CHINA

Climate Transparency

CLIMATE TRANSPARENCY REPORT: COMPARING G20 CLIMATE ACTION TOWARDS NET ZERO 2021

NOT ON TRACK FOR A 1.5°C WORLD

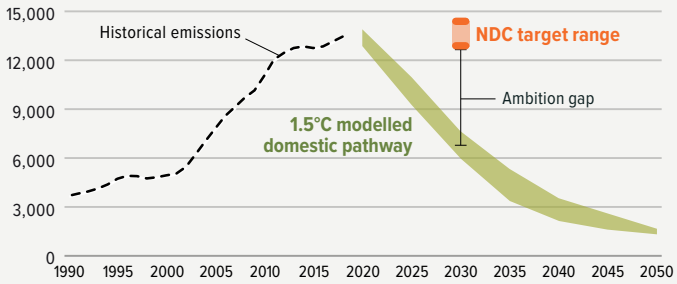
1.5°C

China's NDC target (as of September 2021) would increase emissions to 63-82% above 2005 levels, or approximately 12,921-14,410 $MtCO_2e$, by 2030. To keep below the 1.5˚C temperature limit, China's 2030 emissions would need to be around 6,578 $MtCO_2e$ (or 17% below 2005 levels), leaving an ambition gap of 6,343 $MtCO_2e$. All figures exclude land use emissions.

Gütschow et al., 2021; Climate Analytics, 2021

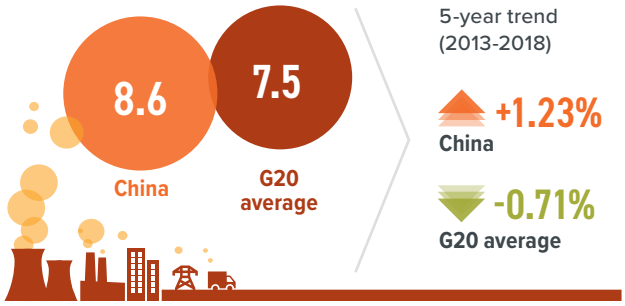
China's announced, yet to be officially submitted, updated 2030 NDC target translates to approximately 12,922 $MtCO_2e$ by 2030

1.5°C compatible emissions pathway ($MtCO_2e$/year)[1]



PER CAPITA GREENHOUSE GAS (GHG) EMISSIONS ABOVE G20 AVERAGE

GHG emissions (incl. land use) per capita (tCO_2e/capita)[2] in 2018



China's per capita emissions are 1.15 times greater than the G20 average. Total per capita emissions have increased by 1.2% since 2013 -2018.

Climate Action Tracker, 2021; Gütschow et al., 2021; United Nations, 2019

KEY OPPORTUNITIES FOR ENHANCING CLIMATE AMBITION

President Xi's 2060 carbon neutrality announcement and the targets in the recently released 14th Five-Year Plan will spur **emission reductions and energy efficiency improvements across China's economic sectors.**

China must phase out unabated, but preferably all, coal before 2040, and significantly scale down its use before 2030.

China has seen significant growth in both wind and solar, but also in solar thermal, geothermal, and renewable electricity for heat since 2012 and is **well-positioned to take up renewable district heating.**

Climate Action Tracker, 2021; IEA, 2019; Jinping, 2021; Deng et al., 2020

RECENT DEVELOPMENTS

- China's post-COVID economic recovery plan extended subsidies and tax incentives for the promotion of electric vehicles (EVs). The government also invested heavily in power utilities, which resulted in a **significant increase in additional wind and solar capacity**.
- However, much of the economic recovery relies on energy-intensive heavy industry and the **construction of new coal-fired power plants.**
- In March 2020, China **delayed environmental supervision** of manufacturing firms as a means of boosting production which had slowed due to COVID.

Cheng, 2020; Myllyvirta, 2021a; Shearer and Myllyvirta, 2020; Xu and Goh, 2020

CORONAVIRUS RESPONSE AND RECOVERY

The economic lockdown due to COVID-19 resulted in a 4.8% year-on-year (YOY) reduction in China's CO_2 levels during Q1 of 2020, but post pandemic recovery led to a 14.5% YOY growth in Q1 of 2021. By mid 2020, coal capacity in the pipeline had increased by 21%. Overall investment in power utilities had increased 14% YOY even as overall capital spending fell by 6%. "Green Spending" has been estimated at 12% (or USD 0.05bn) of China's total recovery spending of USD 407bn.

IRENA, 2021a; Myllyvirta, 2021b; Shearer and Myllyvirta, 2020

CONTENTS

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

LEGEND

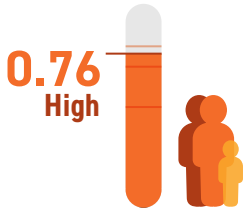
Trends show developments over the past five years for which data are available. The colour-coded arrows indicate assessment from a climate protection perspective: Orange is bad, green is good.

Decarbonisation Ratings[3] 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[4] 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 (HDI)

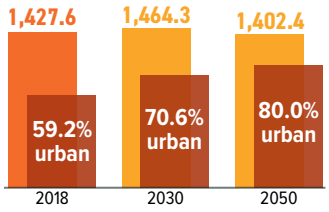


The HDI reflects life expectancy, level of education, and per capita income. China ranks high.

Data for 2019. UNDP, 2020

Population and urbanisation projections

(in millions)

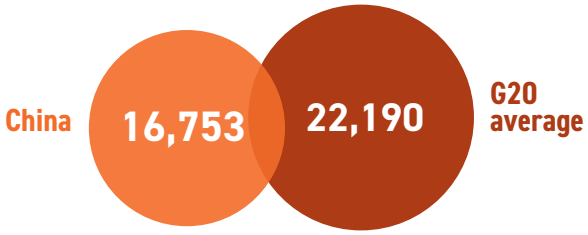


China's population is projected to decrease by 1.7% by 2050, and become more urbanised. However, in the short term, both population and the level of urbanisation are expected to increase, potentially increasing energy demand and greenhouse gas (GHG) emissions unless decoupling occurs.

United Nations, 2019; United Nations, 2018

Gross Domestic Product (GDP) per capita

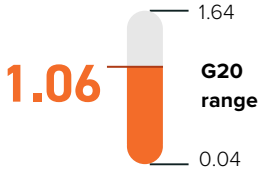
(PPP constant 2015 international $) in 2019



World Bank, 2021; United Nations, 2019

Death rate attributable to air pollution

Ambient air pollution attributable death rate per 1,000 population per year, age standardised in 2019



Over 1.8 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 total population, this is one of the higher levels in the G20.

Institute for Health Metrics and Evaluation, 2020

This source differs from the source used in last year's profiles, and therefore the data are not comparable.

A JUST TRANSITION

A just transition away from coal would necessitate retraining coal workers for economic activities aligned with lowering emissions and increased renewable energy uptake. Coal jobs in China have declined by roughly half since reaching a peak of 5.3 million in 2013. At the same time, renewable energy jobs increased from 2.6 to 4.4 million over the same period. The decline in coal employment is not unexpected. A transition away from coal also affects China's rural households, which rely on coal for heating. Policies to restrict coal used for this purpose should consider how to supply affordable heating alternatives to those affected.

