Climate Transparency

BROWN TO GREEN: **2019**

THE G20 TRANSITION TOWARDS A NET-ZERO EMISSIONS ECONOMY

CHINA

China's greenhouse gas (GHG) emissions are – per capita – higher than the G20 average.

China's total GHG emissions (excl. land use) have quadrupled since 1990 and are projected to increase further.

Greenhouse gas (GHG) emissions (incl. land use) per capita[1]
(tCO$_2$e/capita)

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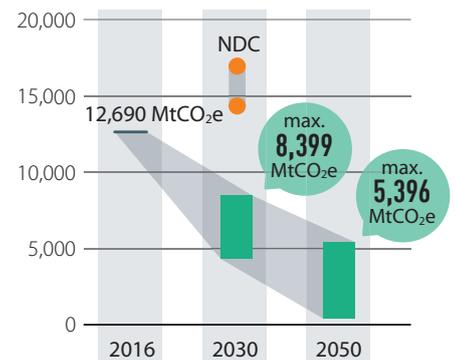
8.8 China

7.5 G20 average

Trend (2011-2016)   +2%   -1%

China needs to reduce its emissions by 33% by 2030 from its 2016 levels.

China needs to reduce its emissions to below 8.4 GtCO$_2$e by 2030 and to below 5.4 GtCO$_2$e by 2050 to be within its fair-share range compatible with global 1.5°C IPCC scenarios. China's 2030 NDC will only limit its emissions to 14.4-16.0 GtCO$_2$e. All figures are drawn from the Climate Action Tracker and exclude land use emissions.

1.5°C compatible pathway[2]
(MtCO$_2$e/year)

NDC

12,690 MtCO$_2$e

max. **8,399** MtCO$_2$e

max. **5,396** MtCO$_2$e

20,000 / 15,000 / 10,000 / 5,000 / 0

2016 — 2030 — 2050

Source: CAT 2019

Recent developments[3]

In 2018, China sold more electric vehicles than the rest of the world put together.

China began construction of new coal-fired plants in 2018 after a previous ban was lifted, bringing its total coal capacity under construction to 235GW.

In 2018 the Chinese government abruptly reduced subsidies for solar projects.

Key opportunities for enhancing climate ambition[3]

China's existing coal capacity surpasses requirements, thereby creating risks of stranded assets and impeded growth of renewables

→ **China should restrict investment in new coal to avoid risks on the investments.**

#1

China struggles to expand zero-carbon electricity supply fast enough to meet rapidly growing demand

→ **China needs to control the rate of electricity demand growth through stringent efficiency policies.**

#2

The Chinese NDC is not reflective of the transition that is possible

→ **China should enhance its NDC by announcing an earlier peak of energy-related CO$_2$ emissions, ideally before 2025.**

#3

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*
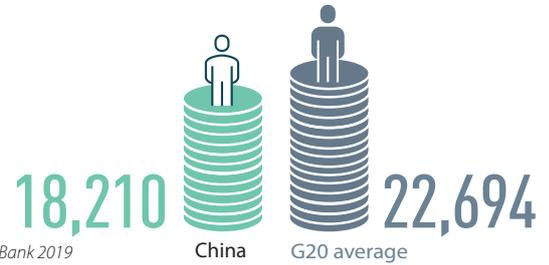
CHINA –
SOCIO-ECONOMIC CONTEXT

Human Development Index

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

0.752

low   very high

Data for 2017 | Source: UNDP 2018

Gross Domestic Product (GDP) per capita
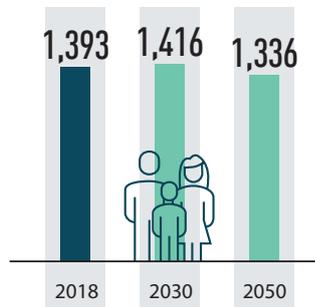
(PPP US$ const. 2018, international)

18,210
China

22,694
G20 average

Data for 2018 | Source: World Bank 2019

Population projections

(millions)

The World Bank expects China's population to grow by 2030, but then decrease by 2050 to below today's level.

1,393   **1,416**   **1,336**
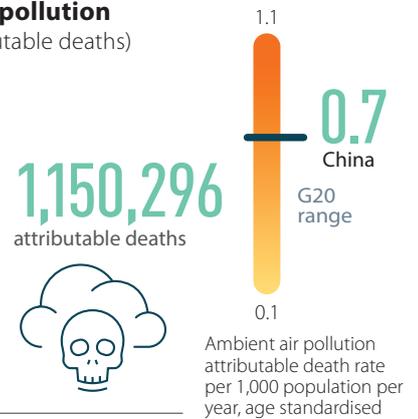
2018   2030   2050

Source: World Bank 2019

Death through ambient air pollution

(total ambient air pollution attributable deaths)

More than 1 million people die in China 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 at the upper end of the G20 range.

1,150,296
attributable deaths

1.1

0.7
China

G20 range

0.1

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

Data for 2016
Source: World Health Organization 2018

JUST TRANSITION[3]

After 2000, coal use increased significantly in China until 2013. After 2013, coal use began to decrease, mainly due to air pollution control policies and policies to support an energy revolution strategy; but although coal use decreased in 2018, it went down only slightly.

However, reducing coal use could have negative impacts on employment in related sectors. Currently, there are nearly 3.5 million workers in the coal mining industry. Action to address over-capacity from 2013 to 2016 resulted in about 1.3 million coal mining workers needing to be moved to other sectors. Supporting re-employment is a long-term policy in China; the first policy was released in 2002 by the

State Council, with further policies subsequently released. In the most recent policy – 'Some opinions on promoting employment at present and in the future', major measures include support for enterprise development including financial support for new small enterprises, for re-employment training, and for unemployed people; the policy specifies the responsibilities of every government agency. In 2018, 5.51 million people were re-employed, including 1.81 million who had been deemed to be 'difficult' to employ.

Legend for all country profiles

Trends

The trends show developments over the past five years for which data are available.

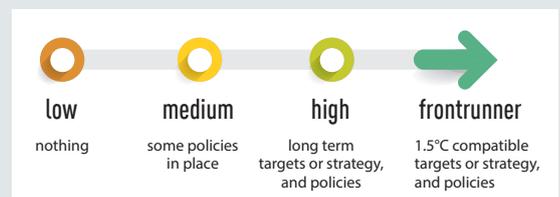The thumbs indicate assessment from a climate protection perspective.

