The EU’s greenhouse gas (GHG) emissions are – per capita – slightly above the G20 average.

Total emissions have decreased by 24% (1990-2016), excluding land use emissions.

**Greenhouse gas (GHG) emissions (incl. land use) per capita**

<table>
<thead>
<tr>
<th>EU</th>
<th>G20 average</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.9 tCO₂e/capita</td>
<td>7.5 tCO₂e/capita</td>
</tr>
</tbody>
</table>

Data for 2016: Source: CAT 2019; PRIMAP 2018; World Bank 2019

The EU is not on track for a 1.5°C world.

The EU’s fair-share range is below 758 MtCO₂e by 2030 and below -4,089 MtCO₂e by 2050. Under the EU’s 2030 NDC target, emissions would only be limited to 3,390-3,418 MtCO₂e. 1.5°C-compatibility can be achieved via strong domestic emissions reductions, supplemented with contributions to global emissions-reduction efforts. All figures are drawn from the Climate Action Tracker and exclude land use.

**1.5°C compatible pathway**

<table>
<thead>
<tr>
<th>MtCO₂e/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,354 NDC</td>
</tr>
<tr>
<td>Max. 758 MtCO₂e</td>
</tr>
<tr>
<td>Max. -4,089 MtCO₂e</td>
</tr>
</tbody>
</table>

Source: CAT 2019

**Recent developments**

- The new president of the European Commission calls for -55% GHG reduction by 2030, as proposed by the European Parliament, and for climate neutrality by 2050.
- The European Commission adopted an action plan on sustainable finance in 2018.
- The currently discussed EU budget for 2021-2027 (MFF) is not in line with a 1.5°C limit, especially regarding the EU’s agriculture policy (CAP) and the Cohesion policy.

**Key opportunities for enhancing climate ambition**

1. **Substantially increase the 2030 NDC target in order to drastically ratchet up action in the short term, and adopt a strategy for net-zero GHG emissions by 2050 at the very latest.**
2. **Adopt goal of 100% sales of zero-emission personal vehicles, buses and delivery trucks by 2030.**
3. **Introduce a moratorium to stop expansion of gas infrastructure (pipelines and LNG ports).**

This country profile is part of the Brown to Green 2019 report. The full report and other G20 country profiles can be downloaded at: [http://www.climate-transparency.org/g20-climate-performance/g20report2019](http://www.climate-transparency.org/g20-climate-performance/g20report2019)
The Human Development Index reflects life expectancy, level of education, and per capita income. The EU ranks very high.

Data for 2017 | Source: UNDP 2018

Population projections (millions)
The EU’s population is expected to decrease by 2% by 2050.

Source: World Bank 2019

Death through ambient air pollution (total ambient air pollution attributable deaths)
Over 225,000 people die in the EU every year as a result of outdoor air pollution, due to stroke, heart disease, lung cancer and chronic respiratory diseases. Compared to the total population, this is one of the lower levels in the G20.

Data for 2016 | Source: World Health Organization 2018

The European Commission included the concept of ‘just transition’ in its communication dealing with the Energy Union, according to which a just energy transition will require “retraining or up-skilling of employees in certain sectors and, where needed, social measures at the appropriate level”. In December 2017, the Commission established the Platform for Coal Regions in Transition to assist EU Member States and regions going through structural and technological transition in coal regions. Altogether 20 regions in eight Member States (Czechia, Germany, Greece, Poland, Romania, Slovakia, Slovenia and Spain) are currently part of the platform, and a number of pilot projects are already underway. Under the newly established Modernisation Fund of the EU Emissions Trading Scheme (ETS), lower-income Member States can access substantial financial resources to, among other, fund a just transition.

The trends show developments over the past five years for which data are available. The thumbs indicate assessment from a climate protection perspective.

For more information see the Annex and Technical Note.
EU GHG emissions have dropped by only 24% (1990-2016) and the EU’s climate targets for 2030 (at least -40%) and 2050 (-80 to -95%) are 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.