Hao, 2017; He et al., 2020; IRENA, 2014, 2021b; Li and Zhang, 2021; Zhang et al., 2017

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.**

Climate risk-induced fatalities in China stood at an average of 1,056 per year between 2000 and 2019.

With global warming, society and its supporting sectors are increasingly **exposed to severe impacts**, such as such as heatwaves, droughts, and rainfall variability.

Crop yields and food security will likely be much affected by meteorological disasters requiring speedy adaptation of agricultural practices.

ADAPTATION NEEDS

Climate Risk Index

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

Annual weather-related fatalities

1,056 Deaths

0.08 PER 100,000 INHABITANTS

RANKING: 15th in the G20

High — Death rate — Low

Based on Germanwatch, 2019

Annual average losses (US$ millions PPP)

35,272

0.25 PER UNIT GDP (%)

RANKING: 3rd in the G20

High — Losses — Low

Based on Germanwatch, 2019

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			
		% of time in drought conditions			
HEAT AND HEALTH		Heatwave frequency			
		Days above 35°C			
AGRICULTURE	Maize	Reduction in crop duration			
		Hot spell frequency			
		Reduction in rainfall			
	Rice	Reduction in crop duration			
		Hot spell frequency			
		Reduction in rainfall			
	Wheat	Reduction in crop duration			
		Hot spell frequency			
		Reduction in rainfall			

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 RESPONSE AND RECOVERY

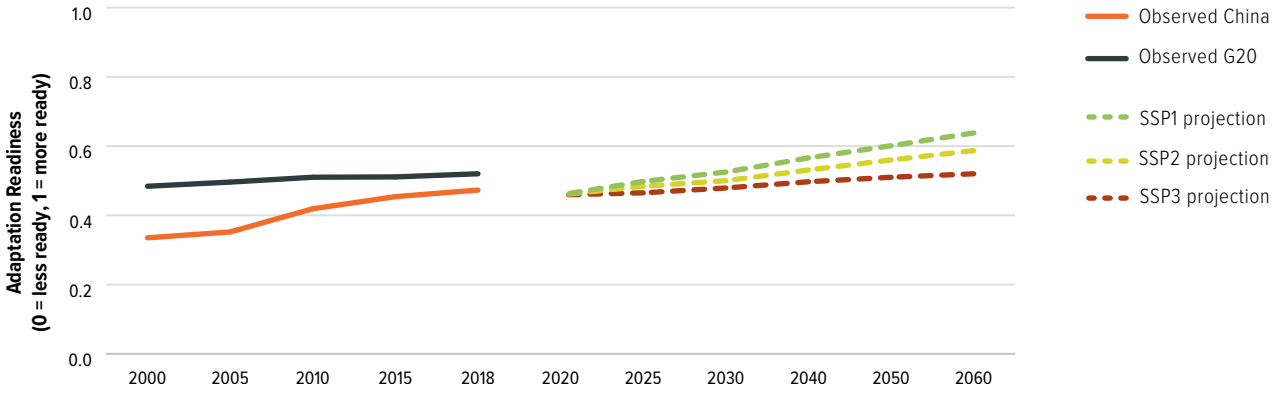
As a response to the likely link between wildlife habitat loss and COVID-19 outbreak, China has strengthened enforcement of its existing ecological red line strategy, particularly in Yunnan province. The pandemic has seemingly brought more attention to biodiversity among urban residents and has led to calls to improve wildlife protection laws.

O'Meara, 2021; Stanway, 2021

Adaptation Readiness

The figure shows 2000-2018 observed data from the Notre Dame Global Adaptation Initiative (ND-GAIN) Index overlaid with projected Shared Socioeconomic Pathways (SSPs) from 2020 to 2060.

Notre Dame Global Adaptation Initiative (ND-Gain) Readiness Index



China's observed adaptation readiness is well below the G20 average. Measures in line with SSP1 would produce improvements in readiness to bring it in line with the 2018 G20 average between 2040 and 2045. Other measures, as represented by SSP2 and SSP3, would continue to undermine its readiness to adapt in the long term.

The readiness component of the Index created by the ND-GAIN encompasses social (social inequality, information and communications technology infrastructure, education and innovation), 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 projections of future governance and, therefore, of possible adaptation readiness. The three scenarios shown here in dotted lines are described as a sustainable development-compatible scenario (SSP1), a middle-of-the-road (SSP2), and a 'Regional Rivalry' (SSP3) scenario.

Based on Andrijevic et al. 2020; ND-Gain Index, 2021

ADAPTATION POLICIES

National Adaptation Strategies

Document name	Publication year	Fields of action (sectors)												Monitoring & evaluation process
		Agriculture	Biodiversity	Coastal areas and fishing	Education and research	Energy and industry	Finance and insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	
National Strategy for Climate Change Adaptation	2013	●	●	●	●	●	●	●	●	●	●		●	●	Target year 2020 to be merged with national five-year plan

Nationally Determined Contribution (NDC): Adaptation

TARGETS

Improvement of National Emergency Management System and construction of flood control projects under 14th Five-Year Plan.

ACTIONS

Actions outlined in the latest release of China's Policies and Actions for Addressing Climate Change (2018).

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

China's GHG emissions, excluding LULUCF, have increased by 269% (1990-2018) and the government's climate targets for 2030, which translate to a 256-304% increase from 1990 levels are not in line with a 1.5°C pathway.

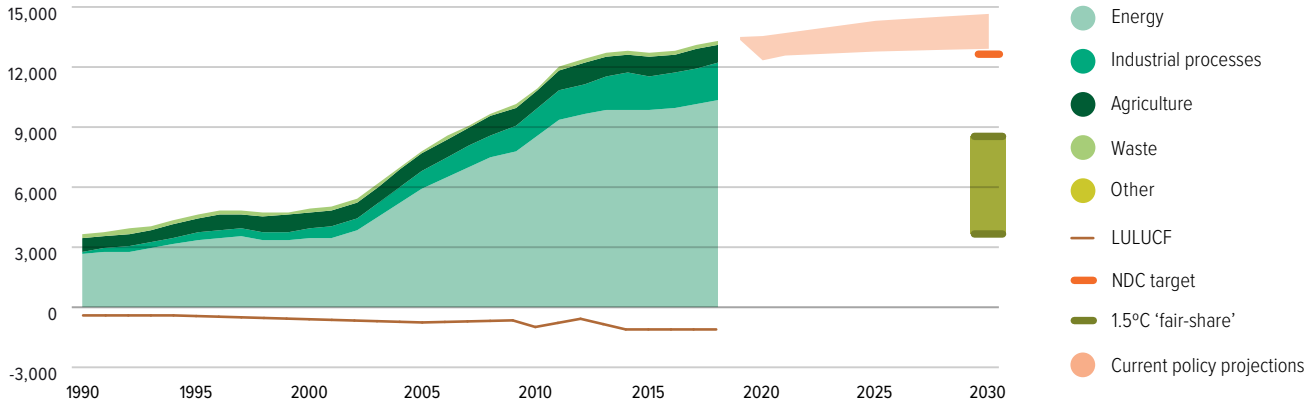
1.5°C COMPATIBILITY

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.

