EU28*

Climate Transparency

2020

CLIMATE TRANSPARENCY REPORT **COMPARING G20 CLIMATE ACTION AND RESPONSES TO THE COVID-19 CRISIS**

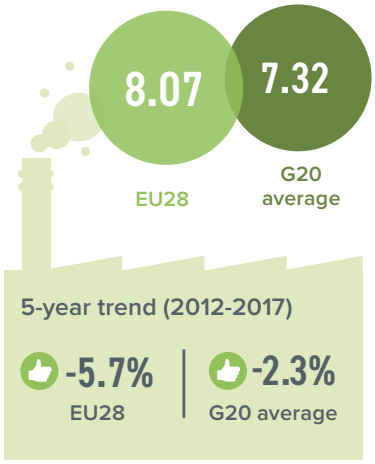
This country profile is part of the **Climate Transparency Report 2020**. Find the full report and other G20 country profiles at: www.climate-transparency.org

PER CAPITA GREENHOUSE GAS (GHG) EMISSIONS CLOSE TO G20 AVERAGE

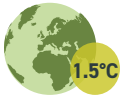
EU28 GHG emissions per capita have been in a declining trend over the past decade, and is slightly above the G20 average value in 2017.

Data for 2017. Sources: Enerdata, 2020; UN Department of Economic and Social Affairs Population Division, 2020; Gütschow et al., 2019

GHG emissions (incl. land use) per capita (tCO_2e/capita)[1]

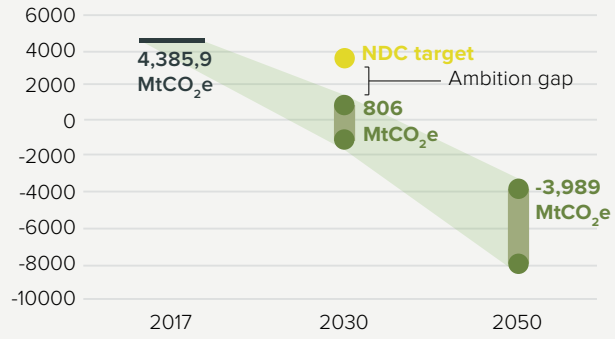


NOT ON TRACK FOR A 1.5°C WORLD



The EU's 'fair-share' range is below 806 $MtCO_2e$ by 2030 and below -3,989 $MtCO_2e$ by 2050. Under the EU's 2030 NDC target, emissions would only be limited to 3,390 $MtCO_2e$. The EU can achieve 1.5°C 'fair-share' compatibility via strong domestic emissions reductions, supplemented with support for emissions reductions abroad. All figures exclude land use emissions and are based on pre-COVID-19 projections.

EU28 1.5°C 'fair-share' pathway ($MtCO_2e$/year)[1&2]



Source: Climate Action Tracker, 2020

KEY OPPORTUNITIES FOR ENHANCING CLIMATE AMBITION

ADOPT A COAL PHASE-OUT PLAN

Countries (e.g. Poland, Czech Republic, Bulgaria and Romania) that have not adopted a coal phase-out plan and date need to do so urgently, so the EU can align with the Paris Agreement.

TARGET 3.5% RENOVATION RATE PER ANNUM

Increasing the building sector renovation rate from the current 1% to at least 3.5% would not only decrease emissions but would also decrease energy poverty and energy imports.

DEVELOP DECARBONISING STRATEGIES

Developing green hydrogen could be critical in decarbonising hard to abate sectors, such as chemicals and steel.

RECENT DEVELOPMENTS

The adoption of the "climate neutrality by 2050" goal in December 2019 was a step in the right direction for the EU. However, the policy measures planned in the European Green Deal that may result in a radical ratcheting up of the EU's emissions reduction efforts must still be ensured.

The European Commission and Parliament separately proposed increasing the EU's goal to "at least 55%" and "60%" below 1990 levels, respectively. EU member states have yet to agree to either proposal.

While the share of coal decreased by 24% in 2019, there is a threat of potential carbon lock-in due to the use of natural gas. Not only has generation from this energy source increased by 12% in 2019, but the EU is also co-funding 32 new gas infrastructure projects worth EUR 29bn.

Sources: European Commission, 2019b, 2019e; European Council, 2019; Agora Energiewende and Sandbag, 2020; Artelys, 2020

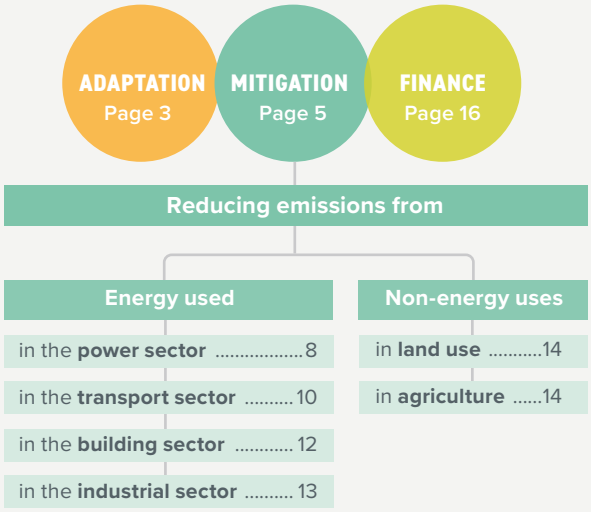
CORONAVIRUS RECOVERY In July 2020 leaders of the EU Member States agreed to the multiannual financial framework (MFF) for 2021-2027, and a recovery plan called the "Next Generation EU" (NGEU). Combined, these will amount to over EUR 1.8tn and at least 30% of this amount is to be spent on climate action.

Reference: European Council, 2020

* Due to data availability at the time of writing and despite the UK's withdrawal from the EU on 31 January 2020, the report still presents emissions data for the EU28. The UK's lack of participation in the EU's policymaking processes in the months preceding its official withdrawal, however, means that the political decisions presented concern the EU27 not the EU28.

CONTENTS

We unpack the EU28's progress and highlight key opportunities to enhance climate action across:



LEGEND

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

Decarbonisation Ratings[4] assess a country's performance compared to other G20 countries. A high score reflects a relatively good effort from a climate protection perspective but is not necessarily 1.5°C compatible.

Policy Ratings[5] evaluate a selection of policies that are essential pre-conditions for the longer-term transformation required to meet the 1.5°C limit.

SOCIO-ECONOMIC CONTEXT

Human Development Index

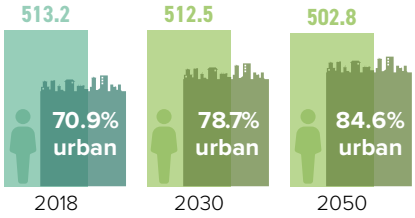
The Human Development Index reflects life expectancy, level of education, and per capita income. EU28 ranks very high.

Data for 2018. Weighted average calculate for all EU Member States. Source: UNDP, 2019

Population and urbanisation projections

(in millions)

The EU28's population is expected to decrease by about 2% by 2050 but also become more urbanised.



Data for 2018. Sources: United Nations, 2018; The World Bank, 2019

Gross Domestic Product (GDP) per capita

(PPP constant 2015 international $)

Data for 2019. Source: The World Bank, 2020

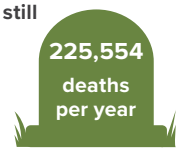
Death rate attributable to air pollution

Ambient air pollution attributable death rate per 1,000 population per year, age standardised.

0.3 EU28

0.1–1.1 G20 RANGE

Over 225,000 people die in the EU28 every year as a result of outdoor air pollution, from stroke, heart disease, lung cancer and chronic respiratory diseases. **Compared to total population, this is still one of the lowest levels in the G20.**



Data for 2016. Source: WHO, 2018

JUST TRANSITION

TRANSITION PLAN FOR COAL WORKERS

To mitigate the impact of coal phase-out on affected communities, in 2017 the EU established a Platform for Coal Regions in Transition aiming at stakeholder knowledge-sharing and exchanges of experiences in affected regions.

The EU also created the Just Transition Mechanism, aiming to mobilise at least EUR 100bn between 2021 and 2027.

Additional resources were committed in the framework of the COVID-19 recovery programmes adopted by the European Council in July 2020.

The money will be spent based on just transition plans prepared by the governments of the Member States for the regions affected by coal phase-out.

References: European Commission, 2019a, 2020c, 2020b; Climate Investment Funds, 2020

1. ADAPTATION
ADDRESSING AND REDUCING VULNERABILITY TO CLIMATE CHANGE

PARIS AGREEMENT **Increase the ability to adapt to the adverse effects of climate change and foster climate resilience and low-GHG development.**

The European Union is vulnerable to climate change and adaptation actions are needed.

On average, 474 fatalities and almost USD 4bn losses occur annually due to extreme weather events.

With global warming, society and its supporting sectors are increasingly exposed to severe impacts such as droughts and reduction in crop duration in the agricultural sector.

ADAPTATION NEEDS

Climate Risk Index

Impacts of extreme weather events in terms of fatalities and economic losses that occured. All numbers are averages (1999-2018).

