Climate Transparency

BROWN TO GREEN

The G20 transition to a low-carbon economy | 2017

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ABOUT THIS REPORT

The Brown to Green Report 2017 by Climate Transparency provides a comprehensive overview of the G20 countries, whether – and how well – they are doing on the journey to transition to a low-carbon economy. It assesses the main trends for the G20 in emissions, climate policy performance, finance, and decarbonisation. The report summarises and compares the findings presented in Climate Transparency's country profiles for each G20 country (incl. the EU). Findings are based on publicly available data by renowned institutions.

The country profiles and a technical note on data sources and methodology can be downloaded on **http://www.climate-transparency.org/g20-climate-performance/g20report2017**.

TRANSPARENCY AND COMPARABILITY ARE DRIVERS FOR MORE AMBITIOUS CLIMATE ACTION

Alvaro Umaña and Peter Eigen

When President Trump decided to pull the US out of the Paris Agreement, his justification was that the agreement was "very unfair" to the US. The question of whether the Paris Agreement is fair and whether countries are delivering what is needed to meet the long-term objective is a hugely important one. While most people and states agree about "holding the increase in the global average temperature to well below 2°C" and "to pursue efforts to limit the temperature increase to 1.5°C," a common understanding that burdens and benefits are shared fairly will be crucial for governments.

The ability to compare what governments do with what is required to meet the long-term objective is even more important, as the Paris Agreement has a bottom-up architecture, where countries independently define what their contributions should be, depending on their national circumstances.

Our Brown to Green Report provides politicians, business leaders, experts, media and civil society with the information with which they can easily compare G20 government climate action, and whether their effort is sufficient to stay under the well below 2°C/1.5°C limit. Our report is comprehensive, yet concise enough that the non-expert and those with limited time gain a clear insight.

When we founded Climate Transparency in 2014, we were driven by our own personal experiences as Minister for Environment in Costa Rica and as founder of Transparency International. As a minister, you have to deal with many policy challenges simultaneously and you therefore are reliant on credible and precise information for making informed decisions. Country comparisons are crucial to develop a better understanding of what other countries in the region are doing and how Costa Rica could learn from them.

Transparency has been a powerful tool for civil society to combat corruption. The yearly Corruption Perception Index of Transparency International – ranking countries according to their perceived levels of corruption – has demonstrated that governments care about their reputation. Repeatedly, governments have responded to Transparency International, signalling they would be raising anti-corruption measures.

These experiences motivated and guided us, when we were thinking about describing government climate action. Global greenhouse gas emissions will need to peak in the near future, and be reduced to net zero soon after 2050 to meet the well below 2°C or 1.5°C limit under the Paris Agreement. Even a cursory look at the present government commitments shows that this limit will be far exceeded unless they step up their ambition.

For this reason, we decided to bring together experts from around the world to produce an annual report of the G20 countries' climate actions. For good reason, we call the report "Brown to Green". The laudable efforts for more green investments will only help the climate if they are coupled with a drastic reduction in investments in "brown" fossil fuels.

The G20 countries are well positioned to provide the needed leadership for this transition. They account for 85% of global GDP and 80% of worldwide CO_2 emissions. According to IRENA-IEA, these countries are also home to 98% of global installed capacity of wind power, 97% of solar power and 93% of electric vehicles.

We rely on publicly available information, but, of course, we know that the choice of what information to use involves judgment calls. And the judgment of even the most scientifically minded expert can be influenced by national and institutional perspectives. We are proud to say that our partnership has significantly grown over the last year and now includes experts and institutions from Argentina, Brazil, China, France, Germany, India, Indonesia, Mexico, South Africa and the UK. And we believe that the convergence of these global perspectives together with a commitment to work according to scientific standards leads to credible information.

Article 13 of the Paris Agreement mandates an "enhanced transparency framework". This transparency framework is crucial to track the actions undertaken by countries as well as the financial, technological and capacity-building support provided. A global stocktake every five years will determine whether national contributions add up to remain well below 2°C/1.5°C and is supposed to lead to strengthening the plans of countries.

Our Brown to Green report complements the UNFCCC transparency mechanism. It reports on countries' progress

once a year – a shorter interval than the Paris Agreement demands. In contrast to government technical reporting, it provides easily accessible and independent information for politicians, policy makers, civil society, media and non-climate experts that can stimulate the national debates to increase ambition. By driving transparency, we support the building of trust and confidence among countries.

The German G20 Presidency has put climate change high on the agenda. And while President Trump withdraws from the Paris Agreement, we can observe positive decarbonisation developments in many countries, even the US.

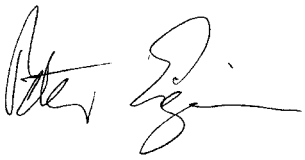
The Brown to Green Report 2017 is Climate Transparency's third report published on the eve of the G20 summit. We are proud to present several changes to last year's report that improve our analysis on how well G20 countries are transitioning towards a low-carbon economy:

- For the first time, the Brown to Green report sheds light on the decarbonisation developments per sector in each G20 country.
- We have strived to refer to the well below 2°C and aiming for 1.5°C benchmark where possible. In some cases – for example the adequacy analysis of the Nationally Determined Contributions – only measurements based on 2°C are available. We are aware that these do not reflect the Paris Agreement goals and efforts have to go further, and we are aiming to adjust our analysis accordingly next year.
- The finance section of the report has been extended, now also presenting information on green bonds, public finance invested in fossil fuels, effective carbon prices and a more detailed account of climate finance.

We hope our transparent and comparable information can be a powerful tool to stimulate a race to the top in climate action.

Alvaro Umaña

Former Minister of Environment and Energy of Costa Rica, and former Ambassador of Costa Rica to the United Nations Copenhagen Climate Change Conference



Peter Eigen

Founder and Chair of the Advisory Council of Transparency International, and Co-Founder of the HUMBOLDT-VIADRINA Governance Platform

THE G20 IS DECARBONISING, BUT TOO SLOWLY

G20 countries account for 75% of global greenhouse gas emissions and about 82% of global energy-related CO_2 emissions (2014).[1] If present emission trends were to continue, global temperatures would increase between 3 and 4°C.[2] The consequences for the world would be dramatic.

Because they are the biggest contributors, the G20 governments have a special responsibility to act on climate change, using their economic strength to lead the transition to a low-carbon economy.

The necessity to protect the climate is not simply a burden, it coincides with other urgent needs and offers substantial benefits. The industrialised world's ageing energy system needs massive investments, and many people without – or with only limited access to energy – require more non-polluting energy for a decent, healthier life. Moving from a "brown" economy based on fossil fuels to a sustainable "green" economy creates jobs and fosters innovation. Moving away from fossil fuels in energy production, transport and industry would dramatically reduce air pollution and increase public health for billions of people.

The G20 countries as a whole have made big efforts to reduce their impact on climate. They have started the transition from brown to green, but are in an early phase. Present efforts are neither sufficient in speed – nor in depth – to keep global warming to the limit set in the Paris Agreement: "holding the increase in the global average temperature to well below 2°C" and "to pursue efforts to limit the temperature increase to 1.5°C".

1) *PRIMAP (2017), https://www.pik-potsdam.de/research/climate-impacts-and-vulnerabilities/research/rd2-flagship-projects/gia/primap/primap and IEA (2017): "CO2 Emissions from Fuel Combustion", https://www.iea.org/statistics/relateddatabases/co2emissionsfromfuelcombustion/*

2) *Rogelj, J., den Elzen, M., Höhne, N., Fransen, T., Fekete, H., Winkler, H., Schaeffer, R., Sha, F., Riahi, K. & Meinshausen, M. (2016). "Paris Agreement climate proposals need a boost to keep warming well below 2 °C", Nature, 534(7609), 631–639, http://doi.org/10.1038/nature18307*

GREENHOUSE GAS (GHG) EMISSIONS DEVELOPMENT

STILL RISING, BUT ENERGY-RELATED CO_2 EMISSIONS HAVE STALLED

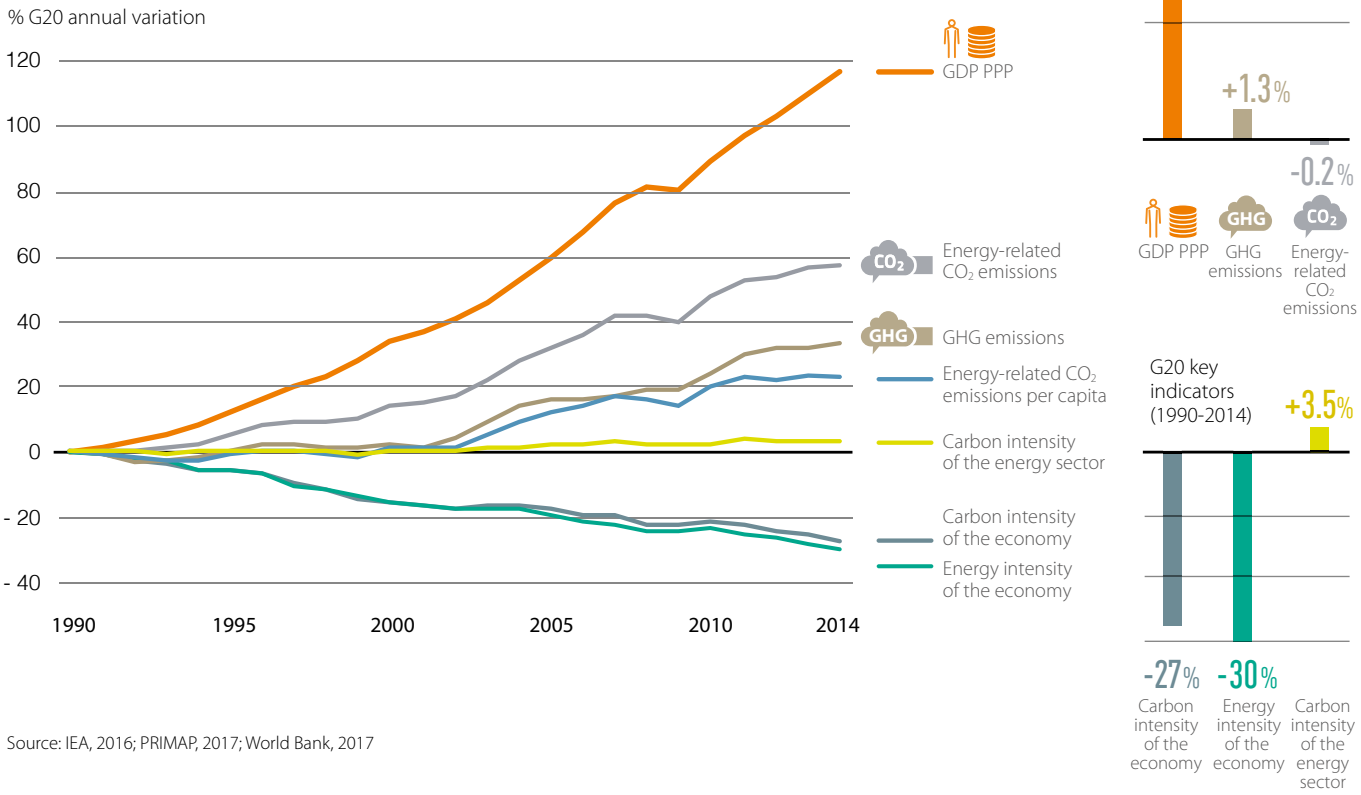
The G20 countries' greenhouse gas emissions[3] grew by 34% between 1990 and 2014.[4] Yet, in the same period their economies grew more, by nearly 117%, demonstrating that G20 countries are using energy resources more efficiently than in the past.

There are signs of an absolute decoupling of emissions and economic growth (i.e. declining emissions with a growing economy) within the G20. According to the International Energy Agency, global energy-related CO_2 emissions stalled in 2014 for the first time and were kept almost constant also in 2015 and 2016.[5] This trend is confirmed by other estimates.[6]

To stay within the Paris Agreement limits, G20 emissions need to be drastically reduced – a peak needs to be reached by 2020 and CO_2 emissions need to decline to net zero by around 2050.[7]

According to the International Energy Agency, global energy-related CO_2 emissions stalled in 2014 for the first time and were kept almost constant also in 2015 and 2016.

KEY INDICATORS ON THE G20 TRANSITION TO A LOW-CARBON ECONOMY



Source: IEA, 2016; PRIMAP, 2017; World Bank, 2017

If the climate objectives are to be met, the carbon intensity has to reduce substantially.

3) *Including Land Use, Land Use Change and Forestry (LULUCF) emissions*
4) *PRIMAP (2017), https://www.pik-potsdam.de/research/climate-impacts-and-vulnerabilities/research/rd2-flagship-projects/gia/primap/primap*
5) *IEA (2017): "IEA finds CO2 emissions flat for third straight year even as global economy grew in 2016", https://www.iea.org/newsroom/news/2017/march/iea-finds-co2-emissions-flat-for-third-straight-year-evenas-global-economy-grew.html*
6) *The Global Carbon Project (2017), http://www.globalcarbonproject.org and BP (2017), http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html*
7) *Rogelj, J., Luderer, G., Pietzcker, R. C., Schaeffer, M., Krey, V., & Riahi, K. (2015): "Energy system transformations for limiting end-of-century warming to below 1.5°C", Nature Climate Change, 5, 519–527, http://doi.org/10.1038/NCLIMATE2572*

DECARBONISATION

GREENER, YET STILL TOO BROWN

G20 economies are becoming more efficient – both the energy intensity and the carbon intensity of the economies are decreasing.[8] As both energy consumption and the economy have grown, the higher efficiency has not been sufficient to lead to an overall reduction in greenhouse gas emissions.

