South Africa’s greenhouse gas (GHG) emissions are – per capita – above the G20 average. Total GHG emissions (excl. land use) have increased by 39% since 1990, but emissions in recent years have been almost constant owing largely to low economic growth and declining electricity intensity.

South Africa is not on track for a 1.5°C world. South Africa needs to reduce its emissions to below 360 MtCO₂e by 2030 and to below 231 MtCO₂e by 2050 to be within its fair-share range compatible with global 1.5°C IPCC scenarios. South Africa’s NDC would only limit its emissions to between 415 and 631 MtCO₂e in 2025 and 2030 (adjusted to exclude land use). All figures are drawn from the Climate Action Tracker and exclude land use.

Recent developments:

- In June 2019, South Africa introduced a carbon tax. The effective tax rate is still low (US$0.4 to US$3.2/CO₂) but will be reviewed for the second phase.
- No new renewable energy capacity has been procured since 2015, despite the country facing acute power shortages at the moment.
- The 2019 Integrated Resource Plan for the country’s electricity sector includes 1500 MW of new coal plants, to come online from 2023 onwards, in addition to the current plants being built.

Key opportunities for enhancing climate ambition:

1. Halt new coal plants, cancel construction of units 5 and 6 at Kusile, and accelerate decommissioning of plants too costly to retrofit to meet air quality standards.
2. Prioritise construction of mass electrified public transit in urban centres by 2030.
3. Establish better mandatory building codes for new residential, and commercial buildings and shift to more efficient appliances.
South Africa’s energy sector is the most coal-dependent of the G20 countries. South Africa also has high levels of poverty and unemployment, and ensuring a just transition has therefore been explicitly recognised as a priority in national policy and in the country’s NDC. The coal mining sector employs over 80,000 workers and is concentrated in regions with higher than average unemployment levels, making the transition more challenging.

A social dialogue process to reach pathways for a just transition has been started by South Africa’s National Planning Commission. A series of multi-stakeholder dialogues has resulted in the identification of key priorities, including analysis of the employment vulnerabilities of affected workers, and the identification of pilot ‘hotspots’ for intervention (such as closing mines and power plants). However, beyond identifying vulnerabilities, explicit transition policies for workers and communities in specific places and times are yet to be developed.

South Africa now needs to develop worker transition pathways, and build local economic resilience in coal-dependent regions. Opportunities in renewable energy, manufacturing and agriculture could pave the way for cleaner air and water, and for improved food security in coal areas, at the same time as addressing structural unemployment in the South African economy.
South Africa's GHG emissions (excl. land use) increased by 41% (1990-2016) and its current 2030 target is not in line with a 1.5°C pathway.

In 2030, global GHG emissions need to be 45% below 2010 levels and reach net zero by 2070.

South Africa’s emissions (excl. land use) increased by 41% between 1990 and 2016, mainly driven by emissions from energy. Under current policies, it is possible that South Africa will meet the upper end of its NDC range in 2025 but not achieve its 2030 NDC target. South Africa will need to scale up climate action to meet the lower-end of its NDC in 2025 and 2030, with even more effort required to become 1.5°C compatible.

In 2030, global GHG emissions need to be 45% below 2010 levels and reach net zero by 2070.

Source: IPCC SR1.5 2018
Fossil fuels still make up around 88% of South Africa’s energy mix (including power, heat, transport fuels, etc) – this is among the highest in the G20. Energy supply from renewables has barely increased over the last two decades.

The share of fossil fuels globally needs to fall to 67% of global total primary energy by 2030 and to 33% by 2050 and to substantially lower levels without Carbon Capture and Storage.

Energy mix

This graph shows the fuel mix for all energy supply, including energy used for electricity generation, heating, cooking, and transport fuels. Fossil fuels (oil, coal and gas) make up 88% of South Africa’s energy mix, which is above the G20 average.