Annual weather-related fatalities

13.9
PER 100,000 INHABITANTS

Source: Based on Germanwatch, 2019

Annual average losses (USD mn PPP)

2.9
PER UNIT GDP (%)

Source: Based on Germanwatch, 2019

The EU has already been struck by extreme weather events such as floods, droughts, heat waves, storms and wildfires. Similar to 2018, 2019 was another record-breaking year with extreme summer temperatures for several EU 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

Impact ranking scale:

Very low · Low · Medium · High · Very high

			1.5°C	2°C	3°C
WATER		% of area with increase in water scarcity	High	High	High
		% of time in drought conditions	High	High	High
HEAT AND HEALTH		Heatwave frequency	Very low	Low	High
		Days above 35°C	Low	Medium	Medium
AGRICULTURE	Maize	Reduction in crop duration	Medium	High	High
		Hot spell frequency	Low	Low	High
		Reduction in rainfall	Low	Very low	Very low
	Wheat	Reduction in crop duration	Low	Medium	High
		Hot spell frequency	Low	Low	Medium
		Reduction in rainfall	High	High	High

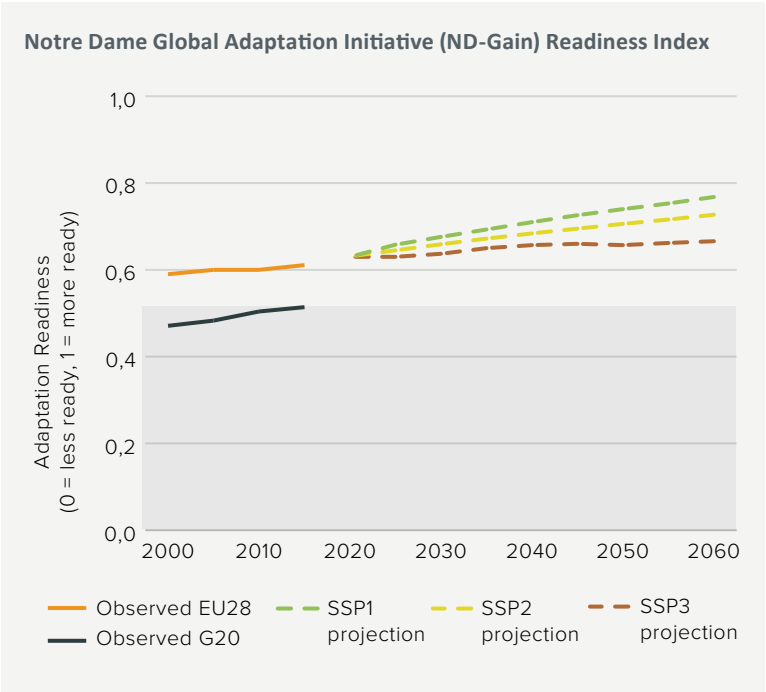
Source: Water, Heat and Health: own research. Agriculture: Arnell et al., 2019.

Note: These indicators are national scale results, weighted by area and based on global data sets. They are designed to allow comparison between regions and countries and, therefore, entail simplifications. They do not reflect local impacts within the country. Please see technical note for further information.

CORONAVIRUS RECOVERY Increasing resilience was one of the three priorities of the EU's COVID-19 recovery package; however, it applied to economic and social resilience without explicitly mentioning adaptation to climate change. Nonetheless, resources spent on modern, sustainable agriculture may also be used to increase the resilience of this sector when faced with droughts and heatwaves.

Adaptation readiness

The figure shows 2000-2015 observed data from the ND-GAIN Index overlaid with projected Shared Socioeconomic Pathways (SSPs) from 2015-2060.



On average the European Union scored well above the G20 average between 2000 and 2015 and is projected to continue doing so given its combination of social, economic and governance structures. Adaptation challenges still exist, but the EU is well-positioned to adapt if it puts in place measures compatible with SSP1, and to a lesser extent, SSP2. Other measures, as represented by SSP3, slow its readiness to adapt in the long term.

The readiness component of the Index created by the Notre Dame Global Adaptation Initiative (ND-GAIN) encompasses social, economic and governance indicators to assess a country's readiness to deploy private and public investments in aid of adaptation. The index ranges from 0 (low readiness) to 1 (high readiness).

The overlaid SSPs are qualitative and quantitative representations of a range of possible futures. The three scenarios shown here in dotted lines are qualitatively described as a sustainable development-compatible scenario (SSP1), a middle-of-the-road (SSP2) and a 'Regional Rivalry' (SSP3) scenario. The shaded area delineates the G20 average in 2015 for easy reference.

Source: Andrijevic et al., 2020

ADAPTATION POLICIES

National Adaptation Strategies

Document name	Publication year	Fields of action (sectors)												M&E process
		Agriculture	Biodiversity	Coastal areas and fishing	Education and research	Energy and industry	Finance and insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	
EU strategy on adaptation to climate change	2013														Information provided by Member States under the Monitoring Mechanism Regulation (MMR)

Nationally Determined Contribution (NDC): Adaptation

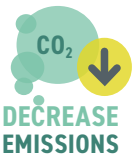
Targets	Actions
Not mentioned	Not mentioned

2. MITIGATION
REDUCING EMISSIONS TO LIMIT GLOBAL TEMPERATURE INCREASE

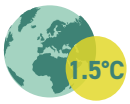
PARIS AGREEMENT

Hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit to 1.5°C, recognising that this would significantly reduce the risks and impacts of climate change.

EMISSIONS OVERVIEW



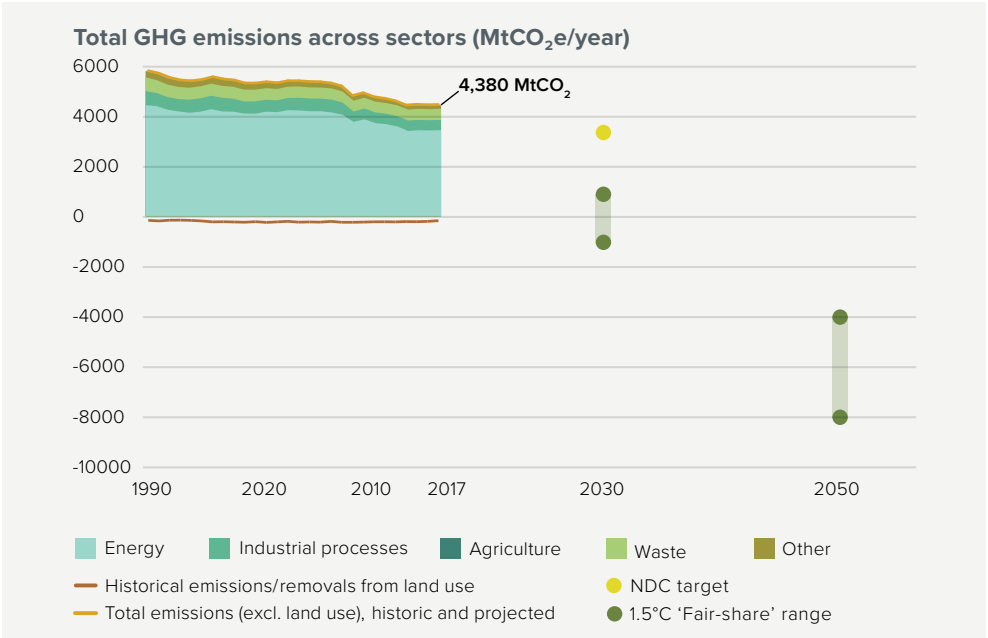
EU28's total GHG emissions (excl. land use) fell by over 25% between 1990-2018. After a 2% drop in 2018, more is expected for 2019, mostly due to a 9% drop from the EU ETS, responsible for approximately 45% of EU emissions.



In 2030, global CO_2 emissions need to be 45% below 2010 levels and reach net-zero by 2050. Global energy-related CO_2 emissions must be cut by 40% below 2010 levels by 2030 and reach net-zero by 2060.

Source: Rogelj et al., 2018

GHG emissions across sectors and CAT 1.5°C 'fair-share' range ($MtCO_2e$/year)

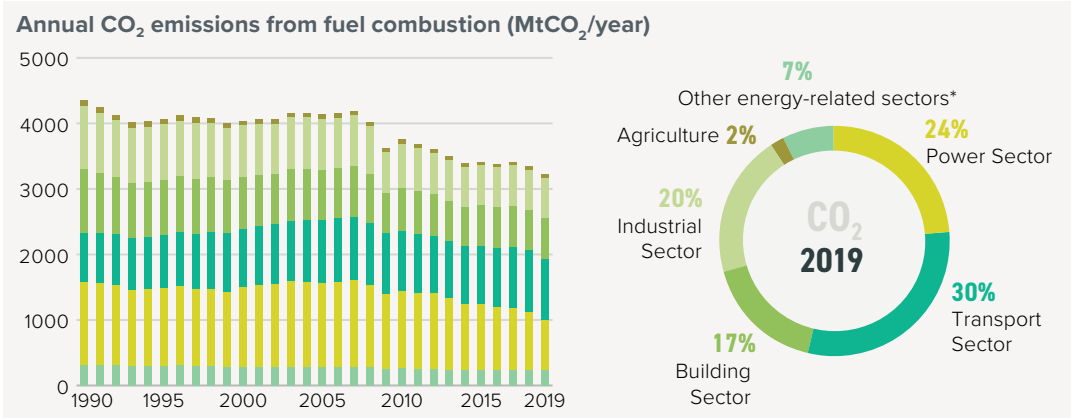


The EU's emissions (excl. land use) decreased by 25% between 1990 and 2018, with reductions in all sectors except for transport, which increased by 20%. The fastest reduction in emissions took place in electricity generation, at 34%, with agriculture and buildings at 20% and 26%, respectively.

