www.pwc.co.uk/lowcarboneconomy

The Paris Agreement: A turning point?

The Low Carbon Economy Index 2016

November 2016

pwc

Contents

The Paris Agreement: A turning point?

In Paris last year, governments agreed to limit warming to well below two degrees. Did this signal a turning point? Are countries matching the decarbonisation pledges they made at the climate summit?

The results are positive. In 2015 the world economy decarbonised at a record 2.8%. But this still falls far short of the rapid reductions needed to achieve the two degrees goal.

As a result of this decarbonisation gap, companies face both climate impacts risks and low carbon transition risks – Their investors are increasingly demanding to know the implications and calling for better disclosure. The G20 FSB Task Force on Climate-related Financial Disclosure is expected to issue guidelines on how they should do this.

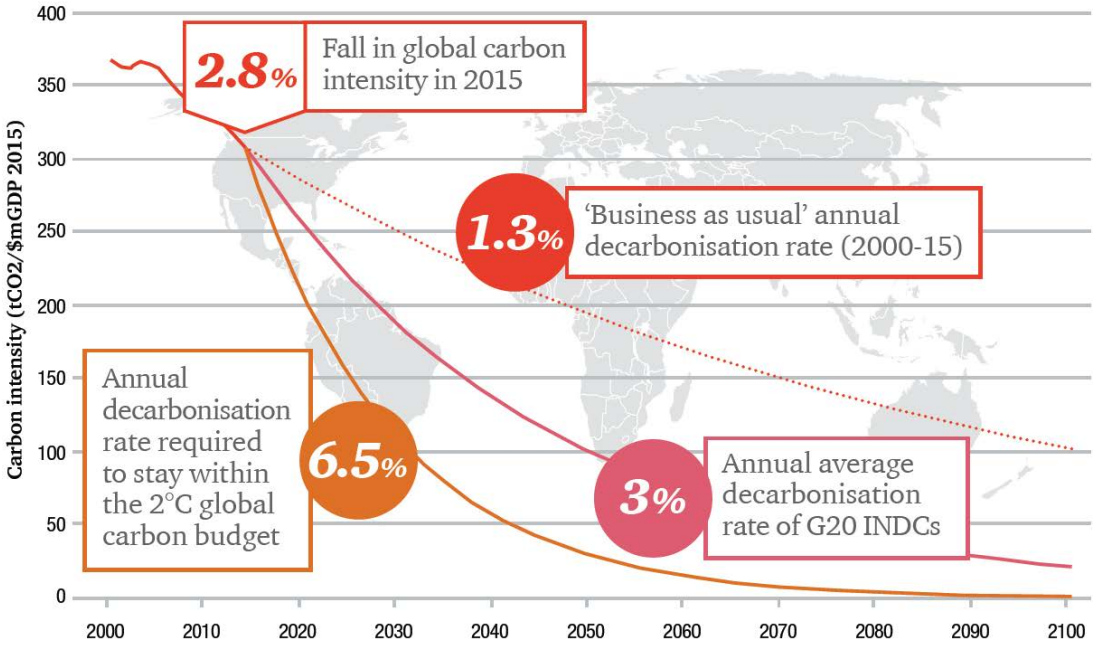
Pathway to two degrees

This year marks a step change in the decarbonisation of the global economy. For the last 15 years the global decarbonisation rate has averaged only 1.3% a year. In the lead up to the Paris Agreement in December 2015, carbon intensity fell by a record-breaking 2.8% (up from 2.7% in 2014). Some major emerging economies, including China, showed sharp reductions in carbon intensity last year. In addition several countries saw sharp falls in coal consumption. These may be the first signs of the uncoupling of emissions from economic growth.

Global emissions were flat in 2015 while GDP grew by a respectable 3.1%. Coal consumption fell by 1.8%, with a switch to lower carbon gas (+1.7%) as well as oil (+1.9%). Wind and solar energy output grew at 17.4% and 32.6% last year, but are still tiny fractions of the whole energy system.

Governments have proposed a range of emissions targets with different baselines and target years. To gauge performance, PwC's Low Carbon Economy Index calculates the implied carbon intensity pathways and assesses their ambition on a comparable basis.