Carbon intensity of the energy sector

Carbon intensity shows how much CO₂ is emitted per unit of energy supply. In South Africa, carbon intensity is, at 73 tCO₂, above the G20 average, reflecting the continuing high share of fossil fuels in the energy mix. However, carbon intensity has dropped slightly (-4%, 2013-2018).

Rating of carbon intensity compared to other G20 countries

Source: own evaluation
Solar, wind, geothermal and biomass development

Total primary energy supply (TPES) from solar, wind, geothermal and biomass (PJ)

**Share of TPES in 2018**
- Solar: 0.25% (3.46% G20 average)
- Wind: 0.25% (0.00% G20 average)
- Geothermal: 0.00%
- Biomass, excl. traditional biomass: 3.46% (0.25% G20 average)

Solar, wind and modern biomass account for almost 4% of South Africa’s energy supply – the G20 average is 6%. Their share in total energy supply has increased by around 14% in the last five years (G20 average: +29%). Bioenergy (for electricity, transport and heat) makes up by far the largest share.

**Energy supply per capita**

Total primary energy supply per capita (GJ/capita)

- South Africa: 101 GJ/capita
- G20 average: 98 GJ/capita

The level of energy supply per capita is closely related to economic development, climatic conditions and the price of energy. At 101 GJ/capita, energy supply per capita in South Africa is slightly above the G20 average, but is declining (-5%, 2013-2018) in contrast to the increasing G20 average (+1%).
South Africa’s economy is one of the most energy intensive in the G20. CO₂ emissions from energy have remained almost stable over the last two decades.

**Energy intensity of the economy**

(TJ/PPP US$2015 million)

<table>
<thead>
<tr>
<th>Country</th>
<th>Energy Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>8.31</td>
</tr>
<tr>
<td>G20 average</td>
<td>4.86</td>
</tr>
</tbody>
</table>


-4% -12%

**Rating current level (2018)**

very low

Data for 2018 | Source: Enerdata 2019; World Bank 2019

This indicator quantifies how much energy is used for each unit of GDP. This is closely related to the level of industrialisation, efficiency achievements, climatic conditions or geography. South Africa’s energy intensity is one of the highest in the G20 and has declined less (-4%, 2013-2018) than the G20 average.

Global energy and process-related CO₂ emissions must be cut by 40% below 2010 levels by 2030 and reach net zero by 2060.

**Energy-related CO₂ emissions**

CO₂ emissions from fuel combustion (MtCO₂/year)

Share of TPES in 2018

- Transport 13%
- Agriculture 2%
- Buildings 5%
- Industries (incl. autoproducers) 16%
- Other energy sector 12%
- Electricity and heat 53%

The largest driver of overall GHG emissions are CO₂ emissions from fuel combustion. In South Africa, they have remained almost stable over the last decade, with only minor ups and downs. At 53%, the electricity and heat sector is by far the largest single contributor of energy-related CO₂ emissions.
The power sector is responsible for 53% of South Africa’s energy-related CO₂ emissions. South Africa has the highest share of coal power in the G20, and has no plans to effectively phase out coal power. Private sector investment in renewable energy has, however, established a sizable footprint, contributing 5% of total generation.

South Africa produces 89% of its electricity from coal – this is the highest level in the G20, and more than double the G20 average. In contrast, renewables make up only 5% (the G20 average is 25%), but South Africa has had a world-class renewables auction programme over the last six years which has led to large roll-outs of renewable energy capacity.

Emissions intensity of the power sector
(gCO₂/kWh)

South Africa: 928 (G20 average: 458)

For each kilowatt hour of electricity, 928 gCO₂ are emitted in South Africa. This is double the G20 average and reflects the high share of coal in the power sector. Emission intensity has dropped only marginally (-3%, 2013-2018).

Coal must be phased out in the EU/OECD no later than 2030, in the rest of the world no later than 2040. Electricity generation needs to be decarbonised before 2050, with renewable energy the most promising option.  

