the latest version of PwC's 'World in 2050' model. This was last published in February 2017 and details and a methodology summary can be found here: http://www.pwc.com/world2050.

For emissions, the study considers energy-related carbon emissions drawn from the BP Statistical Review (2019). For biofuels we adjust BP Statistical Review (2019) data from production to consumption using US Energy Information Administration data.

We use Intergovernmental Panel on Climate Change global estimated carbon budget data on fossil fuel emissions taken from the IPCC Special Report on Global Warming of 1.5C, to estimate the energy related emissions associated with limiting warming to 1.5 and 2 degrees by 2100.

The national targets

Our analysis of the national targets (including UK climate targets) in this report considers the full national greenhouse gas inventory. Therefore, this analysis includes emissions from industrial process, fugitives (leaks from pipes), land use change and forestry. This is because some countries' targets focus on actions to reduce emissions in those sectors (which are outside our normal energy-based LCEI model). This means that despite the emission intensity numbers not being directly comparable to those in Table 1, the rate of change implied by these NDCs is representative of what is required in Figure 1.



NDC targets were taken from the UNFCCC portal

Where available national greenhouse gas inventory data was taken from the UNFCCC. This was supplemented with national government department data where gaps existed in UNFCCC data. Where there were still missing years we used the rate of change in energy related emissions from the BP Statistical Review (2019) and applied this to the UNFCCC or national government department data.

Where NDCs mention emissions from Land Use, Land Use Change and Forestry (LULUCF) we assume a net-net approach has been used. If LULUCF is not mentioned in NDCs we assumed it is not included in the target.

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