

Chapter 2

Pre-2020 action: trends and progress

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2.1 Introduction

This chapter provides an update, based on the latest available scientific literature, on trends in global emissions and progress towards the G20 members meeting their Cancun Pledges. These trends give key indications of pre-2020 mitigation progress and action.

In light of the Paris Agreement, enhanced pre-2020 mitigation action is more urgent than ever: studies indicate that holding the increase in global average temperature well below 2°C above pre-industrial levels, and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, requires that global greenhouse gas emissions peak before 2020. Moreover, enhancing pre-2020 action would facilitate the implementation and strengthening of the Nationally Determined Contributions (NDCs), as well as the transition to the stringent long-term emissions reductions that are required to reach the temperature target of the Paris Agreement.

To assess whether emissions show signs of peaking, section 2.2 provides an overview of current trends in total global emissions of greenhouse gases, and of energy- and industry-related carbon dioxide (CO₂) emissions as a major driver of total global greenhouse gas emissions. This is followed by an update on the extent to which G20 members are on track to meet their Cancun Pledges (section 2.3). This update is based on an assessment of current policy portfolios of the G20 members and plausible assumptions regarding macroeconomic trends and offsets. The chapter ends by reiterating the urgency of immediately enhancing mitigation action to facilitate the transition towards least-cost emission reduction trajectories after 2020 that are aligned with the 2°C and 1.5°C temperature goals.

2.2. Trends in current global emissions

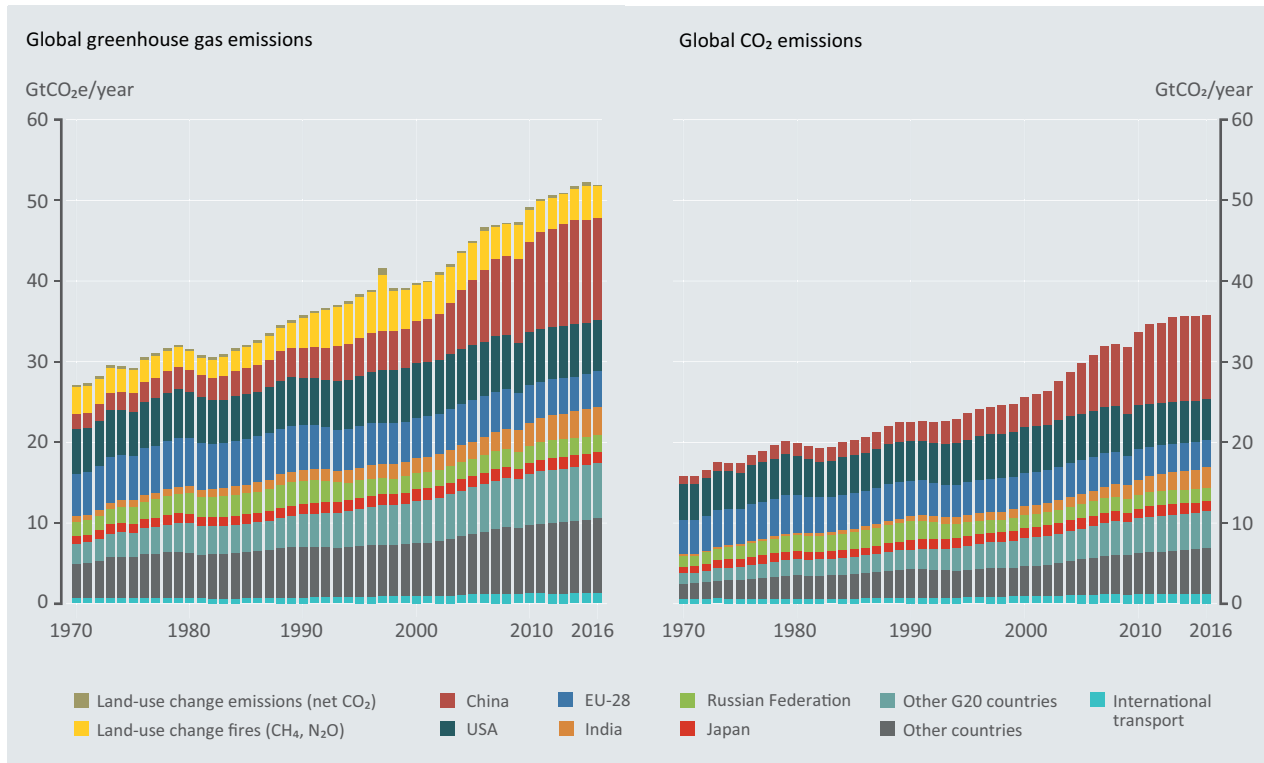
Total global greenhouse gas emissions continue to increase, although the rate of growth has decreased over the past few years. Total global greenhouse gas emissions, including emissions from land use, land-use change and forestry (LULUCF), were estimated at about 51.9 GtCO₂e/year in 2016 (Olivier *et al.*, 2017)¹. Often, greenhouse gas emissions from LULUCF are accounted for separately, because they show large inter-annual variation and are very uncertain (see Grassi *et al.*, 2017). Considering total global greenhouse gas emissions excluding LULUCF (thus also excluding forest fires), reveals a slowdown in growth in the past three years. They reached 47.8 billion tonnes of CO₂-equivalent in 2016 following increases of 0.9 percent in 2014, 0.2 percent in 2015, and 0.5 percent in 2016 (Olivier *et al.*, 2017)². Taking into consideration that 2016 was a leap year, and thus 0.3 percent longer than other years, the growth in total global emissions in 2015 and 2016 is the slowest since the early 1990s, except for years of global economic recession.