The carbon intensity of the energy sector (CO_2/Total Primary Energy Supply (TPES)) in the G20 has been slightly increasing between 1990 and 2014 as the growing energy demand has been partly satisfied with coal. The needs of developing countries will require an increase of their total primary energy supply. If the climate objectives are to be met at the same time, the carbon intensity has to reduce substantially. During recent years, there has been a decreasing trend for more than half of the G20 countries (Argentina, Australia, the EU, France, Italy, Mexico, Republic of Korea, Russia, Turkey, the UK and the United States).

Renewable energy is on the rise, but coal and other fossil fuels still dominate in the G20's energy mix.

CLIMATE POLICY PERFORMANCE

HIGH ON POLICY DEVELOPMENT, LOW ON AMBITION AND IMPLEMENTATION

All G20 governments have put forward mitigation targets and introduced national climate policies in different sectors. In most countries, policy frameworks are quite comprehensive. But 2020 targets and the initial Nationally Determined Contributions filed with the Paris Agreement are insufficient to limit global warming to well below 2°C, let alone to the 1.5°C target, as mandated in the Paris Agreement.

After the great success of the adoption and the fast entry into force of the Paris Agreement, the real challenge is in implementing measures at home. This is reflected in the fact that experts from many G20 countries have ranked their government's performance in international policy processes (being constructive in the international climate negotiations) higher than their national climate policy performance, where they are criticised for their inadequate ambition and implementation. China, Brazil, France, Germany, India, Mexico and South Africa receive high scores for both their national and international climate policy performance. After the change in the US government, the US's national and international policy performance has been rated down by experts from high to very low.

8) See graph in Executive Summary

FINANCING THE TRANSITION

G20 GOVERNMENTS CONTINUE TO SUBSTANTIALLY FINANCE BROWN INFRASTRUCTURE

Investments

Globally, total investment required in infrastructure over the next 15 years is estimated to be around US$ 80-90 trillion. To make this investment compatible with a 2°C target initially requires a higher investment of about 5% which pays off over time.[9] Countries need to scale up public and private financial flows, and to redirect flows from brown to green.

G20 countries are attractive for renewable energy investments, with notable differences between countries. Investment attractiveness is particularly high in China, France, Germany and the UK. Green bonds, while still only a small part of the G20 debt market, have shown strong growth rates in recent years, particularly in China.

Global capacity for renewable energy production has increased faster than ever in 2016, and thanks to significant price drops lower investments were needed than in the previous year.[10] Overall more green capacity was added than brown.

The emissions intensity of electricity production from capacity that was installed in 2016 indicates how green or brown recent investments have been. For G20 countries that mainly installed renewables or other low-carbon sources, the average emissions intensity of new investments in the power sector ranges between 0 to 0.2 tCO_2/MWh, e.g. in Italy, France, Germany, and the US. Australia and South Africa also had a low emissions intensity in 2016, but added significant coal capacity in the years prior to 2016. Countries with a high share of new capacity from emissions-intensive coal (often alongside investments in renewables) are in the order of 0.5 to 0.8 tCO_2/MWh, such as China, India, Korea and Indonesia. Saudi Arabia has an equally high emissions intensity with added oil and gas capacity.

Public institutions are lagging behind: G20 countries' public finance institutions, such as national and international development banks, majority state-owned banks and export credit agencies, spent over US$ 88 billion on average annually on coal, oil and gas projects between 2013 and 2014.[11] Among G20 countries, the highest levels of public finance for fossil fuels come from Japan and China, who provided about US$ 19 billion and US$ 17 billion a year between 2013 and 2014, respectively.

Fiscal policies

The G20 countries are not living up to their long-standing and repeated commitment to phasing out fossil fuel subsidies. Based on data from the OECD and IEA, in 2014, G20 countries provided over US$ 230 billion subsidies to coal, oil and gas.

More carbon pricing mechanisms have been introduced in recent years. However, carbon prices and effective carbon rates, which take into account various energy taxes and carbon pricing schemes remain too low in G20 countries to encourage a substantial shift to a low-carbon economy.

Provision of international support

Key to building trust and faith in the UNFCCC negotiations between developed and developing nations is the provision of international climate finance. The G20 countries with obligations under the UNFCCC include some of the biggest contributors of international public finance to developing countries. Japan, France, Germany, UK and the US each provided between US$ 8.4 billion and US$ 1.2 billion per year in 2013-2014 amounting to between 0.2 and 0.02% of GDP. Australia, Canada and Italy provided less climate finance during this period, both in absolute terms and relative to GDP. President Trump has announced the US will cease its funding altogether.

9) *Bhattacharya, A., Meltzer, JP., Oppenheim, J., Qureshi, Z. & Stern, N. (2016): "Delivering on sustainable infrastructure for better development and better climate. Brookings Institution", https://www.brookings.edu/wp-content/uploads/2016/12/global_122316_delivering-on-sustainable-infrastructure.pdf*

10) *Frankfurt School-UNEP Centre/BNEF (2017), "Global Trends in Renewable Energy Investment 2017", http://fs-unep-centre.org/publications/global-trends-renewable-energy-investment-2017*

11) *Bast, E., Doukas, A., Pickard, S., van der Burg, L., Whitley, S. (2015): "Empty Promises. G20 Subsidies to Oil, Gas and Coal Production.", https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9958.pdf*

COUNTRY OVERVIEW [12]

 ARGENTINA

Argentina's performance rates medium in the category of greenhouse gas emissions per capita and low in the category of energy use per capita compared to other G20 countries. The share of renewables in Argentina's energy supply is above G20 average, with an upward trend in absolute renewable energy supply. Investment attractiveness for renewable energy is in the middle range of the G20.

After a long period of virtually no climate policy activity, and an election, Argentina is now catching up. A discussion on the long-term strategy has started, as Argentina remains one of the few G20 countries without a national climate strategy beyond its NDC. A new renewable energy law, two successful, large-scale renewable energy tender rounds in 2016, coupled with a gradual phase-out of fossil fuel consumption subsidies, show a fresh commitment to clean technologies.

Argentina has been heavily investing in the exploration and development of new reserves of oil and gas in recent years. It separately provides financing through its public institutions, which spent, on average, US$ 2 billion on fossil fuels a year between 2013 and 2014. Argentina's experts continue to rate their country's policy performance in many sectors as low, and have demanded more ambitious and sector-specific targets.

 AUSTRALIA

Australia's performance in the greenhouse gas emissions per capita category rates medium. Its performance for all other decarbonisation indicators is low – or even very low. Australia has the fifth highest share of coal in energy supply in the G20, and it continues to subsidise the production and consumption of fossil fuels. Yet, its investment attractiveness for renewable energy ranks in the higher middle range. In 2016, Australia's investments in renewables reached record numbers.

Experts rate Australia's climate policy performance very low. They acknowledge Australia's progress in developing enhanced renewable energy schemes and energy efficiency programs, particularly in the residential building sector, but criticise the government's overall lack of ambition in climate policies and its continued support for coal.

Australia provides less than 0.01% of GDP on international climate finance – it ranks fifth of the eight G20 countries obliged to provide climate finance.

The Australian climate policy has been characterised by significant uncertainties during recent years. The government abolished the Australian carbon price mechanism in 2014.

 BRAZIL

Brazil heads the G20 rating on performance of greenhouse gas emissions per capita, taking into account the trend and level, also in relation to a "well below 2°C" benchmark. Brazil's performance in energy use per capita rates medium. Its share of renewable energy is by far the highest in the G20 (38%).

Brazil's investment attractiveness for renewable energy is in the middle field of the G20. Economic recession and political instability have led to a sharp decline in energy demand causing the A-3 wind and solar auction in December 2016 to be cancelled. The end of financing of oil and coal-fired power plants by the Brazilian Development Bank (BNDES) will have an effect on future investments.

National experts rate Brazil's policy performance high: while acknowledging developments in renewable energy and the forest sector, they demand more ambitious emissions and efficiency targets. A plan for phasing out fossil fuel subsidies and an effective carbon price signal are still missing. Brazil's fossil fuel subsidies amounted to US$ 27 billion in 2014 (one of the highest levels of support in the G20). Financing of fossil fuel projects through public institutions was, on average, US$ 3 billion a year in 2013 and 2014.

 CANADA

Canada performs very low in the two categories of greenhouse gas emissions and energy use per capita – it has the highest greenhouse gas emissions per capita and the highest energy use per capita in the G20. While hydropower dominates its power sector, Canada has the G20's second-highest rate of new wind energy installations.

Experts rate the climate policy performance of Canada's government medium. They give credit to their government for developing the Pan-Canadian Framework on Climate Change and Clean Growth that sends a signal for a strengthened climate policy.

Although Canada has cut some subsidies to exploration, it continues to subsidise the production and consumption of fossil fuels. In addition, Canadian public finance institutions provided, on average, about US$ 3 billion a year for fossil fuels between 2013 and 2014. While official OECD estimates only report US$ 114 million of subsidies in 2014, other research finds that subsidies to coal, oil and gas production, including through public finance institutions, total US$ 1.6 billion.[13]

Canada's provision of international climate finance is lower than 0.01% of its GDP, ranking second-last within the G20 countries obliged to provide climate finance under the UNFCCC.

12) The country overview summarises the main findings of the report. Its main sources are Allianz Climate and Energy Monitor (2017), CAT (2017), CCPI (2017), Climate Bonds Initiative (2017), OECD (2017), OCI & NRDC (2017) and RECAI (2017).

13) Touchette and Whitley (2015), "G20 subsidies to oil, gas and coal production: Canada", https://www.odi.org/publications/10091-g20-subsidies-oil-gas-coal-production-canada

CHINA

China's performance rates low in the categories of greenhouse gas emissions per capita, energy intensity of the economy, carbon intensity of the energy sector, energy use per capita and share of coal in energy supply.

Yet experts rate its current policy performance high compared to other G20 countries. On an international level, China has assumed a strong leadership role. National experts stress China's rapid expansion of renewable energy and the possibility of CO_2 emissions peaking before 2030, earlier than planned. The country is swiftly decommissioning coal power plants and aims to increase its renewable energy capacity by 38% above 2015 levels by 2020. China's coal use started to decline from 2014, and it is believed this trend will continue. China has the highest subsidies for electric cars within the G20.

China rates as having one of the G20's highest levels of investment attractiveness for renewable energy. The first Chinese green bonds were issued in late 2015, but substantial growth has since made China 2016's largest single green bond issuing country.

However, Chinese public finance institutions spent US$ 16 billion – the second highest amount in the G20 – on fossil fuel projects between 2013 and 2014. A change in fiscal policies is still needed: the Chinese government continues to subsidise its fossil fuel industry, including coal. Encouragingly, China plans to implement a national Emissions Trading System in 2017, in addition to the pilot ETS's now running in several regions. China reports increasing provision of international public finance to a number of developing countries, although annual data on the scale or nature of such contribution is not available.

EUROPEAN UNION

The European Union rates high in the categories of greenhouse gas emissions per capita and energy use per capita.

Experts rate its climate policy performance medium. The EU and many of its member states are currently failing to deliver on their mitigation targets. According to experts, policies are not ambitious enough to stay well below the limit of 2°C or 1.5°C warming. Nevertheless, the EU's role in the negotiations leading to the Paris Agreement and especially its reaction to the US's exit from the accord indicates that the EU can assume a leadership role.

The EU has been the largest issuer of green bonds (US$ 76 billion) breaking new boundaries in 2017 through sovereign issuance, green bond funds and exchange-traded funds. Efforts are being made to provide greater price stability and predictability in the EU Emissions Trading System. The European Commission has repeatedly asked Member States to phase out fossil fuel subsidies by 2020, and they have committed to developing plans to do so. The EU has also committed to remove subsidies to hard coal mining by 2018. However, the EU has not established a mechanism for tracking progress on these pledges.

FRANCE

France's performance in the greenhouse gas emissions per capita category is very high. It has the third lowest level of emissions per capita in the G20, with a decreasing trend during recent years. The country performs high in the category energy use per capita.

Experts give France a high score for its policy performance. They expect President Macron to uphold the targets set by the previous administration. France is one of the few G20 countries that has submitted a long-term emissions-development strategy to the UNFCCC, and has a national strategy for near-zero energy buildings (as part of EU policies).

France is one of the G20 countries that is highly attractive to renewable energy investment. It aims for a decarbonisation of its electricity sector by 2050, although its renewable energy target remains relatively unambitious. France continues to support fossil fuels, most notably through consumption subsidies for diesel.

France is a frontrunner in green finance: it has the highest market penetration of green bonds within the G20. In early 2017, it issued its first green sovereign bond at EUR 7 billion. France is also the G20's second largest donor of bilateral climate finance relative to GDP.

GERMANY

Germany ranks relatively low in the indicator for the level of greenhouse gas emissions per capita due to its high share of coal in energy supply.[14] It has a medium score in the energy use per capita category. Its absolute coal supply has increased in recent years by 11% (2009-2014). It continues to provide significant subsidies to coal and, while it plans to end subsidies to coal production by the end of 2018, it has recently introduced new subsidies for coal-fired power.[15] Germany's public investment to fossil fuels was, on average, about US$ 3 billion a year between 2013 and 2014.

Experts rate Germany's policy performance high, but point to the need to improve its sectoral targets and to an adequate phase-out for coal. Germany is one of the few G20 countries that submitted a long-term low-emission development strategy to the UNFCCC and has a national strategy for near-zero energy buildings (as part of EU policies).