Decarbonisation Ratings[4]

These ratings assess a country's performance compared to other G20 countries. A high scoring reflects a relatively good effort from a climate protection perspective but is not necessarily 1.5°C compatible.

very low   low   medium   high   very high

Policy Ratings[5]

The policy ratings evaluate a selection of policies that are essential pre-conditions for the longer-term transformation required to meet the 1.5°C limit.

low   medium   high   frontrunner

nothing   some policies   long term   1.5°C compatible
           in place   targets or strategy,   targets or strategy,
                            and policies   and policies

For more information see the Annex and Technical Note
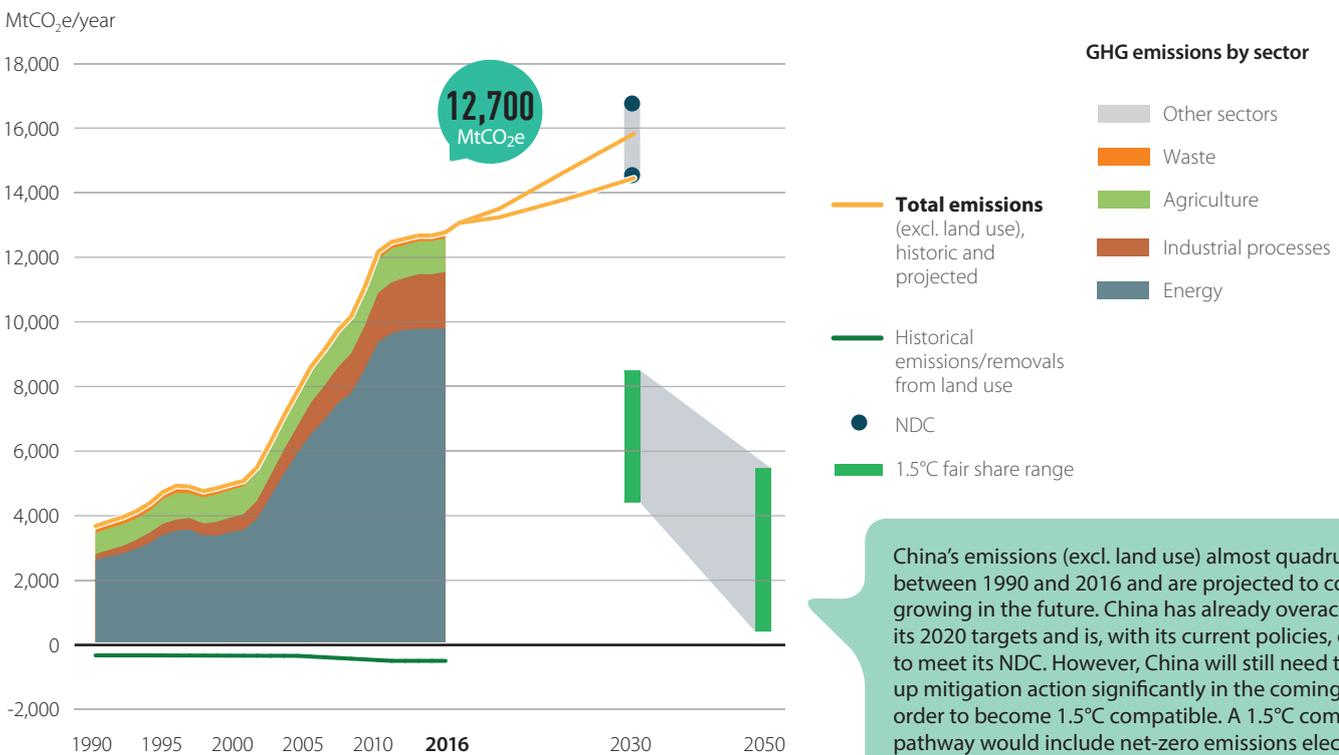
2

CHINA

MITIGATION BIG PICTURE

> **!** China's GHG emissions have almost quadrupled since 1990 and the government's climate targets for emissions to peak in 2030 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.

1.5°C[6]

Source: IPCC SR1.5 2018

Total GHG emissions across sectors[2]

$MtCO_2e$/year

12,700 $MtCO_2e$

Total emissions (excl. land use), historic and projected

Historical emissions/removals from land use

● NDC

▬ 1.5°C fair share range

Source: PRIMAP 2018; CAT 2019

GHG emissions by sector

- Other sectors
- Waste
- Agriculture
- Industrial processes
- Energy

China's emissions (excl. land use) almost quadrupled between 1990 and 2016 and are projected to continue growing in the future. China has already overachieved its 2020 targets and is, with its current policies, on track to meet its NDC. However, China will still need to scale up mitigation action significantly in the coming years in order to become 1.5°C compatible. A 1.5°C compatible pathway would include net-zero emissions electricity generation before 2050.
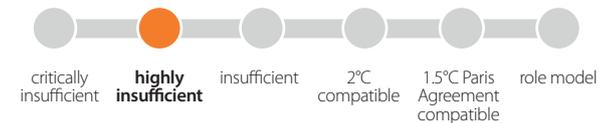
Nationally-determined contribution (NDC): Mitigation

Targets	To achieve the peaking of carbon dioxide emissions by around 2030, and making best efforts to peak earlier
	To lower carbon dioxide emissions per unit of GDP by 60%, to 65% of the 2005 level
Actions	Actions specified (sectors: energy, industry, buildings, transport, forestry, waste)

Source: UNFCCC, NDC of respective country

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

Status	In preparation
2050 target	–
Interim steps	–
Sectoral targets	–

Climate action tracker (CAT) evaluation of NDC[2]

critically insufficient | **highly insufficient** | insufficient | 2°C compatible | 1.5°C Paris Agreement compatible | role model

Source: CAT 2019

Source: UNFCCC, LTS of respective country
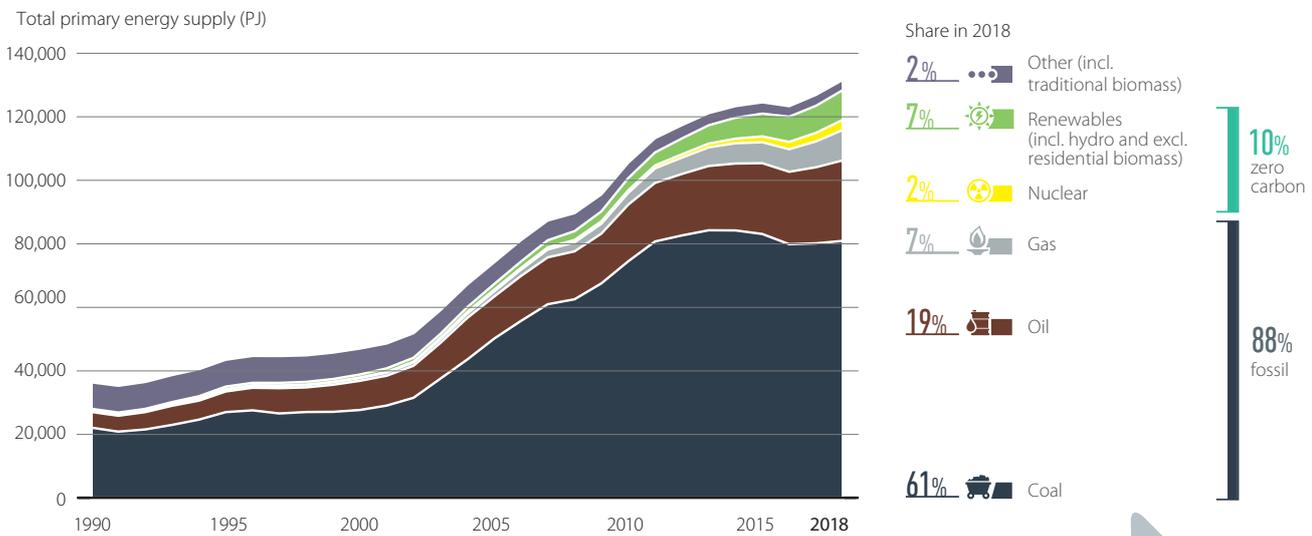
MITIGATION ENERGY

CHINA

> **!** Fossil fuels still make up 87% of China's energy mix (including power, heat, transport fuels, etc), with coal being the predominant resource. Supply from renewable energy sources has increased over the last few years, but remains at a low level.