¹ The greenhouse gas emissions estimates in EDGAR 4.3.2 (Olivier *et al.*, 2017) for recent years have decreased compared to the earlier greenhouse gas emission estimates presented in UNEP (2016; 2015). Apart from revisions due to revised statistics (for example, for China), also the use of more detailed emission factors (for example, for cement clinker) and sometimes a change in data source for other sources than fuel combustion (for example, gas flaring and LULUCF emissions including biomass burning emissions), led to a lower level of CO₂ emissions. Likewise, replacing so-called Fast Track estimates for CH₄ and N₂O emissions by more detailed and recent statistics and improved information on emission factors and abatement (for example, CH₄ in fossil fuel production) led to lower calculated emissions. Combined, this leads to total greenhouse gas emissions that are about 1 GtCO₂e lower for recent years than presented in recent Emissions Gap Reports.

² The data presented here have been calculated using the new EDGAR 4.3.2 dataset (Olivier *et al.*, 2017), which provides emissions per source and country for the period 1970–2012 (Janssens-Maenhout *et al.*, 2017). This was extended for CO₂ using international statistics through 2016, and for other greenhouse gases using statistics through 2014 (FAO), 2017, 2016 (IEA 2017, BP 2017), and other data sources such as CDM projects through 2016 (for example, reductions of CH₄, N₂O and HFC-23).

Figure 2.1.a: Global greenhouse gas emissions for top six emitting countries and regions (excluding land use, land-use change and forestry), international transport emissions, and land use, land-use change and forestry emissions.

Figure 2.1.b: Global carbon dioxide emissions per region from fossil fuel use, cement production and other processes, and from international transport.



Note: Other G20 countries include Argentina, Australia, Brazil, Canada, Indonesia, Mexico, Republic of Korea, Saudi Arabia, South Africa and Turkey. The greenhouse gas total are expressed in terms of billions of tonnes of global annual CO₂ equivalent emissions (GtCO₂e/year). CO₂ equivalent is calculated using the Global Warming Potentials (GWP-100) metric of UNFCCC as report in the IPCC Second Assessment Report, similar as has been done in the IPCC Fifth Assessment Report. Source: EDGAR v4.3.2 FT2016 (Olivier *et al.*, 2017).

Figure 2.1 shows the trends in total global emissions for the period 1970–2016. Trends in global greenhouse gas emissions are illustrated in Figure 2.1a, while Figure 2.1b shows the development in global carbon dioxide (CO₂) emissions from fossil fuel combustion, cement production and other processes. It should be noted that the time series data for total global greenhouse gas and CO₂ emissions used for the Emissions Gap Reports have been updated since the 2016 report. This affects the numbers presented in the 2016 report, where the updated estimate for total global greenhouse gas emissions in 2014 is 51.7 GtCO₂e, and the estimate for global total CO₂ emissions in 2015 is 35.6 GtCO₂.