Figure 1:
Low Carbon Economy Index 2016: Transition pathways



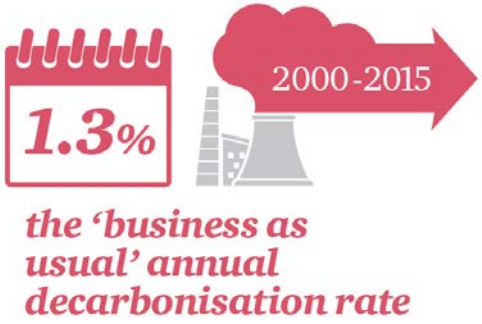
Sources: BP, Energy Information Agency, World Bank, IMF, UNFCCC, National Government Agencies, PwC data and analysis.

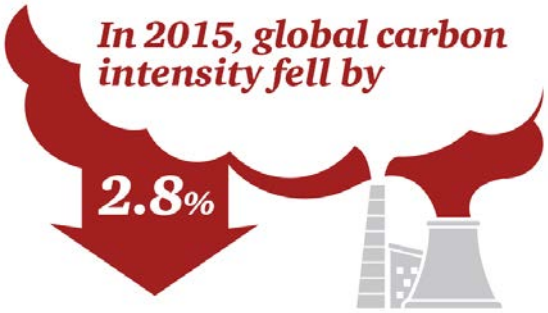
Notes: GDP is measured on a purchasing power parity (PPP) basis. The INDC pathway is an estimate of the decarbonisation rate needed to achieve the targets released by G20 countries. INDCs only cover the period to 2030, we extrapolate the trend in decarbonisation needed to meet the targets to 2100 for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

Overall, the INDC pledges aim for a global average decarbonisation rate of nearly 3% per year – More than double the business as usual rate of 1.3% (2000-14). This suggests a step change in government policies to reduce emissions and support clean infrastructure investment. But this INDC pathway is more closely aligned with the IPCC's three degrees scenario.

Despite the relatively rapid decarbonisation in 2015, countries still fall short of what's needed. Based on expected GDP growth of approximately 3% each year and the remaining two degrees carbon budget, on average, countries will need to reduce their carbon intensity by 6.5% every year from now to 2100.

Countries are expected to address this ambition gap during the global stocktake and INDC review process over the next few years. Governments will need to engage with business to clearly make the link between their ambitious emissions targets, their policies – Both sector specific and economy-wide – and investment in low carbon infrastructure and products.





3% the annual average decarbonisation rate needed
… to achieve COP21 targets

6.5% the annual decarbonisation rate required
… to stay within the 2 degrees carbon budget

the year the carbon budget will run out
… if we remain at 'business as usual' rates

global GDP growth in 2015

The Index

Our Low Carbon Economy Index shows how fast the G20 countries decarbonised their economies last year, relative to their INDC targets.

The good news this year is that three of the world's six largest economies (US, China and the UK) are at the top of the league table.

Table 1:
Low Carbon Economy Index – country summary

Country	Change in carbon intensity 2014-15	INDC target annual change in carbon intensity 2015-2030	Annual average change in carbon intensity 2000-2015	Change in energy related emissions 2014-2015	Real GDP growth (PPP) 2014-2015	Carbon intensity (tCO2/$m GDP) 2015
World	-2.8%	-2.8%	-1.3%	0.2%	3.1%	295
G7	-3.6%	-3.4%	-2.1%	-1.9%	1.8%	252
E7	-4.0%	-2.5%	-1.3%	0.5%	4.6%	363
China	-6.4%	-3.5%	-2.4%	0.04%	6.9%	475
UK	-6.0%	-3.1%	-3.5%	-3.8%	2.3%	157
US	-4.7%	-4.3%	-2.4%	-2.4%	2.4%	301
South Africa	-4.5%	-4.5%	-1.7%	-3.2%	1.3%	583
Mexico	-4.4%	-3.9%	-0.6%	-2.0%	2.5%	206
Canada	-4.2%	-3.9%	-1.9%	-3.1%	1.1%	351
Japan	-2.7%	-3.0%	-0.9%	-2.3%	0.5%	257
Turkey	-2.6%	0.7%	-0.9%	1.3%	4.0%	211
India	-2.0%	-1.9%	-1.5%	5.4%	7.6%	276
Korea	-1.4%	-4.3%	-1.3%	1.1%	2.6%	419
Germany	-1.1%	-3.1%	-1.9%	0.5%	1.7%	195
EU	-0.7%	-3.1%	-2.3%	1.2%	1.9%	180
Australia	-0.5%	-4.5%	-2.1%	1.8%	2.3%	347
France	-0.2%	-3.1%	-2.6%	0.9%	1.2%	121
Russia	0.0%	0.8%	-3.2%	-3.7%	-3.7%	418
Argentina	0.0%	-2.2%	-0.8%	1.4%	1.3%	190
Indonesia	0.6%	-5.9%	0.0%	5.4%	4.8%	208
Brazil	0.8%	-3.9%	0.2%	-3.0%	-3.8%	157
Saudi Arabia	1.1%	-0.3%	0.5%	4.6%	3.5%	411
Italy	4.7%	-3.1%	-1.8%	5.5%	0.8%	153