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.

1.5°C [6]

Source: IPCC SR1.5 2018

Energy mix[7]

Total primary energy supply (PJ)

Source: Enerdata 2019

Share in 2018

2% Other (incl. traditional biomass)

7% Renewables (incl. hydro and excl. residential biomass)

2% Nuclear

10% zero carbon

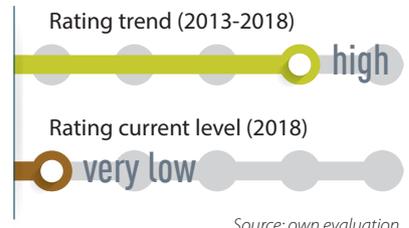7% Gas

19% Oil

88% fossil

61% Coal

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 87% of China's energy mix, which is around the G20 average (82%).

Carbon intensity of the energy sector

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

CHINA — G20

71 tCO_2
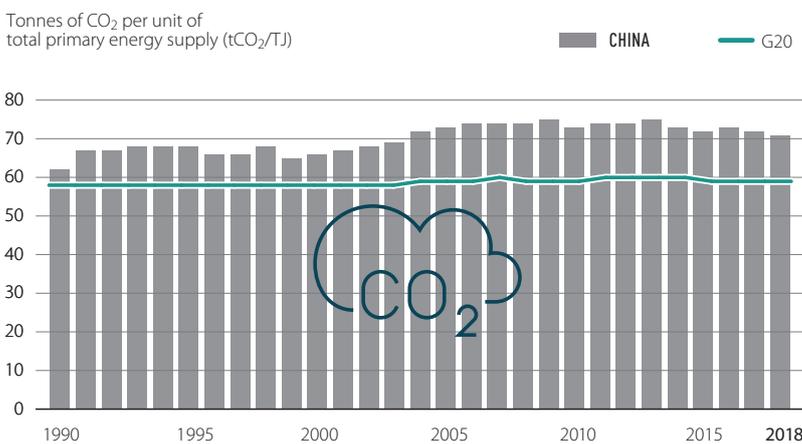
Source: Enerdata 2019

Rating of carbon intensity compared to other G20 countries[4]

Rating trend (2013-2018)

high

Rating current level (2018)

**very low**

Source: own evaluation

Carbon intensity shows how much CO_2 is emitted per unit of energy supply. In China, carbon intensity has consistently been above the G20 average, reflecting the high use of fossil fuels in the energy mix. However, there has been a downward trend since 2013.

MITIGATION ENERGY

CHINA

Solar, wind, geothermal and biomass development[8]

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

2.6%

Source: Enerdata 2019
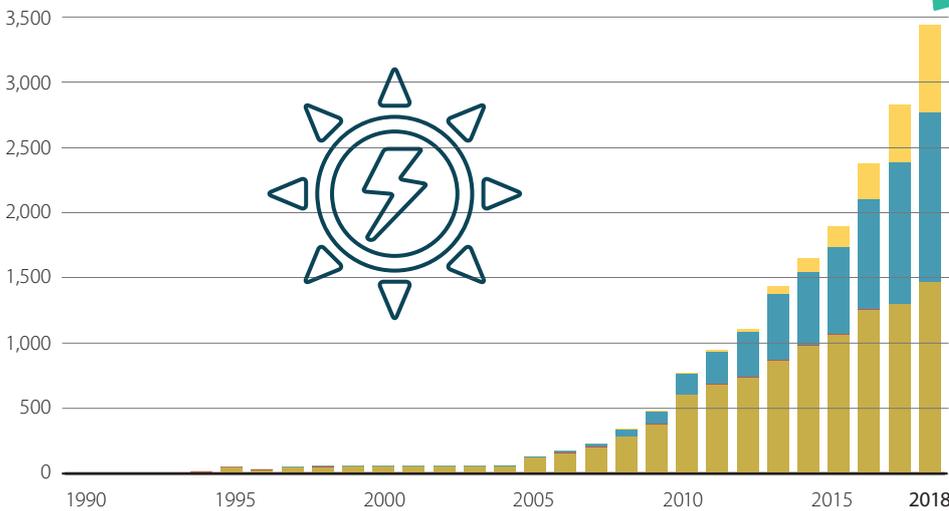
Share of TPES in 2018

0.51% ☀ ▪ Solar

0.99% ◀ Wind

0.00% ⌇ Geothermal

1.11% 🌾 Biomass, excl. traditional biomass

Solar, wind and biomass account for only 2.6% of China's energy supply – the G20 average is 6%. In the last five years, the share of these sources in total energy supply has risen by around 136%, more than the G20 average (+29%, 2013-2018). Bioenergy (for electricity, biofuels for transportation and heat) makes up the largest share.
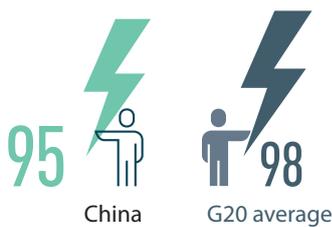
Rating of share in TPES compared to other G20 countries[4]

Rating trend (2013-2018)
very high

Rating current level (2018)
low

Source: own evaluation

Energy supply per capita

Total primary energy supply per capita (GJ/capita)

95 China

98 G20 average

The level of energy supply per capita is closely related to economic development, climatic conditions and the price of energy. At 95 GJ/capita, energy supply per capita in China is around the G20 average, but has increased more (+5%, 2013–2018) than the G20 average (+1%).

Trend (2013-2018) **+5%**   **+1%**

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

Rating of energy supply per capita compared to other G20 countries[4]

Rating trend (2013-2018)
low

Rating current level (2018)
high

Source: own evaluation

MITIGATION | ENERGY

CHINA

Energy use per capita remains just below the G20 average, but is increasing. CO_2 emissions from energy began to rise again and China's economy remains very energy intensive.

Global energy and process-related CO_2 emissions must be cut by 40% below 2010 levels by 2030 and reach net zero by 2060.