Carbon dioxide emissions from fossil fuel combustion, cement production and other processes³ are the major source of total global greenhouse gas emissions. Currently they account for about 70 percent of total global greenhouse gas emissions and were estimated at a total of 35.8 GtCO₂ for 2016 (Olivier *et al.*, 2017)⁴. Given their share of total greenhouse gas emissions, it is relevant to look more closely at their trend. As Figure 2.1b indicates, global CO₂ emissions from fossil fuel use and cement production remained stable for the second year in a row in 2016, against a backdrop of

relatively stable economic growth. Reduced growth in coal use since 2011, primarily in China and secondarily in the United States, plays a key role in the recent slowdown in growth in global CO₂ emissions (Olivier *et al.*, 2017; Peters *et al.*, 2017). Growing renewable power generation has also contributed, but has had a less significant impact than economic factors and energy efficiency (Peters *et al.*, 2017). These findings are in line with other studies on trends in global energy-related CO₂ emissions until 2016 (BP, 2017; IEA, 2017; Jackson *et al.*, 2016).

A number of studies provide detailed analysis of key drivers for the development in CO₂ emissions from fossil fuel use and cement production at the country level (Olivier *et al.*, 2017; Peters *et al.*, 2017). In China, CO₂ emissions have decreased since 2015, following a slowdown in annual growth of China’s CO₂ emissions since 2012. The decrease since 2015 is mainly caused by reduced coal use, but is also due to structural changes in the country’s economy and energy mix. The European Union has consistently reduced CO₂ emissions since 1979, mainly driven by continual improvements in energy intensity and carbon intensity combined with lower economic growth since the global financial crisis. In the United States of America, energy-related CO₂ emissions have decreased over the last 10 years. This decrease has mainly occurred in the power sector, due to a shift from coal to natural gas use in electricity generation, but also from increased use of renewables and a somewhat slower economic growth. In contrast, India’s emissions have grown steadily over the past decade.

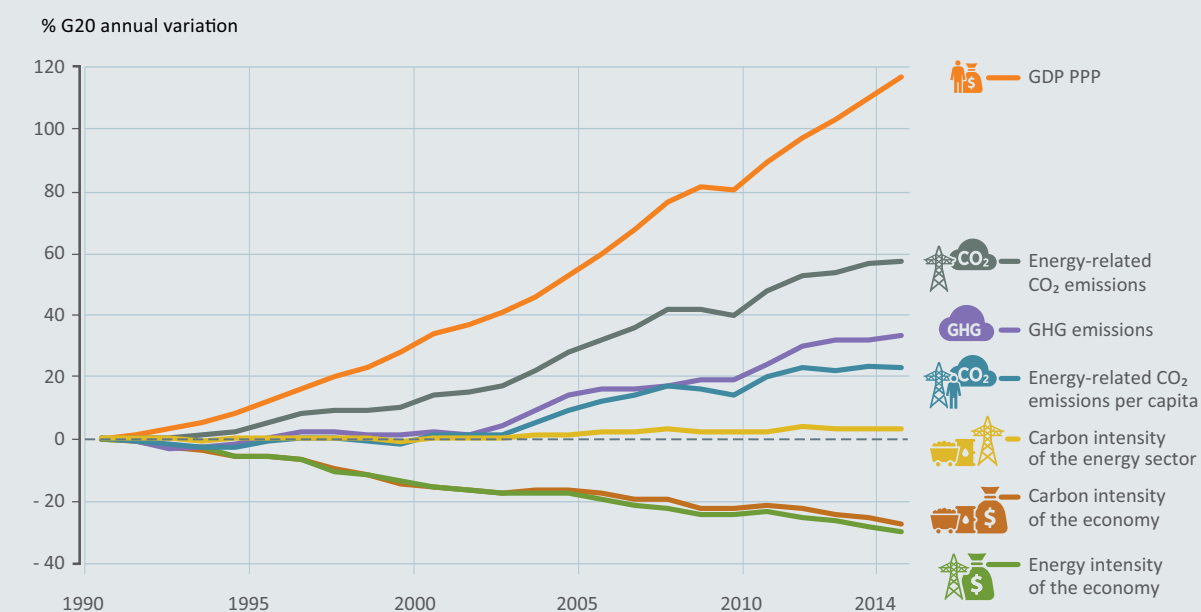
³ Including flaring of waste gas during gas and oil production, feedstock and other non-energy uses of fuels, and several other small sources.
⁴ This is slightly lower than the 2015 emissions estimate of 36.2 GtCO₂, as presented last year, due to regular annual statistical revisions of fuel consumption in International Energy Agency and British Petroleum statistics as well as revisions and some full updates, including emission factors, for several other sources (gas flaring, cement production, solvent use, ammonia production, urea and lime application) (Olivier *et al.*, 2017).

Box 2.1: Greenhouse gas emissions development: how have G20 members performed collectively?