### Total GHG emissions across sectors

<table>
<thead>
<tr>
<th>Year</th>
<th>Total emissions (excl. land use), historic and projected</th>
<th>GHG emissions by sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>-8,000 MtCO₂e</td>
<td>Other sectors</td>
</tr>
<tr>
<td>1995</td>
<td>-6,000 MtCO₂e</td>
<td>Waste</td>
</tr>
<tr>
<td>2000</td>
<td>-4,000 MtCO₂e</td>
<td>Agriculture</td>
</tr>
<tr>
<td>2005</td>
<td>-2,000 MtCO₂e</td>
<td>Industrial processes</td>
</tr>
<tr>
<td>2010</td>
<td>0 MtCO₂e</td>
<td>Energy</td>
</tr>
<tr>
<td>2016</td>
<td>2,000 MtCO₂e</td>
<td>Historical emissions/removals from land use</td>
</tr>
<tr>
<td>2030</td>
<td>4,350 MtCO₂e</td>
<td>NDC</td>
</tr>
<tr>
<td>2050</td>
<td>1.5°C fair share range</td>
<td></td>
</tr>
</tbody>
</table>

Source: PRIMAP 2018; CAT 2019

### Nationally-determined contribution (NDC): Mitigation

<table>
<thead>
<tr>
<th>Targets</th>
<th>At least 40% of domestic GHG emissions reduction compared to 1990 by 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Not mentioned</td>
</tr>
</tbody>
</table>

Source: UNFCCC, NDC of respective country

### Long-term strategy (LTS) to be submitted to the UNFCCC by 2020

<table>
<thead>
<tr>
<th>Status</th>
<th>First 2050 roadmap endorsed in 2011; submission of updated strategy to UNFCCC expected in 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>2050 target</td>
<td>80-95% reduction from 1990 levels</td>
</tr>
<tr>
<td>Interim steps</td>
<td>Yes: 20% by 2020, at least 40% by 2030</td>
</tr>
<tr>
<td>Sectoral targets</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: UNFCCC, LTS of respective country

The European Commission presented its long-term strategic climate vision in 2018, including a target of climate neutrality by 2050. The European Council is expected to decide on the target by the end of 2019 as the basis for development of the Long Term Low Greenhouse Gas Emissions Development Strategy.

Source: CAT 2019
Renewables are increasingly replacing coal energy but fossil fuels still make up 71% of the EU’s energy mix (including power, heat, transport fuels, etc).

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

Total primary energy supply (PJ)

<table>
<thead>
<tr>
<th>Year</th>
<th>EU</th>
<th>G20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>80,000</td>
<td>10,000</td>
</tr>
<tr>
<td>1995</td>
<td>80,000</td>
<td>10,000</td>
</tr>
<tr>
<td>2000</td>
<td>80,000</td>
<td>10,000</td>
</tr>
<tr>
<td>2005</td>
<td>80,000</td>
<td>10,000</td>
</tr>
<tr>
<td>2010</td>
<td>80,000</td>
<td>10,000</td>
</tr>
<tr>
<td>2015</td>
<td>80,000</td>
<td>10,000</td>
</tr>
<tr>
<td>2018</td>
<td>80,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Share in 2018

- Other (incl. traditional biomass): 3%
- Renewables (incl. hydro and excl. residential biomass): 12%
- Nuclear: 13%
- Gas: 26%
- Oil: 32%
- Coal: 14%

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) still make up 71% of the EU energy mix, which is below the G20 average (82%). The share of renewables has increased only slightly over the past two decades, mainly replacing coal.

Carbon intensity of the energy sector

Tonnage of CO₂ per unit of total primary energy supply (tCO₂/TJ)

Carbon intensity shows how much CO₂ is emitted per unit of energy supply. The carbon intensity of the EU energy mix is at 49 tCO₂/TJ, one of the lowest in the G20, and has decreased slightly more (-3%, 2013-2018) than the G20 rate (-2%). This reflects the growing share of renewables.
Solar, wind, geothermal and biomass development

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

**Rating of share in TPES compared to other G20 countries**

Rating trend (2013-2018)  
Rating current level (2018)

Source: own evaluation

**Energy supply per capita**

Total primary energy supply per capita (GJ/capita)

**Rating of energy supply per capita compared to other G20 countries**

Rating trend (2013-2018)  
Rating current level (2018)

Source: own evaluation

---

Solar, wind, geothermal and modern biomass account for 10.5% of EU energy supply – the G20 average is 6%. In the last five years, the share of these sources in total energy supply has increased by around 27%, slightly less than the G20 average (+29% 2013-2018). Bioenergy (for electricity, biofuels for transportation and heat) makes up the largest share.