Rogelj et al., 2018

GHG emissions across sectors and CAT 1.5°C 'fair-share' range ($MtCO_2e$/year)[5]

Total GHG emissions across sectors ($MtCO_2e$/year)

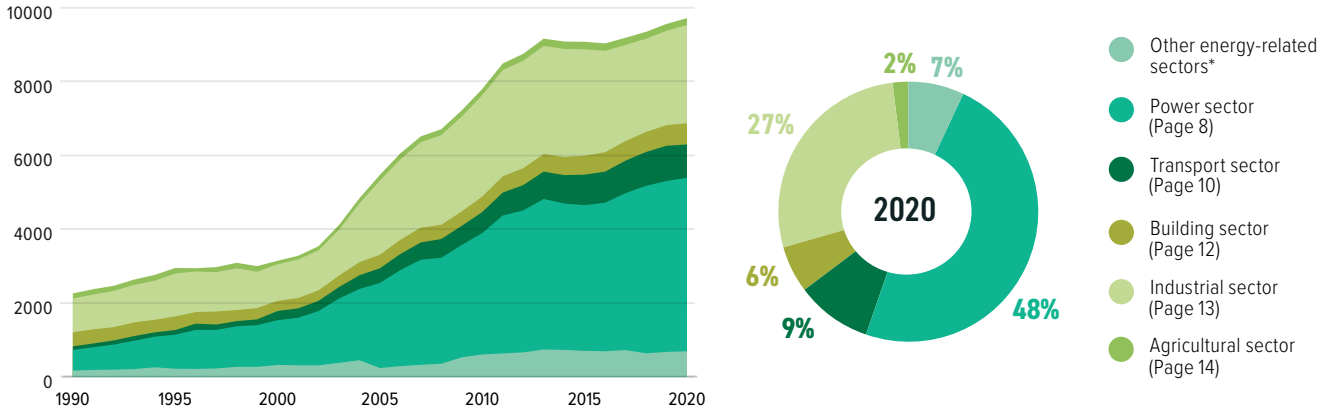


China's emissions (excl. land use) increased by 269% between 1990 and 2018, reaching 13,400 $MtCO_2e$ in 2018, with emissions from energy and industrial process seeing the largest relative increases. The most recent emissions projections show that under current policies, China will most likely meet its national mitigation target. China should strengthen its target to be in line with its 'fair-share' contribution to the Paris Agreement's 1.5°C temperature limit.

Gütschow et al., 2021; Climate Action Tracker, 2020a, 2021

Energy-related CO_2 emissions by sector

Annual CO_2 emissions from fuel combustion ($MtCO_2$/year)



The largest driver of overall GHG emissions are CO_2 emissions from fuel combustion. In China, energy-related emissions increased rapidly in the decade from 2003, saw a slight decline, and, since 2016, have been increasing once again, albeit at a much slower rate. The power sector, with a 48.4% share, is the largest contributor to total CO_2 emissions from fuel combustion, followed by industry and transport with 27.4% and 9.3%, respectively.

Enerdata, 2021 *Due to rounding, some graphs may sum to slightly above or below 100%*

**'Other energy-related sectors' covers energy-related CO_2 emissions from extracting and processing fossil fuels.*

ENERGY OVERVIEW

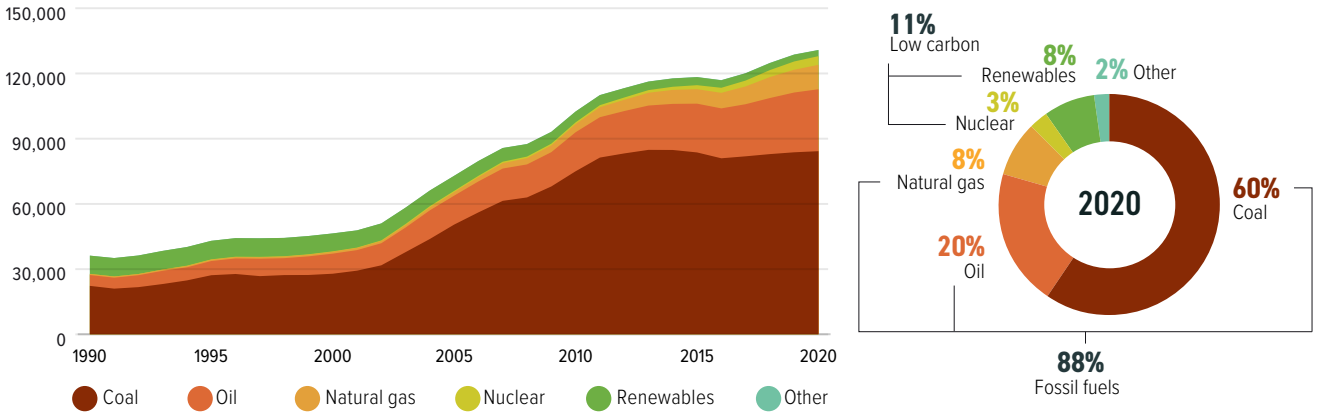
China's primary energy mix is dominated by fossil fuels, which make up 88% of the total. Following a decade of rapid growth in coal, renewables (excl. biomass) have met 26% of new supply since 2013. During this time, oil and natural gas have, respectively, contributed 41% and 27% to new supply.

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 (CCS).

Rogelj et al., 2018

Energy mix

Total primary energy supply (TPES) (PJ)

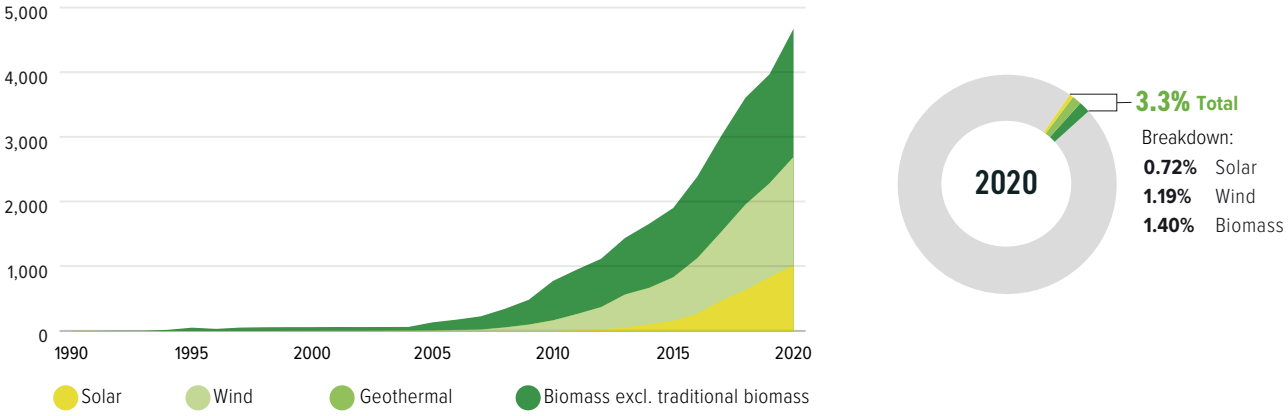


This graph shows the fuel mix for all energy supply, including energy used not only for electricity generation, heating, and cooking, but also for transport fuels. Fossil fuels (oil, coal, and gas) make up 88% of China's energy mix, around the G20 average. Coal's share is significantly larger than the G20 average, while natural gas is significantly less. Renewables (excl. biomass) make up only around 8% of total energy supply. However, supply from renewables has been growing at an average of about 10% per year since 2014, twice as much as the G20 average. Conversely, China's natural gas supply has also been growing at about 10% per year.