1.5°C[6]

Source: IPCC SR1.5 2018

Energy intensity of the economy
(TJ/PPP US$2015 million)

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. China's energy intensity is above the G20 average, but has decreased by 23% (2013-2018), more than the G20 rate (-12%).
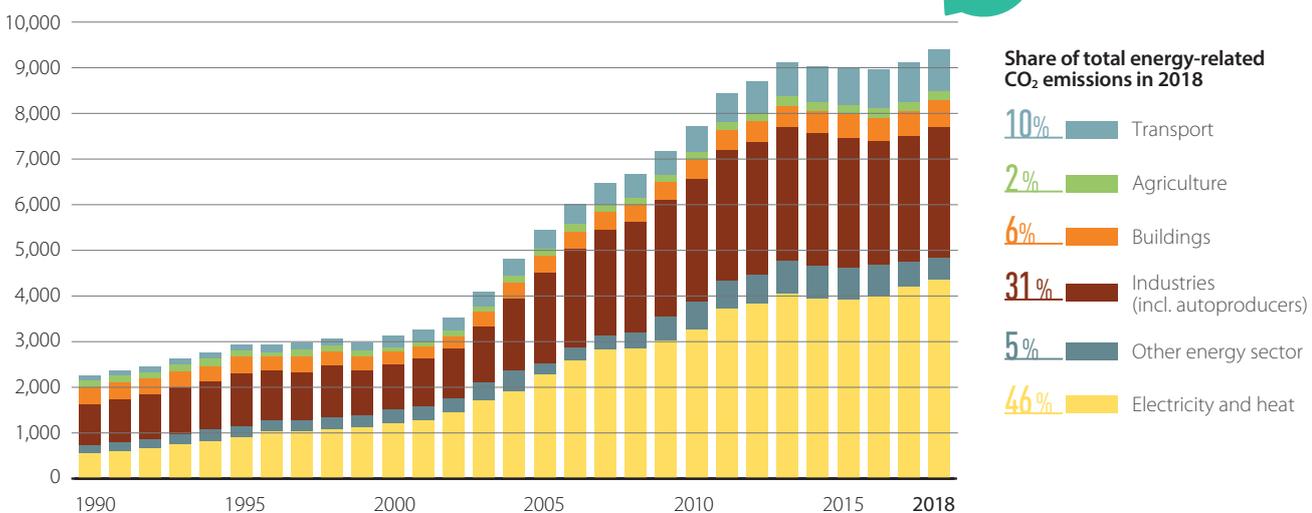
5.88
China

4.86
G20 average

Trend
(2013-2018) 👍 **-23%**   👎 **-12%**

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

Rating of energy intensity compared to other G20 countries[4]

Rating trend (2013-2018)
very high

Rating current level (2018)
low

Source: own evaluation

Energy-related CO_2 emissions[9]

CO_2 emissions from fuel combustion (MtCO₂/year)

9,467
MtCO₂

Source: Enerdata 2019

Share of total energy-related CO_2 emissions in 2018

10% Transport
2% Agriculture
6% Buildings
31% Industries (incl. autoproducers)
5% Other energy sector
**46%** Electricity and heat

The largest driver of overall GHG emissions are CO_2 emissions from fuel combustion. In China, they began to rise again in 2017 after falling for two years. At 46%, the electricity sector is the largest contributor, followed by the industry sector at 31%.

MITIGATION POWER SECTOR

CHINA

> **!** China still produces 67% of electricity from coal, despite a decision to reduce the coal share in the energy mix below 58% by 2020. While it is expected to go beyond that target, a commitment to a coal phase-out would be necessary to stay within the 1.5°C limit.

Share in energy-related CO_2 emissions

46%

Data for 2018 | Source: Enerdata 2019
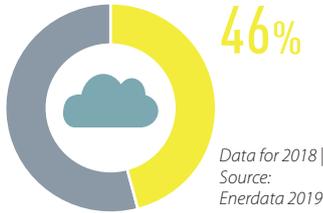
Coal must be phased out in the EU/OECD no later than 2030, in the rest of the world no later than 2040. Electricity generation needs to be decarbonised before 2050, with renewable energy the most promising option.[5]
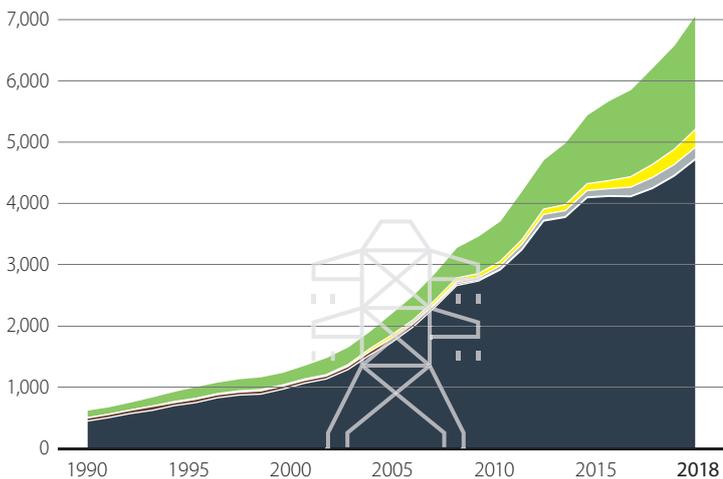
1.5°C[6]

Source: IPCC SR1.5 2018; Climate Analytics 2016; Climate Analytics 2019
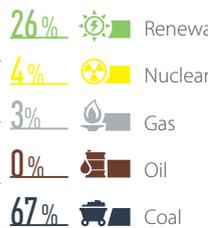
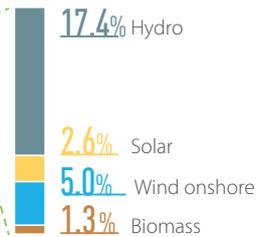## STATUS OF DECARBONISATION

Power mix

Gross power generation (TWh)

Source: Enerdata 2019

Shares in 2018

- **26%** Renewables
- **4%** Nuclear
- **3%** Gas
- **0%** Oil
- **67%** Coal

Renewables shares

- **17.4%** Hydro
- **2.6%** Solar
- **5.0%** Wind onshore
- **1.3%** Biomass
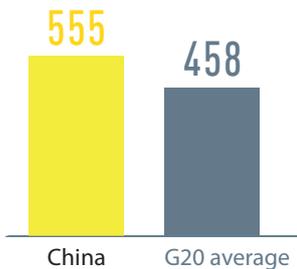
> China is increasingly producing power from renewables, mostly from large hydropower. Renewables make up 26% of the power mix – close to the G20 average. However, coal power is still increasing in absolute terms and makes up 67% of the power mix – one of the highest levels in the G20.

Emissions intensity of the power sector
(gCO₂/kWh)

555 China
458 G20 average

Data for 2018 | Source: Enerdata 2019

Trend (2013-2018)

-17% China **-11%** G20 average

Rating of emissions intensity compared to other G20 countries[4]

Rating trend (2013-2018) **high**

Rating current level (2018) **low**

Source: own evaluation

Share of renewables in power generation
(incl. large hydro)

25% G20 average

26% China

Trend (2013-2018)

+26% China **+20%** G20 average

Rating of share of renewables compared to other G20 countries[4]

Rating trend (2013-2018) **high**

Rating current level (2018) **medium**

Source: own evaluation

Data for 2018 | Source: Enerdata 2019

> For each kilowatt hour of electricity, 555 gCO₂ are emitted in China. This is above the G20 average, although emission intensity has dropped by 17%, more than the G20 average of -11% (2013-2018). This reflects the growing use of renewables.