G20 members have made more efficient use of energy resources: total greenhouse gas emissions from G20 countries grew by 34 percent between 1990 and 2014, while GDP grew by nearly 117 percent during the same period. Per capita energy-related CO₂ emissions seem to have peaked and there are signs of an absolute decoupling of economic growth and greenhouse gas emissions.

Current levels of effort are, however, not enough. Climate Transparency (2017) concludes that current efforts are sufficient neither in speed nor in depth to keep global warming to the limit set in the Paris Agreement. One area that requires major effort is the power sector, given that the carbon intensity of electricity has not improved for the last 25 years, because the electricity mix has continued to be dominated by coal and other fossil fuels.

Figure 2.2 Key indicators on the G20 transition to a low-carbon economy: trends between 1990 and 2014.



Source: Climate Transparency (2017)

Focusing on emissions and energy and carbon intensities of the G20 members, box 2.1 describes the trends of key indicators on the transition to a low-carbon economy observed between 1990 and 2014 for G20 members (Climate Transparency, 2017).

In summary, global greenhouse gas emissions continue to grow, although the slowdown in growth of global greenhouse gas emissions and the apparent stabilization of global levels of CO₂ emissions from fossil fuels and industry over the past two to three years is very encouraging. However, it is still too early to say whether it is likely to be permanent, and both the speed and depth of mitigation efforts require significant scaling up to enable a transition towards mitigation pathways consistent with the long-term temperature goal of the Paris Agreement.

2.3. Progress towards achieving the Cancun Pledges: G20 members

In line with last year's Emissions Gap Report, this section provides an update on the progress towards achieving the

Cancun Pledges, focusing on the G20 members⁵. Thirteen of the members have pledges for 2020 (counting the EU members France, Germany, Italy and UK as one member) and three do not have pledges. These economies collectively generate around three quarters of total global greenhouse gas emissions⁶. Although it is critical that all countries advance as far as possible towards achieving their Cancun Pledges, the role of the highest-emitting economies is particularly critical to achieving the Paris Agreement mitigation goals.

⁵ The members of the G20 are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Republic of Korea, Russia, Saudi Arabia, South Africa, Turkey, the UK, the USA, and the EU. In our analysis, the EU including all its Member States (regardless of G20 status) is considered as a single Party, and EU Member States are not considered individually. In general, evaluating the pledges of other countries is limited by a lack of data. Aggregate measures for the G20 do not double count EU members that are also G20 members as individual countries.

⁶ In 2012, these parties accounted for 77 percent of global emissions excluding LULUCF and 75 percent of global greenhouse gas emissions including LULUCF (WRI CAIT, 2017).

Box 2.1: Assumptions of the assessment of progress towards the Cancun Pledges

For each G20 member, estimates of 2020 emissions are compared under three cases:

1. **Pledge case (official data):** Identifies the maximum level of greenhouse gas emissions that each member could emit in 2020 and still meet its pledge – without considering the use of offsets. Where available, the 2020 emission level described by the member as the pledge level is used; alternatively, these levels are calculated working from official base-year or baseline data. The sources of official country data are provided in Table 2.1.
2. **Current policy trajectory case (official data):** Identifies most recent, publicly available official estimates of 2020 emissions, considering projected economic trends and current policy approaches. The sources of official country data are provided in Table 2.1.
3. **Current policy trajectory case (independent analysis):** Identifies estimates of 2020 emissions, considering the best current estimates of projected economic trends and current policy approaches, including policies at least through 2015, based on independent analysis rather than official data. Estimates are drawn from the Climate Action Tracker (CAT) (2017g) and PBL (den Elzen *et al.*, 2016a; Kuramochi *et al.*, 2016b; PBL, 2017) for all countries, as well as other, country-specific sources where noted. The independent analysis of current policy trajectories supplements the official sources described in point two by providing data that targets consistency across countries and political independence.

Source: Adapted from UNEP (2015)

To assess the progress of G20 members towards their Cancun Pledges, this section compares current emissions trajectories with the trajectories associated with the achievement of the pledges of these members. In line with previous Emissions Gap Reports, three cases are considered: a pledge case, based on official data; a current policy trajectory case, based on official data; and a current policy trajectory case, based on independent analysis. These three cases are briefly described in box 2.1.