Enerdata, 2021 *Due to rounding, some graphs may sum to slightly above or below 100%*

Solar, wind, geothermal, and biomass development

TPES from solar, wind, geothermal and biomass (PJ)

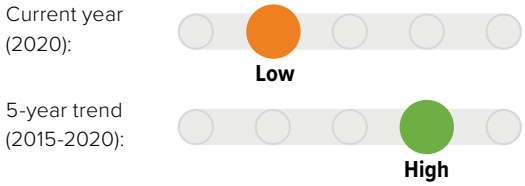


Solar, wind, geothermal and traditional biomass account for 3.3% of China's energy supply – the G20 average is 7%. The share of renewables in the total energy supply has increased by around 114% in the last five years (2015-2020), much faster than the G20 average of 32%. Bioenergy (for electricity and heat) makes up the largest share, followed closely by wind. Solar has experienced the largest growth among new renewables over the last five years.

Enerdata, 2021 *Due to rounding, some graphs may sum to slightly above or below 100%*

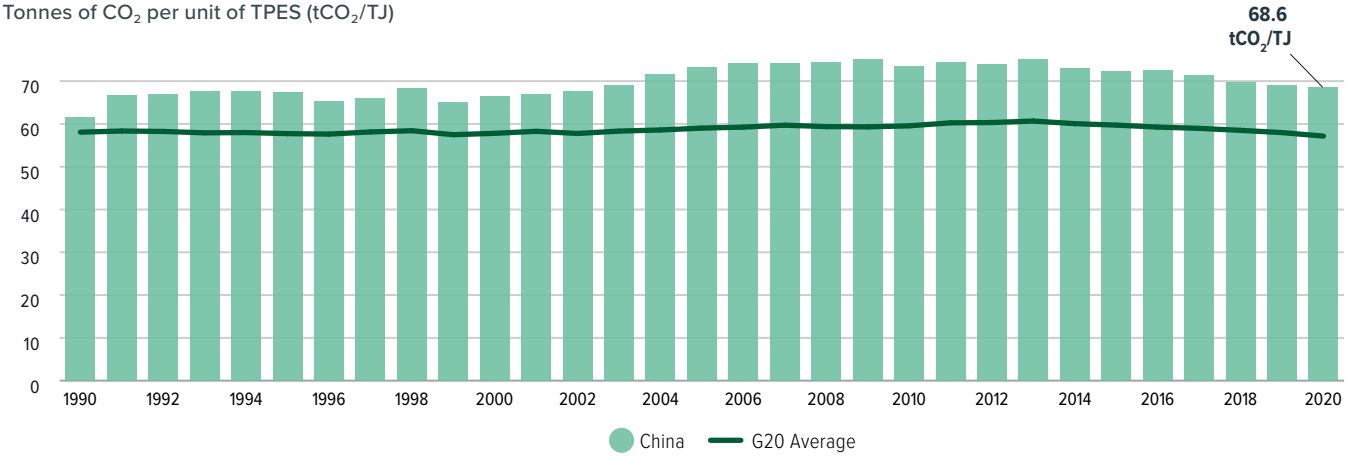
Note: Large hydropower and solid fuel biomass in residential use are not reflected due to their negative environmental and social impacts.

Decarbonisation rating: renewable energy share of TPES compared to other G20 countries



Carbon intensity of the energy sector

Tonnes of CO_2 per unit of TPES (tCO_2/TJ)



Carbon intensity is a measure of how much CO_2 is emitted per unit of energy supply. China's emissions intensity of primary energy is currently 68.6 tCO_2/TJ, about 20% above the G20 average. China's emissions intensity of primary energy has been decreasing at a greater rate than the G20 average. However, the country reached a peak of 75 tCO_2/TJ in 2013 while the G20's peak, which occurred in the same year, was just over 60 tCO_2/TJ. Thus, while China's current energy emissions intensity level is ranked very low, the decreasing trend is ranked high.

Enerdata, 2021

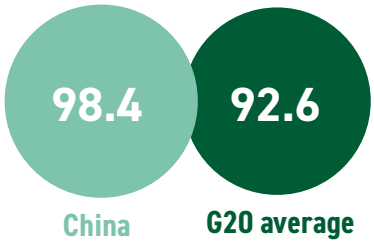
Decarbonisation rating: carbon intensity of the energy sector compared to other G20 countries

Current year (2020): **Very low**

5-year trend (2015-2020): **High**

Energy supply per capita

TPES per capita (GJ/capita) in 2020



TPES per capita (GJ/capita): 5-year trend (2015-2020)

+12.06%
China

-0.12%
G20 average

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

Current year (2020): **Medium**

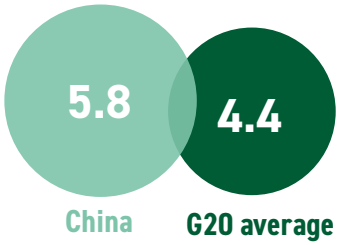
5-year trend (2015-2020): **Very low**

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 China is, at 98.4 GJ/capita in 2020, slightly above the G20 average, but increased by 12% between 2015 and 2020, in contrast to the 0.12% decreasing trend seen in the G20 average.

Enerdata 2021, United Nations, 2019

Energy intensity of the economy

(TJ/million US$2015 GDP) in 2019



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

-19.26%
China

-10.56%
G20 average

Decarbonisation rating: energy intensity compared to other G20 countries

Current year (2019): **Low**

5-year trend (2014-2019): **Very high**

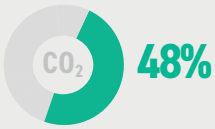
This indicator quantifies how much energy is used for each unit of GDP. This is closely related to the level of industrialisation, efficiency achievements, climatic conditions or geography. China's energy intensity is higher than the G20 average and has been decreasing at a higher rate of 19% (2014-2019) as compared to the G20.

Enerdata, 2021; World Bank, 2021

POWER SECTOR

Emissions from energy used to make electricity and heat

China produced 63% of its electricity from coal in 2020. However, the government plans to reduce coal consumption by 2026, and wind and solar have accounted for an increasing share of new generation in recent years. Nonetheless, the generation mix is not compatible with a 1.5°C pathway.



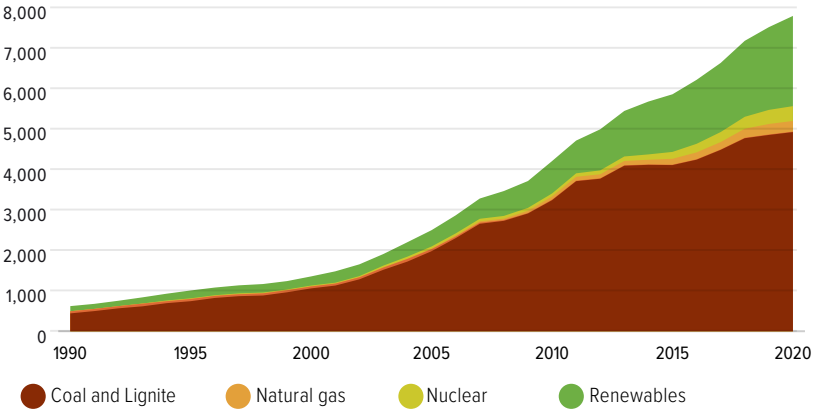
Share of energy-related CO_2 emissions from electricity and heat production in 2020.