14) Germany's performance rates high in the overall category of greenhouse gas emissions per capita which is based on three indicators: 1) level of greenhouse gas emissions per capita in 2014, 2) recent development of emissions between 2009-2014 and 3) the recent level compared to a well below 2°C pathway. From 2014 onwards there was no positive emission trend.

15) Whitley et al. (2017): "Cutting Europe's Lifelines to Coal", https://www.odi.org/sites/odi.org.uk/files/resource-documents/11494.pdf

Investment attractiveness for renewable energy is very high in Germany. It has the G20's highest effective carbon rate, but this is still too low to meet the Paris Agreement goals. Germany provides the G20's third largest amount of international climate finance relative to GDP.

INDIA

India receives high ratings for its performance in the category of greenhouse gas emissions per capita, and very high ratings in the category of energy use per capita. It has the G20's lowest levels of greenhouse gas emissions and energy use per capita.

Despite a growth in renewable energy over recent years, coal is dominant in India's primary energy supply above G20 average. Given the recent transitions in the power sector, India is witnessing an opportunity to stop building any inefficient coal power plants till 2022, and add massive renewable based capacity of 175GW by the same year. Its investment attractiveness for renewable energy is relatively high. India is the only country in the G20 that has announced to end the sale of fossil fuel cars by 2030, thus out-performing the G20 in the personal transport sector. However, it continues to support consumption of diesel, LPG and kerosene, as well as production of oil, gas and coal, although the support for coal has been decreasing.

INDONESIA

Indonesia's performance rates medium in the category of greenhouse gas emissions per capita, and very high in the category of energy use per capita – it has the G20's second lowest level of energy use per capita. Its share of renewables in energy supply (8.5% in 2014) is above the G20 average. There is barely any growth in absolute renewable energy supply and absolute coal supply is increasing.

According to national experts, Indonesia has to improve its forest protection policies: it has the G20's highest deforestation-related emissions. In addition, support schemes for renewable energy in the electricity sector and a carbon price signal have to be enhanced. In comparison to other G20 countries, Indonesia's investment attractiveness for renewable energy is rated low: 2016 saw a small increase in installed capacity of geothermal and solar PV. Indonesia's overall renewable energy capacity remains low. Indonesia lags behind other G20 countries in installed wind and solar PV capacities, and in attracting major global renewable energy businesses.

Indonesia's fossil fuel subsidies are one of the G20's highest, and and represented a substantial part of the government's budget in 2014. Since 2014, there has been progress in phasing out fossil fuel subsidies partly due to fiscal pressures. On the other hand, Indonesia has plans to expand its coal plant construction.[16]

ITALY

Italy's performance in the categories of greenhouse emissions per capita, and energy use per capita rates very high due to a reduction in emissions and energy use over recent years. Italy's share of renewable energy (15%) in energy supply is above the G20 average.

Italy's investment attractiveness for renewable energy ranks in the lower mid-range of G20 countries. Having already surpassed its 2020 target for renewable energy, its future pathway is unclear as its 2030 Energy Strategy is still under preparation. There is no strategy on how Italy plans to implement competitive bidding for large-scale renewables as set by the EU. Little new net renewable energy capacity has been installed since 2013.

Following a stable period, the amount of support dedicated to fossil fuel consumption in Italy has also risen sharply since 2012 – to more than US$ 4.6 billion in 2014.

This trend is also reflected in the expert rating of Italy's climate policy performance: National experts criticise the fact that the focus of energy policy is still mainly on fossil fuels. National and international climate policy continues to be uninspired, and lacks proactivity. Yet, Italy's performance in hosting the G7 – and prioritising climate protection on the G7 agenda – was seen as a good first step.

Italy provides the G20's lowest levels of international climate finance relative to its GDP.

JAPAN

Japan's performance in the category of greenhouse emissions per capita ranks very low. Its emissions are above the G20 average and have shown an increasing trend over the last years. In contrast, it performs high in energy use per capita.

National experts rank Japan's policy performance very low due to the reactivation of nuclear energy as the main alternative to fossil fuels, instead of sufficiently promoting renewable energy.

Japan's investment attractiveness for renewable energy performs in the middle range of the G20. Japan has extended its feed-in tariff scheme for wind until 2019, further supporting the strong investments in the technology. Investments in solar energy may be decreasing after the government switched from feed-in tariffs to auctions and a focus on smaller rooftop projects. Japan has two subnational Emission Trading Schemes as well as a national carbon tax - in place since 2012.

Japan provides the G20's highest amount of international climate finance relative to GDP – most of it as bilateral funding (including efficient coal technologies). However, Japan also spent the highest amount of public finance on fossil fuels in the G20 – an average of US$ 19 billion a year between 2013 and 2014. Moreover, the Japanese government provides subsidies to oil

16) CAT (2015): "The Coal Gap: planned coal-fired power plants inconsistent with 2°C and threaten achievements of INDCs, http://climateactiontracker.org/assets/publications/briefing_papers/CAT_Coal_Gap_Briefing_COP21.pdf

and gas production, mainly to Japanese companies operating overseas.

KOREA, REP.

The Republic of Korea performs very low in the category of greenhouse gas emissions per capita and the category of energy use per capita. Current levels of both categories are above the G20 average and too high compared to a well below 2°C benchmark. Its share of coal in energy supply is about 36%, above G20 average.

Experts rate its climate policy performance low. Yet, Korea's new president has announced greater efforts in reducing greenhouse gas emissions and promoting renewable energy. He has temporarily closed ten coal-fired plants.[17]

The Republic of Korea's investment attractiveness for renewable energy ranks in the G20's lower middle field. Total wind and solar PV capacity increased in 2016. Overall, levels of market capacity and maturity for renewables remain low, with a marginal share of renewables in the generation mix.

The Republic of Korea spent the third largest amount of public finance in the G20 on fossil fuels – an average of US$ 10 billion a year between 2013 and 2014. Separately, the government subsidises fossil fuels, mainly through tax breaks for gasoline. While the Republic of Korea planned to phase out subsidies to coal production by 2020, it has introduced new subsidies for oil refineries.

While the Republic of Korea has no obligation to provide climate finance under the UNFCCC, it reports US$ 0.19 billion in support to other developing countries and has supported the Green Climate Fund (GCF) with pledges of US$ 100 million.

MEXICO

Mexico has a relatively high performance in the categories of greenhouse gas emissions per capita and energy use per capita. Its share and growth rates of renewable energy remain below the G20 average, despite significantly increasing the amount of renewable energy capacity installed in 2016 compared to previous years.

Mexico is one of the few G20 countries that has submitted a long-term low-emissions development strategy to the UNFCCC. Unlike most G20 countries, it has no energy efficiency standards in the industry sector. Overall, Mexico receives a positive policy performance rating from national experts, but they criticise its mitigation strategy for 2050 for not containing an implementation roadmap, and the fact that it does not provide clear measures and actions of how to comply with the emission reduction targets set in its Climate Change Law.

Mexico has recently improved its support policy for renewable energy. Its investment attractiveness for renewables is in the middle range of the G20 due to its low market absorption capacity and general investment conditions. A carbon tax was introduced in 2014, which applies to fossil fuels but exempts natural gas. In 2016, it announced plans to establish a national carbon market in 2018, and expressed a strong interest in a North American carbon market. However, it continues to subsidise its oil and gas industry through tax breaks and budgetary support. Although without obligation, it has made a voluntary contribution to the Green Climate Fund.

RUSSIA

Russia performs comparatively low in the categories of greenhouse gas emissions per capita and energy use per capita. It has the fifth highest level of greenhouse gas emissions per capita in the G20.

Experts rate Russia's climate policy performance low. They criticise the fact that the focus of its national energy strategy is still on fossil fuels and, while there are some approaches to improve renewable energy and energy efficiency, implementation is still slow.

The government provides significant subsidies to oil and gas producers, and has stalled plans to reduce consumption subsidies by raising fuel prices. Separately, it provided an average of US$ 7 billion a year of public finance for fossil fuel energy between 2013 and 2014.

The investment attractiveness for renewable energy in the country is low with a negligible amount of installed renewables capacity.

SAUDI ARABIA

Saudi Arabia performs very low in the categories of greenhouse gas emissions and energy use per capita. It has the G20's second highest energy use per capita.

Saudi Arabia's climate policy performance assessed by national experts is rated very low. They stress that the government continues to rely on its oil reserves instead of exploiting the high potential for renewable energy.

Saudi Arabia's investment attractiveness for renewable energy is very low and in 2016 no new renewable energy capacity was installed. Saudi Arabia recently announced it would seek to invest US$ 30-50 billion in renewables by 2030, but there are doubts whether it can achieve these plans.[18]

Saudi Arabia provides the largest amount of fossil fuel subsidies in the G20. Separately, it spent an average of US$ 7 billion of public finance on fossil fuels a year between 2013 and 2014 – the fourth highest amount in the G20.

17) Reuters (2017): "South Korea plans energy U-turn away from coal, nuclear", http://www.reuters.com/article/us-southkorea-politics-energy-idUSKBN18V0EH
18) Saha, S. & Livingston, D. (2017): "Saudi Arabia's Renewable Revolution", https://www.foreignaffairs.com/articles/saudi-arabia/2017-06-06/saudi-arabias-renewables-revolution

SOUTH AFRICA

South Africa's performance ranks medium in the category of greenhouse gas emissions per capita. Its emissions per capita have increased slightly since 2009. South Africa ranks medium for its energy use per capita.

Despite an increase in absolute renewable energy supply, South Africa has the highest share of coal in the G20.

South Africa is one of the few G20 countries that has no emissions performance standards for cars. Yet, national experts rate South Africa's policy performance as high, valuing the sectoral approaches for achieving its national targets, as well as its contribution to the international climate negotiations. South Africa aims to implement a carbon price, but its start date has been delayed.

South Africa's investment attractiveness is ranked in the middle range of the G20. Given the current unwillingness of South Africa's national utility Eskom to sign further Power Purchase Agreements, uncertainty among investors remains. The government provides tax breaks for some liquid fuels users, and subsidises some fossil fuel exploration and production.

TURKEY

Turkey performs medium among G20 countries in the categories of greenhouse gas emissions and energy use per capita. It has the sixth highest share of coal in energy supply in the G20, with an increasing trend.

Experts rank Turkey's national climate policy and international policy last and second to last in the G20. They criticise the lack of Turkey's energy efficiency targets and remark that the funding of most of the climate protection projects comes from international institutions rather than national budgets.

The investment attractiveness for renewable energy in Turkey is very low. Turkey increased both its solar PV and wind capacity in 2016. Yet, recently the government provided significant subsidies to fossil fuels, mainly to the coal industry, including through the state-owned coal company, which has created uncertainties about the future of renewables. Turkey plans a significant expansion of coal-fired power plants.[19]

UK

The UK performs very high in the categories of greenhouse gas emissions and energy use per capita – both levels have decreased during recent years. The UK has had one of the highest recent growth rates in absolute renewable energy supply, although its share of renewable energy in energy supply remains below G20 average.

Experts rate the UK's climate policy performance as low. The government has failed to deliver a policy framework for renewables from 2017 onward; the UK Treasury expects investment in renewables to fall by 96% by 2020. The continuation of several other important policies, including zero carbon homes, also seems to be at risk.

The investment attractiveness for renewables in the UK is high. Yet, this is expected to decline due to the recent rollback on policies supporting renewable energy. The UK is one of the few G20 countries with no renewable energy target beyond 2020.

By reducing taxes and increasing subsidies to oil and gas production, the UK is the only G7 country that has sharply increased fossil fuel support in recent years. However, the UK claims it has no fossil fuel subsidies, basing that claim on its own definition.

The UK provides the G20's fourth highest level of international public climate finance relative to GDP, and the highest amount through multilateral climate funds. Between 2013 and 2015, however, it has spent an average of about US$ 6 billion a year of public finance on fossil fuels.

UNITED STATES

The United States performs very low in the category of greenhouse gas emissions and low in the category of energy use per capita. It has the G20's fourth highest level of greenhouse gas emissions per capita and the highest level of energy use per capita.

After the change in the federal government, national experts have rated both the US' national and international climate policies down. The US now ranks at the bottom of the G20. If all the Trump administration's announcements and budget cuts continue being implemented, support schemes for renewables would be reduced. The announced exit from the Paris Agreement is seen as an immense step backwards.

The investment attractiveness for renewable energy in the US is still high, but has been marked by a downward trend. There is uncertainty in the US about possible reductions in the Investment Tax Credit and Production Tax Credit and after the new US administration announced it will review – and repeal – the Clean Power Plan. Such recent developments add to existing federal tax breaks that subsidise various types of offshore oil and gas production.

The US spent an average of US$ 4 billion of public finance a year on fossil fuels between 2013 and 2014. Despite a decline in coal-fired power, federal tax breaks support various types of offshore oil and gas production. Trump also threatens the US's position as fourth highest provider of international bilateral climate finance and the remaining US$ 2 billion of its Green Climate Fund Pledge.

19) CAT (2015): "The Coal Gap: planned coal-fired power plants inconsistent with 2°C and threaten achievements of INDCs, http://climateactiontracker.org/assets/publications/briefing_papers/CAT_Coal_Gap_Briefing_COP21.pdf

WHY THE G20 COUNTRIES MUST MAKE A RAPID TRANSITION TO LOW-CARBON ECONOMIES

Keeping global warming "well below" 2°C requires an early peak in global greenhouse gas emissions around 2020, a subsequent rapid fall in emissions, net zero emissions in the middle of the second half of the century, and net zero global CO_2 emissions by roughly 2060. For limiting warming to 1.5°C, CO_2 emissions have to be net zero by roughly 2050.[20] This requires major transformational changes, particularly of our energy and transport systems.