CHINA

MITIGATION POWER SECTOR

POLICIES[5]

Renewable energy in the power sector

low — medium — high — frontrunner

medium

China has no long-term renewables strategy but aims for an installed capacity of 250GW wind, 150GW solar and 60GW hydro by 2020 – the targets for solar PV and wind have already been overachieved. The government announced a mandatory renewable energy certificate scheme, with starting in 2020.

⚠ In 2018, the government abruptly reduced subsidies for solar projects.

Source: own evaluation

Coal phase-out in the power sector

low — medium — high — frontrunner

medium

China has no phase-out plans for coal but aims to reduce its share in the energy mix to less than 58% by 2020. However, in 2018, the government lifted a 2-year ban on new coal-fired power plant construction. A nationwide carbon trading system is due to start in 2020 – coal-power is the first industry to be included.

Source: own evaluation

MITIGATION TRANSPORT SECTOR

❗ **Transport emissions per capita are on the rise in China (+20%, 2013-2018). In order to stay within a 1.5°C limit, passenger and freight transport need to be decarbonised. Electric vehicle sales are increasing significantly, and public transport and bicycle use are developing quickly in China.**

Share in energy-related CO_2 emissions

10% direct

1% from electricity

Data for 2018 | Source: Enerdata 2019
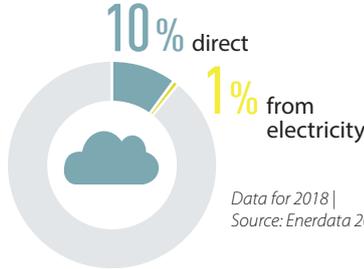
The proportion of low-carbon fuels in the transport fuel mix must increase to about 60% by 2050.

1.5°C[6]

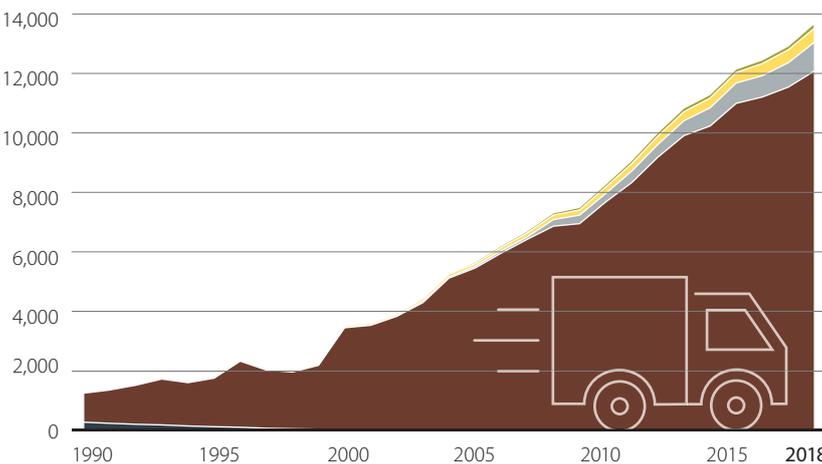*Source: IPCC SR1.5 2018*

STATUS OF DECARBONISATION

Transport energy mix

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

Electricity and biofuels make up only 4% of the energy mix in transport.

Share in 2018

0.8%		Biofuels
3.5%		Electricity
7.1%		Gas
88.6%		Oil
0.0%		Coal

Source: Enerdata 2019

CHINA

MITIGATION | TRANSPORT SECTOR

STATUS OF DECARBONISATION (continued)

Transport emissions per capita[10]
(tCO_2/capita,
excl. aviation emissions)

Trend (2013-2018)

+20% China
+5% G20 average

0.66 China
1.13 G20 average

Rating of transport emissions compared to other G20 countries[4]

Rating trend (2013-2018)
very low

Rating current level (2018)
high

Data for 2018
Source: Enerdata 2019; World Bank 2019

Source: own evaluation

Aviation emissions per capita[11]
(tCO_2/capita)

Trend (2011-2016)

+35% China
+10% G20 average

0.08 China
0.15 G20 average

Rating of aviation emissions compared to other G20 countries[4]

Rating trend (2011-2016)
very low

Rating current level (2016)
high

Data for 2016
Source: Enerdata 2019; IEA 2018

Source: own evaluation

Motorisation rate
(vehicles per 1,000 inhabitants)

135

Data for 2018 | Source: Agora 2018
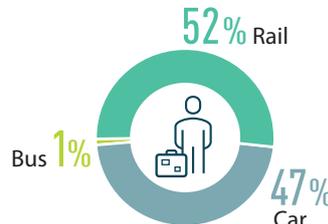
Market share of electric vehicles in new car sales
(%)

4.5%

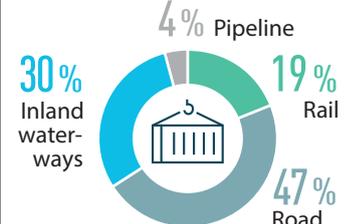*Data for 2018 | Source: IEA 2019*

Passenger transport
(modal split in % of passenger km)

52% Rail
1% Bus
47% Car

Data for 2015 | Source: Agora 2018

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

4% Pipeline
19% Rail
30% Inland water-ways
47% Road

Data for 2015 | Source: Agora 2018

POLICIES[5]

Phase out fossil fuel cars

low   medium   high   frontrunner
medium

The government has no phase-out strategy for fossil fuel cars but a target of 5 million electric vehicles by 2020 and, since 2018, requires manufacturers to sell a minimum quota of zero-emission vehicles. There is a fleet average target of fuel consumption of 5l/100km for new passenger vehicles in 2020. Beijing is considering whether to stop gasoline-car sales before 2025.

⚠ The government has slashed its 'new energy vehicles' subsidies by 67%.

Source: own evaluation

Phase out fossil fuel heavy-duty vehicles

low   medium   high   frontrunner
medium

As of 2015, fuel consumption limits for new tractors, trucks and buses aim to reduce consumption by 10.5%-14.5% compared to the previous standard (2011-2014) by mid-2021. A 3-year plan adopted in 2018 aims to reduce the carbon intensity of the freight sector. China has no plan to reduce absolute emissions from the freight sector.

Source: own evaluation

Modal shift in (ground) transport

low   medium   high   frontrunner
medium

China has no longer-term strategy for a modal shift but aims for public transport to represent 30% of motorised travel in urban centres by 2020. The 2011 Transit Metropolis Programme supports cities in improving their public transport systems, inter-modal integration, and transit-oriented developments. The length of metro lines doubled since 2012, and more than 6,000km under construction. More than 30 cities in China have announced plans to electrify their bus and taxi fleets by 2022.

Source: own evaluation

MITIGATION | BUILDINGS SECTOR

CHINA

> (!) **China's building emissions –** including heating, cooking and electricity use – make up 21% of total CO_2 emissions. Per capita, building-related emissions are slightly below the G20 average but have been increasing. To stay within the 1.5°C limit, China needs to implement more stringent energy efficiency measures.