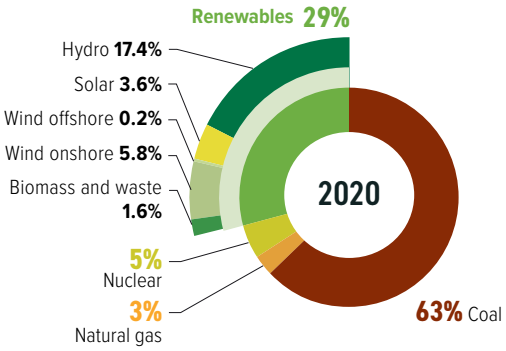
Worldwide, coal use for power generation needs to peak by 2020, and between 2030 and 2040, all the regions of the world need to phase out coal-fired power generation. By 2040, the share of renewable energy in electricity generation has to be increased to at least 75%, and the share of unabated coal reduced to zero.

Rogelj et al., 2018; Climate Action Tracker, 2020b

Electricity generation mix

Gross power generation (TWh)



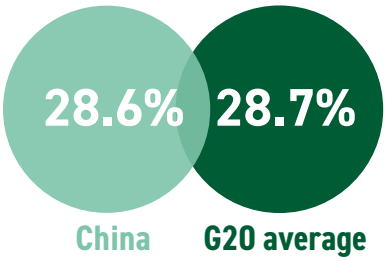


China **generated 67% of its electricity from fossil fuels in 2020**. The share of renewable energy in China's power sector has been increasing, accounting for approximately 29% of the power mix in 2020. While much of this increase has been due to large scale hydro projects, in the last five years the share of renewables in power generation has increased 16%, well under the G20 average increase of 25% over the same time frame.

Enerdata, 2021 *Due to rounding, some graphs may sum to slightly above or below 100%*

Share of renewables in power generation

(incl. large hydro) in 2020

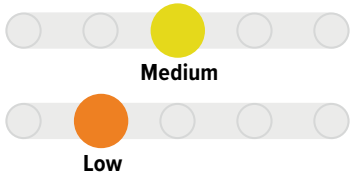


Share of renewables in power generation: 5-year trend (2015-2020)

+15.96%
China

+24.49%
G20 average

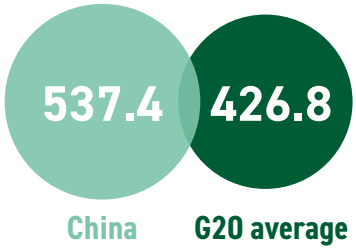
Decarbonisation rating: share of renewables compared to other G20 countries



Enerdata, 2021

Emissions intensity of the power sector

(gCO_2/kWh) in 2020

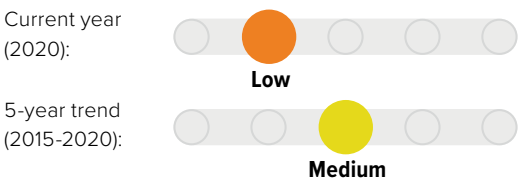


Emissions intensity of the power sector:
5-year trend (2015-2020)

-10.9%
China

-11.18%
G20 average

Decarbonisation rating: emissions intensity compared to other G20 countries



For each kilowatt hour of electricity, 537 g of CO_2 is emitted in China. China's emissions-intensity has been decreasing, at a five-year trend of around 10%, slightly less than the G20 average. Emissions intensity in China has decreased (-11%) just slightly more slowly between 2015-2020 than the G20 average in the same period (-11%). The share of renewables in power generation in China is almost the same as that of the G20 average in 2020.

Enerdata, 2021

POLICY ASSESSMENT

Renewable energy in the power sector

In December 2020, China announced a proposed update to its NDC which included targets for a 25% share of non-fossil fuels in primary energy and at least 1,200 GW of solar and wind capacity by 2030. Since then, the National Energy Administration (NEA) has set an interim target for renewables to make up 25% installed power capacity, and wind and solar to make up 16.5% of the generation mix by 2025. The NEA has also proposed that the country's grid companies should purchase 40% of their generation from renewables (25.9% from non-hydro renewables) by 2030.

Climate Action Tracker, 2021; Daiss, 2021; Xu and Stanway, 2021

Coal phase-out in the power sector

In April 2021, President Xi announced that China would strictly control coal consumption over the next five years and begin phasing out coal from 2026. However, this followed a year of post-COVID-19 recovery which saw provinces stimulate their economies through building new coal plants (38.4 GW commissioned in 2020) and increase production in fossil-fuel-intensive industries, such as cement and steel. The country currently has 97 GW of coal plants under construction and another 163 GW under pre-construction development, representing 52% and 55%, respectively, of the world's total.

On the other hand, China has set a binding target for reducing energy and emissions intensity of GDP in its 14th Five-Year Plan (-13.5% and -18%, respectively), which is the first time the country has implemented such strong policy to decouple GDP growth from coal consumption.

Global Energy Monitor, 2021a, 2021b; Liu et al., 2021; Myllyvirta, 2021a; Xinhua, 2021a

CORONAVIRUS RESPONSE AND RECOVERY

China's COVID-19 recovery efforts in 2020 relied heavily on fossil-fuel-intensive industry and saw a boom in the development of coal-fired power plants. In total, the country commissioned 38.4 GW of new coal capacity in 2020, surpassing the 37.8 GW retired globally. At the same time, China brought 120 GW of wind and solar capacity online.

Deign, 2021; Global Energy Monitor, 2021a

TRANSPORT SECTOR

Emissions from energy used to transport goods and people

Transport emissions continue to rise. In 2019, 25% of passenger and 66% of freight transport was by road. Oil accounts for 89% of passenger-related consumption, and coal transported 42% of freight cargo (tonnes-kilometres). Between 2013 and 2018, heavy-duty vehicles (HDVs) increased, on average, by 4% per year and **in Beijing, transport is now the main source of PM2.5**. Electric vehicles (EVs) make up only 5.7% of new car sales.

1.04%
Indirect emissions

9.29%
Direct emissions

Share of transport in energy-related CO_2 emissions

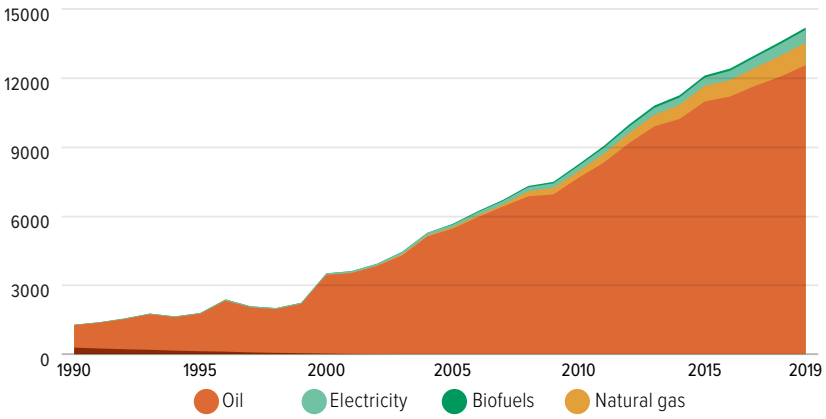
1.5°C COMPATIBILITY

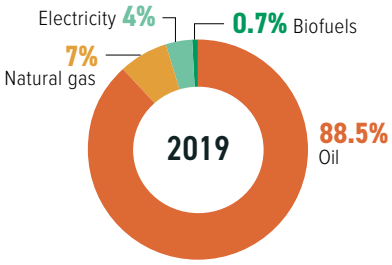
The share of low-carbon fuels in the transport fuel mix globally must increase to between 40% and 60% by 2040 and 70% to 95% by 2050.