The 2030 climate target is an "at least 40%" reduction below 1990, but in September 2020 the Commission suggested an increase to "at least 55%". The EU 2050 goal is for "climate neutrality".

Sources: Gütschow et al., 2019; Climate Action Tracker, 2020

Energy-related CO_2 emissions by sector



** 'Other energy-related sectors' covers energy-related CO_2 emissions from extracting and processing fossil fuels.*
Due to rounding, some graphs may sum to slightly above or below 100%.

The largest driver of overall GHG emissions are CO_2 emissions from fuel combustion. Fuel combustion emissions have steadily dropped over the past decade, and are now at 16% below 2010 levels, driven mostly by a switch from coal to renewables. From 2009, the transport sector became the largest source of emissions – now accounting for 30%.

Source: Enerdata, 2020

CORONAVIRUS RECOVERY

The target of spending at least 30% of the Recovery and Resilience Facility on climate action provides some of the resources needed to achieve a much more ambitious emissions reduction goal for 2030, and the climate neutrality goal by 2050. At time of writing, however, the definition of what kinds of measures would be considered as fulfilling the mandatory 30% target had not been clarified, and remains open to interpretation and possible misuse.

ENERGY OVERVIEW

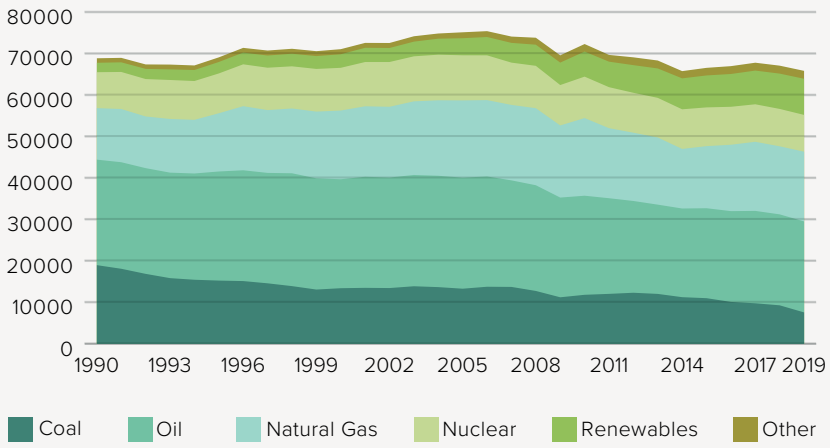
Fossil fuels make up 70% of the EU28's energy mix. With the increase in renewable energy over the past decades, the carbon intensity of the energy mix has reduced from approximately 60 tCO_2/TJ in 1990 to 48 tCO_2/TJ in 2019.

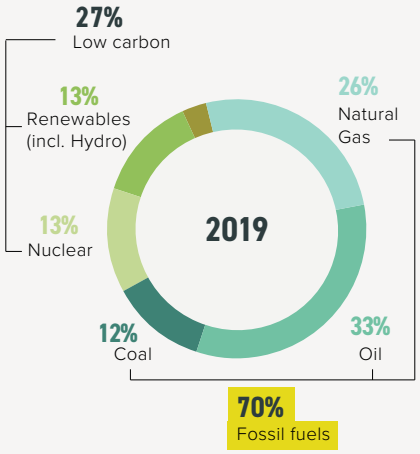
The share **of fossil fuels in the global primary energy mix needs to fall to 67% by 2030 and to 33% by 2050** (and to substantially lower levels without Carbon Capture and Storage).

Source: Rogelj et al., 2018

Energy Mix

Total primary energy supply (PJ)





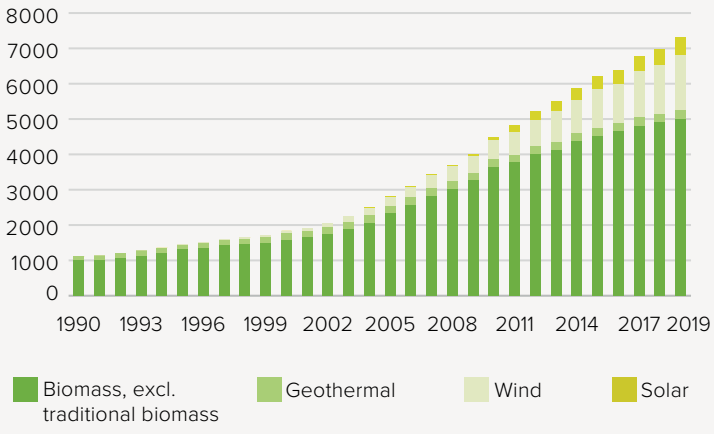
Source: Enerdata, 2020

Due to rounding, some graphs may sum to slightly above or below 100%.

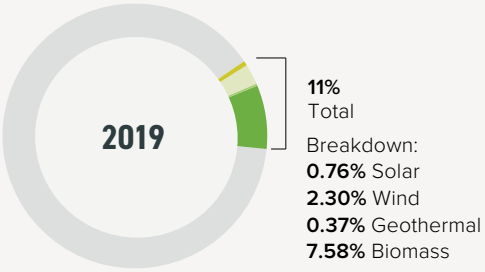
This graph shows the fuel mix for all energy supply, including energy used for electricity generation, heating, cooking, and transport fuels. Fossil fuels make up 70% of the EU28's energy mix, still lower than the G20 average of 85%. The share of renewables has increased slightly over the past two decades, especially in the power sector, mainly replacing coal.

Solar, Wind, Geothermal, and Biomass Development

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



Solar, wind, geothermal and biomass account for 11% of the EU28's energy supply



Source: Enerdata, 2020

Large hydropower and solid fuel biomass in residential use are not reflected due to their negative environmental and social impacts.
Due to rounding, some graphs may sum to slightly above or below 100%.

Decarbonisation rating: RE share of TPES compared to other G20 countries

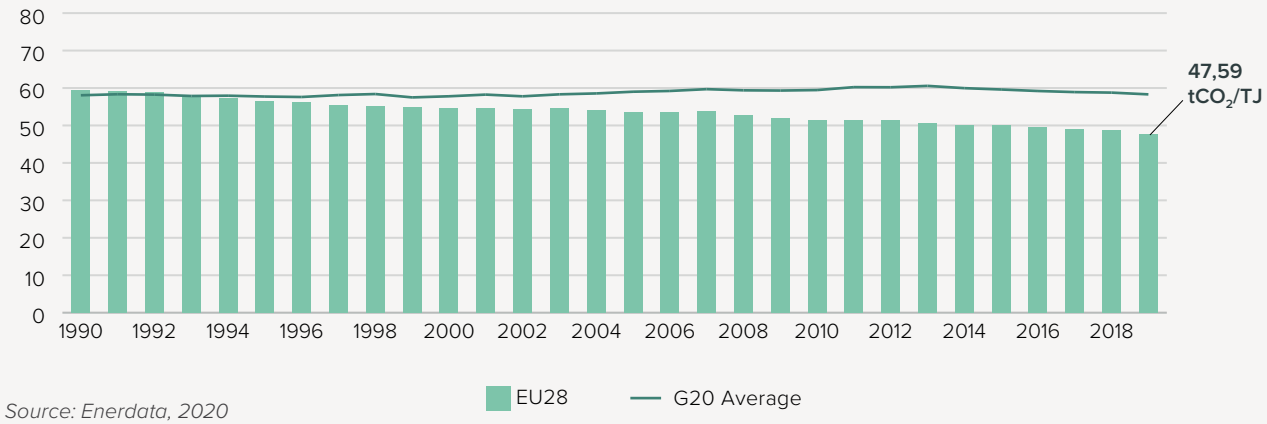
Source: own evaluation

Solar, wind, geothermal and biomass account for 11% of EU28's energy supply – the G20 average is only 9%. The share in total energy supply has increased by around 23% between 2014 and 2019. Bioenergy (for electricity and heat) makes up the largest share.

Source: Enerdata, 2020

Carbon Intensity of the Energy Sector

Tonnes of CO_2 per unit of total primary energy supply (tCO_2/TJ)



Source: Enerdata, 2020

Decarbonisation rating: carbon intensity of the energy sector compared to other G20 countries

5-year trend (2014-2019): High

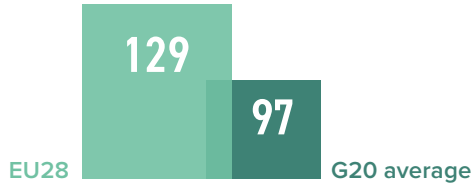
Current year (2019): High

Carbon intensity shows how much CO_2 is emitted per unit of energy supply. Carbon intensity of EU28 was 48 tCO_2/TJ in 2019, which is one of the lowest among the G20. This reflects the continuously growing share of renewables in the energy mix.

Source: own evaluation

Energy supply per capita

(GJ/capita)



Sources: Enerdata, 2020; The World Bank, 2019

TPES per capita (GJ/capita): 5-year trend (2014-2019)

-0.4% EU28 | +1.9% G20 average

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

Energy use per capita in the EU28 is 129 GJ/capita, well above the G20 average (96 GJ), but is decreasing slightly (-0.3%, 2014-2019) in contrast to the increasing G20 average (+2%).