The level of energy supply per capita is closely related to economic development, climatic conditions and the price of energy.

At 130 GJ/capita, energy supply per capita in the EU is above the G20 average, but has decreased slightly (-1%, 2013-2018) in contrast to the rising G20 average (+1%).
Energy intensity of the economy

(TJ/PPP US$2015 million)

3.43 EU

4.86 G20 average

Trend (2013-2018) -11% -12%

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. The energy intensity of the EU’s economy is well below the G20 average and has decreased by an amount (-11%, 2013-2018) similar to the G20 average.

Rating of energy intensity compared to other G20 countries

Rating trend (2013-2018)

Rating current level (2018)

Source: own evaluation

Energy-related CO₂ emissions

CO₂ emissions from fuel combustion (MtCO₂/year)

Share of total energy-related 
CO₂ emissions in 2018

Transport 28%
Agriculture 2%
Buildings 17%
Industries (incl. autoproducers) 19%
Other energy sector 7%
Electricity and heat 27%

Source: Enedata 2019

The largest driver of overall GHG emissions are CO₂ emissions from fuel combustion. In the EU, they have decreased continuously over the past decade and are now 12% below 2010 levels. The transport sector is the largest contributor at 28%, followed by electricity and heat at 27%.

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

1.5°C

Source: IPCC SR1.5 2018

Energy use per capita remains at a high level in the EU and is only decreasing slightly. In order to be in line with a 1.5°C pathway, energy-related CO₂ emissions need to decrease further.
The EU still produces 41% of its electricity from fossil fuels. The power mix needs to be decarbonised completely to be compatible with a 1.5°C pathway.

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.

The EU is increasingly producing power from renewables, mainly from large hydropower and onshore wind energy. In total, renewables make up a third of the power mix (the G20 average is 25%). The share of coal has decreased in the past decade but nevertheless accounted for 20% of the power mix in 2018.

For each kilowatt hour of electricity, 269 gCO₂ are emitted in the EU. Emission intensity has dropped by 15% (2013-2015), reflecting the decreasing share of fossil fuels in the electricity mix.
The EU aims to increase the share of renewable energy in the power sector to 32% by 2030 but has no 2050 target. EU Member States are required to propose a plan by the end of 2019 to identify how they aim to contribute to achieving the 2030 Europe-wide target.

Source: own evaluation

The EU does not have a specific coal policy or an overall coal phase-out target but has agreed to phase-out subsidies for power plants emitting 550gCO₂/kWh or more by 2025. Ten Member States (26% of the EU’s coal capacity) plan to phase out by 2030 at the latest. The 2018 reform of the EU Emissions Trading Scheme might accelerate this process on economic grounds.

Source: own evaluation

Across the EU, 83% of passenger transport is by private car, and 75% of freight transport is via road. Both sectors are still dominated by fossil fuels and per capita emissions from transport continue to rise. In order to stay within a 1.5°C limit, passenger and freight transport need to be decarbonised.

Source: own evaluation

Electricity and biofuels make up only 7% of the energy mix in transport.
Transport emissions per capita\(^{10}\) (tCO\(_2\)/capita, excl. aviation emissions)

<table>
<thead>
<tr>
<th></th>
<th>EU</th>
<th>G20 average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-2018</td>
<td>(+7)%</td>
<td>(+5)%</td>
</tr>
<tr>
<td>Rating trend (2013-2018)</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>Rating current level (2018)</td>
<td>low</td>
<td>low</td>
</tr>
</tbody>
</table>

Data for 2018
Source: Enerdata 2019; World Bank 2019

Aviation emissions per capita\(^{11}\) (tCO\(_2\)/capita)