Rogelj et al., 2018; Climate Action Tracker, 2020b

Transport energy mix

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



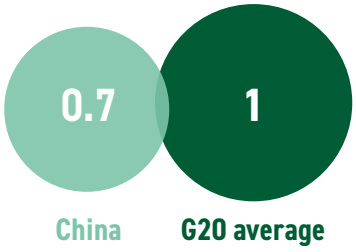


Electricity and biofuels make up only 4.6% of the energy mix in transport.

Enerdata, 2021 *Due to rounding, some graphs may sum to slightly above or below 100%*

Transport emissions per capita

excl. aviation (tCO_2/capita) in 2020

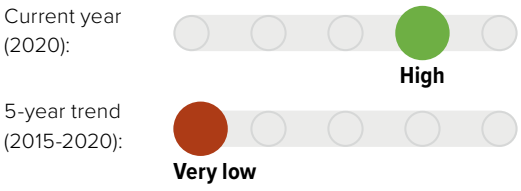


Transport emissions: 5-year trend (2015-2020)

+22.6%
China

-4.3%
G20 average

Decarbonisation rating: transport emissions compared to other G20 countries

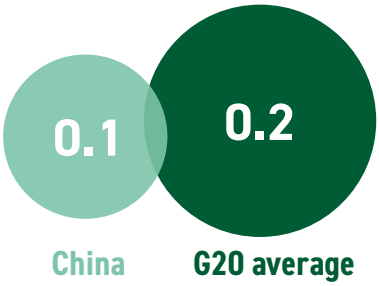


Reductions in transport emissions per capita in 2020, and concomitant changes in the 5-year trends and decarbonisation ratings, reflect widespread economic slowdowns and transport restrictions imposed in response to the COVID-19 pandemic. For a discussion of broader trends in the G20 and the rebound of transport emissions in 2021, please see the Highlights Report at www.climate-transparency.org

Enerdata, 2021; United Nations, 2019

Aviation emissions per capita[6]

(tCO_2/capita) in 2018

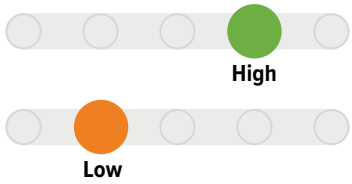


Aviation emissions: 5-year trend (2013-2018)

+54.39
China

+21.25%
G20 average

Decarbonisation rating: aviation emissions compared to other G20 countries



Enerdata, 2021; International Energy Agency, 2020; United Nations, 2019

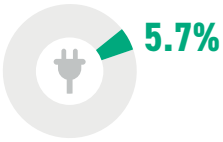
Motorisation rate

159 VEHICLES
per 1,000 inhabitants in 2019 in China*

Enerdata, 2021

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

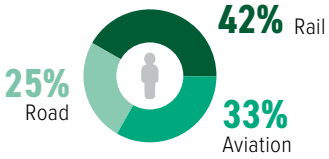
The share of EVs in new car sales in 2020 was 5.7%.



IEA, 2021c

Passenger transport

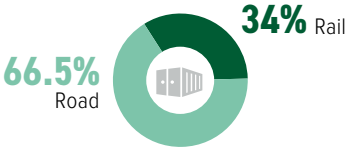
(modal split in % of passenger-km) in 2019*



Enerdata, 2021

Freight transport

(modal split in % of tonne-km) in 2019*



Freight transport by air, pipelines and waterways are excluded due to lack of data.

Enerdata, 2021

**Owing to the variety of sources and data years available, these data are not comparable across G20 countries.*

POLICY ASSESSMENT

Phase out fossil fuel cars

China has announced plans to phase out conventional fossil fuel cars by 2035. The country has set targets to raise the share of EVs in new car sales to 20% by 2025. The influential industry body, the China Society of Automotive Engineers (SAE), has released a roadmap suggesting that this share will increase to 50% by 2035. The government's targets mean that the other 50% of car sales will be conventional (non-plug-in) hybrids, which still rely on fossil fuels. The country cut EV subsidies earlier this year after extending them in April 2020 about concerns over COVID-19's effect on the EV industry.

Argus, 2021; Lutsey et al., 2021; Tabeta, 2020; Xinhua, 2021b

Phase out fossil fuel heavy-duty vehicles

In July 2021, China implemented its Stage 3 fuel consumption standards to all new heavy commercial vehicles. Fuel consumption limits for new tractors (15%), trucks (14%), and buses (16%) have been increased from the previous Stage 2 standard. China currently has no plan to reduce absolute emissions from the freight sector.

Transport Policy, 2018

Modal shift in (ground) transport

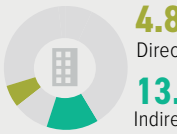
As part of a broader programme to cut air pollution, China initiated a three-year plan in 2018 to reduce freight transport by diesel-burning trucks and increase freight transport by electric-powered railway system. However, this plan fell behind schedule. Regardless, the country has prioritised a shift from highways to railways and waterways as part of its efforts to develop a green economy under the 14th Five-Year Plan. The Plan also seeks to build intercity railways in metropolitan areas.

Murphy, 2021; Xin, 2020

BUILDING SECTOR

Emissions from energy used to build, heat and cool buildings

China's buildings account for 4.87% of direct CO_2 emissions and 13.36% of indirect CO_2 emissions. Per capita emissions from the building sector are about 7% higher than the G20 average. China's **policies are not sufficient** for a 1.5°C pathway.



Share of buildings in energy-related CO_2 emissions. Building emissions occur directly (burning fuels for heating, cooking, etc) and indirectly (grid-electricity for air conditioning, appliances, etc.)

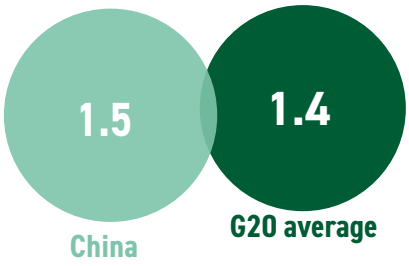
1.5°C COMPATIBILITY

By 2040, global emissions from buildings need to be reduced by 90% from 2015 levels, and be 95-100% below 2015 levels by 2050, mostly through increased efficiency, reduced energy demand, and electrification in conjunction with complete decarbonisation of the power sector.