Key: Top 5 Bottom 5

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

Figures 2 and 3 show the historic and projected changes in carbon intensity of major economies if they achieve their INDCs. The global average carbon intensity from 2005 to 2015 is included in green for comparison, followed by the two degrees global average reduction pathway. This provides a reference point for the historic performance and future ambition of countries. 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. However, only the EU, US and Japan are projected to be near the average intensity required by 2030 to limit warming to two degrees.

Figure 2:

Developed economies progress and targets

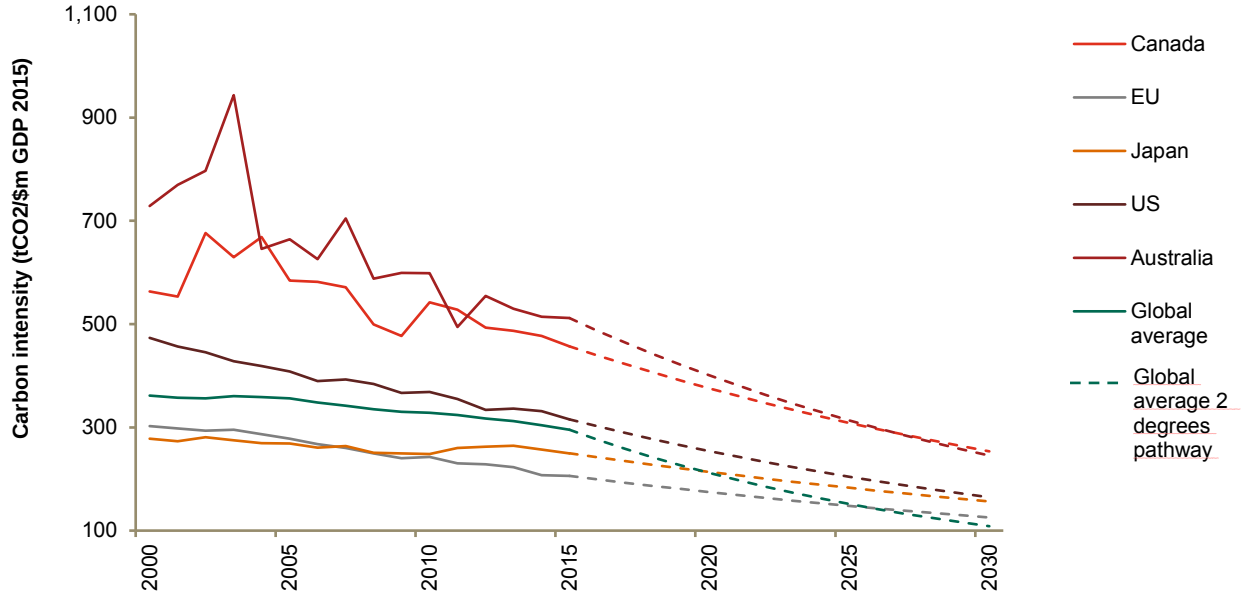


Figure 3:

Emerging economies progress and targets

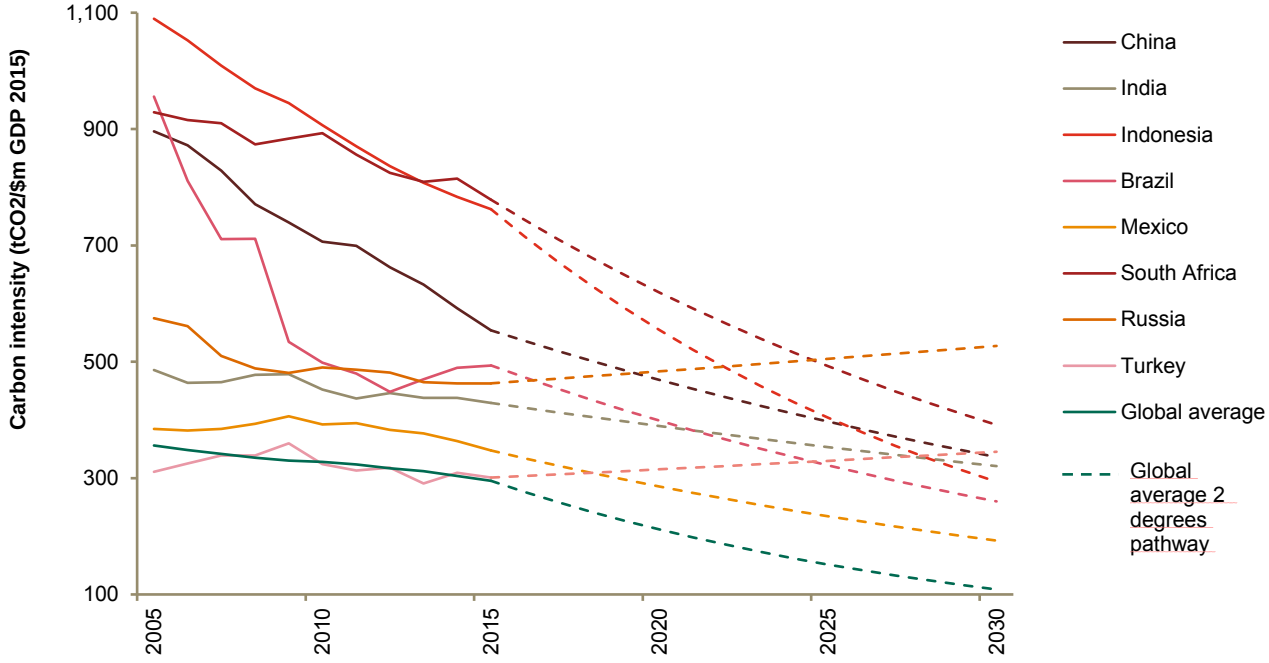


Table 2:
INDC targets for G20 countries

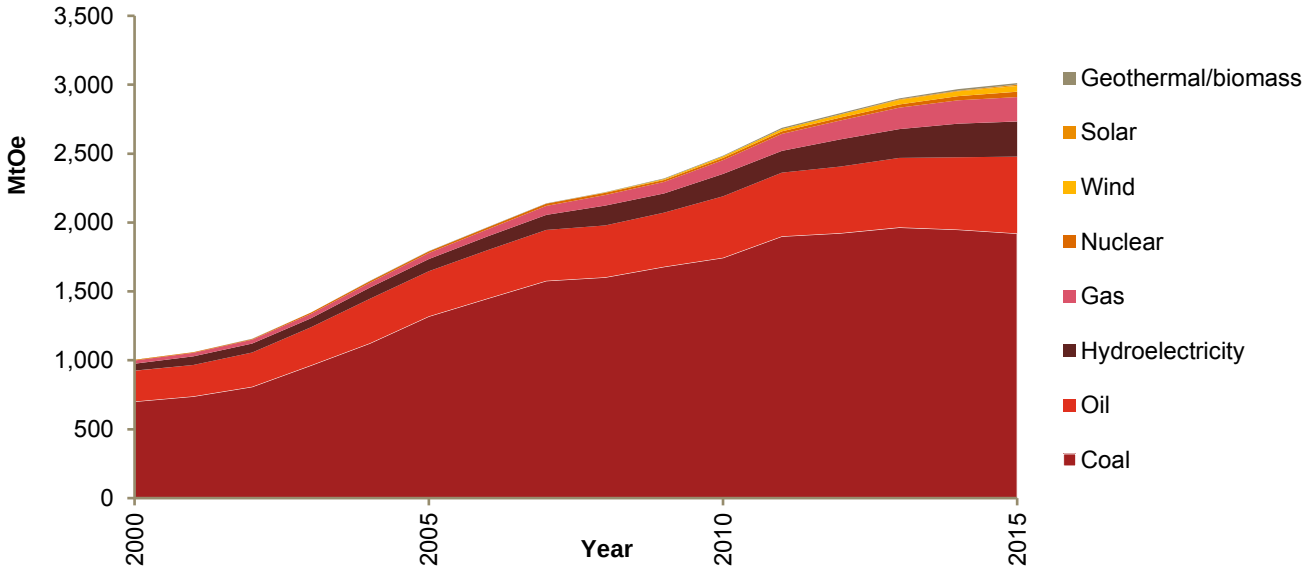
Country	Target description
South Africa	Emissions in a range between 398 and 614 MtCO2e by 2025-30
Mexico	22% reduction against baseline scenario by 2030
Korea	37% reduction against baseline scenario by 2030
Canada	30% reduction against 2005 absolute emissions by 2030
Japan	26% reduction against 2013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