Decarbonisation rating: energy supply per capita compared to other G20 countries

5-year trend (2014-2019): Medium

Current year (2019): High

Source: own evaluation

Energy intensity of the economy

(TJ/PPP USD2015 millions)

Data for 2018. Sources: Enerdata, 2020; The World Bank, 2018

Energy intensity of the economy: 5-year trend (2014-2019)

-10.7% EU28 | -11.6% G20 average

This indicator quantifies how much energy is used for each unit of GDP, which is closely related to the level of industrialisation, efficiency, climatic conditions and geography.

The EU28's energy intensity is well below the G20 level and is decreasing at a similar speed (-11%, 2013-2018) as the G20.

Decarbonisation rating: energy intensity compared to other G20 countries

5-year trend (2013-2018): Medium

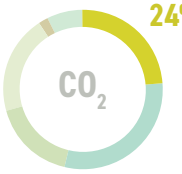
Current year (2018): High

Source: own evaluation

POWER SECTOR

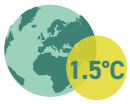
Emissions from energy used to make electricity and heat

The EU28 still produces 15% of electricity from coal, 22% from gas and 2% from oil. It needs to decarbonise the power sector completely by 2040 (at the latest) in order to be in line with a 1.5°C limit.



Share in energy-related CO_2 emissions from electricity and heat production

Source: Enerdata, 2020



COMPATIBILITY

Coal and decarbonisation

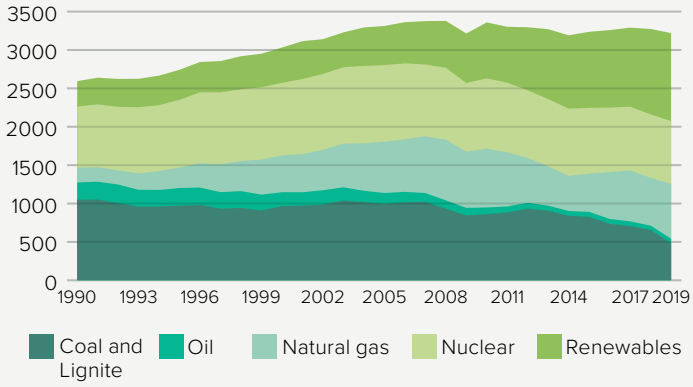
Worldwide, **coal use for power generation needs to peak by 2020,** and between 2030 and 2040, all the regions of the world need to phase out coal-fired power generation. **Electricity generation has to be decarbonised before 2050**, with renewable energy the most promising alternative.

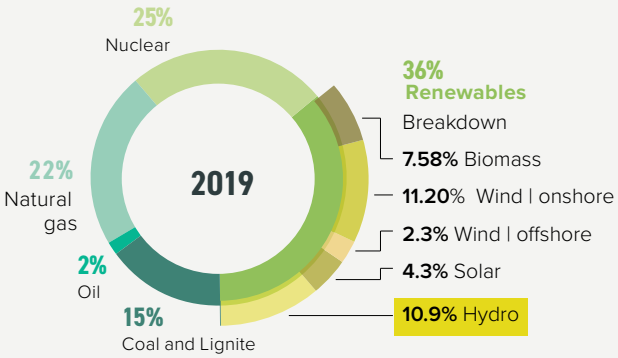
Sources: Rogelj et al., 2018; Climate Analytics, 2016; Climate Analytics, 2019

STATUS OF DECARBONISATION

Electricity mix

Gross power generation (TWh)

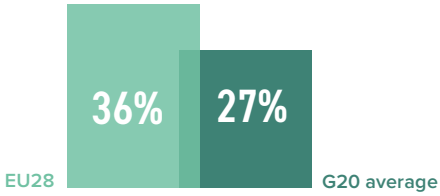




The EU28 is increasingly producing power from renewables, mainly from large hydropower and onshore wind. In total, renewables account for about a third of the power mix. The share of coal power has decreased over the past decades but nevertheless accounted for 15% of the power mix in 2019.

Share of renewables in power generation

(incl. large hydro)



Source: Enerdata, 2020

Share of renewables in power generation: 5 year trend (2014-2019)

+19% EU28

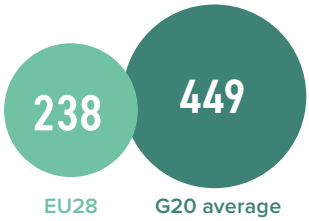
+19.5% G20 average

Decarbonisation rating: share of renewables compared to other G20 countries

Source: own evaluation

Emissions intensity of the power sector

Country vs G20 average (gCO_2/kWh)



Source: Enerdata 2020

Emissions intensity: 5-year trend (2014-2019)

-21.1%
EU28

-10.3%
G20 average

For each kilowatt hour of electricity, 238gCO_2 are emitted in the EU28. This is nearly half that of the G20 average. The emissions-intensity dropped by 21% between 2014 and 2019, reflecting the decreasing share of fossil fuels in the electricity generation mix.

Decarbonisation rating: emissions intensity compared to other G20 countries

5-year trend (2014-2019): High

Current year (2019): High

Source: own evaluation

POLICY ASSESSMENT

Renewable energy in the power sector

Medium

Should the European Council adopt the "at least 55%" emissions reduction goal suggested by the European Commission, the share of renewables in the power sector will need to increase to at least 65% in 2030. Development of renewables in the EU is driven by partial internalisation of the externalities resulting from the combustion of fossil fuels via emissions trading in the framework of the EU ETS. Support mechanisms for renewables will also be important.

References: own evaluation, based on European Commission, 2020a.

Coal phase-out in the power sector

Medium

Coal power plants have already been phased out in three EU countries: Belgium, Sweden and Austria. An additional 11 countries have announced a coal phase-out, all but Germany before 2030, with most aiming to phase out coal before 2025. In Czech Republic and Spain, coal phase-out is under discussion, with 2025 as the potential phase-out date discussed in the latter. **Only five EU Member States, all Eastern European, have no plans nor held discussions on the future of coal in their countries.** Of those, only in Poland does coal play an important role: with over 30 GW installed, it is responsible for 22% of total EU27 coal capacity, second only to Germany. However, a recent draft of Poland's "Energy Policy until 2040" indicates it may decrease the share of coal in its electricity mix to as low as 11% from 75% currently.

References: own evaluation, based on Europe Beyond Coal, 2020; Ministry of Climate, 2020

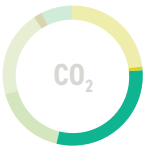
TRANSPORT SECTOR

Emissions from energy used to transport people and goods

The transport sector is the second largest emitting sector in the European Union. The sector's much slower emissions reductions, especially compared with the power sector, led to an increased share of total emissions from 14% in 1990 to 22% in 2018. The increase in electrically-charged vehicles (including plug-ins), which in the first half of 2020 reached a share of 7%, creates the potential for accelerating emissions reductions. To stay within a 1.5°C limit, all new EU-registered vehicles need to be electric by 2030.

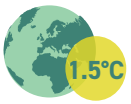
Share in energy-related CO_2 emissions from transport sector

Source: Enerdata, 2020



0.59% Electricity-related emissions

29% Direct emissions



COMPATIBILITY

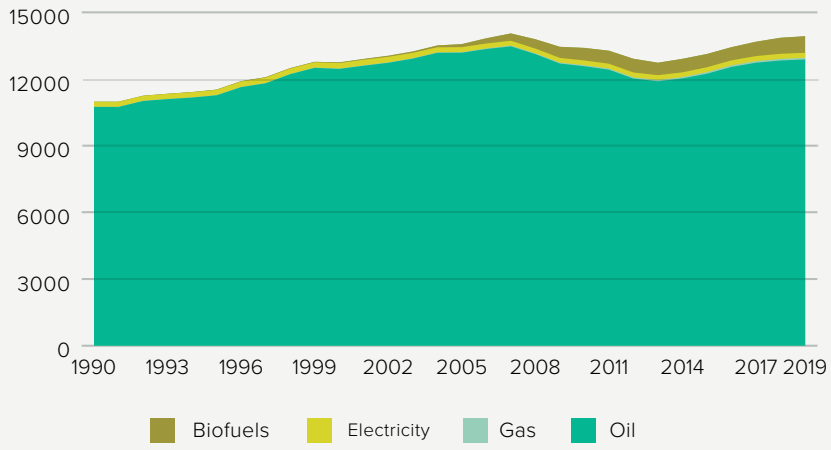
The share of low-carbon fuels in the transport fuel mix must increase to about 60% by 2050.

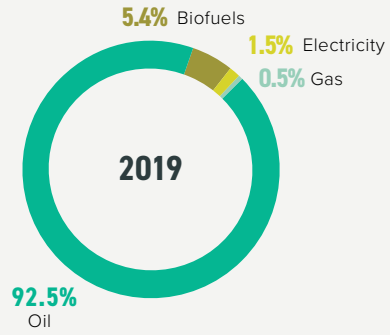
Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Transport energy mix

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





Source: Enerdata, 2020

Due to rounding, some graphs may sum to slightly above or below 100%.

Electricity and biofuels make up only 7% of the energy mix in transport, with the rest coming from oil. The EU has a goal to increase the share of renewables in the power sector to at least 14% in 2030.