Status of decarbonisation

South Africa

For each kilowatt hour of electricity, 928 gCO₂ are emitted in South Africa. This is double the G20 average and reflects the high share of coal in the power sector. Emission intensity has dropped only marginally (-3%, 2013-2018).
Mitigation: Power Sector

Renewable energy in the power sector

South Africa's 2019 Integrated Resource Plan proposes an expansion of renewable energy capacity from a current total of 3800 MW (excluding large hydro) to a total of 26700 MW (plus a projected 6000 MW in distributed PV) in 2030. However, no new RE has been procured since 2015, and no 2050 renewables target has been adopted so far. 

Source: own evaluation

Coal phase-out in the power sector

South Africa does not have a coal phase-out policy or plan. The 2019 Integrated Resource Plan includes investment in 1500 MW of new coal plants before 2030. South Africa's current coal fleet would then mainly retire in the 2030s and 2040s, with several plants remaining operational in 2050.

Source: own evaluation

Mitigation: Transport Sector

Share in energy-related CO₂ emissions

The proportion of low-carbon fuels in the transport fuel mix must increase to about 60% by 2050. 

Source: IPCC SR1.5 2018

People in South Africa travel mostly by minibus taxi, by bus or on foot, with limited private vehicle ownership. Emissions in the sector are primarily from road transport (more than 90%), from fossil fuels. The government has recently finalised its Green Transport Strategy, which seeks to cut the share of national emissions from transport by 5% by 2050.

Source: own evaluation

Status of Decarbonisation

Transport energy mix

Final energy consumption of transport by source (PJ/year)

Share in 2018

- Biofuels: 0.0%
- Electricity: 1.6%
- Gas: 0.0%
- Oil: 98.4%
- Coal: 0.0%

Electricity and biofuels make up only 2% of the energy mix in transport.

Source: Enerdata 2019
South Africa has no plan to phase out fossil fuel vehicles, and as yet no energy or emissions standards for vehicles, apart from an emissions-related tax on vehicle purchase and the carbon tax. The 2018 Green Transport Strategy proposes a range of measures to promote shifting to low-emission vehicles and introduce vehicle emissions standards.

South Africa has not adopted a target to phase out emissions from freight transport, nor are there energy or carbon emission standards for heavy-duty vehicles. However, it aims to shift freight from road to rail.

South Africa’s Green Transport Strategy (2018-2050) aims for a 5% reduction of transport emissions by 2050; shifting 30% of freight transport from road to rail; 20% of passenger transport from private cars to public and eco-mobility transport by 2022. There are support schemes for promoting public transport. Support schemes for promoting public transport exist.

Detailed programmes for implementing the strategy are currently lacking.
**STATUS OF DECARBONISATION**

**Building emissions per capita**

- **South Africa**: 1.68 tCO₂/capita
- **G20 average**: 1.54 tCO₂/capita

**Residential buildings: energy use per m²**

- **G20 average**: 0.91 GJ
- **South Africa**: 0.74 GJ

**Commercial and public buildings: energy use per m²**

- **G20 average**: 3.53 GJ
- **South Africa**: 0.74 GJ

**Trend (2013-2018)**

- Building emissions per capita are slightly above the G20 average. But in contrast to the G20 average, South Africa has reduced that level by 15% (2013-2018).

**Building-related emissions per capita are generally lower than the G20 average. But in contrast to the G20 average, South Africa has reduced that level by 15% (2013-2018).**

**POLICIES**

**Near-zero energy new buildings**

- **South Africa**: high
- **G20 average**: medium

South Africa’s National Development Plan sets a goal for zero-emissions buildings by 2030. The draft National Energy Efficiency Strategy foresees a 54% improvement in average energy performance of new commercial buildings by 2030, compared to the 2015 baseline. There are ambitious mandatory energy building codes for new residential and non-residential buildings.

The building codes will need to be policed for effective implementation.

**Energy retrofitting existing buildings**

- **South Africa**: medium
- **G20 average**: high

There are no mandatory building retrofit policies but the government has introduced a 5-year project to retrofit 1,450 buildings. The draft National Energy Efficiency Strategy foresees a 20% improvement in energy performance of the residential building stock.