Greenhouse gas emissions are the cause of climate change, but they have only limited predictive value in assessing whether a country is transitioning to a low-carbon economy. This Brown to Green report therefore describes the emissions development in the G20 member states, and provides a comprehensive overview on 1) their climate policy performance, 2) their provision of financing and advancing a financial framework for the transition and 3) their decarbonisation developments.

A country's policy performance shows the actions taken by its government. Policies influence finance flows: coherent climate policies, well-aligned investment frameworks and green finance instruments are essential to steer investment towards a low-emissions, resilient economy and determine the degree of decarbonisation.

20) Rogelj et al. (2015), "Zero emission targets as long-term global goals for climate protection", Environ. Res. Lett. 10 (2015) 105007 and Rogelj, J., Luderer, G., Pietzcker, R. C., Kriegler, E., Schaeffer, M., Krey, V., & Riahi, K. (2015): "Energy system transformations for limiting end-of-century warming to below 1.5 °C", Nature Climate Change, 5(6), 519–527, https://doi.org/10.1038/nclimate2572

GREENHOUSE GAS EMISSIONS: STILL RISING, BUT ENERGY-RELATED CO_2 EMISSIONS HAVE STALLED

Global greenhouse gas emissions need to reach zero in the middle of the second half of this century.

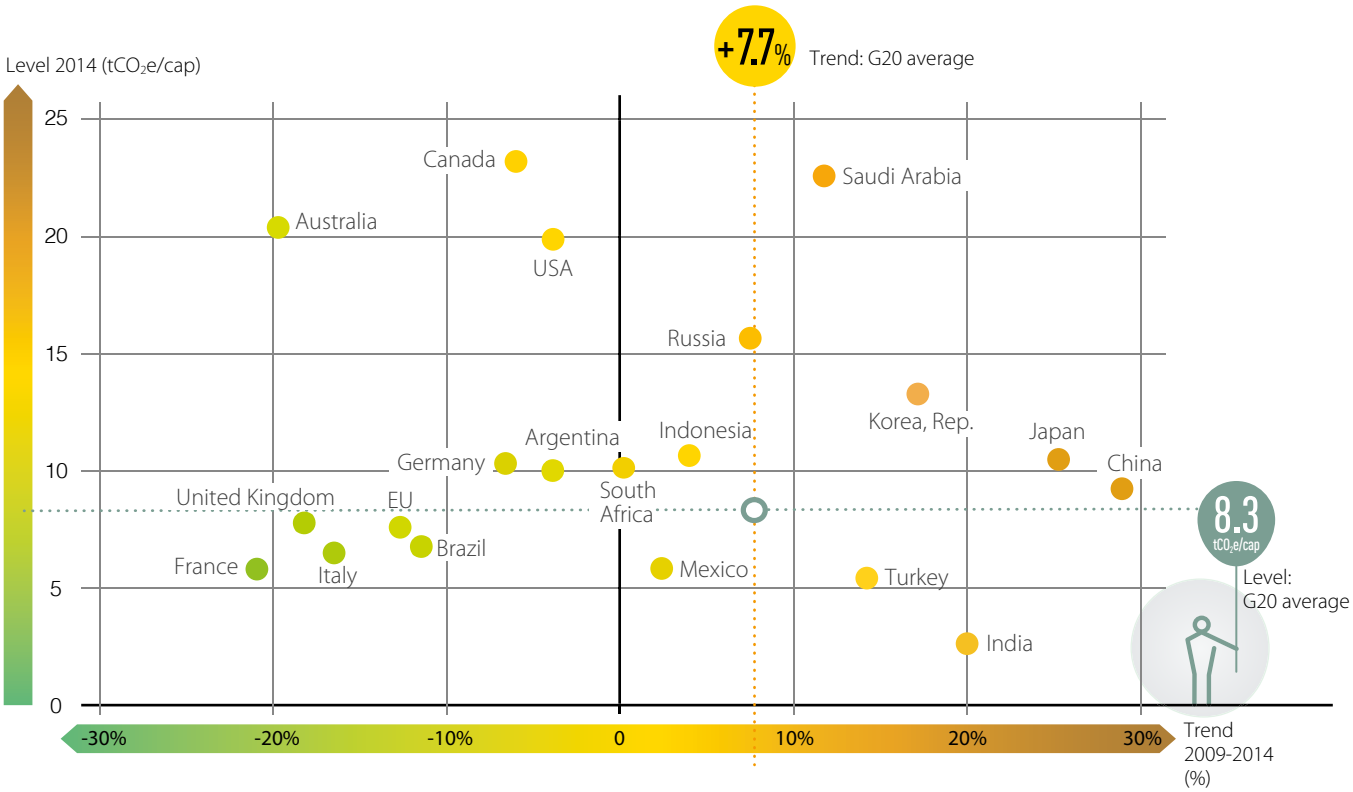
The G20 countries' greenhouse gas emissions[21] grew by 34% between 1990 and 2014.[22] Yet, in the same period their economies grew more, by nearly 117%, demonstrating that G20 countries are using energy resources more efficiently than in the past.

In half the G20 member countries, greenhouse gas emissions per capita are no longer increasing.

Recently published numbers suggest that total global energy-related CO_2 emissions have stalled for three consecutive years (2014–2016).[23]

21) Including LULUCF
22) PRIMAP (2017), https://www.pik-potsdam.de/research/climate-impacts-and-vulnerabilities/research/rd2-flagship-projects/gia/primap/primap
23) REN21, 2017: "Renewables 2017 Global Status Report", http://www.ren21.net/gsr-2017/chapters/chapter_01/chapter_01/

GREENHOUSE GAS EMISSIONS PER CAPITA



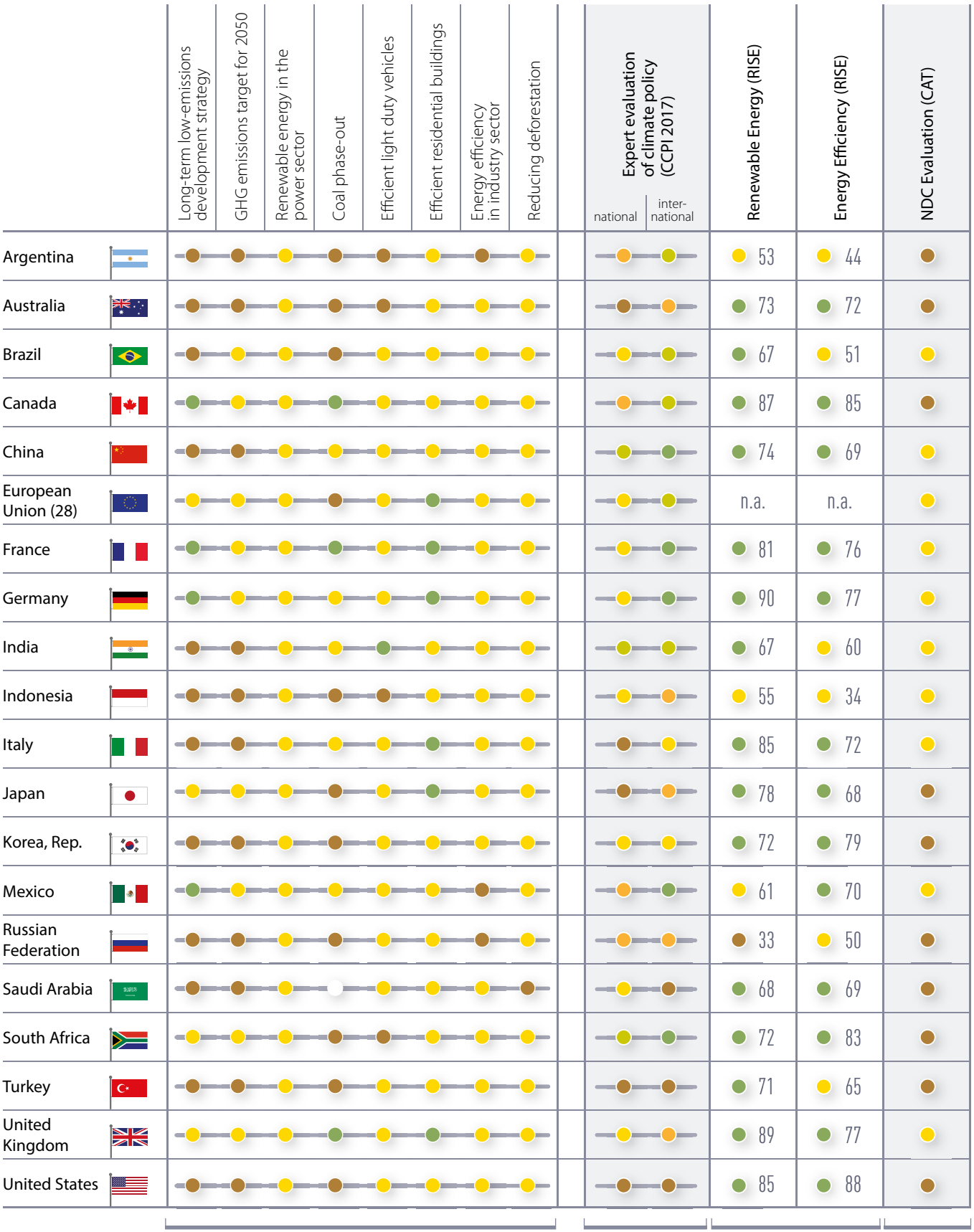
Source: CCPI 2017; PRIMAP, 2017

HIGH ON POLICY DEVELOPMENT, LOW ON AMBITION AND IMPLEMENTATION

An evaluation of the G20 climate policy performance – looking at policies, targets against benchmarks and expert opinions – reveals:

- Most G20 countries have climate policies in place in the power, transport, building, industry and forestry sectors;
- Yet, the majority of G20 country climate policies in different sectors are not sufficiently ambitious to reach well below 2°C, let alone 1.5°C targets;
- The mitigation targets of G20 countries (2020 targets and the first NDCs) are inadequate to limit global warming as required by the Paris Agreement;
- Many of the G20 national experts have ranked their country's performance in international policy processes (being constructive in the international climate negotiations) higher than their national climate policy performance at home, where they criticise inadequate ambition and implementation.

G20 CLIMATE POLICY PERFORMANCE RATING



Source: Own evaluation based on CAT, 2016; CCPI 2017 - G20 Edition; RISE index, 2017; CAT, 2017

	Criteria description		
	Low	Medium	High
Long term low emissions development strategy	No long term low emissions strategy	Existing long term low emissions strategy	Long-term low emissions strategy submitted to the UNFCCC in accordance with Article 4, paragraph 19, of the Paris Agreement
GHG emissions target for 2050	No emissions reduction target for 2050 (or beyond)	Existing emissions reduction target for 2050 (or beyond)	Emissions reduction target to bring CO_2 emissions to at least net zero by 2050
Renewable energy in power sector	No policy or support scheme for renewable energy in place	Support scheme for renewables in the power sector in place	Support scheme and target for 100% renewables in the power sector by 2050 in place
Coal phase-out	No consideration or policy in place for phasing out coal	Significant action to reduce coal use implemented or coal phase-out under consideration	Coal phase-out in place
Efficient light duty vehicles	No policy or emissions performance standards for LDVs in place	Energy/emissions performance standards or support for LDVs	National target to phase out fossil fuel cars in place
Efficient residential buildings	No policy or low-emissions building codes and standards in place	Building codes, standards and fiscal/financial incentives for low-emissions options in place	National strategy for near-zero energy buildings (at least for all new buildings)
Energy efficiency in industry sector	No policy or support for energy efficiency in industrial production in place	Support for energy efficiency in industrial production (covering at least two of the country's subsectors (e.g. cement and steel production))	Target for new installations in emissions-intensive sectors to be low-carbon after 2020, maximising efficiency
Reducing deforestation	No policy or incentive to reduce deforestation in place	Incentives to reduce deforestation or support schemes for afforestation /reforestation in place	National target for reaching zero deforestation by 2020s

CLIMATE POLICIES ARE IN PLACE, BUT ARE NOT COMPATIBLE WITH THE PARIS AGREEMENT'S TEMPERATURE LIMITS

Most G20 countries have introduced policies to decarbonise their power, transport, building, industry and forestry sectors.[24] As major economies and emitters, but also frontrunners in renewable energy worldwide, the G20 countries have a particular responsibility, reflecting different capabilities, and are well positioned to provide the needed leadership for the transition from brown to green. Based on a Climate Action Tracker (CAT) analysis of the steps to be taken in different sectors to reach this target, the current level of ambition for the majority of policies of G20 countries is not high enough to be compatible with the Paris Agreement temperature limit.[25]

Long-term low-emissions development strategy: Canada, France, Germany and Mexico have submitted their long-term low-emission development strategies to the UNFCCC, and are therefore ranked high. The EU, Japan, South Africa and the UK have long-term strategies, though they have not submitted these to the UNFCCC as invited to do so in Article 4.19, so are ranked medium.

Greenhouse gas emissions target for 2050: Argentina, Australia, China, India,[26] Indonesia, Italy, the Republic of Korea, Russia, Saudi Arabia and Turkey do not have a greenhouse gas emissions target for 2050 or beyond (ranked low). All other G20 countries do (ranked medium), although their targets do not bring CO_2 emissions to net zero by 2050.

Renewable energy in the power sector: all G20 countries have support schemes for renewable energy in place. They are ranked medium as none of them have a target for 100% renewables by 2050.