Share in energy-related CO_2 emissions

6 % direct

15 % from electricity
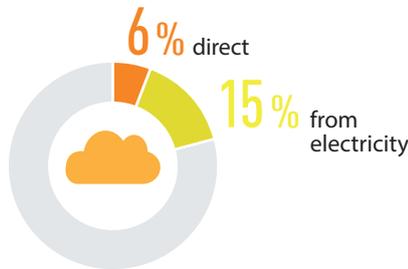
Data for 2018 | Source: Enerdata 2019

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.

1.5°C [6]

Source: IEA ETP B2DS scenario assessed in IPCC SR1.5 2018

STATUS OF DECARBONISATION

Building emissions per capita
(incl. indirect emissions)
(tCO$_2$/capita)

1.45 China

1.54 G20 average

[-] +25.6%   [-] +1%

Trend (2013-2018)

Rating of building emissions compared to other G20 countries [4]

Rating trend (2013-2018)
very low

Rating current level (2018)
high

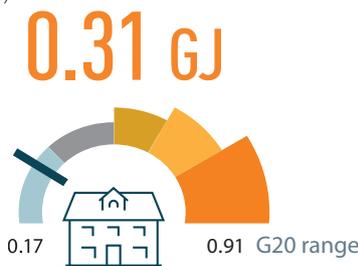*Source: own evaluation*

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

Residential buildings: energy use per m²
(GJ)

0.31 GJ
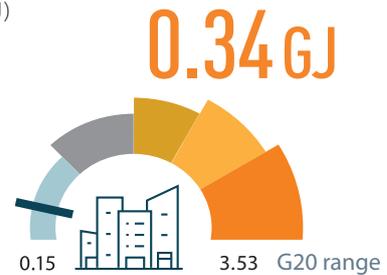
0.17   0.91 G20 range

Data: year different per country | Source: ACEEE 2018

> Building-related emissions per capita are slightly below the G20 average. But in contrast to the G20 average, China's emissions increased by 26% between 2013 and 2018.

Commercial and public buildings: energy use per m²
(GJ)

0.34 GJ

0.15   3.53 G20 range

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. In China, energy use per m² is in the bottom range of G20 countries, particularly for commercial and public buildings.

POLICIES [5]

Near-zero energy new buildings

low
low   medium   high   frontrunner

China aims to increase the energy efficiency of new buildings by 20% by 2020 and to construct 50% of new buildings as certified green buildings in urban areas. By 2030, 30% of new and renovated buildings are planned to be near zero-energy (100% by 2025 would be 1.5°C compatible). China has mandatory energy efficiency codes for urban residential and commercial buildings.

Source: own evaluation

Renovation of existing buildings

medium
low   medium   high   frontrunner

China has no strategy for building retrofitting. However, the central government makes large investments in renovation, provided through different funds, and plans to turn more than 60% of existing residential buildings in urban areas into energy-efficient buildings by 2020.
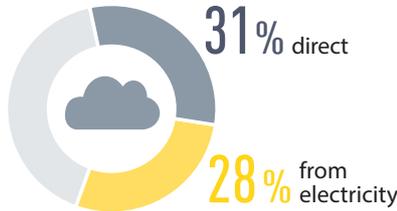
Source: own evaluation

MITIGATION INDUSTRY SECTOR

CHINA

! **Industry-related emissions make up more than half of CO_2 emissions in China, and its industry emission intensity remains well above the G20 average.**

Share in energy-related CO_2 emissions (not including process emissions)

31% direct

28% from electricity

Data for 2018 | Source: Enerdata 2019

Global industrial CO_2 emissions need to be reduced by 65–90% from 2010 levels by 2050.

1.5°C[6]

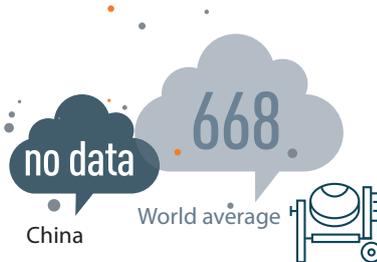*Source: IPCC SR1.5 2018*

STATUS OF DECARBONISATION

Industry emissions intensity[12]
(tCO_2e/US$2015 GVA)

0.92
China

0.51
G20 average

Data for 2016 | Source: Enerdata 2019; PRIMAP 2018; World Bank 2019

👍 **-28.1**% 👍 **-10.2**%

Trend (2011-2016)

Rating of emissions intensity compared to other G20 countries[4]

Rating trend (2011-2016)
very high

Rating current level (2016)
very low

Source: own evaluation

Carbon intensity of cement production[13]
($kgCO_2$/tonne product)

no data
China

668
World average

Data for 2015 | Source: CAT 2019

When comparing industrial emissions with the gross value added (GVA) from the industry sector, China's emission intensity remains well above the G20 average, but has decreased at a greater rate (-28%, 2011-2016).

Carbon intensity of steel production[13]
($kgCO_2$/tonne product)

1,960
China

1,650
World average

Data for 2015 | Source: CAT 2019

Steel production and steelmaking are significant GHG emission sources, and are challenging to decarbonise. China's steel industry is more emission intensive than the world average.

POLICIES[5]

Energy efficiency

low   medium   **high**   frontrunner

According to the International Energy Agency, mandatory energy efficiency policies cover 51-100% of industrial energy use (as of 2017). However, China's landmark Top 10,000 Energy-Consuming Enterprises programme, which ran from 2006, expired recently. Energy savings have largely been driven by this mandatory target-based programme, and it is uncertain whether it will be extended.

Source: own evaluation

MITIGATION LAND USE

CHINA

> **!** In order to stay within the 1.5°C limit, China needs to make the land use and forest sector a net sink of emissions, eg by halting the expansion of residential areas and infrastructure development, and creating new forests.

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

1.5°C[6]

Source: IPCC SR1.5 2018

Gross tree cover loss by dominant driver[14]

Tree cover loss (million hectares)

- Commodity-driven deforestation
- Forestry
- Shifting agriculture
- Urbanisation
- Wildfire
- Total

Source: Global Forest Watch 2019

Note: 2000 tree cover extent | >30% tree canopy | these estimates do not take tree cover gain into account

POLICIES[5]

(Net) zero deforestation

low   medium   **high**   frontrunner

China has not established a target of net-zero deforestation but has pledged to increase forest area by 40 million hectares by 2020 compared to 2005 levels. China's 1998 Natural Forest Conservation Program aims to recover native forests and was expanded in 2017 to ban commercial logging in natural forests.