<table>
<thead>
<tr>
<th></th>
<th>EU</th>
<th>G20 average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-2016</td>
<td>(+5)%</td>
<td>(+10)%</td>
</tr>
<tr>
<td>Rating trend (2011-2016)</td>
<td>medium</td>
<td>low</td>
</tr>
<tr>
<td>Rating current level (2016)</td>
<td>low</td>
<td>low</td>
</tr>
</tbody>
</table>

Data for 2016
Source: Enerdata 2019; IEA 2019

Motorisation rate (vehicles per 1,000 inhabitants)

587

Data for 2016
Source: Agora 2018

Market share of electric vehicles in new car sales (%)

<table>
<thead>
<tr>
<th></th>
<th>Air</th>
<th>Rail</th>
<th>Road</th>
<th>Inland water-ways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>83%</td>
<td>8%</td>
<td>9%</td>
<td>no data</td>
</tr>
</tbody>
</table>

Data for 2016
Source: IEA 2019

Passenger transport (modal split in % of passenger km)

83% Car

Data for 2015
Source: Agora 2018

Freight transport (modal split in % of tonne-km)

17% Rail

Data for 2015
Source: Agora 2018

Phase out fossil fuel cars

There is no target for the phase-out of light-duty vehicles (LDVs) at EU level. More stringent fleet-wide CO\(_2\) emission performance standards are due to take effect in 2020. -15% for 2025 and -37.5% for 2030 from 2021 levels. Manufacturers can ease the targets with credits gained from the production of zero- and low-emission vehicles.

Source: own evaluation

Phase out fossil fuel heavy-duty vehicles

There is no strategy to reduce absolute emissions from heavy-duty vehicles (HDVs) at EU level. The first emission standards for HDVs were adopted in 2019, with a 15% reduction target by 2025 compared to 2019 levels and 30% by 2030. Manufacturers can ease the targets with credits gained from the production of zero- and low-emission vehicles.

Source: own evaluation

Modal shift in (ground) transport

The EU promotes the development of EU-wide transport networks, including rail. In a 2011 White Paper, the European Commission outlined its vision for the transport sector, proposing to eliminate fossil-fuel cars in city centres and to shift 50% of road freight to more sustainable modes by 2050.

A study rates progress as ‘insufficient’ and estimates that road freight will still be the dominant transport mode by 2050.

Source: own evaluation
EU building emissions – including heating, cooking and electricity use – make up a third of total CO₂ emissions. Per capita, building-related emissions are above the G20 average.

**Share in energy-related CO₂ emissions**

- **17%** direct
- **16%** from electricity

Data for 2018 | Source: Enerdata 2019

Global emissions from buildings need to be halved by 2030, and be about 80% below 2010 levels by 2050, achieved mostly through increased efficiency, reduced energy demand and electrification in conjunction with complete decarbonisation of the power sector.

**STATUS OF DECARBONISATION**

**Building emissions per capita**

(incl. indirect emissions) (tCO₂/capita)

- EU: 2.07
- G20 average: 1.54

- **-10.8%**
- **+1%**

**Trend** (2013-2018)

Rating of building emissions compared to other G20 countries

- Rating current level (2018): medium

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

Building emissions are largely driven by how much energy is used in heating, cooling, lighting, household appliances, etc. There is no data on energy use per m² in the EU.

**Residential buildings: energy use per m²**

- (GJ)
- EU: 0.17
- G20 range: 0.91

Data: year different per country | Source: ACEEE 2018

Building-related emissions per capita are above the G20 average. In contrast to the G20 average, the EU has reduced this level by 11% (2013-2018).

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

- (GJ)
- EU: 0.15
- G20 range: 3.53

Data: year different per country | Source: ACEEE 2018

Building emissions are largely driven by how much energy is used in heating, cooling, lighting, household appliances, etc. There is no data on energy use per m² in the EU.

**POLICIES**

**Near-zero energy new buildings**

- low
- medium
- high
- frontrunner

The 2010 Energy Performance Building Directive requires EU Member States to introduce minimum performance requirements. As of 31 December 2020, all new buildings will be required to be near zero-energy.