Table 2.1: Studies used to estimate the emissions in 2020 under the pledge case and current policy trajectory case for G20 members

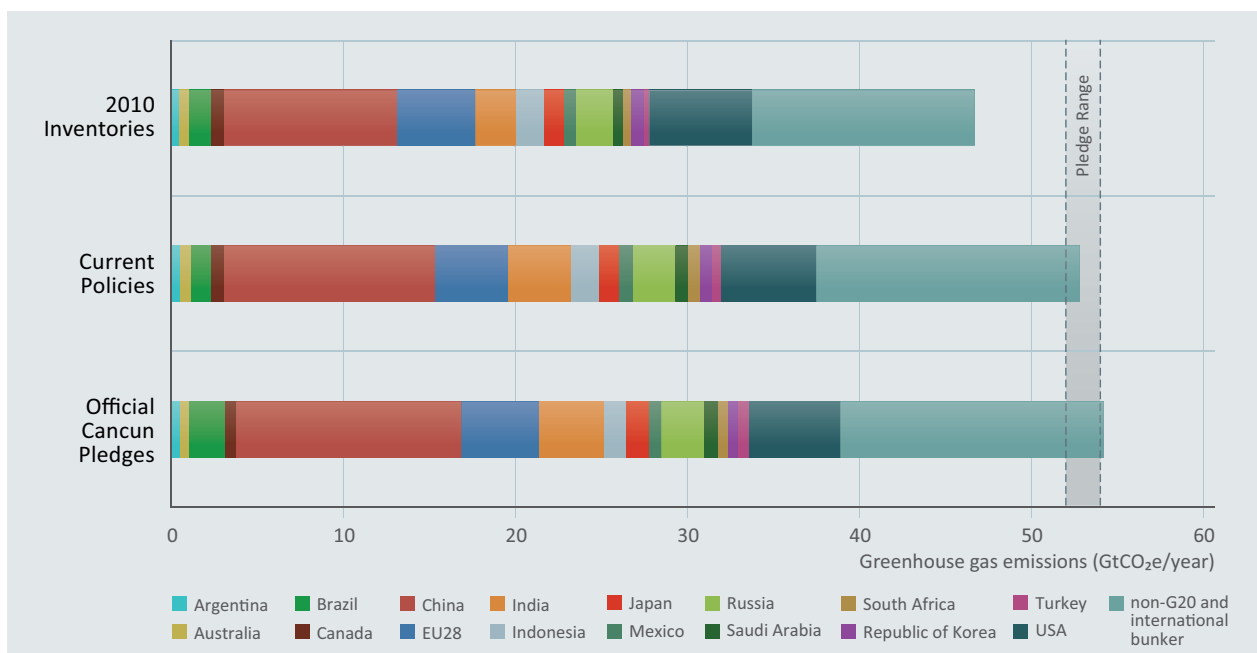
| Country | 2020 pledge case | Current policy trajectory | |
|-------------------|--|---|--------------------------------------|
| | Official data | Official data | Independent estimates |
| Argentina | No pledge ^a | Ministry of the Environment and Sustainable Development, Argentina (2015) | CAT |
| Australia | Government of Australia (2016) | Government of Australia (2016) | CAT, PBL, RepuTex (2016) |
| Brazil | Government of Brazil (2010) | N/A | CAT, PBL |
| Canada | Government of Canada (2016) | Government of Canada (2016) | CAT, PBL |
| China | N/A ^b | N/A | CAT, PBL, Sha <i>et al.</i> (2017) |
| EU28 | EEA (2014) | EEA (2016b) | CAT, PBL |
| India | Planning Commission Government of India (2011, 2014) | | CAT, PBL, Mitra <i>et al.</i> (2017) |
| Indonesia | BAPPENAS (2015) | N/A | CAT, PBL |
| Japan | Government of Japan (2016) | N/A | CAT, PBL |
| Mexico | NCCS (2013) | (Government of Mexico, 2012b; NCCS, 2013) | CAT, PBL |
| Russia | Government of Russia (2014) | Government of Russia (2015) | CAT, PBL |
| Saudi Arabia | No pledge ^a | N/A | CAT |
| South Africa | Department of Environmental Affairs, Republic of South Africa (2011a, 2011b) | N/A | CAT, PBL |
| Republic of Korea | Republic of Korea (2016) | N/A | CAT, PBL |
| Turkey | No pledge ^a | Republic of Turkey, Ministry of Environment and Urbanization (2016) | CAT, PBL |
| USA | US Department of State (2016) | US Department of State (2016) | CAT, PBL |

Note:

^a Argentina, Saudi Arabia and Turkey have not proposed greenhouse gas reduction pledges, and here we assume current policies.