Source: own evaluation
SOUTH AFRICA

STATUS OF DECARBONISATION

Industry emissions intensity (tCO$_2$/US$2015$ GVA)

<table>
<thead>
<tr>
<th>Country</th>
<th>Value</th>
<th>G20 average</th>
<th>Trend (2011-2016)</th>
<th>Rating of emissions intensity compared to other G20 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>0.88</td>
<td>0.51</td>
<td>+5.5%</td>
<td>low</td>
</tr>
</tbody>
</table>

Carbon intensity of cement production (kgCO$_2$/tonne product)

<table>
<thead>
<tr>
<th>Country</th>
<th>Value</th>
<th>World average</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>358</td>
<td>668</td>
<td>DATA for 2015</td>
</tr>
</tbody>
</table>

Carbon intensity of steel production (kgCO$_2$/tonne product)

<table>
<thead>
<tr>
<th>Country</th>
<th>Value</th>
<th>World average</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>2,203</td>
<td>1,650</td>
<td>DATA for 2015</td>
</tr>
</tbody>
</table>

When comparing industrial emissions with the gross value added (GVA) from the industry sector, South Africa’s industry is very emission intensive.

Steel production and steelmaking are significant GHG emission sources. Emission intensity for steel production in South Africa is well above world average.

POLICIES

Energy efficiency

According to the International Energy Agency, mandatory energy efficiency policies cover 0-10% of industrial total energy use (as of 2017). The draft Energy Efficiency Strategy envisages reducing the energy consumption of manufacturing by 16% by 2030 compared to 2015.

The Industrial Energy Efficiency Programme (2016-2020) aims at direct energy savings of 1,000 GWh through energy management measures. The programme has been highly successful in reducing energy consumption in the past.

Higher electricity prices push industrial consumers towards cheaper forms of energy, mainly coal.
In order to stay within the 1.5°C limit, South Africa will need to enhance its current land sector sink even further by reversing further deforestation and promoting soil carbon enhancement on grasslands and on savanna.

Global deforestation needs to be halted and changed to net CO₂ removals by around 2030.

From 2001 to 2018, South Africa lost 1.34Mha of tree cover, equivalent to a 22% decrease since 2000. This does not take tree-cover gain into account.

South Africa’s agricultural emissions are mainly from digestive processes in animals, livestock manure, and the use of synthetic fertilizers.

In South Africa, the largest sources of GHG emissions in the agricultural sector are digestive processes in animals (enteric fermentation), livestock manure, and – to a lesser extent – the use of synthetic fertilizers. A shift to best practice environmental land-use management (eg organic farming, reduced tillage, use of biodigesters), more efficient use of fertilizers, and dietary changes could help reduce emissions.
South Africa is vulnerable to climate change and adaptation actions are needed.

On average, 47 fatalities and losses amounting to US$611 million occur yearly due to extreme weather events.

With global warming, society and its supporting sectors are increasingly exposed to extreme weather events, such as droughts and reductions in crop duration.

With a 3°C warming, South Africa would experience around 50 days per year when temperatures reach higher than 35°C.

### ADAPTATION POLICIES

**Nationally-determined contribution: Adaptation**

<table>
<thead>
<tr>
<th>Targets</th>
<th>Six targets specified: develop national adaptation plan; mainstream adaptation into development; build institutional capacity; develop early warning systems; develop vulnerability assessment and needs framework; communicate investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Actions specified (sectors not mentioned)</td>
</tr>
</tbody>
</table>