Coal phase-out: the CAT estimates that emissions from coal-fired power plants must be phased out globally before 2050 to be compatible with the Paris temperature limit. Canada, France and the UK have established a plan for a coal phase-out (ranked high). Other countries, Germany, Italy and Mexico, are currently considering phasing out coal, or have taken significant action to reduce coal consumption. China and India recently cancelled a number of new coal power plant projects (ranked medium). China's coal use started to decrease from 2014, and it is believed this trend will continue. Brazil is not decommissioning coal-fired plants (having a low coal share of around 6% in its energy mix), thus ranked low, but the Brazilian Development Bank announced to no longer finance coal-fired power plants.

24) Best practices for climate-related agricultural policies vary for G20 countries. Therefore, no evaluation of the level of ambition is included.
25) CAT (2016), "The ten most important short-term steps to limit warming to 1.5°C", http://climateactiontracker.org/assets/publications/publications/CAT_10_Steps_for_1o5.pdf
26) India has a long-term goal that is not expressed in terms of absolute emissions levels but says to never exceed per capita emissions of developed countries.

Efficient light duty vehicles: to bring down emissions in the personal transport sector, only zero emission vehicles should be on the road by the middle of the century. India is the only G20 country that has announced a total ban on new fossil fuel-driven cars from 2030 (ranked high). With the exception of Argentina, Australia, Indonesia and South Africa (ranked low), all other G20 countries have energy/emissions performance standards, or support for efficient light duty vehicles in place (ranked medium).

Efficient residential buildings: according to the CAT, new buildings will eventually have to be fossil-free and near zero energy to be in line with the Paris Agreement temperature limit.[27] In addition, extensive efforts to retrofit existing, inefficient housing stock are needed. Frontrunners are the EU (its member states France, Germany, Italy and the UK) as well as Japan which have national strategies for near-zero energy buildings in place (ranked high). All other G20 countries have introduced building codes, standards or fiscal/financial incentives for low-emission options in the residential building sector, although with various levels of stringency (ranked medium).

Energy efficiency in industry sector: no G20 country has a low-carbon target for new installations in emissions-intensive sectors beyond 2020. Most G20 countries support energy efficiency in industrial production, albeit with different ambition levels. Argentina and Mexico so far do not have such policies (ranked low).

Reducing deforestation: limiting global temperature increase to the Paris Agreement limit requires net zero deforestation by around 2020 according to CAT estimates. No G20 country has a national target for deforestation. With the exception of Saudi Arabia, all G20 countries have incentives to reduce deforestation and support schemes for afforestation/reforestation (ranked medium).

G20 COUNTRIES ARE STRONG PERFORMERS IN RENEWABLE ENERGY AND ENERGY EFFICIENCY POLICIES

According to the Regulatory Indicators for Sustainable Energy (RISE) index of the World Bank Group,[28] 15 of the G20 countries show a strong performance in national policy and regulatory framework for renewable energy compared globally. Three countries – Argentina, Indonesia and Russia – are regarded as middling performers and only Saudi Arabia is regarded as a poor performer.

Most G20 countries have a strong performance in the area of energy efficiency – although lower than for renewable energy. Argentina, Brazil, India, Indonesia, Saudi Arabia and Turkey score in the mid-range.

G20 2020 TARGETS AND NDCs ARE INADEQUATE TO REACH PARIS AGREEMENT GOALS

All G20 countries have submitted their first NDCs,[29] which will be tracked within the newly established UNFCCC Transparency framework.

The UN Environment Programme's Emissions Gap Report[30] concluded that there is a large gap between emissions projected for 2030 and what is required to be consistent with a well below 2°C/1.5°C trajectory and the NDCs. The analysis implies a temperature increase of at least 3°C in 2100.

Informed by the upcoming IPCC Special Report on 1.5°C, the 2018 Facilitative Dialogue aims to provide a comprehensive picture of what the national contributions and financial flows add up to.

According to the Climate Action Tracker (CAT), the G20 governments' NDCs and 2020 mitigation targets are less ambitious than what is needed to limit global warming below 2°C, let alone 1.5°C.[31] The CAT rating takes into account the issue of an equitable distribution of countries' contributions. The NDCs and 2020 mitigation targets of ten G20 countries are considered "inadequate," and would lead to a warming of 3-4°C: Argentina, Australia, Canada, Japan, the Republic of Korea, Russia, Saudi Arabia, South Africa, Turkey and the

27) Zero emissions could be achieved with net zero energy use or 100% emission free energy use, e.g. electricity from renewables.

28) RISE helps to compare national policy and regulatory frameworks for renewable energy (Indicators: 1) Legal framework, 2) Planning for renewable energy expansion, 3) Incentives and regulatory support, 4) Attributes of financial and regulatory incentives, 5) Network connection and pricing, 6) Counterparty risk, 7) Carbon pricing and monitoring) and energy efficiency (Indicators: 1) National energy efficiency planning, 2) Energy efficiency entities, 3) Information provided to consumers about electricity usage, 4) EE incentives from electricity rate structures, 5) Incentives & mandates: large consumers, 6) Incentives & mandates: public sector, 7) Incentives & mandates: utilities, 8) Financing mechanisms, 9) Minimum performance standards, 10) Energy labeling systems, 11) Building energy codes, 12) Carbon pricing. RISE classifies countries into a green zone of strong performers in the top third (Score: 67-100), a yellow zone of middling performers (Score: 34-66), and a red zone of weaker performers in the bottom third (Score: 0-33).

29) Argentina and the EU have revised their NDC after the entering into force of the Paris Agreement.

30) UNEP (2016): "The Emissions Gap Report 2016", http://www.unep.org/emissionsgap/resources

31) CAT (2016) „Climate Action Tracker", http://climateactiontracker.org/

United States. The other G20 countries – Brazil, China, the EU (and consequently its G20 member states France, Germany, Italy and the UK), India, Indonesia and Mexico – have been ranked "medium."

EXPERTS RANK THE INTERNATIONAL POLICY PERFORMANCE OF G20 COUNTRIES BETTER THAN THEIR NATIONAL PERFORMANCE

Experts from G20 countries consulted by the Climate Change Performance Index in October 2016 and May 2017[32] have ranked their country's performance in international policy processes higher than their national climate policy performance, where they criticise inadequate ambition and implementation. Experts express appreciation for G20 countries ratifying the Paris Agreement, Italy as G7 Presidency, and Germany as G20 Presidency both advocating for climate action in these forums, and the EU and China stepping in for the disappearing international climate leadership of the US. In contrast, experts observe that the implementation of ambitious climate policies on a national level lags behind.

Good performers in national and international climate policies are China, Brazil, France, Germany, India, Mexico and South Africa.

- National experts stress **China's** rapid expansion of renewable energy and the possibility of CO_2 emissions peaking before 2030, earlier than planned.
- While acknowledging developments in renewable energy and the forest sector, **Brazilian** experts demand more ambitious emissions reduction and efficiency targets. A plan for phasing out fossil fuel subsidies and an effective carbon price signal are still missing.
- National experts in **France** expect President Macron will stick with the targets set by the previous administration.
- **Germany** slightly improved its ranking due to its new climate protection plan for 2050. Experts point to the need to improve its sectoral targets and implement measures to reach them. An adequate plan to phase out coal, and policies to reduce emissions from the transport sector would be important steps.
- **Indian** experts value one of the largest expansion programmes for renewable capacity in the world.
- **Mexico** was praised for developing – and submitting early – a long-term decarbonisation strategy. Yet, its strategy for 2050 does not contain a clear implementation roadmap.
- Experts value **South Africa's** sectoral approaches for achieving its national targets as well as the contribution to the international climate negotiations.

Poor performers are Australia, Japan, Saudi Arabia, Turkey and the United States.

- Experts acknowledge **Australia's** progress in developing enhanced renewable energy schemes and energy efficiency programmes, particularly in the residential building sector. They criticise the government's overall lack of ambition in climate policies.
- **Japan's** policy performance is ranked very low. Enhancing nuclear power plants as well as coal-fired power plants instead of strengthening renewable energy was criticised by experts.
- Experts have acknowledged that **Saudi Arabia** ratified the Paris Agreement, but criticised the government's continued reliance on its oil reserves instead of exploiting the high potential for renewable energy.
- **Turkish** experts criticise the lack of an energy efficiency target and remark that funding of most climate protection projects comes from international institutions rather than national budgets.
- National experts rate the **United States** down both on a national and international scale. If all the Trump administration's announcements and budget cuts are implemented, support schemes for renewables would be reduced. The US exit of the Paris Agreement is seen as an immense step backwards.

32) The CCPI evaluates a country's performance in national climate policy, meaning the performance in establishing and implementing a sufficient policy framework, as well as international climate diplomacy through feedback from national climate and energy experts. CCPI (2017), "Climate Change Performance Index", https://germanwatch.org/en/ccpi

GREEN INVESTMENTS ARE ON THE RISE, BUT G20 GOVERNMENTS CONTINUE TO SUBSTANTIALLY FINANCE BROWN INFRASTRUCTURE

Globally, total investment required in infrastructure over the next 15 years is estimated to be around US$ 80-90 trillion. To make this investment compatible with a 2°C target initially requires a higher investment of only 5% which will pay off over time.[33] Countries need to scale up public and private financial flows, but these flows will also need to be redirected from brown to green. This offers enormous opportunities for climate change mitigation, and for economic growth and job creation.

The main trends of G20 financing the transition to a low-carbon economy include:

Investments

- G20 countries are attractive for investments in renewable energy, noting variations within the G20;
- Green bonds constitute less than 1% of each G20 countries' debt market,[34] but recent growth rates are remarkable;
- In 2016, more green than brown energy capacity was installed worldwide. Yet, there is still substantial public and private investment in G20 countries into brown energy infrastructure;
- Public institutions of G20 countries still provide large amounts of financing for fossil fuels;

Fiscal policies

- G20 governments are not meeting their commitments to phase out fossil fuel subsidies;
- More carbon pricing mechanisms have been introduced in recent years. Effective carbon rates, which take into account various energy taxes and carbon pricing schemes, remain too low in G20 countries;

Provision of international support

- International climate finance provision varies significantly in nature.

33) Bhattacharya, A., Meltzer, JP., Oppenheim, J., Qureshi, Z. & Stern, N. (2016): "Delivering on sustainable infrastructure for better development and better climate. Brookings Institution", https://www.brookings.edu/wp-content/uploads/2016/12/global_122316_delivering-on-sustainable-infrastructure.pdf

34) Green bonds outstanding per country as a percentage of the overall debt securities market for that country

1. INVESTMENTS

INVESTMENT ATTRACTIVENESS FOR RENEWABLE ENERGY

	Allianz	RECAI * Ranking out of 40	RECAI Trend **
Argentina	medium	high 12	↑
Australia	medium	high 5	↑
Brazil	medium	high 15	↓
Canada	medium	high 11	↓
China	high	high 1	↑
European Union (28)	n.a.	n.a.	n.a.
France	high	high 8	↓
Germany	high	high 4	↑
India	medium	high 2	↑
Indonesia	low	n.a.	n.a.
Italy	medium	high 18	↑
Japan	medium	high 7	↑
Korea, Rep.	medium	medium 33	↓
Mexico	low	high 9	↓
Russian Federation	low	n.a.	n.a.
Saudi Arabia	very low	n.a.	n.a.
South Africa	medium	high 19	↓
Turkey	very low	high 17	↑
United Kingdom	high	high 10	↑
United States	medium	high 3	↓

very low · low · medium · high · very high

low · medium · high

increasing trend · decreasing trend

*) *Adapted from RECAI and re-classified in 3 categories (low, medium, high) for comparison purposes with Allianz Monitor. The number indicates the rank of the country in the worldwide RECAI ranking.*

**) *Taken from RECAI issue of May 2017*

G20 COUNTRIES ARE LEADING IN INVESTMENT ATTRACTIVENESS FOR RENEWABLE ENERGY

The Allianz Climate and Energy Monitor and the Renewable Energy Country Attractiveness Index (RECAI) analyse a country's investment attractiveness for renewable energy. The Allianz Monitor rates G20 countries based on their climate and long-term transition strategy, renewable energy target, support policies for renewables and fossil fuel subsidies. RECAI ranks the top 40 countries worldwide concerning macro indicators (e.g. economic stability), energy needs (e.g. security and supply), enablement environment, project delivery (e.g. infrastructure), and technology potential. As both indices look at different aspects, conclusions vary to some extent.

According to RECAI, the investment attractiveness for renewable energy in G20 countries on average is high, compared to non-G20 countries.

Frontrunners in both ratings are China, France, Germany and the UK.

- **China** ranks first and fourth respectively in the latest RECAI and Allianz Monitor editions for renewable energy investment attractiveness. The country has ambitious plans to scale up renewables, and has recently achieved record-high installation rates.
- **France** strives for a total decarbonisation of its electricity sector by 2050. The installation of wind energy capacity in the past has been relatively high; developments in other renewable energy sources has been slow.[35]
- **Germany** ranks very high in both the RECAI and Allianz Monitor indices. It has a high renewable energy target and strong support scheme. The country recently switched from a support policy based on feed-in tariffs to competitive auctioning for large-scale renewables.[36]
- The current high ranking of the **UK** is expected to decline due to its recent rollback on renewable energy support policies. The UK is one of a few G20 countries that lacks a renewable energy target beyond 2020.[37]

Australia, Canada, India, Italy, Japan, South Africa and the United States have a relatively high investment attractiveness. There is uncertainty in the US about possible reductions in the Investment Tax Credit and Production Tax Credit after the new US administration announced its review of the Clean Power Plan.