Transport emissions per capita

excl. aviation (tCO_2/capita)

Data for 2018. Source: Enerdata, 2020

Transport emissions: 5-year trend (2013-2018)

+7.1% EU28

+5.5% G20 average

Decarbonisation rating: transport emissions compared to other G20 countries

5-year trend (2013-2018): Medium

Current year (2018): Medium

Source: own evaluation

Aviation emissions per capita[6]

(tCO_2/capita)

Data for 2017. Source: Enerdata, 2020

Aviation emissions: 5-year trend (2012-2017)

+12.7% EU28 | +18.7% G20 average

Decarbonisation rating: aviation emissions compared to other G20 countries

5-year trend (2012-2017): Medium

Current year (2017): Low

Source: own evaluation

Motorisation rate

587 VEHICLES PER 1,000 INHABITANTS (2016)

83% of the kilometres travelled is by car and almost 59% of people in the EU28 have a car.

Data for 2016. Source: Vieweg et al., 2018

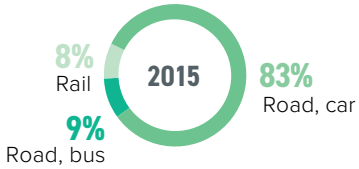
Market share of electric vehicles in new car sales (%)

No data available

Source: IEA, 2019

Passenger transport

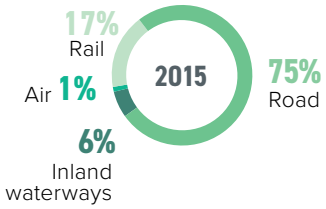
(modal split in % of passenger-km)



Data for 2015. Source: Vieweg et al., 2018

Freight transport

(modal split in % of tonne-km)



Data for 2015. Source: Vieweg et al., 2018

POLICY ASSESSMENT

Phase out fossil fuel cars

Medium

Some EU Member States have already announced plans to ban the sale of combustion cars in the coming decades. The most ambitious are Denmark, the Netherlands, and Sweden which plan to phase out sales of combustion vehicles by 2030. France plans to do so by 2040.

The phase-out of combustion vehicles is driven in the EU by increasingly ambitious emissions standards and promotion of zero- and low-emissions vehicles (ZLEV). According to the EU regulation from 2019, in 2025 at least 15% of passenger cars and light vans must be ZLEV. By 2030, this share should increase to 35%

References: own evaluation, based on Dutch Government, 2017; Electrive, 2019; WEF, 2017; European Commission, 2019f

Phase out fossil fuel heavy-duty vehicles

Medium

While there is no phase-out date for combustion heavy-duty vehicles in any of the EU Member States, the EU was the first of the G20 members to adopt emissions standards for heavy-duty vehicles. According to regulations adopted in 2019, emissions from new vehicles should decrease by 15% in the period 2025-2029 and by 30% from 2030 onwards, in comparison to emissions of the new vehicles sold between 1 July 2019 and 30 June 2020. The regulation also sets a 2% benchmark for the share of zero- and low-emission vehicles (ZLEV). Whereas failing to meet this benchmark does not result in any negative consequences, exceeding it leads to more lenient emissions standards for the remaining vehicles.

In 2019 the EU amended its directive on clean and energy-efficient road transport and set a minimum share of clean heavy-duty vehicles (trucks and buses) in the total number of heavy-duty vehicles contracted by Member States.

References: own evaluation, based on European Parliament and the Council of the European Union, 2019a, 2019b

Modal shift in (ground) transport

Medium

Between 2001 and 2016 the EU adopted four railway packages aiming at strengthening the position of railways in comparison to other modes of transport. The measures adopted include creation of a single European railway area that facilitates competition between different railway service providers and increasing the interoperability of the railway system. However, these efforts still did not have an impact on shifting freight transport from road to railways: between 2013 and 2018 the share of freight transported by rail remained constant at 18.7%, whereas the share of freight transported by road increased from 73.9-75.3% at the costs of inland shipping. Currently the EU is discussing amending the 1992 Directive on combined transport that would also include broadening its scope to national intermodal operations and extending economic support measures for transshipment terminals, which could facilitate a shift from road to rail especially for long distances (European Parliament, 2020). Shifting EU investment from road to rail infrastructure offers the potential to increase the attractiveness of low carbon modes of transport.

References: own evaluation, based on European Commission, 2020b; Eurostat, 2020

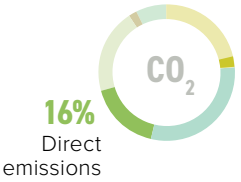
BUILDING SECTOR

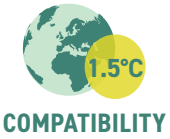
Emissions from energy used to build, heat and cool buildings

The EU28's building emissions – counting heating, cooking and also electricity use – make up about a third of total energy-related CO_2 emissions. Per capita, building-related emissions are above the G20 average.

Building emissions occur directly (burning fuels for heating, cooking, etc) and indirectly (grid-electricity for air conditioning, appliances, etc).

Source: Enerdata, 2020





Global emissions from buildings need to be halved by 2030, and be 80-85% below 2010 levels by 2050, mostly through increased efficiency, reduced energy demand and electrification in conjunction with complete decarbonisation of the power sector.

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Building emissions per capita

(incl. indirect emissions) (tCO_2/capita)

Source: Enerdata, 2020

Building-related emissions per capita are above the G20 average. This partly reflects climatic conditions but also the high level of floor area per person. In contrast to the G20 average, the EU28 has managed to decrease the level by 11% between 2014 and 2019.

Building emissions: 5-year trend (2014-2019)

-11.49% EU28 | +1.82% G20 average

Decarbonisation rating: building emissions compared to other G20 countries

5-year trend (2014-2019): High

Current year (2019): Medium

Source: own evaluation

Residential buildings

Energy use per m²

No data available

Commercial and public buildings

Energy use per m²

No data available

Building emissions are largely driven by how much energy is used in heating, cooling, lighting, household appliances, etc. In the EU on average emissions from heating are decreasing due to improved insulation resulting in decreasing energy consumption, and fuel switch, influencing emissions intensity of the energy. At the same time indirect emissions from electricity increase resulting from higher energy consumption for air conditioning and household appliances

Source: Climate Analytics, 2020

POLICY ASSESSMENT

Near zero energy new buildings

High

Emissions from the buildings sector in the EU are covered by the Energy Performance Buildings Directive (EPBD). This directive, amended in 2018, obliges Member States to introduce minimum energy performance requirements and ensure that, from 2021, all new buildings are "nearly zero energy buildings" (NZEB).
European legislation also contributes to increasing the energy-efficiency of household appliances in the framework of the Eco-design and the Energy Labelling directives which are set to reduce emissions by 315 $MtCO_2e$ in 2020 and 515 $MtCO_2e$ in 2030.
Fuel switch away from fossil fuels is driven by the planned phase-out of fossil fuels in heating. Some countries have already introduced such a ban (e.g. Denmark) or are planning to do so (e.g. the Netherlands and the UK)

References: own evaluation, based on European Parliament and the Council of the European Union, 2018c; IEA, 2017; Cambridge Econometrics, 2019; Energy Saving Trust, 2019; European Commission, 2017

Renovation of existing buildings

High

The EU's EPBD directive amended in 2018 obliges each member state to submit a long-term renovation strategy leading to fully decarbonising its building stock by 2050, with specific milestones for 2030. To meet this goal the EU needs to significantly accelerate its renovation rate, which currently amounts to about 1% annually.
In October 2020 the European Commission plans to publish its "Renovation Wave" initiative under the European Green Deal. A renovation rate of 3.5% would be 1.5°C compatible.

References: own evaluation, based on European Parliament and the Council of the European Union, 2018c; Climate Action Tracker, 2020b; European Commission, 2019b

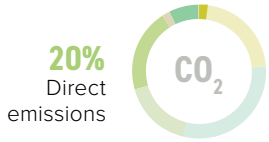
INDUSTRY SECTOR

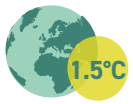
Emissions from energy in the industrial sector

Industry-related emissions make up about a third of CO_2 emissions in the EU28 and the level of emissions from this sector is increasing slightly.

Share in energy-related CO_2 emissions from industrial sector

Source: Enerdata, 2020





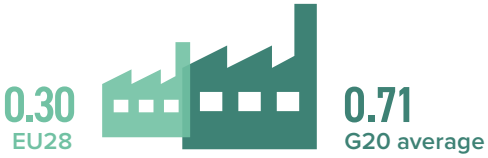
Industrial emissions need to be reduced by 65-90% from 2010 levels by 2050.

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Industry emissions intensity[7]

(tCO_2e/USD2015 GVA)



Data for 2016. Sources: Gütschow et al., 2019; Enerdata, 2020

Industry emissions: 5-year trend (2011-2016)

-15% EU28 | -12% G20 average

Decarbonisation rating: emissions intensity of industry compared to other G20 countries

Source: own evaluation

Carbon intensity of cement production[8]

($kgCO_2$/tonne product)

EU28's cement industry is less emissions intensive than the world average.

Data for 2016. Sources: CAT Decarbonisation Data Portal, 2020; Climate Action Tracker, 2019

Carbon intensity of steel production[8]

($kgCO_2$/tonne product)

Steel production and steelmaking are significant GHG emission sources, and challenging to decarbonise.