Rogelj et al., 2018; Climate Action Tracker, 2020b

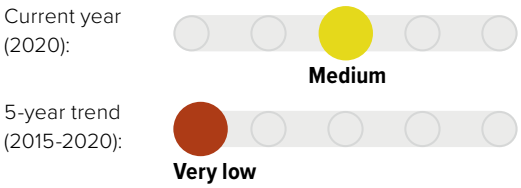
Building emissions per capita

(incl. indirect emissions) (tCO_2/capita) in 2020



Building emissions: 5-year trend (2015-2020)

Decarbonisation rating: building emissions compared to other G20 countries



In contrast to the slight decline in average G20 emissions (3%), China's levels have increased by 29% (2015-2020). 2020 was the first year that China's per capita emissions (1.5 tCO_2) exceeded the G20 average (1.4 tCO_2). China's rapidly increasing building-related emissions reflect the country's high fossil fuel share in primary energy and rapid urbanisation.

Enerdata, 2021; United Nations, 2019

POLICY ASSESSMENT

Near zero energy new buildings

In September 2019, China implemented its Technical Standard for Near Zero Energy Buildings. The government had previously set a goal for 20% energy efficiency in new urban buildings by 2020 compared to 2015, and for "green buildings" to account for 50% of new urban buildings. Recently, the Ministry of Housing and Urban-Rural Development (MOHURD) has released a draft 14th Five-Year Development Plan for Green Buildings. The plan also seeks to improve the building electrification rate from its current 30% to 55%. Subsequent Five-Year Plans have placed a growing emphasis on green buildings.

MOHURD, 2021; Zhou et al., 2020

Renovation of existing buildings

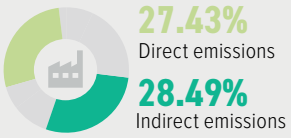
China, through MOHURD, has issued guidelines and targets for retrofitting existing buildings. Through the directives in the Five-Year Plans, the ministry has sought to steadily increase the energy performance of existing buildings. The government sees green retro-fitting of existing buildings as an important aspect of both urban and rural development.

IEA, 2021a; MOHURD, 2021

INDUSTRY SECTOR

Emissions from energy use in industry

Direct and indirect emissions from industry in China make up 27.4% and 28.5% of energy-related CO_2 emissions respectively. To align with the emissions-intensity of GDP reduction targets (-18% from 2021-2025) of the 14th Five-Year Plan, China's aluminium and steel industries plan to peak CO_2 by 2025, and reduce by 40% and 30%, respectively, from that peak by 2040.



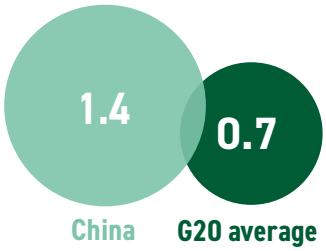
Share of industry in energy-related CO_2 emissions.

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

Rogelj et al., 2018

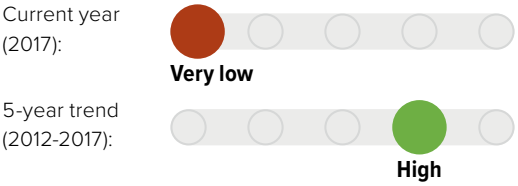
Industry emissions intensity[7]

(tCO_2e/USD2015 GVA) in 2017



Industry emissions intensity: 5-year trend (2012-2017)

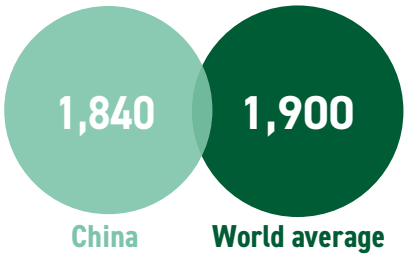
Decarbonisation rating: industry emissions intensity compared to other G20 countries



Enerdata, 2021; World Bank, 2021

Carbon intensity of steel production[8]

($kgCO_2$/tonne product) in 2016



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

World Steel Association, 2018; Climate Action Tracker, 2020c

POLICY ASSESSMENT

Energy efficiency

In 2018, 75% of China's industrial sector was covered under mandatory energy efficiency policies, more than double the global amount. China's 14th Five-Year Plan promotes the "green transformation" of the steel industry, one of the country's largest sources of emissions. Emissions targets in the Plan have **prompted state-run steel and aluminium industries to announce 2025 carbon peaking targets,s as well as strategies for emissions reduction thereafter.**

EEO, 2021; Finance Sina, 2021; IEA, 2021b

LAND USE SECTOR

Emissions from changes in the use of the land

To stay within the 1.5°C limit, **China needs to make the land use and forest sector a net sink of emissions**, e.g., discontinuing the degradation of peatlandss, converting cropland into wetlands, and by creating new forests.

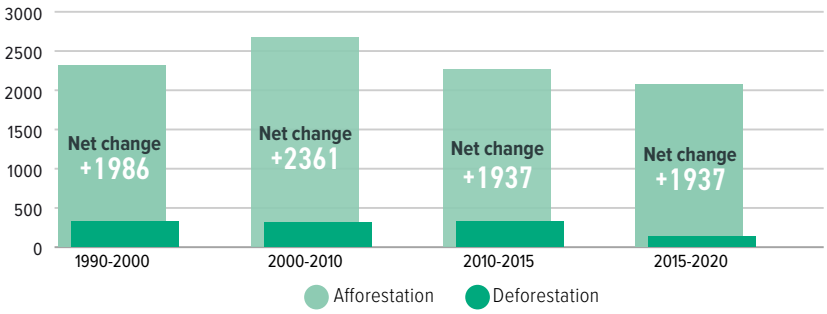
COMPATIBILITY

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

Rogelj et al., 2018

Annual forest expansion, deforestation and net change

Forest area change in 1,000 ha/year



Between 2015-2020, China gained 1937 kha of forest area per year. In general, China's rate of afforestation greatly exceeds that of deforestation.

Global Forest Resources Assessment, 2020

Note: There is a change of source and methodology for measuring this indicator from last year's profiles, which means the two years may not be directly comparable.

POLICY ASSESSMENT

Target for net zero deforestation

Medium

China's current NDC includes a target to increase forest stock by 4.5 billion cubic metres by 2030 compared to 2005. Its proposed update strengthens this target to 6 billion cubic metres. In context, this represents about a third of the country's current forest stock and represents a quarter of the increase seen in the period 2014-2018. In December 2019, the government revised its Forest Law to ban purchase, processing, and transport of illegal logs. As the country is the world's largest importer of these logs, its recent policy shift could result in reduced deforestation globally.

Jide et al., 2019; Mukpo, 2020

AGRICULTURE SECTOR

Emissions from agriculture

China's agricultural emissions are mainly from the use of synthetic fertilisers, livestock manure, and digestive processes (enteric fermentation). **A 1.5°C compatible pathway requires behavioural and dietary shifts and less fertiliser use.**

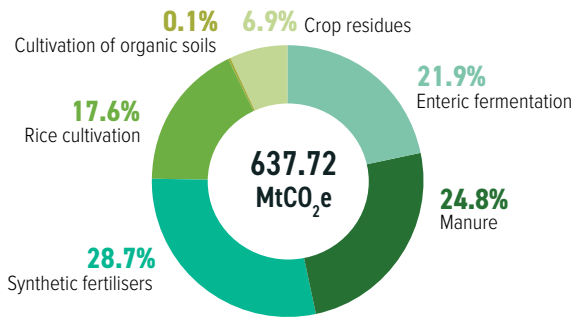
COMPATIBILITY

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).