Source: own evaluation

**Renovation of existing buildings**

- low
- medium
- high
- frontrunner

The EU Energy Performance Building Directive, revised in 2018, requires EU Member States to submit long-term renovation strategies in order to achieve full decarbonisation of the building stock by 2050, with specific milestones for 2030 and 2040. This would equal a renovation rate of approximately 3% annually.

Source: own evaluation
**MITIGATION**

**INDUSTRY SECTOR**

**EUROPEAN UNION**

**STATUS OF DECARBONISATION**

Industry-related emissions make up almost a third of CO₂ emissions in the EU and the level of emissions is rising slightly.

<table>
<thead>
<tr>
<th>Share in energy-related CO₂ emissions (not including process emissions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19% direct</td>
</tr>
<tr>
<td>10% from electricity</td>
</tr>
</tbody>
</table>

Global industrial CO₂ emissions need to be reduced by 65–90% from 2010 levels by 2050.

**EUROPEAN UNION**

- **Share in energy-related CO₂ emissions** (not including process emissions)
  - EU: 19%
  - G20 average: 10%

- **Industry emissions intensity**
  - EU: 0.23 tCO₂e/US$2015 GVA
  - G20 average: 0.51 tCO₂e/US$2015 GVA

- **Carbon intensity of cement production**
  - EU: 604 kgCO₂/tonne product
  - World average: 668 kgCO₂/tonne product

- **Carbon intensity of steel production**
  - EU: 759 kgCO₂/tonne product
  - World average: 1,650 kgCO₂/tonne product

**Energy efficiency**

According to IEA, less than 10% of EU energy use in industry was covered by mandatory energy efficiency policies as of 2017. However, the Industrial Emissions Directive requires around 50,000 industrial installations to prove that they use the best available techniques to receive a permit to operate. The Energy Efficiency Directive requires all large enterprises in Europe to carry out an energy audit every four years.

**POLICIES**

- **Emission reductions**
  - EU: 9.5%
  - G20 average: 10.2%

**Trend** (2011-2016)

**Rating of emissions intensity compared to other G20 countries**

- **Rating trend (2011-2016)**: high
- **Rating current level (2016)**: high

**Source**: own evaluation

When comparing industrial emissions with the gross value added (GVA) from the industry sector, the EU performs relatively well within the G20.

Steel production and steelmaking are significant GHG emission sources, and are challenging to decarbonise. The EU's cement industry is slightly less emission intensive than the world average, but its steel industry is less than half as emission intensive.

**Source**: IPCC SR1.5 2018
In order to stay within the 1.5°C limit, the EU needs to make the land use and forest sector a net sink of emissions, eg by halting the expansion of residential areas and by creating new forests.

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

In 2018, the EU made mandatory the Kyoto protocol rule that all LULUCF emissions must be offset by CO₂ removals through afforestation or improved forest management by 2021-2030.

The EU’s agricultural emissions are mainly from digestive processes in animals, livestock manure, and the use of synthetic fertilizers. A 1.5°C pathway requires dietary shifts, increased organic farming, and less fertilizer use.

Global methane emissions (mainly enteric fermentation) need to decline by 10% by 2030 and by 35% by 2050 (from 2010 levels). Nitrous oxide emissions (mainly from fertilizers and manure) need to be reduced by 10% by 2030 and by 20% by 2050.

In the EU, the largest sources of GHG emissions in the agricultural sector are digestive processes in animals (enteric fermentation), livestock manure, and the use of synthetic fertilizers. A shift to organic farming, more efficient use of fertilizers, and diet changes could help reduce emissions.
The EU is vulnerable to climate change and adaptation actions are needed.

On average, 4,045 fatalities and losses amounting to US$15.8 billion occur yearly due to extreme weather events.

With global warming, society and its supporting sectors are increasingly exposed to severe climate events such as droughts and reduction in crop duration.

**ADAPTATION POLICIES**

### Nationally-determined contribution: Adaptation

<table>
<thead>
<tr>
<th>Targets</th>
<th>Not mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>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>Fields of action (sectors)</th>
<th>M&amp;E process (reporting frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU strategy on adaptation to climate change</td>
<td>2013</td>
<td>n/a</td>
<td>Information provided by Member States under the Monitoring Mechanism Regulation (MMR)</td>
</tr>
</tbody>
</table>

*Source: own research*

The EU strategy on adaptation mainly aims at getting EU Member States to draw up their adaptation strategies. All have now adopted such strategies.
Climate Risk Index for 1998-2017

Impacts of extreme weather events in terms of fatalities and economic losses that occurred.