Source: UNFCCC, NDC of respective country

### National adaptation strategies

<table>
<thead>
<tr>
<th>Document name</th>
<th>Publication year</th>
<th>Agriculture</th>
<th>Biodiversity</th>
<th>Coasts/areas &amp; fishing</th>
<th>Education &amp; research</th>
<th>Energy &amp; industry</th>
<th>Finance &amp; insurance</th>
<th>Forestry</th>
<th>Health</th>
<th>Infrastructure</th>
<th>Tourism</th>
<th>Transport</th>
<th>Urbanism</th>
<th>Water</th>
<th>M&amp;E process (reporting frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Climate Change Adaptation Strategy</td>
<td>2018</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Annual reporting and update of the strategy every 5 years</td>
</tr>
</tbody>
</table>

Source: own research
South Africa has already been struck by extreme weather events such as heat waves, dry spells, fires, heavy rainfalls and droughts. As highlighted by the numbers from the Climate Risk Index, such extreme weather events result in fatalities and economic losses. Climate change is expected to worsen the intensity, frequency and impacts of such events.

Overall, with rising temperatures, all sectors are adversely affected. In the water sector, water scarcity and time spent in drought conditions drastically increase. Heat wave frequency increases significantly, together with a high number of days when temperatures reach higher than 35°C.

Impact ranking scale

- **Very low**
- **Low**
- **Medium**
- **High**
- **Very high**

Blank cells signify that there is no data available.

Maize has the largest share of crop production out of the four crops analysed (maize, rice, soybeans, wheat). Maize is affected by a decrease in hot spell frequency, a slight decrease in rainfall and a drastic reduction in crop duration.
South Africa’s fossil fuel subsidies totalled US$2.3 billion in 2017, mostly on petroleum and coal. The country was the first African nation to introduce a carbon tax, doing so in 2019.

**Nationally-determined contribution: Finance**

<table>
<thead>
<tr>
<th>Conditionality</th>
<th>Not specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment needs</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>Actions</td>
<td>National actions to align financial flows mentioned (fiscal levers)</td>
</tr>
<tr>
<td>International market mechanisms</td>
<td>Not mentioned</td>
</tr>
</tbody>
</table>

Source: UNFCCC, NDC of respective country

**Financial policy and regulation supporting a brown to green transition**

Through policy and regulation governments can overcome challenges to mobilising green finance, including: real and perceived risks, insufficient returns on investment, capacity and information gaps.

<table>
<thead>
<tr>
<th>Category</th>
<th>Instruments</th>
<th>Objective</th>
<th>Under discussion/ implementation</th>
<th>Not identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Financial Principles</td>
<td>N/A</td>
<td>This indicates political will and awareness of climate change impacts, showing where there is a general discussion about the need for aligning prudential and climate change objectives in the national financial architecture.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enhanced supervisory review, risk disclosure and market discipline</th>
<th>Climate risk disclosure requirements</th>
<th>Disclose the climate-related risks to which financial institutions are exposed</th>
<th>X</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Climate-related risk assessment and climate stress-test</td>
<td>Evaluate the resilience of the financial sector to climate shocks</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enhanced capital and liquidity requirements</th>
<th>Liquidity instruments</th>
<th>Mitigate and prevent market illiquidity and maturity mismatch</th>
<th>X</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lending limits</td>
<td>Limit the concentration of carbon-intensive exposures</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incentivise low carbon-intensive exposures</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Differentiated Reserve Requirements</td>
<td>Limit misaligned incentives and canalise credit to green sectors</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Source: own research

The Banking Association South Africa introduced voluntary ‘Principles for Managing Environmental and Social Risk’ in 2014. In 2017, the financial regulatory body of South Africa, the South African Financial Services Board, welcomed and called for the implementation of Taskforce on Climate-related Financial Disclosure (TCFD) recommendations. In the same year, South Africa’s National Treasury convened financial sector regulatory agencies and industry associations to develop a sustainable finance roadmap, engaging private sector actors in TCFD relevant forums.
Fiscal policy levers raise public revenues and direct public resources. Critically, they can shift investment decisions and consumer behaviour towards low-carbon, climate-resilient activities by reflecting externalities in prices.