Has coal consumption peaked in China?

China's position at the top of the Index is the result of falling coal use and the changing nature of its economic development, with rapid growth in services. China consumes half the global coal output, so changes that affect consumption in China have global significance for the coal market and emissions. In 2015, coal consumption in China fell by 1.5%1 or 29 Mtoe (million tonnes of oil equivalent), which compares with total UK consumption of 23Mtoe last year. This fall has been the most significant factor in levelling China's emissions and is partly the result of policies to improve air quality and power plant efficiency. And although it is a small part of China's economy, solar power grew by 70% in 2015.

As China looks to rebalance its economy, the service sectors have experienced significant growth, with average annual services exports growth of 14.3% since 2010. Financial Services dominated this growth, as the financial intermediation industry's share of Chinese GDP grew by 1.5 times over 5 years (from 6.2% in 2010 to 9.2% in H1 2016).

Figure 4:
China's Energy Mix 2000-15



[1] *China's own official figures suggest that coal consumption fell by 3.7% from 2014 to 2015. http://www.stats.gov.cn/english/PressRelease/201602/t20160229_1324019.html*

The UK maintains position as climate leader

For the second year running, UK's consumption of coal has fallen by over 20% and has maintained its position as a leader in our Index.

This is largely the result of the EU's Large Combustion Plant directive and a UK policy to close all coal-fired power plants by 2025. Coal now makes up around 12.2% of the UK energy mix. This trend is accompanied by a 31% increase in renewables generation, which has now reached 9.1% of the energy mix. Only two years ago coal's share of the energy mix was more than three times that of renewables.

While changes in coal and renewables have played significant roles in the reductions in carbon intensity, changes in the UK economy have also been important. The service sector has been the primary driver of the UK economic recovery since the recession in 2008. Services now accounts for 80% of total UK jobs and is expected to continue growing. Manufacturing on the other hand has suffered, with outputs falling in 2015 after being relatively flat since early 2011.

The decarbonisation of the UK's economy looks set to continue. Recent government announcements include the adoption of the fifth carbon budget, the approval of the Hinkley C nuclear power project and confirmation of the government's intent to ratify the Paris Agreement. But there are questions about the status of the EU Emissions Trading System and whether climate action will feature in the Government's Brexit negotiations with the EU.