35) Allianz Climate and Energy Monitor (2017), https://allianz.com/en/monitor
36) See footnote 35
37) See footnote 35

GREEN BONDS IN G20 COUNTRIES ARE ON THE RISE

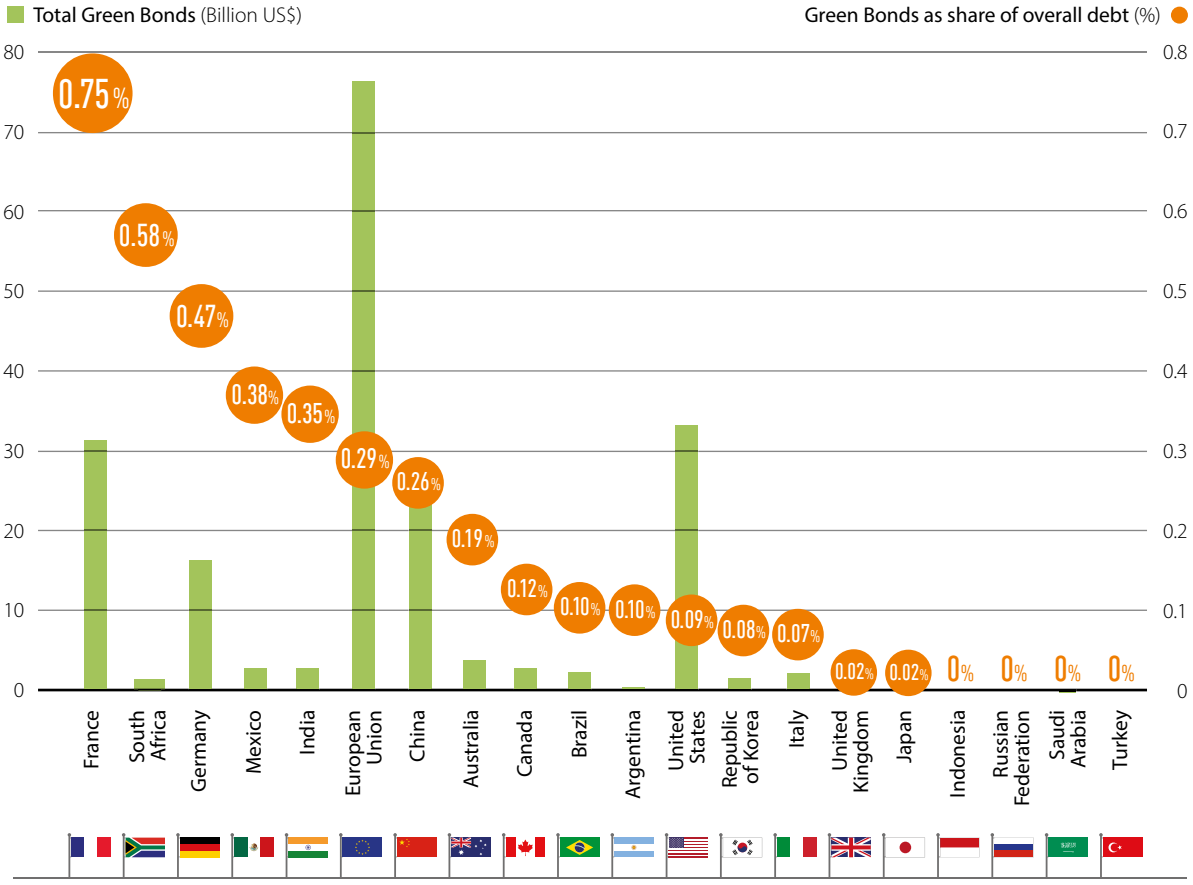
Green bonds – financing projects that deliver environmental benefits – have gained considerable prominence in recent years. Although green bonds constitute less than 1% of each G20 country's debt market,[38] the growth rates are remarkable: worldwide annual issuance rose from just US$ 3 billion in 2011 to US$ 95 billion in 2016.

France, South Africa, Germany and Mexico have the G20's highest green bond market penetration.[39, 40] France issued its first green sovereign bond in early 2017 – the largest green bond issued to date at EUR 7 billion – increasing the overall French green bond market by approximately 25%.

In terms of total green bonds, the EU has been the most influential region (US$ 76.29 billion) breaking new boundaries in 2017 through sovereign issuance, green bond funds and exchange-traded funds.

China is just behind the EU with regard to market penetration. The first Chinese green bonds were issued in late 2015, but substantial growth has since made China 2016's largest single green bond issuing country.

GREEN BONDS



38) *Green bonds per country (April 2017) as a percentage of the overall debt securities market for that country (Q3 2016). The numbers referred to in this analysis are green bonds outstanding: Bonds that have been issued but have not yet matured or been otherwise redeemed.*

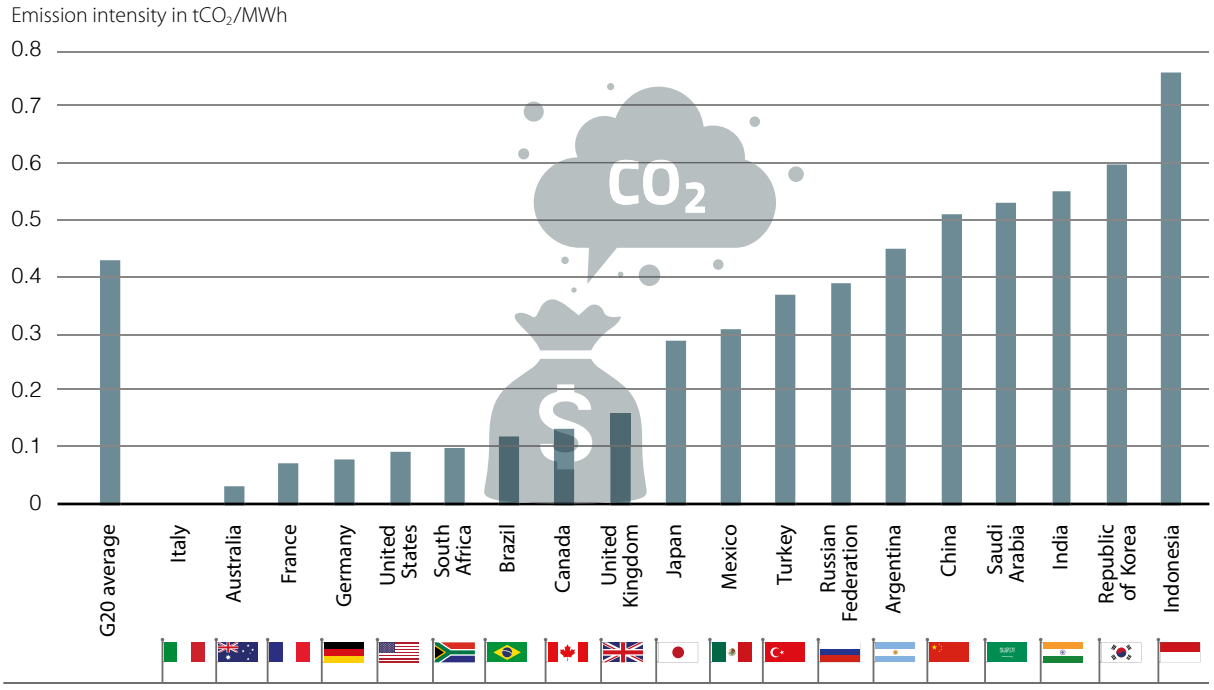
39) *Countries with a very small debt securities market are overweight in the indicator. The global debt securities market is vast compared to the green bond market and concentrated in very few countries. Therefore, countries with minimal green bond issuance but very small bond markets come out as leaders in the figures – e.g. South Africa and Mexico.*

40) *Green bonds include bonds that are labeled green or climate, are in line with Climate Bonds Initiative taxonomy, have no link to fossil fuels and of which more than 95% of proceeds are going to finance and refinancing green projects.*

SUBSTANTIAL PUBLIC AND PRIVATE INVESTMENT IN G20 COUNTRIES IN BROWN ENERGY INFRASTRUCTURE REMAINS

The emissions intensity of electricity production from capacity that was installed in 2016 indicates how green or brown recent investments have been. For G20 countries that mainly installed renewables or other low-carbon sources, the average emissions intensity of new investments in the power sector is between 0 to 0.2 tCO_2/MWh, e.g. in Italy, France, Germany and the US. Australia and South Africa also had a low emissions intensity in 2016, but added significant coal capacity in the years prior to 2016. Countries with a high share of new capacity from emissions-intensive coal (often alongside investments in renewables) are in the order of 0.5 to 0.8 tCO_2/MWh, such as China, India, Korea and Indonesia. Saudi Arabia has an equally high emissions intensity with added oil and gas capacity.

EMISSIONS OF NEW INVESTMENTS IN THE POWER SECTOR IN 2016



Source: Calculations done by IDDRI for Climate Transparency, 2017

FOSSIL FUEL INVESTMENTS BY G20 COUNTRIES' PUBLIC FINANCE INSTITUTIONS ARE VERY HIGH

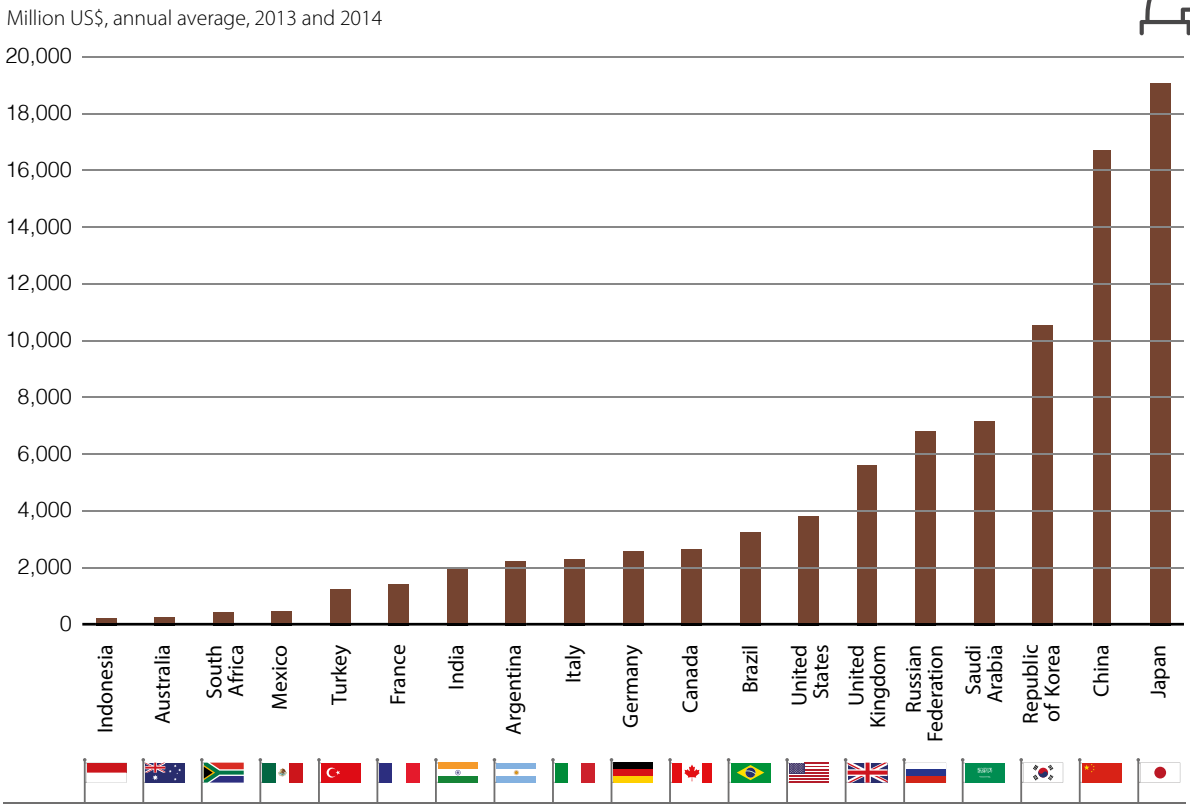
Public finance institutions of G20 countries, such as national and international development banks, majority state-owned banks and export credit agencies, spent an average of over US$ 88 billion a year on coal, oil and gas projects between 2013 and 2014.[41]

The highest levels of public finance for fossil fuels in the G20 come from Japan and China, who provided about US$ 19 billion and US$ 17 billion a year between 2013 and 2014, respectively. Over the same period, Korea provided US$ 10 billion annually, followed by Saudi Arabia and Russia each with US$ 7 billion annually, the UK with nearly US$ 6 billion annually, USA with US$ 4 billion annually, followed by Brazil, Canada, Germany, Italy, Argentina, and India, all with between approximately US$ 2 to 3 billion each.

Export credit agencies and development finance institutions provided the vast majority of this public finance. In some countries, particularly India, Russia, and Turkey, majority state-owned banks are a larger source of funding for fossil fuel projects, while the multilateral development banks, most of which are dominated by G20 shareholders, also continue to provide significant levels of finance for fossil fuel production.

Much of the international public finance for fossil fuels supported exploration-related activities. Much of the fossil fuel finance from G20 countries goes to other G20 countries, driving further fossil fuel production within the G20.

G20 PUBLIC FINANCE FOR FOSSIL FUELS



Source: ODI/OCI, 2015

41) Bast, E., Doukas, A., Pickard, S., van der Burg, L., Whitley, S. (2015): "Empty Promises. G20 Subsidies to Oil, Gas and Coal Production.", https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9958.pdf

2. FISCAL POLICIES

G20 GOVERNMENTS ARE NOT MEETING THEIR COMMITMENTS TO PHASE OUT FOSSIL FUEL SUBSIDIES

Fossil fuel subsidies are effectively a negative carbon price and hinder decarbonisation efforts, including by sustaining uncompetitive industries. In 2009, G20 countries committed to phase out "inefficient" fossil fuel subsidies, and have reaffirmed this commitment every year since.[42] However, governments are not on track in meeting their commitments.