Global Climate Risk Index 2019

<table>
<thead>
<tr>
<th>Weather-related fatalities</th>
<th>Per 100,000 inhabitants</th>
<th>Annual average losses (PPP US$ mn)</th>
<th>Per unit GDP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,045</td>
<td>13.9</td>
<td>15,820</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Source: Germanwatch 2018

The EU has already been struck by extreme weather events such as floods, droughts, heat waves, storms and wildfires. In 2018, the EU first experienced extremely cold weather before being exposed to heat and drought in spring and summer, breaking historic records in many countries. 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.

Exposure to future impacts at 1.5°C, 2°C and 3°C

<table>
<thead>
<tr>
<th>Water</th>
<th>1.5°C</th>
<th>2°C</th>
<th>3°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of area with increase in water scarcity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of time in drought conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: own research

<table>
<thead>
<tr>
<th>Agriculture</th>
<th>1.5°C</th>
<th>2°C</th>
<th>3°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in crop duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot spell frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in rainfall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in crop duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot spell frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in rainfall</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Based on Arnell et al 2019

Impact ranking scale

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

Blank cells signify that there is no data available.

National crop production

(share in % of total production quantity in tonnes)

Wheat and maize represent the largest shares of crop production out of the four crops analysed (maize, rice, soybeans, wheat). Both crops are impacted by a drastic reduction in crop duration. Wheat also undergoes reductions in rainfall and an increase in hot spell frequency. For maize, hot spell frequency can drastically increase.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>10%</td>
</tr>
<tr>
<td>Soybeans</td>
<td>1%</td>
</tr>
<tr>
<td>Wheat</td>
<td>24%</td>
</tr>
<tr>
<td>Rest</td>
<td>65%</td>
</tr>
</tbody>
</table>

Data for 2017 | Source: FAOSTAT 2019
The EU generated US$16.8 billion through its emission trading scheme in 2018.

### Nationally-determined contribution: Finance

<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><strong>Green Financial Principles</strong></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>Category</th>
<th>Instruments</th>
<th>Objective</th>
<th>Mandatory</th>
<th>Voluntary</th>
<th>Under discussion</th>
<th>Not identified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enhanced supervisory review, risk disclosure and market discipline</strong></td>
<td>Climate risk disclosure requirements</td>
<td>Disclose the climate-related risks to which financial institutions are exposed</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<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></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Enhanced capital and liquidity requirements</strong></td>
<td>Liquidity instruments</td>
<td>Mitigate and prevent market illiquidity and maturity mismatch</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Lending limits</td>
<td>Limit the concentration of carbon-intensive exposures</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incentivise low carbon-intensive exposures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Differentiated Reserve Requirements</td>
<td>Limit misaligned incentives and canalise credit to green sectors</td>
<td></td>
<td></td>
<td></td>
<td>X</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.

While there are no mandatory EU-wide green financial regulations, the EU High-Level Group on Sustainable Finance (HLEG) made recommendations on the need to improve the contribution of finance to sustainable and inclusive growth and mitigation, as well as to strengthen financial stability through the incorporation of environmental, social and governance (ESG) factors into investment decision making.
Fiscal policy levers

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

Subsidies by fuel type

The latest estimates on fossil fuel subsidies being provided through the EU’s long-term budget, the Multiannual Financial Framework (MFF), totalled US$604 million (EUR515 million) per year between 2014-16 (Gençsü et al, 2017). The MFF encompasses three mechanisms of support to fossil fuels (mainly to oil and gas infrastructure projects): the European Regional Development Fund, the Connecting Europe Facility, and the Horizon 2020 research and innovation programme.

Carbon revenues

In 2005, the EU introduced the Emissions Trading Scheme that generated US$16.8 billion of revenues in 2018. The scheme covers 45% of European emissions (in the power, industry and aviation sectors), with emissions priced at US$17/tCO₂ in 2019.