Source: own evaluation

> From 2001 to 2018, China lost 9.42Mha of tree cover, equivalent to a **5.8% reduction since 2000**. This does not take tree-cover gain into account.
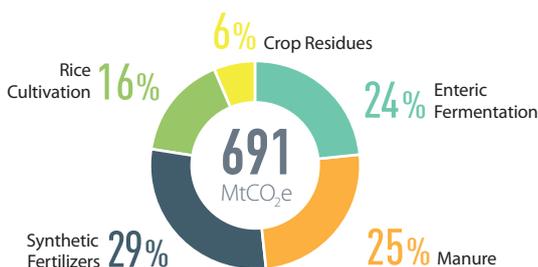
MITIGATION AGRICULTURE

> **!** China's agricultural emissions come mainly from the use of synthetic fertilizers, livestock manure, and digestive processes in animals. 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 fertilzers and manure) need to be reduced by 10% by 2030 and by 20% by 2050.

1.5°C[6]

Source: IPCC SR1.5 2018

GHG emissions from agriculture (not including energy)

- Crop Residues **6%**
- Rice Cultivation **16%**
- Enteric Fermentation **24%**
- **691** MtCO2e
- Manure **25%**
- Synthetic Fertilizers **29%**

> In China, the largest sources of GHG emissions in the agricultural sector are synthetic fertilizers, livestock manure, and digestive processes in animals (enteric fermentation). A shift to organic farming, more efficient use of fertilizers, and diet changes could help reduce emissions.

Data for 2016 | Source: FAOSTAT 2019

CHINA

ADAPTATION

→ **China is vulnerable to climate change and adaptation actions are needed.**

→ **On average, 1,240 fatalities and losses amounting to US$36.6 billion occur yearly due to extreme weather events.**

→ **With global warming, society and its supporting sectors are increasingly exposed to severe impacts.**

→ **With a 3°C warming, China would experience around 15 days per year when temperatures are higher than 35°C.**

ADAPTATION POLICIES

Nationally-determined contribution: Adaptation	
Targets	Not mentioned
Actions	Actions specified (sectors: infrastructure, water, biodiversity/ecosystems, forestry, health)

Source: UNFCCC, NDC of respective country

National adaptation strategies

Document name	Publication year	Fields of action (sectors)													M&E process (reporting frequency)
		Agriculture	Biodiversity	Coastal areas & fishing	Education & research	Energy & industry	Finance & insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	
National Strategy for Climate Change Adaptation	2013	x	x	x	x	x	x	x	x	x	x		x	x	Target year 2020; is to be merged with national five year plan

Source: own research

CHINA

ADAPTATION NEEDS

Climate Risk Index for 1998-2017

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

Global Climate Risk Index 2019 | All numbers are averages (1998-2017)

Weather-related fatalities	Per 100,000 inhabitants
1,241	**0.1**

101 rank out of 181 countries

Annual average losses (PPP US$ mn)	Per unit GDP (%)
36,601	**0.3**

56 rank out of 181 countries

Source: Germanwatch 2018

China has already been struck by extreme weather events such as heavy rainfalls, floods, typhoons and heat waves. 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 extreme weather events.

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

			1.5°C	2°C	3°C
Water		% of area with increase in water scarcity	Low	Low	High
		% of time in drought conditions	Low	Medium	Medium
Heat & Health		Heatwave frequency	Very low	Medium	Very high
		Days above 35°C	Medium	Medium	Medium

Source: own research

			1.5°C	2°C	3°C
Agriculture	Maize	Reduction in crop duration	Very low	Medium	High
		Hot spell frequency	Medium	Medium	Very high
		Reduction in rainfall	Medium	High	High
	Rice	Reduction in crop duration	Low	Medium	High
		Hot spell frequency	Very low	Low	Low
		Reduction in rainfall	Very low	Very low	Low
	Wheat	Reduction in crop duration	Very low	Medium	High
		Hot spell frequency	Medium	High	High
		Reduction in rainfall	Low	Low	Low

Source: Based on Arnell et al 2019

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

Impact ranking scale

- Very low
- Low
- Medium
- High
- Very high
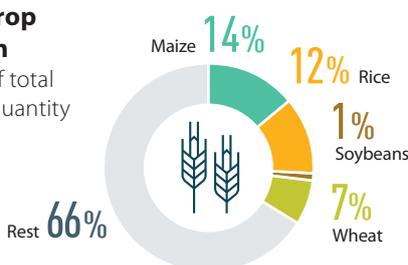
Blank cells signify that there is no data available

National crop production
(share in % of total production quantity in tonnes)

Maize **14%**
Rice **12%**
Soybeans **1%**
Wheat **7%**
Rest **66%**

There are drastic reductions in crop duration for maize, rice and wheat. All crops are also affected by hot spells. Rice is particularly affected by drastic increases in hot spell frequency and reductions in rainfall.

Data for 2017 | Source: FAOSTAT 2019

FINANCE

CHINA

> ! China spent almost US$20 billion on fossil fuel subsidies in 2017, mostly for petroleum. A nationwide emissions trading scheme is due to be launched soon.

Investment into green energy and infrastructure needs to outweigh fossil fuel investments by 2025.

1.5°C[6]

Source: IPCC SR1.5 2018

Nationally-determined contribution: Finance

Conditionality	NDC not conditional on international financial support
Investment needs	Not specified
Actions	National actions to align financial flows specified (financial policies, fiscal policy levers and public spending)
International market mechanisms	Not mentioned

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.

Category	Instruments	Objective	Under discussion/ implementation	Not 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.	X	

|			Mandatory	Voluntary	Under discussion	Not identified
Enhanced supervisory review, risk disclosure and market discipline	Climate risk disclosure requirements	Disclose the climate-related risks to which financial institutions are exposed				X
	Climate-related risk assessment and climate stress-test	Evaluate the resilience of the financial sector to climate shocks				X
Enhanced capital and liquidity requirements	Liquidity instruments	Mitigate and prevent market illiquidity and maturity mismatch				X
	Lending limits	Limit the concentration of carbon-intensive exposures				X
		Incentivise low carbon-intensive exposures	X			
	Differentiated Reserve Requirements	Limit misaligned incentives and canalise credit to green sectors	X			

Source: own research

The People's Bank of China (PBC) has released several mandatory and voluntary sustainable finance regulations, including a green credit Monitoring & Evaluation and Key Performance Indicators checklist (2014), green bond rules (2015) and Guidelines for Establishing the Green Financial System in 2016 (including establishment of a mandatory environmental information disclosure system for all listed companies and bond issues). The PBC also helped establish the Network for Greening the Financial System (NGFS) to share and advance practices on climate risk management in the financial sector. The China Banking Regulatory Commission (CBRC) has also played a role in green financial policy, launching a green credit statistics system (2014).