^b China has no official estimate for the 2020 pledge, and here we assume the 2020 emissions estimate for China's 2020 pledge based on the average outcome of four global studies (PBL, Climate Action Tracker, LSE and University of Melbourne (see Chapter 3).

Figure 2.3: Greenhouse gas emissions of G20 members and the group of non-G20 countries (also includes the international bunker emissions) for the 2020 pledges and current policies scenario.



Source: Table 2.1.

Collectively, G20 countries are on track to achieving the mid-range of the Cancun Pledges, but several countries will need to accelerate action to meet their Cancun Pledge by 2020 (see Figure 2.4). Seven G20 members (Australia, Brazil, China, the EU, India, Japan, and Russia) are on track to meet their Cancun Pledges according to most or all available analyses. Five members (Canada, Mexico, the Republic of Korea, South Africa and the United States) are likely to require further action or to have to purchase offsets — or a combination of the two — to meet their pledges. (The Republic of Korea has not rescinded its pledge communicated to the UNFCCC,

but has amended the Green Growth Basic Act to replace the 2020 pledge with the NDC target for 2030.) Better data are necessary to adequately track progress in some countries, including Indonesia, where there is currently insufficient information to assess whether the country is on track to meet its pledges. The three remaining G20 members (Argentina, Saudi Arabia and Turkey) have no Cancun Pledges. Further details are provided in Box 2.2, which highlights the three important caveats that should be kept in mind when assessing country progress towards the Cancun Pledges.

Box 2.2: Assessing progress towards achieving the Cancun pledges: three caveats

- Pledges do not necessarily demand the same level of effort to achieve.** In other words, a country currently on track to achieve its pledge has not necessarily made a greater effort to mitigate emissions than a country not yet on track.
- Projections are subject to uncertainty associated with macroeconomic trends,** such as changes in gross domestic product (GDP) and population trends, as well as the impact of each country's climate policy action.
- The potential impact of using offsets to achieve pledges is not quantified for the emission trajectories considered.** If offsets are traded internationally, and are stemming from actions that are not really additional or if offsets are counted twice (towards the pledges of both buying and selling parties), the global impact of the pledges will be weakened. Most countries have not clarified their intentions concerning their use of offsets to meet their 2020 pledges. Australia, Brazil, Canada, the European Union, and the United States have explicitly not excluded the possibility; other members have not formally commented (WRI, 2015).

Source: UNEP (2015)

G20 members that are on track to meet their Cancun Pledges

According to all available analyses, four G20 members — China, the EU, India, and Japan — are on track to meet their pledges with currently implemented policies without purchasing offsets. Australia is on track based on the carbon budget approach. Two more countries – Brazil and Russia – are also on track according to most estimates.

China, which pledged a reduction of 40–45 percent in CO₂ emissions intensity, is projected by several studies to be on track to achieve a reduction of at least 42 percent (IEA, 2015; Sha *et al.*, 2015; den Elzen *et al.*, 2016b; Climate Action Tracker, 2017c; Sha *et al.* 2017). China also pledges to increase the share of non-fossil fuels in primary energy consumption to around 15 percent by 2020 and to increase forest coverage and forest stock volume. The Climate Action Tracker update of May 2017 (Climate Action Tracker, 2017c) has made a downward revision of economy-wide greenhouse gas emissions (excluding LULUCF) under current policies for China. Projections are now 11.9–12.2 GtCO₂e/year instead of the 12.2–12.5 GtCO₂e/year projected in the 2016 update. This compares to the pledged emission level of 13.2–13.5 GtCO₂e/year excluding LULUCF, taking into account both CO₂ intensity and non-fossil fuel targets (Climate Action Tracker, 2017c). Some analysts have argued that structural shifts in the economy in recent years make much steeper reductions in the CO₂ intensity of GDP likely; Green and Stern (2017) include an illustrative pathway where CO₂ intensity is halved from 2005 to 2020.

Regarding the EU pledge to reduce its greenhouse gas emissions by 20 percent from 1990 levels, official data for 2014 shows that this pledge has already been met and, in fact, exceeded (EEA, 2016a).

India pledged to reduce its emissions intensity of GDP, excluding the agriculture sector, by 20–25 percent below 2005 levels by 2020. Independent studies project that India will meet its pledge by a narrow margin through the policies that are currently implemented (Climate Action Tracker, 2017d; Mitra *et al.*, 2017; PBL, 2017). The Climate Action Tracker update of May 2017 has made a small downward revision of current policies projections for India for economy-wide greenhouse gas emissions (excluding LULUCF) from 3.6 to 3.5 GtCO₂e/year in 2020. Meanwhile Mitra *et al.* (2017) project 2.9 GtCO₂e/year, considering the impacts of five key policies and excluding the agriculture and land-use sectors.