Data for 2016. Sources: World Steel Association, 2018; CAT Decarbonisation Data Portal, 2020

POLICY ASSESSMENT

Energy Efficiency

In 2018 the EU added a new goal to its energy efficiency directive: decreasing the EU's energy consumption by 32.5% compared with earlier 2018 projections. This should result in energy consumption of the EU28 not exceeding 1,273 Mtoe (million tonnes of equivalent) of primary energy and/or no more than 956 Mtoe of final energy. Achieving the "at least 55%" by 2030 emissions reduction goal would require decreasing energy consumption by between 36-37% for final energy and 39-41% for primary energy. The EU ETS covers emissions from the industry sector, including those resulting from energy consumption. To avoid carbon leakage, sectors deemed vulnerable to the risk of carbon leakage receive emissions allowances free of charge, up to a level reflecting the state-of-the-art benchmarks. The criteria for selecting subsectors at risk of carbon leakage are becoming increasingly stringent, decreasing the share of emissions allowances distributed for free to the industry from 80% in 2013 to 30% in 2020.

References: European Commission, 2015, 2020a; European Parliament and the Council of the European Union, 2018a

LAND USE SECTOR

Emissions from changes in the use of the land

NET SINK OF EMISSIONS

To stay within the 1.5°C limit, the EU needs to make the land use and forest sector a net sink of emissions, e.g. by halting the expansion of residential areas, discontinuing the degradation of peatlands and use of moor soils, converting cropland into wetlands, and by creating new forests. In 2018 the EU adopted a regulation that includes a no-debit rule, meaning that there should be no emissions from the LULUCF sector.

Source: European Parliament and the Council of the European Union, 2018b

1.5°C COMPATIBILITY

Global deforestation needs to be halted and changed to net CO_2 removals by around 2030.

Source: Rogelj et al., 2018

Global tree-cover loss

Gross tree-cover loss by dominant driver (million hectares)

No data available

The share of land covered by forest increased from 36.2% in 2015 to 37% in 2018, with the biggest increase occurring in Bulgaria (by 1.9%), Greece (+6%), France (2.4%), Portugal (+3.8%). **Finland, Sweden, and Slovenia are the most forested EU Member States, with more than 60% of the countries' land area covered by forest.**

Source: Eurostat, 2020

POLICY ASSESSMENT

Target for net-zero deforestation

High

According to EU's 2018 land use and forestry regulation, each member state has to ensure that greenhouse gas emissions from this sector are offset by at least an equivalent removal of CO_2 from the atmosphere in the period 2021 to 2030. This rule is weakened by allowing some removals to be transferred to other Member States; for emissions in inadmissible sectors to be covered by emissions reductions exceeded in other sectors; and the possibility of using 2021-2025 LULUCF emissions reductions to offset emissions in the second half of the decade.

References: own evaluation, based on European Parliament and the Council of the European Union, 2018a, 2018b.

AGRICULTURE SECTOR

Emissions from agriculture

DIETARY SHIFTS ARE NEEDED

The EU's agricultural emissions decreased by 20% between 1990 and 2018. Most of the decrease took place in the early 1990s, and emissions remained at a constant level over the last decade. The overall decrease in emissions resulted in a higher share of emissions from agriculture, increasing from 8.3% in 2006 to 10.3% in 2018.

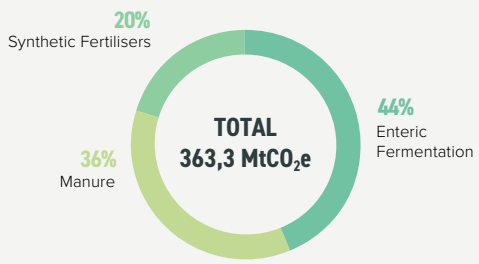
Source: European Environment Agency, 2020a

1.5°C COMPATIBILITY

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 fertilisers and manure) need to be reduced by 10% by 2030 and by 20% by 2050 (from 2010 levels).

Source: Rogelj et al., 2018

Emissions from agriculture (excluding energy)



Data for 2017.
Source: FAO, 2019

In the EU28, the largest sources of GHG emissions in the agricultural sector are digestive processes in animals (enteric fermentation), livestock manure and the use of synthetic fertilisers. A shift to organic farming, more efficient use of fertilisers and dietary changes can help reduce emissions.
In July 2020 the European Commission began consultation on addressing methane emissions, aiming to identify the main areas of action to significantly reduce anthropogenic methane emissions.

Sources: European Commission, 2020a; FAO, 2019

Due to rounding, some graphs may sum to slightly above or below 100%.

MITIGATION: TARGETS AND AMBITION

The combined mitigation effect of nationally determined contributions (NDC) submitted by September 2020 is not sufficient and will lead to a warming of 2.7°C by the end of the century. This highlights the urgent need for all countries to submit more ambitious targets by 2020, as they agreed in 2015, and to urgently strengthen their climate action to align to the Paris Agreement's temperature goal.

AMBITION: 2030 TARGETS

Nationally Determined Contribution (NDC): Mitigation

Targets

EU wide target: in September 2020 the European Commission proposed increasing EU's 2030 emissions reduction goal to "at least 55%" from the current outdated goal of "at least 40%" adopted in 2014.

Actions

Not mentioned

Climate Action Tracker (CAT) evaluation of NDC and actions

	Critically Insufficient
	Highly Insufficient
●	Insufficient
	2°C Compatible
	1.5°C Compatible
	Role Model

NDCs rated "insufficient" are in the least stringent part of a country's 'fair-share' range and not consistent with holding warming below 2°C, let alone with the Paris Agreement's stronger 1.5°C limit. If all government NDCs were in this range, warming would reach over 2°C and up to 3°C.

The EU is currently discussing increasing its emissions reduction goal to "at least 55%" and possibly "at least 60%".

This does not go far enough. An increase of this goal – to 65% – accompanied with funding climate action abroad, would make the EU the first region with commitments compatible with the Paris Agreement. Rating individual member states as part of the EU is difficult because of the internal burden sharing system, interlinkage of the actions through the emission trading system and redistribution of financial flows, linked electricity sector. We therefore do not provide a 1.5°C and 2°C temperature levels for EU member states.

Evaluation as at October 2020, based on the EU's NDC. Source: Climate Action Tracker

TRANSPARENCY: FACILITATING AMBITION

Countries are expected to communicate their NDCs in a clear and transparent manner in order to ensure accountability and comparability.

The NDC Transparency Check has been developed in response to Paris Agreement decision (1/CP.21) and the Annex to decision 4/CMA.1. While the Annex is only binding from the second NDC onwards, countries are "strongly encouraged" to apply it to updated NDCs, due in 2020.

NDC Transparency Check recommendations

For more visit www.climate-transparency.org/ndc-transparency-check

To ensure clarity, transparency and understanding, it is recommended that the EU provides additional detailed information in the upcoming NDC Update (compared to the existing NDC), including:

- Provide link to the long term temperature goal of the Paris Agreement. Include grounds on why the NDC target is fair and why it constitutes the EU's "highest possible ambition".
- Expressly cover the land sector and explain how the land sector is included in the EU target.
- State source of data for quantifying the reference point as well as provide information under which the EU would update the value of the reference indicators.

AMBITION: LONG-TERM STRATEGIES

Status	Submitted to the UNFCCC in March 2020 on behalf of the EU27 (excluding the UK)
2050 target	"Climate neutrality" goal by 2050
Interim steps	None
Sectoral targets	No
Net-Zero target	"Climate neutrality" goal by 2050

The Paris Agreement invites countries to communicate mid-century, long-term, and low-GHG emissions development strategies by 2020. Long-term strategies are an essential component of the transition toward net-zero emissions and climate-resilient economies.

3. FINANCE
MAKING FINANCE FLOWS CONSISTENT WITH CLIMATE GOALS

PARIS AGREEMENT

Make finance flows consistent with a pathway towards low-GHG emissions and climate-resilient development.

CONTINUED FOSSIL FUEL SUBSIDIES

While the EU decided to spend almost a third of its Recovery Package and Multiannual Financial Framework on climate action, it continued subsidising fossil fuels, countering the impact of these significant expenditures.

1.5°C COMPATIBILITY

Investment in green energy and infrastructure needs to outweigh fossil fuel investments by 2025.
Source: Rogelj et al., 2018

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 the price.

Fossil Fuel Subsidies

No data available

According to the assessment of the European Commission, between 2008 and 2016 annual subsidies to fossil fuels remained at between EUR 54 and EUR 60bn. The largest beneficiary were fossil fuels in the electricity sector which, in 2016, benefitted from EUR 16bn, followed by transport with EUR 12bn.

Source: European Commission, 2019d

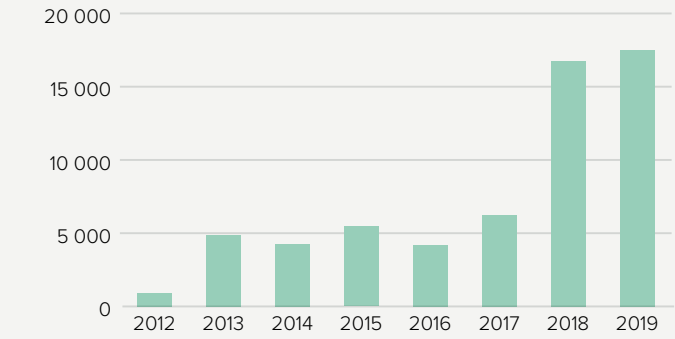
Fossil Fuel Subsidies by fuel type

No data available

The latest estimates on fossil fuel subsidies being provided through the EU's long-term budget, the Multiannual Financial Framework (MFF), totalled USD 604m (EUR 515m) per year between 2014-16 (Gençsü et al., 2017). The MFF includes two mechanisms of support to fossil fuels (mainly to oil and gas infrastructure projects): the European Regional Development Fund and the Connecting Europe Facility.