Fossil fuel subsidies

In 2017, South Africa’s fossil fuel subsidies totalled US$2.3bn (compared to US$1.6bn in 2008, and the last decade peak of US$3.8bn in 2012). All of the subsidies quantified were for consumption of fossil fuels, and US$1.6 of the subsidies benefited petroleum. The largest subsidy is the value added tax exemption for gasoline, diesel and kerosene through broad objectives to support businesses (US$1.2bn), followed by the free basic electricity allowance (US$0.7bn). Free basic electricity will decarbonise as the electricity system does, and has massive social welfare benefits for the country.

Carbon revenues

Carbon revenues (US$ millions) from explicit carbon pricing schemes

South Africa became the first African nation to launch a carbon tax, in June 2019. The scheme covers 80% of domestic emissions, including all types of fossil fuels, and emissions are charged at US$8/tCO₂ although discounts currently bring the effective rate down to US$0.4 to US$3.2/tCO₂. Estimates for revenues from the scheme are not yet available, given its recent implementation.

Carbon pricing gap

% of energy-related CO₂ emissions

Only 11% of South Africa’s CO₂ emissions are priced at EUR30 or higher (the low-end benchmark), creating a carbon pricing gap of 89%. This gap is much higher than the G20 average of 71%. The price covers not only explicit carbon taxes but also specific taxes on energy use and the price of tradable emission permits.
Public finance

Governments steer investments through their public finance institutions including via development banks, both at home and overseas, and green investment banks. Developed G20 countries also have an obligation to provide finance to developing countries and public sources are a key aspect of these obligations under the UNFCCC.

In 2017, South Africa’s Export Credit Insurance Corporation provided US$400 million guarantee for a coal transportation project in Mozambique.

Commitments to restrict public finance to coal and coal-fired power

<table>
<thead>
<tr>
<th>MDB level</th>
<th>National development agencies and banks</th>
<th>Domestic export credit agencies</th>
<th>Export credit restriction in OECD</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>No commitments identified</td>
</tr>
</tbody>
</table>

Source: own research

Provision of international public support

South Africa is not listed in Annex II of the UNFCCC and it is therefore not formally obliged to provide climate finance. Despite this, it has provided international public finance to the Global Environment Facility (GEF) Trust Fund focal area climate change mitigation. While South Africa may channel international public finance towards climate change via multilateral and other development banks, it has not been included in this report.

Obligation to provide climate finance under UNFCCC

South Africa is not listed in Annex II of the UNFCCC and therefore not formally obliged to provide climate finance. Despite this, it has provided international public finance to the Global Environment Facility (GEF) Trust Fund focal area climate change mitigation.

Bilateral climate finance contributions

Annual average contribution (mn US$, 2015-2016)

0

Theme of support

Mitigation: 0%
Adaptation: 0%
Cross-cutting: 0%
Other: 0%

Source: Country reporting to UNFCCC

Multilateral climate finance contributions

Annual average contribution (mn US$, 2015-2016)

0

Theme of support

Adaptation: 0%
Mitigation: 0%
Cross-cutting: 0%

Source: Country reporting to UNFCCC

Core/General Contributions

Annual average contribution (mn US$, 2015-2016)

0

Source: Country reporting to UNFCCC
ENDNOTES

1) ‘Land use’ emissions is used here to refer to land-use, land use change and forestry (LULUCF). The Climate Action Tracker (CAT) derives historical LULUCF emissions from the UNFCCC Common Reporting Format (CRF) reporting tables data converted to the categories from the IPCC 1996 guidelines, in particular separating Agriculture from Land use, land-use change and forestry (LULUCF), which under the new IPCC 2006 Guidelines is integrated into Agriculture, Forestry, and Other Land Use (AFOLU).

2) The 1.5°C fair share ranges for 2030 and 2050 are drawn from the CAT, which compiles a wide range of perspectives on what is considered fair, including considerations such as responsibility, capability, and equality. Countries with 1.5°C fair-share ranges reaching below zero, particularly between 2030 and 2050, are expected to achieve such strong reductions by domestic emissions reductions, supplemented by contributions to global emissions-reduction efforts via, for example, international finance. On a global scale, negative emission technologies are expected to play a role from the 2030s onwards, compensating for remaining positive emissions.