Japan pledges to reduce its greenhouse gas emissions by 3.8 percent from 2005 levels by 2020. This pledge assumes the same electricity mix as 2012, which was fossil fuel-dominant following the Fukushima nuclear accident. Recent studies (Climate Action Tracker, 2017e; Kuramochi *et al.*, 2016b) project that Japan will overachieve its 2020 pledge due to lower-than-expected end-use energy demand and considerable increase of renewable electricity generation following the introduction of a feed-in-tariff scheme in 2012. Official projections reflecting current policies are unavailable.

In accordance with the Kyoto Protocol accounting rules, Australia uses a carbon budget approach that accounts for

cumulative emissions over the 2013–2020 period in order to assess progress towards its pledge. Australia's latest official projections find that for the budget period (2013–2020), Australia is now on track to overachieve its 2020 pledge by 97 MtCO₂e (cumulative), excluding a 128 MtCO₂e carry-over from its first commitment period under the Kyoto Protocol (Government of Australia, 2016). Independent studies consider the year 2020 in isolation, and find a difference of about 63 MtCO₂e between Australia's projected 2020 emissions and its pledge level for that year (Kuramochi *et al.*, 2016b; PBL, 2017; Reputex, 2016), which is higher than the 37 MtCO₂e difference of Australia's latest official projections (Government of Australia, 2016). The former do not factor in the most recent official projections.

Brazil pledged to reduce its emissions including LULUCF by between 36.1 percent and 38.9 percent by 2020, compared to a business as usual (BAU) scenario. Independent analysis estimates emission projections under current policies at well below the 2020 Cancun Pledge (Climate Action Tracker, 2017b; Kuramochi *et al.*, 2016b; PBL, 2017).

Russia pledged a 25 percent reduction from 1990 levels, excluding LULUCF. According to official data, Russian emissions are projected at about 2.4 GtCO₂e/year for 2020 (Government of Russia, 2014), which is below the pledge level of 2.5 GtCO₂e/year (Government of Russia, 2015). Independent estimates show a similar emission projection.

G20 members that are likely to require further action or purchased offsets

Five countries — Canada, Mexico, the Republic of Korea, South Africa and the United States — are likely to require further action and/or to have to purchase offsets in order to meet their pledges, according to government and independent estimates.

Canada's Cancun Pledge aims to reduce emissions by 17 percent below 2005 levels by 2020. However, according to official projections, Canada's emissions are expected to reach 731 MtCO₂e/year in 2020 (Environment and Climate Change Canada, 2017), well above the pledged level of 620 MtCO₂e/year (Government of Canada, 2016). Independent analysis also suggests that Canada is set to miss its 2020 pledge by a wide margin (Climate Action Tracker, 2017g; PBL, 2017).

Mexico's Cancun Pledge to reduce its greenhouse gas emissions by 30 percent below BAU levels including LULUCF is conditional on the provision of adequate financial and technological support from developed countries as part of a global agreement (UNFCCC, 2011). Under its current policies, Mexico is not on track to meet its pledge. This conclusion is based on official estimates by the Government of Mexico (2012a), adjusted per the National Climate Change Strategy (NCCS, 2013), and independent estimates (Climate Action Tracker, 2017g; PBL, 2017).

Independent estimates of the Republic of Korea's 2020 emissions are well above the level implied by its pledge. Although the country has not rescinded its pledge communicated to the UNFCCC, it amended the Green

Growth Basic Act to replace the 2020 pledge with the NDC target for 2030 (The Law National Information Center, 2016).

South Africa's Cancun Pledge includes a reduction in greenhouse gas emissions, including LULUCF, of 34 percent below BAU by 2020. Independent studies translate this pledge to a range of 400–600 MtCO₂e/year in 2020 (Climate Action Tracker, 2017f; Kuramochi *et al.*, 2016b). An independent current policy scenario projection that covers LULUCF (Kuramochi *et al.*, 2016b) indicates that South Africa is slightly short of reaching the upper end of this range.