Carbon pricing gap

% of energy-related CO₂ emissions

Source: OECD 2018
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.

The EU has cut down on its financing for coal through in recent years, in line with meeting EU-level commitments. The EU’s budget and key public investment banks, the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD), no longer finance coal mining or coal-fired power projects (although there is limited transparency of information on financing through their intermediaries). The EIB’s draft energy lending strategy (due to be approved by the Board later this year) proposes to end its financing for all fossil fuels beyond 2020.

The EU is listed in Annex II of the UNFCCC and as a bloc is formally obliged to provide climate finance. It is ranked fourth largest contributor of bilateral climate finance, with a bias towards mitigation, with flows in 2015/16 increasing since the 2013/14 period. The EU report includes bilateral climate finance of $2.5 billion delivered in 2015/16 through its multilateral development bank, the EIB. This amount is acknowledged but excluded in this report in order to make the EU contribution comparable to other G20 countries.
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.

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### On footnote 5)

<table>
<thead>
<tr>
<th>Category</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Frongrnder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable energy in power sector</td>
<td>No policy to increase the share of renewables</td>
<td>Some policies</td>
<td>Policies and longer-term strategy/target to significantly increase the share of renewables</td>
<td>Short-term policies + long-term strategy for 100% renewables in the power sector by 2050 in place</td>
</tr>
<tr>
<td>Coal phase-out in power sector</td>
<td>No target or policy in place for reducing coal</td>
<td>Some policies</td>
<td>Policies + coal phase-out decided</td>
<td>Policies + coal phase-out date before 2030 (OECD and EU28) or 2040 (rest of the world)</td>
</tr>
<tr>
<td>Phase out fossil fuel cars</td>
<td>No policy for reducing emissions from light-duty vehicles</td>
<td>Some policies</td>
<td>Policies + national target to phase out fossil fuel light-duty vehicles</td>
<td>Policies + ban on new fossil-based light-duty vehicles by 2035 worldwide</td>
</tr>
<tr>
<td>Phase out fossil fuel heavy-duty vehicles</td>
<td>No policy</td>
<td>Some policies</td>
<td>Policies + strategy to reduce absolute emissions from freight transport</td>
<td>Policies + innovation strategy to phase out emissions from freight transport by 2050</td>
</tr>
<tr>
<td>Modal shift in (ground) transport</td>
<td>No policies</td>
<td>Some policies</td>
<td>Policies + longer-term strategy</td>
<td>Policies + longer-term strategy consistent with 1.5°C pathway</td>
</tr>
<tr>
<td>Near zero-energy new buildings</td>
<td>No policies</td>
<td>Some policies</td>
<td>Policies + national strategy for near zero-energy new buildings</td>
<td>Policies + national strategy for all new buildings to be near zero-energy by 2020 (OECD countries) or 2025 (non-OECD countries)</td>
</tr>
<tr>
<td>Retrofitting existing buildings</td>
<td>No policies</td>
<td>Some policies</td>
<td>Policies + retrofitting strategy</td>
<td>Policies + strategy to achieve deep renovation rates of 5% annually (OECD) or 3% (non-OECD) by 2020</td>
</tr>
<tr>
<td>Energy efficiency in industry</td>
<td>No policies</td>
<td>Mandatory energy efficiency policies cover more than 26-50% of industrial energy use</td>
<td>Mandatory energy efficiency policies cover 51–100% of industrial energy use</td>
<td>Policies + strategy to reduce industrial emissions by 75%–90% from 2010 levels by 2050</td>
</tr>
<tr>
<td>(Net) zero deforestation</td>
<td>No policy or incentive to reduce deforestation in place</td>
<td>Some policies</td>
<td>Policies + national target for reaching net zero deforestation</td>
<td>Policies + national target for reaching zero deforestation by 2020 or for increasing forest coverage</td>
</tr>
</tbody>
</table>
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
CLIMATE TRANSPARENCY

Partners:

Funders:

Data Partners:

http://www.climate-transparency.org/g20-climate-performance/g20report2019