The CAT’s evaluation of NDCs shows the resulting temperature outcomes if all other governments were to put forward emissions reduction commitments with the same relative ambition level.

The 2030 projections of GHG emissions are from the CAT’s June 2019 update and are based on implemented policies, expected economic growth or trends in activity and energy consumption.

The CAT methodology does not consider GHG emissions from LULUCF due to the large degree of uncertainty inherent in this type of data, and also to ensure consistency and comparability across countries.

3) See the Brown to Green 2019 Technical Note for the sources used for this assessment.

4) The Decarbonisation Ratings assess the relative performance across the G20. A high scoring reflects a relatively good efforts from a climate protection perspective but is not necessarily 1.5°C compatible. The ratings assess both the ‘current level’ and ‘recent developments’ to take account of the different starting points of different G20 countries. The ‘recent developments’ ratings compare developments over the last five available years (often 2013 to 2018).

5) The selection of policies rated and the assessment of 1.5°C compatibility are informed by the Paris Agreement; the Special Report on 1.5°C of the International Panel on Climate Change (2018), and the Climate Action Tracker (2016). The ten most important short-term steps to limit warming to 1.5°C. The table below displays the criteria used to assess a country’s policy performance. See the Brown to Green Report 2019 Technical Note for the sources used for this assessment.
ENDNOTES (continued)

6) The 1.5°C benchmarks are based on the Special Report on 1.5°C of the International Panel on Climate Change (2018). See the Brown to Green 2019 Technical Note for the specific sources used for this assessment.

7) Total primary energy supply data displayed in this Country Profile does not include non-energy use values. Solid fuel biomass in residential use has negative environmental and social impacts and is shown in the category ‘other’.

8) Large hydropower and solid fuel biomass in residential use are not reflected due to their negative environmental and social impacts.

9) The category ‘electricity and heat’ covers CO2 emissions from power generation and from waste heat generated in the power sector. The category ‘other energy use’ covers energy-related CO2 emissions from extracting and processing fossil fuels (e.g., drying lignite).

10) This indicator shows transport emissions per capita, not including aviation emissions.

11) This indicator adds up emissions from domestic aviation and emissions from international aviation bunkers in the respective country. Emissions by aircrafts in the higher atmosphere lead to a contribution to climate change greater than emissions from burning fossil fuels. In this Country Profile, however, only a radiative forcing factor of 1 is assumed.

12) This indicator includes only direct energy-related emissions and process emissions (Scope 1) but not indirect emissions from electricity.

13) This indicator includes emissions from electricity (Scope 2) as well as direct energy-related emissions and process emissions (Scope 1).

14) This indicator covers only gross tree-cover loss and does not take tree-cover gain into account. It is thus not possible to deduce from this indicator the climate impact of the forest sector. The definition of ‘forest’ used for this indicator is also not identical with the definition used for the indicator on page 3.

15) ‘Effective carbon rates’ are the total price that applies to CO2 emissions, and are made up of carbon taxes, specific taxes on energy use and the price of tradable emission permits. The carbon pricing gap is based on 2015 energy taxes and is therefore likely to be an underestimate, as taxation has tended to increase in countries over time.

16) The database used to estimate public finance for coal is a bottom-up database, based on information that is accessible through various online sources, and is therefore incomplete. For more information, see the Brown to Green 2019 Technical Note.

17) See the Brown to Green 2019 Technical Note for the sources used for this assessment.

18) Climate finance contributions are sourced from Biennial Party reporting to the UNFCCC. Refer to the Brown to Green Report 2019 Technical Note for more detail.

For more detail on the sources and methodologies behind the calculation of the indicators displayed, please download the Technical Note at: http://www.climate-transparency.org/g20-climate-performance/g20report2019
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