Carbon Pricing and Revenue

In 2005, the EU introduced the Emissions Trading Scheme (ETS), which in 2019 generated USD 17.5bn of revenues. The scheme covers 45% of European emissions (in the power, industry and aviation sectors), with emissions priced at USD 28/tCO_2 in 2019.



Source: I4CE, 2019; OECD, 2018

CORONAVIRUS RECOVERY

In addition to the EU's Recovery Package – at least 30% of which should be spent on climate action – Member States have also adopted their own financial measures to address the economic repercussions of the response to the coronavirus. These include bailouts for fossil fuels intensive sectors with weak, or even absent, conditionalities. The airline industry has been a primary beneficiary of these unconditional bailouts.

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.

Public finance for fossil fuels

No data available

The EU has cut down its financing for coal in recent years, in line with EU-level commitments. As such, 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. However, the EIB and EBRD have been financing oil and gas projects during the period 2016-2018, estimated at USD 2.1bn and USD 1.09bn, respectively. EU public finance institutions have committed to nearly full exclusion for all "unabated" oil projects from 2021 but have minimal exclusion for gas projects.

Source: Oil Change International, 2020

Provision of international public support

(annual average 2017 and 2018)

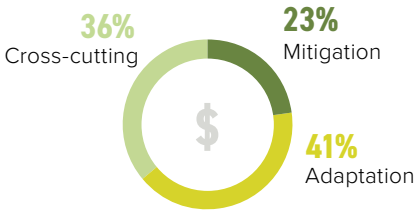
Climate finance contributions are sourced from Party reporting to the UNFCCC.

Bilateral, regional and other channels

Annual average contribution

3,165.97
MN USD

Theme of support:



Multilateral climate finance contributions

3,243.05
MN USD

Theme of support:

Core / General Contributions

Annual average contribution:

0
MN USD

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. In 2017/18, it corrected its earlier bias towards mitigation in bilateral climate finance flows, with amounts increasing since the 2015/16 period. In its most recent report, the EU includes EIB in its multilateral funding, hence the significant jump from the 2015/16 period. These contributions remain considered by the EU as climate-specific, rather than a core general contribution to a multilateral institution.

FINANCIAL POLICY AND REGULATION

Financial policy and regulation

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.

Category	Instruments	Objective	Under Discussion/ implementation		None identified	
Green Financial Principles	n/a	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.	●			
			Mandatory	Voluntary	Under Discussion/ implementation	None identified
Enhanced supervisory review, risk disclosure and market discipline	Climate risk disclosure requirements	Disclose the climate-related risks to which financial institutions are exposed			●	
	Climate-related risk assessment and climate stress-test	Evaluate the resilience of the financial sector to climate shocks				●
Enhanced capital and liquidity requirements	Liquidity instruments	Mitigate and prevent market illiquidity and maturity mismatch				●
	Lending limits	Limit the concentration of carbon-intensive exposures				●
		Incentivise low carbon-intensive exposures				●
	Differentiated reserve requirements	Limit misaligned incentives and channel credit to green sectors				●

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 ESG factors into investment decision making. In March 2018, the European Commission (EC) published its Action Plan on Financing Sustainable Growth, setting an EU strategy on sustainable finance and a roadmap for future work across the financial system. In June 2018, the EC set up the Technical Expert Group (TEG) to assist it in developing a unified classification system for sustainable economic activities (the so-called EU Taxonomy). In December 2018, the European Banking Association (EBA) joined the NGFS. In 2019, the TEG published three reports (EU Taxonomy, Green Bonds standards, and benchmarks on ESG disclosures). In December 2019, the EBA published its Action Plan on sustainable finance, describing its approach and timeline for delivering mandates related to environmental, social, and governance factors. The European Central Bank is a member of the NGFS.

Nationally Determined Contribution (NDC): Finance

Conditionality	Not applicable
Investment needs	Not specified
Actions	Not mentioned
International market mechanisms	No contribution from international credits for the achievement of the target

ENDNOTES

For more detail on the sources and methodologies behind the calculation of the indicators displayed, please download the Technical Note at: www.climate-transparency.org/g20-climate-performance/g20report2020

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 emissions 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.

3 In order to maintain comparability across all countries, this report utilises the PRIMAP year of 2017. However, note that Common Reporting Format (CRF) data is available for countries which have recently updated GHG inventories.

4 The Decarbonisation Ratings assess the current year and average of the most recent five years (where available) to take account of the different starting points of different G20 countries.

5 The selection of policies rated and the assessment of 1.5°C compatibility are informed by the Paris Agreement, the IPCC's 2018 SR15 and the Climate Action Tracker (2016). The table below displays the criteria used to assess a country's policy performance.

6 This indicator adds up emissions from domestic aviation and international aviation bunkers in the respective country. In this Country Profile, however, only a radiative forcing factor of 1 is assumed.

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

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

On endnote 5.	Low	Medium	High	Frontrunner
Renewable energy in power sector	No policy to increase the share of renewables	Some policies	Policies and longer-term strategy/ target to significantly increase the share of renewables	Short-term policies + long-term strategy for 100% renewables in the power sector by 2050 in place
Coal phase-out in power sector	No target or policy in place for reducing coal	Some policies	Policies + coal phase-out decided	Policies + coal phase-out date before 2030 (OECD and EU28) or 2040 (rest of the world)
Phase out fossil fuel cars	No policy for reducing emissions from light-duty vehicles	Some policies (e.g. energy/emissions performance standards or bonus/ malus support)	Policies + national target to phase out fossil fuel light-duty vehicles	Policies + ban on new fossil-based light-duty vehicles by 2035 worldwide
Phase out fossil fuel heavy-duty vehicles	No policy	Some policies (e.g. energy/emissions performance standards or support)	Policies + strategy to reduce absolute emissions from freight transport	Policies + innovation strategy to phase out emissions from freight transport by 2050
Modal shift in (ground) transport	No policies	Some policies (e.g. support programmes to shift to rail or non-motorised transport)	Policies + longer-term strategy	Policies + longer-term strategy consistent with 1.5°C pathway
Near zero energy new buildings	No policies	Some policies (e.g. building codes, standards or fiscal/financial incentives for low-emissions options)	Policies + national strategy for near zero energy new buildings	Policies + national strategy for all new buildings to be near zero energy by 2020 (OECD countries) or 2025 (non-OECD countries)
Energy efficiency in Industry	0-49% average score on the policy-related metrics in the ACEEE's International Energy Efficiency Scorecard	50-79% average score on the policy-related metrics in the ACEEE's International Energy Efficiency Scorecard	80-89% average score on the policy-related metrics in the ACEEE's International Energy Efficiency Scorecard	Over 90% average score on the policy-related metrics in the ACEEE's International Energy Efficiency Scorecard
Retrofitting existing buildings	No policies	Some policies (e.g. building codes, standards or fiscal/financial incentives for low-emissions options)	Policies + retrofitting strategy	Policies + strategy to achieve deep renovation rates of 5% annually (OECD) or 3% (non-OECD) by 2020
Net-zero deforestation	No policy or incentive to reduce deforestation in place	Some policies (e.g. incentives to reduce deforestation or support schemes for afforestation / reforestation in place)	Policies + national target for reaching net-zero deforestation	Policies + national target for reaching zero deforestation by 2020s or for increasing forest coverage

BIBLIOGRAPHY

Agora Energiewende and Sandbag. (2020). "The European Power Sector in 2019", p. 49.

Andrijevic, M. et al. (2020). "Governance in Socioeconomic Pathways and its Role for Future Adaptive Capacity", *Nature Sustainability*. Springer US, 3(1), pp. 35-41.

Arnell, N. W. et al. (2019). "Global and Regional Impacts of Climate Change at Different Levels of Global Temperature Increase", *Climatic Change*. Springer Netherlands, 155(3), pp. 377-391.

Artelys (2020). "An Updated Analysis on Gas Supply Security in the EU Energy Transition".

Cambridge Econometrics. (2019). "Analysis of UK's 2025 Ban on Gas and Oil Heating Systems Highlights the Need for Additional Policy Intervention".

Castro-Alvarez, F. et al. (2018). *The 2018 International Energy Efficiency Scorecard*. Washington, DC: American Council for an Energy-Efficient Economy. https:// www.aceee.org/research-report/i1801

Climate Action Tracker (CAT). (2020). European Union. *In CAT September 2020 Update*. Berlin: Climate Analytics, New Climate Institute. https://climateactiontracker.org/countries/eu/

CAT Decarbonisation Data Portal. (2020). *Climate Action Tracker, Decarbonisation Data Portal*. Berlin, Germany. https://climateactiontracker.org/data-portal/

Climate Analytics. (2019). *Decarbonising South and South East Asia: Shifting Energy Supply in South Asia and South East Asia*. Berlin, Germany. https://climateanalytics.org/media/decarbonisingasia2019-fullreport-climateanalytics.pdf

Climate Analytics. (2016). *Implications of the Paris Agreement for Coal Use in the Power Sector*. Berlin, Germany. https://climateanalytics.org/media/climateanalytics-coalreport_nov2016_1.pdf

Climate Analytics et al. (2020). *CEE Climate Policy Frontier*. Between Regional Best Practices and Paris Agreement: Compatibility in the Building Sector.