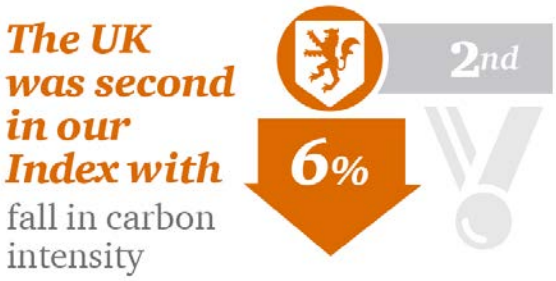
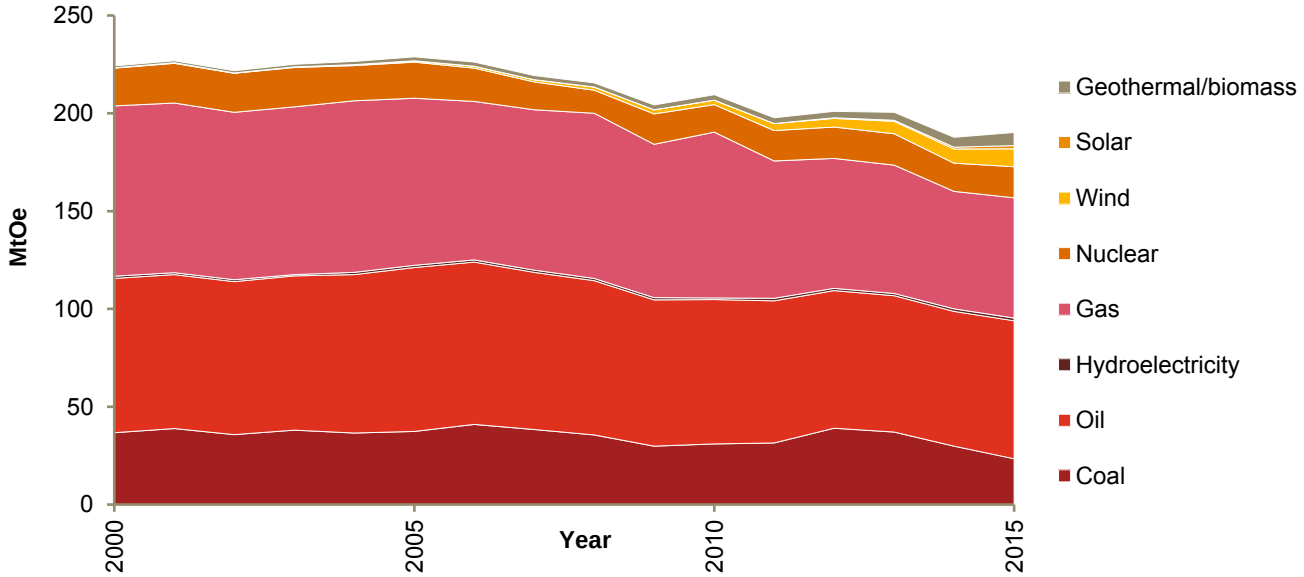


Figure 5:

UK's energy mix 2000-15



Responding to climate risks is a strategic, business priority

Our Low Carbon Economy Index shows the rapid transition that is needed to get to the INDC targets and ultimately to two degrees. This transition presents high probability, high impact risks to the financial performance of companies as well as to the returns expected by their investors and lenders.

Such companies, including financial institutions such as banks, insurers and asset managers/owners, are increasingly expected to identify, understand, manage and report on a range of climate risks and opportunities that will drive the transition to a low-carbon, climate resilient economy. This should allow their stakeholders to better understand and price in these risks and the issue is now firmly on the agenda of financial regulators.

In his speech at Lloyds of London last year, Mark Carney, Governor of the Bank of England and Chair of the Financial Stability Board (FSB), identified climate change as one of the most material threats to financial stability. As a result the FSB set up a Task Force on Climate-related Financial Disclosure (TCFD) at the climate summit in Paris. This Task Force will provide guidelines for financial disclosure on climate risks, including by financial institutions by the end of 2016. The Task Force is focused on the disclosure of financial impacts arising from climate change, and looks to move reporting beyond carbon footprinting alone. Currently few companies or financial institutions are comprehensively able to disclose the financial impacts of climate change to their business.

Methodology

Our approach

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, which is based on a long-term GDP data are taken from the World Bank. Long-term GDP projections are drawn from the latest versions of PwC's 'World in 2050'. This was last published in February 2015 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 (2016). For biofuels we adjust BP Statistical Review (2016) data from production to consumption using US Energy Information Administration data.

We use Intergovernmental Panel on Climate Change data for the energy related emissions associated with limiting warming to two degrees by 2100.

The national targets

Our analysis of the national targets in this report considers the full national greenhouse gas inventory. So 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). So although the emissions intensity numbers are not directly comparable with those in Table 1 of this report the rate of change implied by these INDCs is representative of what's required in Figure 1.

INDC targets were taken from the UNFCCC portal.

Where available national greenhouse gas inventory data was taken from the UNFCCC for 1990 to 2012. This was supplemented with national government department data where gaps existed in UNFCC data. Where there were still missing years we used the rate of change in energy related emissions from the BP Statistical Review (2016) and applied this to the UNFCCC or national government department data.

Where INDCs 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 INDCs we assumed it is not included in the target.

Contacts

Leo Johnson

E: leo.j.johnson@uk.pwc.com

Jonathan Grant

E: jonathan.grant@uk.pwc.com

Lit Ping Low

E: lit.ping.low@uk.pwc.com

Sam Unsworth

E: samuel.j.unsworth@uk.pwc.com

161026-110710-LA-OS