FINANCE

CHINA

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

US$ billions

Source: OECD-IEA 2019

Subsidies by fuel type

11% Natural gas

5% Coal

84% Petroleum
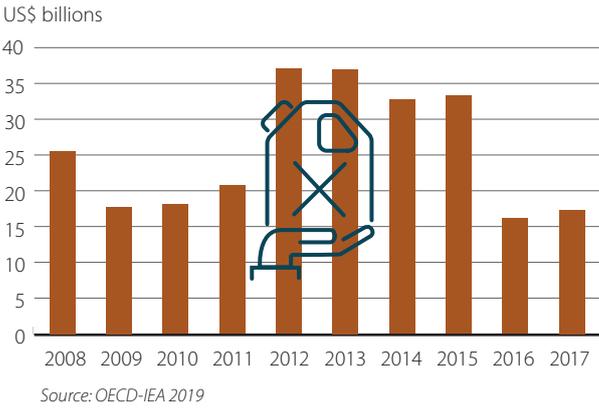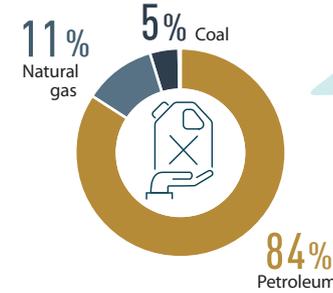
Data for 2017 | Source: OECD-IEA 2019

In 2017, China's fossil fuel subsidies totalled US$19.9bn (compared to US$35.5bn in 2008 and the last decade's peak of US$39.8 bn in 2013). Of the subsidies identified, 73% were for the consumption of fossil fuels, with the remainder for production. The highest amount of subsidy was for petroleum, at US$14.9bn, followed by natural gas at US$1.9bn. The largest subsidy is for petroleum price reform support payments to those most vulnerable in order to remedy price rises (US$9.6bn).

Carbon revenues

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

Source: I4CE 2019
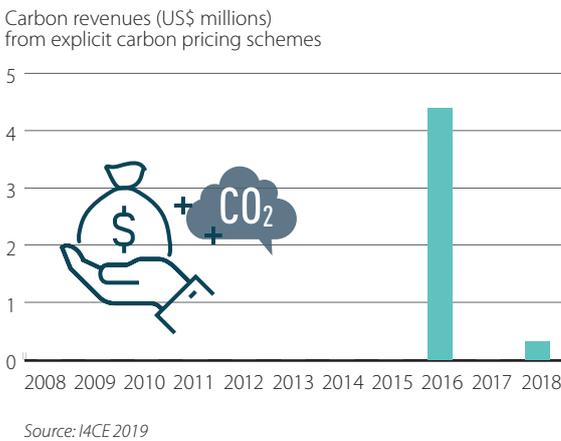
China continues to work on the implementation of its national emission trading scheme since its official launch in December 2017. The scheme aims to cover 30% of domestic emissions (in the power sector), following subnational pilot schemes deployed in nine cities and provinces since 2013 (covering various sectors). Emissions are priced between US$1 and US$8/tCO$_2$. Revenue estimates resulting from these schemes are generally not available.

Carbon pricing gap[15]

% of energy-related CO_2 emissions

90% Gap

10% priced at € 60/tCO$_2$ or more

Data for 2015 | Source: OECD 2018
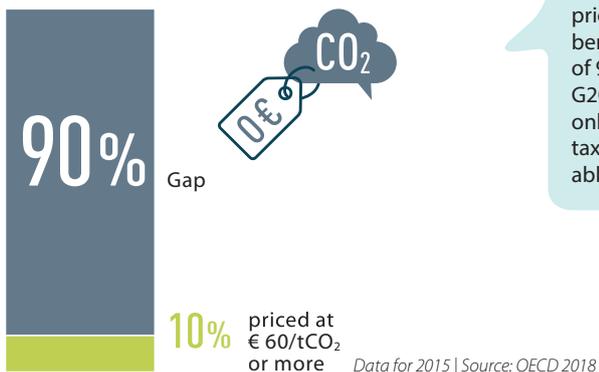
Only 10% of China's CO_2 emissions are priced at EUR30 or higher (the low-end benchmark), creating a carbon pricing gap of 90%. This gap is much higher than the G20 average of 71%. The price covers not only explicit carbon taxes but also specific taxes on energy use and the price of tradable emission permits.

FINANCE

CHINA

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 coal[16]
(million US$)

9,503

9,503
Mio. US$
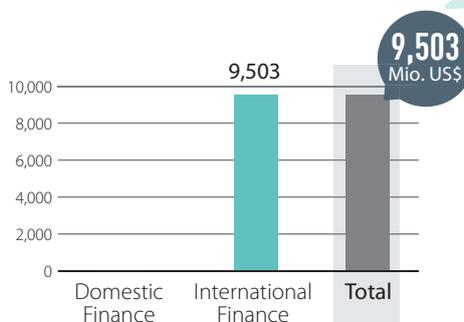
Between 2016 and 2017, China's public finance institutions provided $9.5 billion per year for coal and coal-fired power production internationally. The projects that received the largest amount of finance were coal-fired power plants in Bangladesh, Indonesia, Pakistan and South Africa.

● Domestic Finance
● International Finance

Data year: 2016-2017 average
Source: Oil Change International 2019

Commitments to restrict public finance to coal and coal-fired power[17]

MDB level	National development agencies and banks	Domestic export credit agencies	Export credit restriction in OECD	Comment
—	**X**	—	▬	China's Green Credit policy and associated regulations pushed all Chinese public and private banks to reduce financing for highly polluting industries, including coal. However, it must be noted that these restrictions were not rigid. A US-China joint statement included a restatement of this principle, that China would strengthen "regulations with a view to strictly controlling public investment flowing into projects with high pollution and carbon emissions…"

X yes   ▬ no   ▬ not applicable   *Source: own research*

Provision of international public support[18]

China is not listed in Annex II of the UNFCCC and is therefore not formally obliged to provide climate finance. Despite this, China has provided mitigation finance via the Global Environment Facility (GEF) Trust Fund, climate change mitigation focal area. In its Biennial Update Report (BUR) to the UNFCCC, China includes a chapter on its South-South cooperation, including ongoing commitments and agreements with a number of countries. Tabular data to report on the scale and nature of such contributions for particular years is not included in the BUR and thus not reported here. While China may channel international public finance towards climate change via multilateral and other development banks, it has not been included in this report.

Obligation to provide climate finance under UNFCCC

YES   **NO**

United Nations
Framework Convention on
Climate Change

Bilateral climate finance contributions

Annual average contribution (mn US$, 2015-2016)	Theme of support			
	Mitigation	Adaptation	Cross-cutting	Other
0	**0%**	**0%**	**0%**	**0%**

Source: Country reporting to UNFCCC

Multilateral climate finance contributions

See Technical Note for multilateral climate funds included and method to attribute amounts to countries

Annual average contribution (mn US$, 2015-2016)	Theme of support		
	Adaptation	Mitigation	Cross-cutting
0	**0%**	**0%**	**0%**

Source: Country reporting to UNFCCC

Core/General Contributions

Annual average contribution (mn US$, 2015-2016)
0

Source: Country reporting to UNFCCC

ENDNOTES

G20

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 alsoto 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.

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)
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
Energy efficiency in industry	No policies	Mandatory energy efficiency policies cover more than 26-50% of industrial energy use	Mandatory energy efficiency policies cover 51–100% of industrial energy use	Policies + strategy to reduce industrial emissions by 75%–90% from 2010 levels by 2050
(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

ENDNOTES (continued)

G20

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 CO_2 emissions from power generation and from waste heat generated in the power sector. The category 'other energy use' covers energy-related CO_2 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 CO_2 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 to 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

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