Based on data from the OECD and IEA, in 2014, G20 countries provided over US$ 230 billion subsidies to coal, oil and gas.[43] This estimate only includes tax exemptions and budgetary support towards production and consumption of fossil fuels, and does not consider broader subsidies provided through public finance and state-owned companies.[44] Based on the IEA's approach of measuring subsidies, Saudi Arabia provided the largest amount: over US$ 71 billion. Based on the OECD data, China provides almost US$ 35 billion, Indonesia US$ 32 billion, and Brazil US$ 27 billion. Canada and Turkey provided the least amount, at US$ 114 million[45] and US$ 912 million[46], respectively.

G20 countries initiated a voluntary peer review process of their subsidies in 2013. The US and China conducted a peer review in 2016, and Germany and Mexico are following suit this year.

CARBON PRICES IN THE G20 REMAIN TOO LOW TO TACKLE CLIMATE CHANGE

Carbon pricing is considered a cost-effective way to reduce emissions.[47] Nearly all G20 countries have national or sub-national carbon pricing mechanisms, or are currently exploring their use.

However, across all G20 countries, 'effective carbon rates' – a sum of carbon taxes, taxes on energy use, and tradable emission permit prices – are low in sectors outside of road transport.[48, 49] In 2012,[50] the highest rates per tonne of CO_2 were about US$ 31 in Germany, around US$ 25 in Australia and Italy, and US$ 18 in the UK. Indonesia, Mexico and Russia had the lowest rates, at zero or close to zero.

According to OECD estimates,[51] emissions should be priced at least US$ 37 per tonne revealing a 'carbon pricing gap' within the G20. More recently, the flagship report of the High-Level Commission on Carbon Prices has argued that meeting the global climate goals will require a carbon price of US$ 40-80/t CO_2 by 2020 and US$ 50-100/t CO_2 by 2030.[52]

Effective carbon rates for road-based energy are significantly higher, with the highest being, per every tonne of CO_2, US$ 364 in the UK, US$ 300 in Italy, US$ 266 in Germany.[53]

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42) More recently, G7 countries (a subset of the G20) committed to phasing out fossil fuel subsidies by 2025. In addition, the European Commission has made a commitment to remove those to hard coal mining by 2018, and Member States also committed to begin developing plans for phase-out by 2020.

43) Based on OECD data (and IEA data for Argentina and Saudi Arabia); governments provide limited information on their fossil fuel subsidies

44) OECD-IEA (2015):"Fossil Fuel Inventory 2015",: www.oecd.org/site/tadffss/
The data for subsidies in Argentina and Saudi Arabia is from the IEA subsidies database. The IEA uses a different methodology for calculating subsidies than the OECD. It uses a 'price-gap' approach and covers a sub-set of consumer subsidies. The price-gap approach compares average end-user prices paid by consumers with reference prices that corresponds to the full cost of supply.

45) OECD data for Canada does not include any budgetary support provided and other studies estimate much higher numbers. Touchette and Whitley (2015): "G20 subsidies to oil, gas and coal production: Canada", https://www.odi.org/publications/10091-g20-subsidies-oil-gas-coal-production-canada

46) Other studies estimate higher numbers.

47) Carbon pricing includes different schemes such as emission trading systems (ETS), carbon taxes as well as taxes on fossil fuels.

48) OECD (2016), "Effective Carbon Rates – Pricing CO2 through Taxes and Emission Trading Systems", http://www.oecd.org/tax/effective-carbon-rates-9789264260115-en.htm. A note on biomass emissions and effective carbon rates: the effective carbon rates presented in this report do not factor in emissions from biomass, as many countries and the UNFCCC treat them as carbon-neutral. However, in many cases biomass emissions are found to be non-carbon neutral over their life-cycle, especially due to the land use changes they cause. In OECD's second set of calculations where biomass emissions are also counted in as carbon content, then the effective carbon rates are slightly lower, but only by between 1-16% percentage points. The exceptions are Brazil, India and France, where accounting for biomass emissions makes the effective carbon price 53%, 47% and 22% lower.

49) Specific taxes on energy use, which are predominantly excise taxes, dominate the other two components of effective carbon rates (carbon taxes and tradable permit prices). Carbon taxes are low on average and cover a small part of emissions from energy use across the G20. Tradable permit prices are also low, but contribute significantly to coverage of non-road emissions with a price.

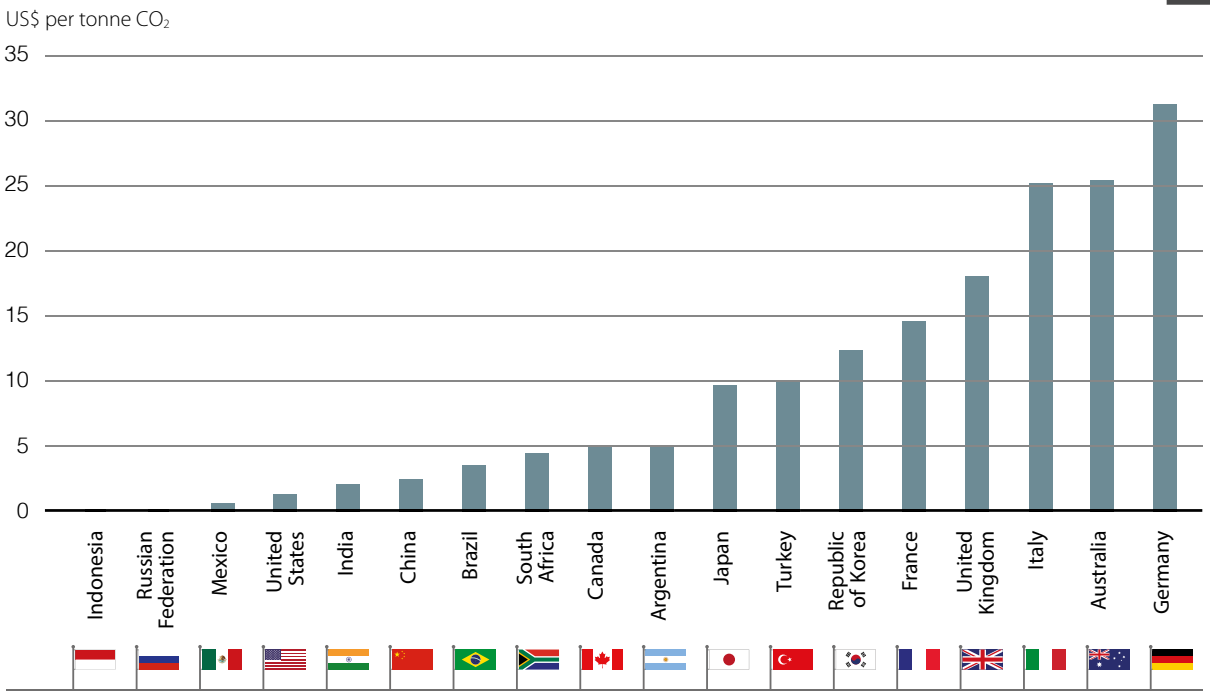
50) The Effective Carbon Rates listed in this report are based on OECD's Taxing Energy Use databases, which uses tax rates and energy use data from 2012. Countries have introduced new tax reforms and policies since 2012, and therefore these rates represent former levels. While it is important to update them, they are included here as they are the latest comprehensive and internationally comparable data of effective carbon prices across G20 countries.

51) Carbon Pricing Leadership Coalition (2017), "Report of the High-Level Commission on Carbon Prices", https://static1.squarespace.com/static/54ff9c5ce4b0a53decccfb4c/t/59244eed17bffc0ac256cf16/1495551740633/CarbonPricing_Final_May29.pdf

52) See reference of footnote 51

53) See reference of footnote 51

EFFECTIVE CARBON RATE (NON-ROAD ENERGY, 2012)



Source: OECD, 2012

3. PROVISION OF INTERNATIONAL SUPPORT

CLIMATE FINANCE PROVISION VARIES SIGNIFICANTLY IN NATURE

Developed countries have committed to mobilise the provision of US$ 100 billion annually to developing countries for climate actions by 2020. Finance can come from both public and private sources. Public finance has a key role in supporting capacity building, piloting technology and in public good provision.

Annually, in the period from 2013-2014, the eight G20 countries, which are obliged to provide support, reported US$ 17 billion in public bilateral flows[54] and over US$ 1.5 billion through multilateral climate funds.[55] These countries include some of the largest climate finance donors.

Japan, France, Germany, UK and the US each provided between US$ 8.4 billion and US$ 1.2 billion a year in 2013-2014, amounting to between 0.2 and 0.02% of GDP. Australia, Canada and Italy provided less climate finance during this period, both in absolute terms and relative to GDP.

The newest financial mechanism under the UNFCCC, the Green Climate Fund (GCF) has strong political significance as the primary channel for delivering multilateral climate finance to support the implementation of the Paris Agreement. The US, Japan, the UK, France and Germany have the five largest pledges to the Green Climate Fund (GCF),[56] ranging from US$ 1 billion to US$ 3 billion. While these pledges have been signed, the Trump administration has announced the US's intention to cancel the remaining US$ 2 billion of its US$ 3 billion pledge. Indonesia, Mexico and the Republic of

54) It is possible that bilateral finance provision overlaps with that reported under investment of public finance institutions.

55) Climate Funds Update (2017), http://www.climatefundsupdate.org/; UNFCCC (2016): "UNFCCC Standing Committee on Finance – 2016 Biennial Assessment and Overview of Climate Finance Flows Report", http://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/2016_ba_technical_report.pdf

56) The Green Climate Fund is not included in the data on multilateral climate funds (2013 and 2014) as there were no project approval until 2015.

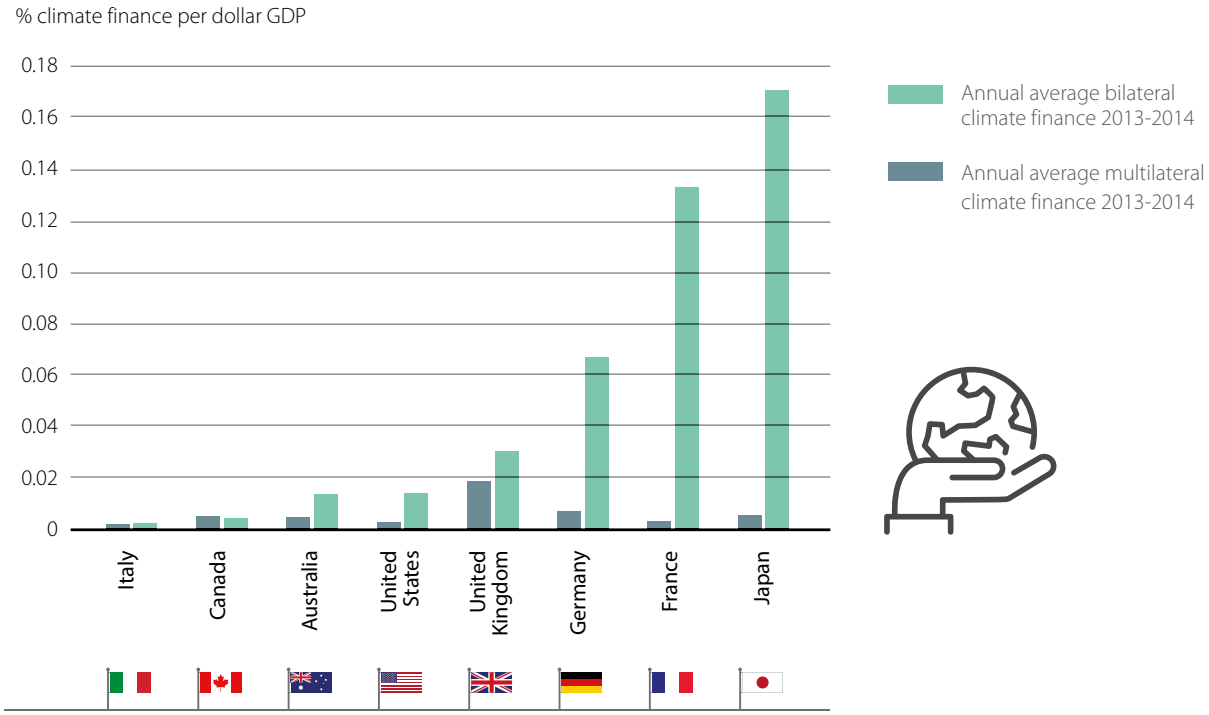
Korea have voluntarily contributed to the GCF. There is also an increase in south-south flows of finance; the Republic of Korea reports close to US$ 0.2 billion in bilateral south-south flows of climate finance.[57] Formal reporting on these flows is not required under UNFCCC.

The nature of the flows of public climate finance vary significantly. Japan includes efficient coal technologies in its bilateral climate finance, for example, as does Australia. All but Australia and UK include export credits to support domestic companies to invest in developing countries. While Germany, Australia, Canada, Italy and the UK have over 87% programmed as grant support, Japan and the US channel more via other instruments including concessional loans, non-concessional loans, and equity. 44% of the bilateral funds and 77% of the multilateral funds[58] are designated for mitigation efforts. 30% of the bilateral funds and 23% of the multilateral funds are dedicated to adaptation, the remainder going to cross-cutting issues.[59]

G20 countries also contribute to climate action through the Multilateral Development Banks (MDBs). In 2014, the MDBs reported climate finance flows of US$ 26 billion to developing countries.