Climate Investment Funds. (2020). "Who Needs a Just Transition?" https://www.climateinvestmentfunds.org/news/ who-needs-just-transition

Dutch Government. (2017). "Confidence in the Future. 2017-2021 Coalition Agreement". https://www.government.nl/ documents/publications/2017/10/10/coalition-agreement- confidence-in-the-future

Electrive. (2019). "Sweden to Ban Sales of Fossil-fuel-powered Cars by 2030". https://www.electrive.com/2019/01/22/ sweden-joins-nations-dropping-combustion-engines- target-2030/

Enerdata. (2020). *Global Energy and CO_2 data*. Grenoble, France. https://www.enerdata.net/research/energy-market-data-co2-emissions-database.html

Energy Saving Trust. (2019). "Switching to Low-carbon Heat: An Example from the Netherlands".

Europe Beyond Coal. (2020). "Overview: National Coal Phase-out Announcements in Europe. Status February 2020."

European Commission. (2020a). "EU Methane Strategy".

European Commission. (2020b). "Financing the Green Transition: The European Green Deal Investment Plan and Just Transition Mechanism". https://ec.europa.eu/commission/presscorner/detail/en/ qanda_20_24

European Commission. (2020c). "Questions and Answers on the Just Transition Mechanism", https://ec.europa.eu/commission/presscorner/detail/en/ qanda_20_931

European Commission. (2019a). Coal Regions in Transition. https://ec.europa.eu/energy/topics/oil-gas-and-coal/EU-coal-regions/coal-regions-transition_en

European Commission. (2019b). "Communication from the Commission: The European Green Deal", COM(2019) 640 final, p. 24. doi: 10.1017/CBO9781107415324.004.

European Commission. (2019c). Comprehensive Study of Building Energy Renovation Activities and the Uptake of Nearly Zero energy Buildings in the EU Final Report.

European Commission. (2019d). "Energy Subsidies and Government Revenues from Energy Products", pp. 1-51.

European Commission. (2019e). Opening Statement in the European Parliament Plenary Session by Ursula von der Leyen, Candidate for President of the European Commission.

European Commission. (2019f). Regulation (EU) 2019/631 – CO_2 Emission Performance Standards, Official Journal of the European Union.
European Commission. (2019g). "Technical Note. Results of the EUCO3232.5 Scenario on Member States", (December).
European Commission. (2017). "Ecodesign Impact Accounting. Status Report 2017".
European Commission. (2015). "EU ETS Handbook". https://ec.europa.eu/clima/sites/clima/files/docs/ets_handbook_en.pdf
European Council. (2019). "Conclusions of the European Council Meeting on 12 December 2019".
European Council. (2020). Long-term Low Greenhouse Gas Emission Development Strategy of the European Union and its Member States. https://data.consilium.europa.eu/doc/document/ST-6612- 2020-INIT/en/pdf
European Council. (2020). "Conclusions adopted by the European Council."
European Environment Agency. (2020a). "EEA Greenhouse Gas – Data Viewer".
European Environment Agency. (2020b). *EU Emissions Trading System (ETS) Data Viewer.* https://www.eea.europa.eu/data-and-maps/ dashboards/emissions-trading-viewer-1
European Parliament. (2020). "Proposal for a Directive on Common Rules for Combined Transport of Goods."
European Parliament and the Council of the European Union. (2019a). "Directive (EU) 2019/1161 of the European Council and of the European Parliament of 20 June 2019, amending Directive 2009/33/EC. http://data.europa.eu/eli/dir/2019/1161/oj
European Parliament and the Council of the European Union. (2019b). "Regulation (EU) 2019/1242 of the European Parliament and of the Council of 20 June 2019 Setting CO_2 emission performance standards for new heavy-duty vehicles and amending Regulations (EC) No 595/2009 and (EU) 2018/956 of the European Parliament". http://data.europa.eu/eli/reg/2019/1242/oj
European Parliament and the Council of the European Union. (2018a). "Regulation (EU) 2018/841 of the the European Parliament and of the Council of 30 May 2018. http://data.europa.eu/eli/reg/2018/841/oj
European Parliament and the Council of the European Union. (2018b). "Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018. http://data.europa.eu/eli/reg/2018/842/oj
European Parliament and the Council of the European Union. (2018c). "Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU. http://data.europa.eu/eli/dir/2018/844/oj
European Parliament and the Council of the European Union. (2009). "Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC. http://data.europa.eu/eli/dir/2009/29/oj
European Union. (2013). *European Union Adaptation Strategy.* https://ec.europa.eu/clima/policies/adaptation/what_en
Eurostat. (2019). Freight Transport Statistics – Modal Split. https://ec.europa.eu/eurostat/statistics-explained/index.php/Freight_transport_statistics_-_modal_split
Eurostat. (2020). "Land Cover for FAO Forest Categories by NUTS 2 Regions". https://data.europa.eu/euodp/en/data/dataset/6H7AbBpF8ukZq5y1Nfp8WQ
Food and Agriculture Organisation (FAO). (2019). *FAOSTAT: Agriculture Total.* Rome, Italy. http:// www.fao.org/faostat/en/#data/GT
Gençsü, I. et al. (2017). Phase-out 2020. Monitoring Europe's Fossil Fuel Subsidies. London. ODI and CAN Europe. https://www.odi.org/sites/odi.org.uk/files/resource-documents/11762.pdf
Germanwatch. (2019). *Global Climate Risk Index 2020. Who Suffers Most from Extreme Weather Events?* Bonn, Germany. http://www.germanwatch.org/
Global Forest Watch. (2019). *Global Annual Tree-Cover Loss by Dominant Driver.* https://www.globalforestwatch.org/
Gütschow, J. et al. (2019). The PRIMAP-hist national historical emissions time series (1850-2017), V.2.1. GFZ Data Services. https://doi.org/10.5880/PIK.2019.018
Institute for Climate Economics (I4CE). (2019). *Global Carbon Account 2019.* Paris, France. https://www.i4ce.org/wp-core/wp-content/uploads/2019/05/i4ce-PrixCarbon-VA.pdf
International Energy Agency (IEA). (2019). Global Electric Vehicle Outlook 2019: Scaling-up the Transition to Electric Mobility. https://www.iea.org/reports/global-ev-outlook-2019
International Energy Agency (IEA). (2017). "Energy Efficiency Indicators Highlights (2017 edition)", International Energy Agency, p. 102. doi: 10.1017/ CBO9781107415324.004.
International Trade Union Confederation. (2009). "What's Just Transition?" https://www.ituc-csi.org/what-s-just-transition
OECD. (2018). *Effective Carbon Rates 2018: Pricing Carbon Emissions Through Taxes and Emissions Trading.* https://doi.org/10.1787/9789264305304-en and country profile supplement; https://www.oecd.org/tax/tax-policy/effective-carbon-rates-all.pdf
OECD-IEA. (2020). *OECD Analysis of Budgetary Support and Tax Expenditures. Fossil Fuel Support Database.* http://www.oecd.org/fossil-fuels/data/
Oil Change International. (2020). *Shift the Subsidies Database.* http://priceofoil.org/shift-the-subsidies
Rogelj, J. et al. (2018). "Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development", in Masson-Delmotte, V. et al. (eds) *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change.* Geneva, Switzerland: IPCC. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter2_Low_Res.pdf
United Nations. (2018). *World Urbanisation Prospects.* Geneva: The Population Division of the Department of Economic and Social Affairs of the United Nations. https://population.un.org/wup
United Nations Department of Economic and Social Affairs, Population Division. (2020). *World Population Prospects, 2019 Highlights.* https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf
United Nations Development Programme (UNDP). (2019). *Human Development Index Ranking* | *Human Development Reports.* New York, USA: UNDP. http://hdr.undp.org/en/content/2019-human-development-index-ranking
Vieweg, M., et al. (2018) *Towards Decarbonising Transport: 2018 Stocktake on Sectoral Ambition in the G20.* Berlin: Agora Verkehrswende, GIZ. https://www.agora-verkehrswende.de/
The World Bank. (2020). *GDP, PPP* (current international $). Washington, DC: USA. https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD
The World Bank. (2019). *Population, total.* Washington, DC: USA. https://data.worldbank.org/indicator/SP.POP.TOTL
The World Health Organisation (WHO). (2018) *Global Health Observatory data repository* | *By category* | *Deaths by country.* Geneva, Switzerland. https://apps.who.int/gho/data/node.main.BODAMBIENTAIRDTHS?lang=en
World Steel Association. (2018). *Steel's Contribution to a Low-Carbon Future and Climate-Resilient Societies.* Brussels, Belgium. https://www.worldsteel.org/

ABOUT CLIMATE TRANSPARENCY

Climate Transparency

Climate Transparency is a global partnership with a shared mission to stimulate a "race to the top" in climate action in G20 countries through enhanced transparency.

www.climate-transparency.org

PARTNERS

CENTRO CLIMA – Centre for Integrated Studies on Climate Change and the Environment - COPPE / UFRJ
CLIMATE ANALYTICS
University of Cape Town
Beijing University of Technology
FARN – Fundación Ambiente y Recursos Naturales
GERMANWATCH
icm – Iniciativa Climática de México
IESR
IGES – Institute for Global Environmental Strategies
IDDRI
New Climate Institute
HUMBOLDT-VIADRINA Governance Platform
ODI
teri

DATA PARTNERS

Agora Verkehrswende
Climate Action Tracker
CCPI – Climate Change Performance Index
Enerdata intelligence + consulting

FUNDERS

climateworks FOUNDATION

Supported by:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
based on a decision of the German Bundestag

European Climate Foundation
WORLD BANK GROUP