The United States submitted a pledge to reduce greenhouse gas emissions levels to 17 percent below 2005 levels by 2020. The most recent official projections, produced before the current Administration took office, indicated that the United States was on track to achieve its 2020 pledge, assuming full implementation of planned measures as of mid-2015 (US Department of State, 2016). However, more recent independent analysis that takes a range of possible policy changes into account raises questions as to whether the United States will meet its 2020 pledge (Climate Action Tracker, 2017a; Climate Advisers, 2017; Climate Interactive, 2017; Hafstead, 2017; Rhodium Group, 2017).

Other G20 members

Insufficient information is currently available to determine whether Indonesia is on track to meet its pledge. Indonesia's Cancun Pledge includes an unconditional 26 percent below BAU and a conditional 41 percent reduction below BAU by 2020, both including LULUCF. There is considerable uncertainty regarding the pledge emission level; the unconditional pledge is translated as 2.2 GtCO₂e/year when using the BAU projection from the First Biennial Update Report, and 1.3 GtCO₂e/year when using the BAU projection consistent with the one reported in Indonesia's NDC (BAPPENAS, 2015). Recent assessments (Kuramochi *et al.*, 2016b; WRI, 2016) project greenhouse gas emissions, including LULUCF, ranging between 1.65 and 1.81 GtCO₂e/year in 2020.

Three G20 member states — Argentina, Saudi Arabia and Turkey — have not proposed greenhouse gas reduction pledges for 2020. However, all three countries have submitted post-2020 pledges to the UNFCCC as part of their Nationally Determined Contributions. In addition, Turkey has submitted a Biennial Report which includes its projected emissions for 2020 (Republic of Turkey, Ministry of Environment and Urbanization, 2016). In all four countries, the emissions are projected to increase towards 2020 and beyond under current policies (Kuramochi *et al.*, 2016b).

2.4. Amplified urgency of enhanced pre-2020 action

As the previous sections have demonstrated, mitigation action shows several encouraging signs. However, the progress of G20 countries towards decarbonization has been slow, as illustrated in Box 2.1. The projected emissions under current policies for 2020 are still far from what is required to improve the starting point for reaching the emission levels in 2030 consistent with pathways aligned with the long-term temperature goal of the Paris Agreement (see Chapter 3). The 2020 emissions under current policies are estimated to be in the mid-range of the Cancun Pledge scenario (see section 2.3), and any further delay in strengthened short-term action will decrease the chance of keeping global warming well below 2°C and will make the 1.5°C target increasingly unattainable.

The UNFCCC and its Parties need to seriously consider the growing number of science-based policy targets and roadmaps that have recently been proposed to strengthen short-term action to meet the Paris Agreement's long-term goals (Figueres *et al.*, 2017; Kuramochi *et al.*, 2016a; Rockström *et al.*, 2017). Box 2.3 presents an action proposal by Figueres *et al.* (2017), which focuses on pre-2020 ambition. As Figueres *et al.* suggest, concerted global effort is required to scale up existing solutions rapidly and to encourage optimism.

Box 2.3: Mission 2020's six-point plan

In collaboration with knowledge leaders and several think tanks, the Mission 2020 initiative convened by Christiana Figueres, the former Executive Secretary of the UNFCCC, developed a six-point plan to enhance pre-2020 action to achieve the Paris Agreement's long-term goals (Figueres *et al.*, 2017):

1. Energy
 - renewable electricity: increase renewable energy from 23.7 percent of the world's electricity supply in 2015 to at least 30 percent in 2020;
 - coal-fired power plants: do not approve any new plants beyond 2020 and retire all existing ones;
2. Infrastructure
 - fully decarbonize buildings and infrastructure by 2050 with US\$300 billion in annual funding. Cities are already upgrading their building stock to zero- or near-zero emission structures at a rate of 3 percent per year;
3. Transport
 - electric vehicles: at least 15 percent share in new car sales globally, up from the current less than 1 percent share;
 - doubling of mass-transit use in cities;
 - heavy duty vehicles: 20 percent increase in fuel efficiency;
 - aviation: 20 percent reduction in greenhouse gas emissions per kilometre travelled;
4. Land use
 - deforestation and land use change: net zero emissions within the 2020s;
 - enhanced afforestation and reforestation;
5. Industry
 - heavy industry: strengthen action in line with halving emissions well before 2050;
6. Finance
 - mobilize US\$1 trillion per year for climate action, mostly from the private sector through, for example, a tenfold increase in green bonds compared with their current level (US\$81 billion in 2016).

Figueres *et al.* also proposes three necessary steps to enable the achievement of the aforementioned sector-specific goals: (1) use science to guide decisions and set targets, (2) scale up existing solutions rapidly, and (3) encourage optimism.