However, MDB investments in adaptation and mitigation cannot be directly attributed to the financial contributions of individual countries. While the share of MDB climate finance attributed to developed countries is estimated at around 65-85%, there are no country level estimates made here.

CLIMATE FINANCE AS PERCENTAGE OF GDP



Source: Climate Funds Update, 2017; Party reporting to the UNFCCC 2013-2014

57) China also reports south-south flows of international cooperation in its reporting to the UNFCCC, however, it is not presented in format from which annual totals can be extracted or analysed.

58) Multilateral climate fund mitigation support includes that for REDD+ that can be labelled 'other' in bilateral support (rather than mitigation) thus the bilateral bias to mitigation may be larger.

59) As the GCF becomes increasingly operational and approves more projects, its commitment to spend 50% of resources on adaptation may go some way to reduce the bias to mitigation through the multilateral climate funds.

MORE "GREEN", STILL TOO MUCH "BROWN"

Keeping the global temperature increase well below 2°C or 1.5°C requires a transition to a low-carbon economy. The analysis of decarbonisation indicators shows that the G20 countries have started this transition, but are in an early phase:

- G20 countries are becoming more efficient, but not enough to compensate for economic and population growth.
- Renewable energy is on the rise in the G20, but coal and other fossil fuels still dominate.

G20 CARBON INTENSITY OF THE TOTAL PRIMARY ENERGY SUPPLY: STILL RISING, NOT MEETING CLIMATE OBJECTIVES

G20 economies are becoming more efficient – the energy intensity and carbon intensity of G20 economies are both decreasing.[60] However, as both energy consumption and the economy have grown, the higher efficiency has not been sufficient to lead to an overall reduction in greenhouse gas emissions.

The energy intensity of the G20 economy (Total Primary Energy Supply/GDP) and the carbon intensity of the G20 economy (CO_2/GDP) decreased by about 30% and 27% respectively between 1990 and 2014.[61] All G20 countries, with the exception of Brazil and Saudi Arabia, show a decreasing trend in energy intensity since 2009. Both these countries' energy intensity levels are below the G20 average (5 MJ per 2011 US$).

60) See graph in Executive Summary
61) IEA (2016): "Energy balances", http://www.iea.org/statistics/topics/energybalances/

Despite reductions in recent years, Canada, China, Russia and South Africa have still high levels of energy intensity. The UK leads the field: it achieved the highest reduction rate since 2009 (-17 %) and has lowest level (3 MJ per US$), due to a switch from coal to gas in the energy supply as well as a shift towards a service-oriented economy.

Energy use per capita – which should increase for developing countries to meet development needs – grew slightly in the G20 between 1990 and 2014. India, Indonesia, Italy and the UK have the best performance in energy use per capita among the G20 countries, if one considers current level and trends of energy use per capita and the level and target compared to a well below 2°C pathway.

The carbon intensity of the energy sector (CO_2/TPES) in the G20 has slightly increased between 1990 and 2014, as the growing energy demand has been partly satisfied with coal.[62] The needs of developing countries will require an increase of their total primary energy supply. If the climate objectives are to be met at the same time, the carbon intensity has to be reduced substantially. Over recent years, there has been a decreasing trend for more than half of the G20 countries (Argentina, Australia, the EU, France, Italy, Mexico, Republic of Korea, Russia, Turkey, the UK and the United States).

62) See graph on share of coal in this chapter

G20 DECARBONISATION PERFORMANCE RATING

	Emissions	Energy intensity of the economy	Carbon intensity of the energy sector	Energy use per capita	Share of coal in TPES	Share of renewables in TPES
	Overall rating*	Current level (2014)	Current level (2014)	Overall rating**	Current level (2014)	Current level (2014)
Argentina						
Australia						
Brazil						
Canada						
China						
European Union (28)						
France						
Germany						
India						
Indonesia						
Italy						
Japan						
Korea, Rep.						
Mexico						
Russian Federation						
Saudi Arabia						
South Africa						
Turkey						
United Kingdom						
United States						

very low
low
medium
high
very high

Source: IEA 2016, CCPI 2017 - G20 Edition

*) *The CCPI rating on the performance in greenhouse gas emissions per capita is based on three categories: 1) greenhouse gas emissions per capita level (2014), 2) Recent developments of greenhouse gas emissions per capita (2009-2014) and 3) current level compared to a well below 2°C pathway.*

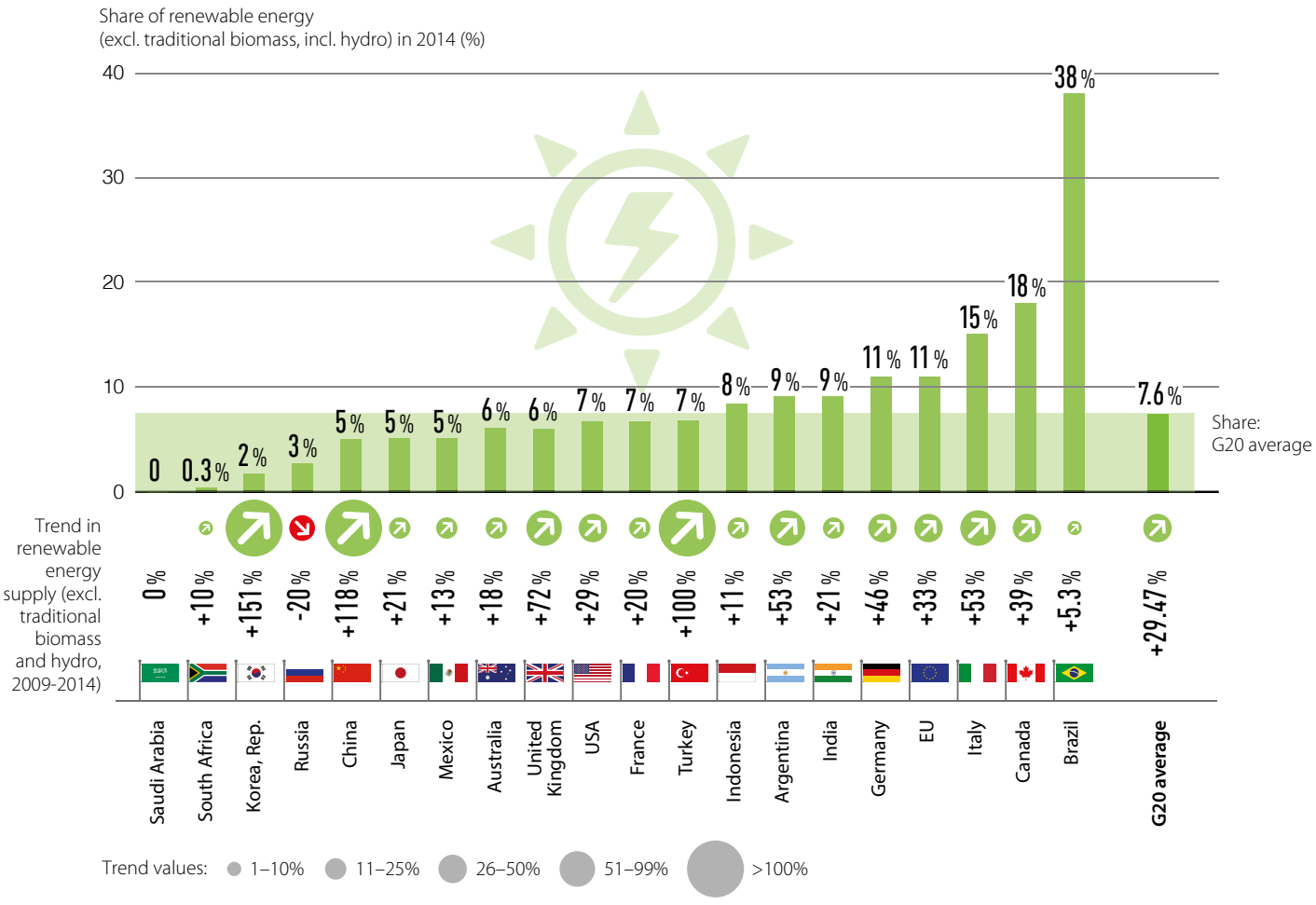
**) *The CCPI rating on the performance in energy use per capita is based on four categories: 1) energy use per capita level (2014), 2) recent developments of energy use per capita (2009-2014), 3) current level compared to a well below 2°C pathway and 4) future target compared to a well below 2°C pathway.*

RENEWABLE ENERGY IS ON THE RISE IN THE G20...

The absolute renewable energy supply[63] has been increasing in most G20 countries between 2009 and 2014 and for the G20 in total by 29%. An exception is Russia, where absolute renewable energy supply decreased by 20%.

China, the Republic of Korea, Turkey and the UK have experienced strong growth in absolute renewable energy supply.

SHARE AND TREND OF RENEWABLES IN TOTAL PRIMARY ENERGY SUPPLY (2009-2014)



Source: IEA, 2016

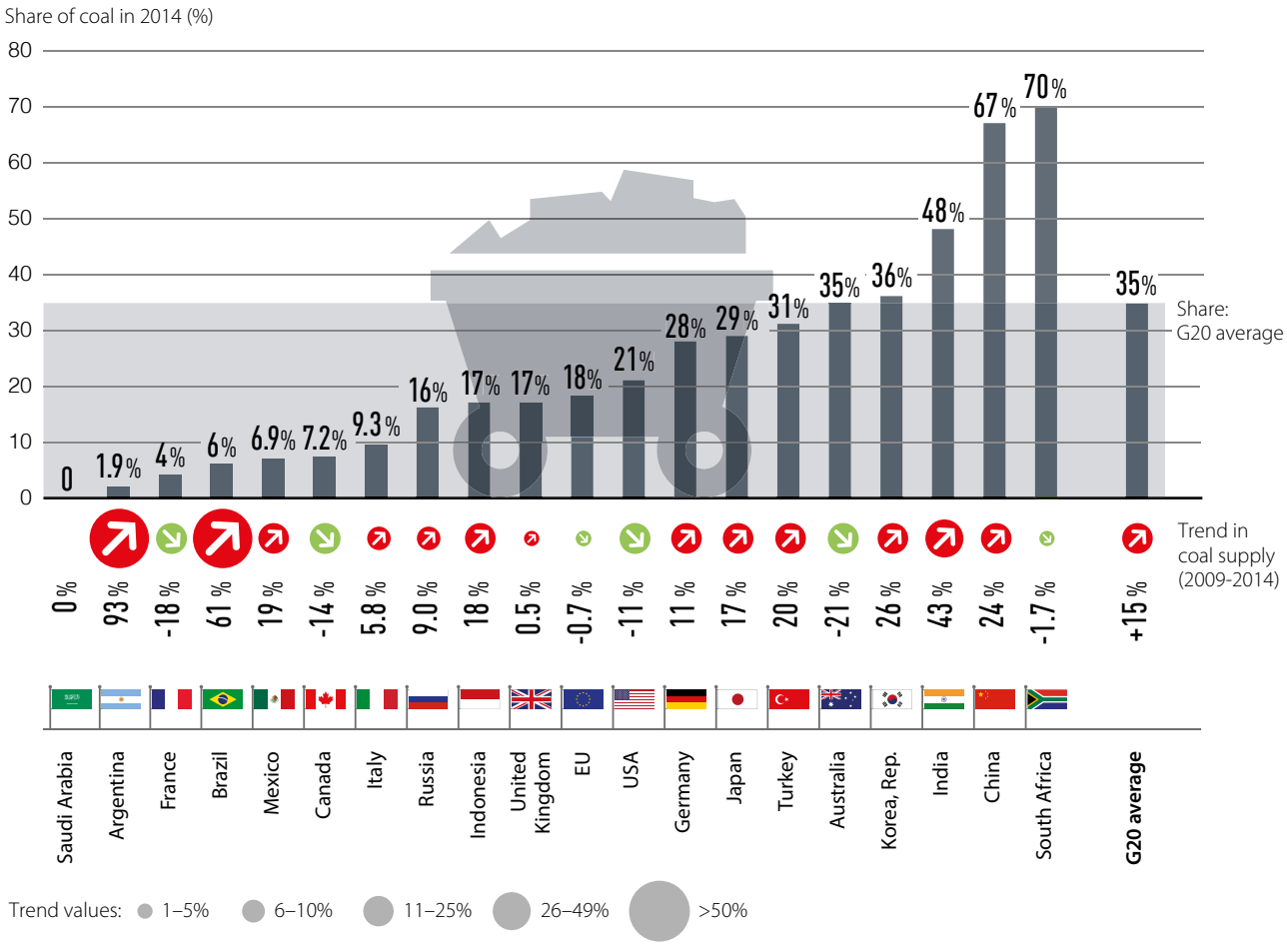
63) *Excluding traditional biomass and hydro*

...BUT COAL AND FURTHER FOSSIL FUELS STILL DOMINATE THE ENERGY MIX

Most G20 countries still rely strongly on coal in their total primary energy supply. In 2014, South Africa had a share of coal of 70%, China 67%, India 48%, the Republic of Korea 36%, Australia 35%, Turkey 31%, Japan 29% and Germany 28%. China and Australia show decreasing trends in their absolute coal supply since 2009.

Saudi Arabia is not using coal, Argentina, Italy and Mexico have a low share of coal and all are highly dependent on oil and gas. Canada and France depend strongly on nuclear energy.

SHARE AND TREND OF COAL IN TOTAL PRIMARY ENERGY SUPPLY (2009-2014)



Source: IEA, 2016

Climate Transparency

BROWN TO GREEN

The G20 transition to a low-carbon economy | 2017