Rogelj et al., 2018

Emissions from agriculture (excluding energy)

Emissions from the agriculture sector in 2018

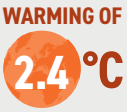


In China, the largest sources of GHG emissions in the agriculture sector are the use of synthetic fertilisers (29%), livestock manure (25%), and enteric fermentation (22%). Dietary changes and efficient use of fertilisers as well as reductions in food waste could help reduce emissions from this sector.

FAO, 2021

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 (NDCs) assessed by April 2021 is **not sufficient and will lead to a warming of 2.4°C by the end of the century.** This highlights the urgent need for all countries to submit more ambitious targets by COP26, as they agreed to do in 2015, and to **urgently strengthen their climate action to align to the Paris Agreement's temperature goal.**

Climate Analytics, 2021a

Climate Action Tracker (CAT) evaluation of targets and actions

CHINA'S OVERALL RATING

- 1.5°C Paris Agreement compatible
- Almost sufficient
- Insufficient
- **HIGHLY INSUFFICIENT**
- Critically insufficient

This CAT evaluation is a **new, overall rating**, that combines the several, separately rated elements, of policies and actions, domestic and internationally supported targets, 'fair-share target' and the country's contribution to climate finance. The CAT gives China an overall rating of "Highly insufficient".* China's climate commitments in 2030 are also rated as "Highly insufficient" as emission levels expected under the peaking and non-fossil share NDC targets are compatible with warming levels of between 3°C and 4°C by the end of the century, if all countries followed this ambition. China's climate policies and action are rated as "Insufficient", as current national policies are consistent with domestic pathways associated with 3°C and could lead to rising, rather than falling, emissions. To improve on its rating China would need to peak emissions as early as possible, decrease coal and other fossil fuel consumption at a much faster rate than currently planned, and set clear phase-out timelines.

China's proposed NDC update is only a slight improvement from its first NDC and does not result in an improvement in the CAT's rating, even if officially submitted; it would need to adopt more ambitious medium-term climate targets to match its long-term net-zero goal. For the full assessment of the country's target and actions, and the explication of the methodology see www.climateactiontracker.org

Climate Action Tracker, 2021

** For the purposes of this rating China's NDC commitment was treated as unconditional, as it has not indicated a level of ambition that would be achieved with international support (conditional NDC target).*

AMBITION: 2030 TARGETS

Nationally Determined Contribution (NDC): Mitigation

TARGETS

- Achieve the peaking of CO2 emissions **around 2030**, and make best efforts to peak earlier
- Lower CO_2 emissions per unit of GDP by 60% to 65% of the 2005 level by 2030
- Increase non-fossil-fuel share of primary energy to 20% by 2030
- Increase forest stock volume by 4.5 billion cubic metres by 2030 compared to 2005

China's proposed updated NDC has not been submitted to the UNFCCC (as of 29 September 2021).

The headline assertion contains firmer language about achieving the peaking of CO_2 emissions **before 2030**, as well as more ambitious goals for carbon intensity, non-fossil-fuel share of TPES, forest stock and installed renewable energy.

ACTIONS

Actions specified in the following sectors: energy, industry, buildings, transport, forestry, waste

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, which sets out the "information to facilitate clarity, transparency and understanding" as crucial elements of NDCs.

NDC Transparency Check recommendations

China's NDC was submitted to the UNFCCC on 9 March 2016. To ensure clarity, transparency, and understanding, it is recommended that China provides additional detailed information in its next NDC or NDC update (compared to the existing NDC), including:

- Provide additional information on how the reference indicators are constructed and quantified.
- Detail the coverage of sectors, sources, and sinks.
- Explicitly state the time frame, period of implementation of the NDC, and how China will account for its mitigation target(s).
- Detail if China's mitigation targets contain the highest possible ambition aligned to the Paris Agreement's long-term temperature goals.
- Provide information on considerations of fairness and ambition of the NDC.

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

AMBITION: LONG-TERM STRATEGIES

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.

Status	Submitted to UNFCCC, last update in 2016
Interim steps	Yes: Peak CO_2 emissions by 2030
Sectoral targets	Yes
Net zero target	Yes
Net zero year	2060

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.

China spent USD 18bn on fossil fuel subsidies in 2019, about half of what it spent in 2013. However, **in 2019 China had the highest fossil fuel subsidies in the G20**. The government is set to implement its national emissions trading scheme in July 2021. This will be limited to the power sector and cover 30% of the country's emissions.

1.5°C COMPATIBILITY

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

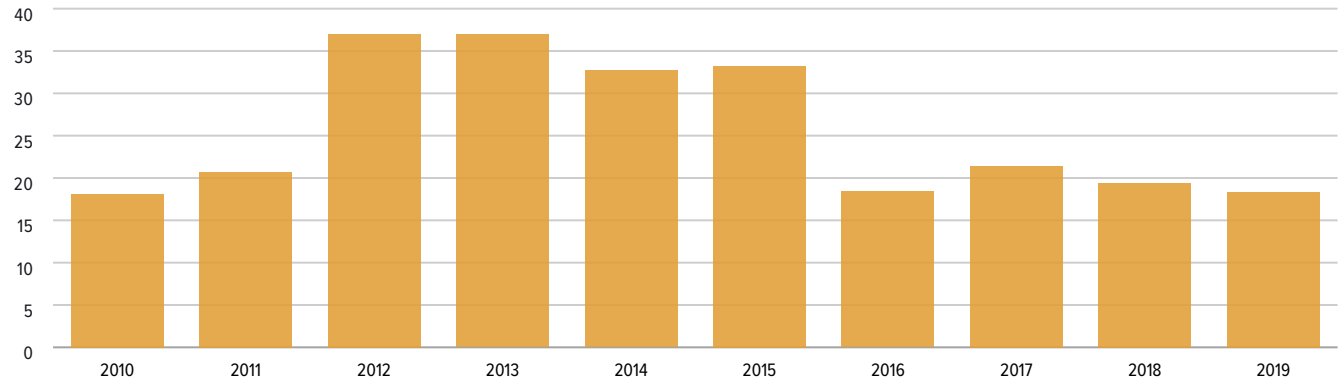
Rogelj et al., 2018

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

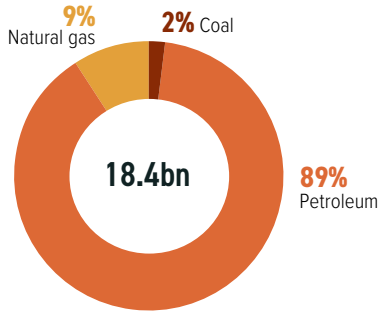
(USD billions)



OECD-IEA Fossil Fuel Support database, 2020

Fossil fuel subsidies by fuel type

USD in 2019



Over the past decade (2010-2019), **China's fossil fuel subsidies were at their highest between 2012 and 2015, reaching a value of USD 18.4bn in 2019**. Over this period, most of the subsidies were directed to support the production and consumption of petroleum.

Comparable data is not yet available for 2020. However, according to the Energy Policy Tracker data, during 2020 China has pledged at least USD 18.5bn to fossil fuel energy as part of its energy-related funding commitments and COVID-19 economic response. The biggest funding commitment directed at fossil fuels was a USD 11.3bn investment in a coal indirect liquefaction project in Shaanxi Province. Another big fossil investment was the USD 3.6bn Cathay Pacific bailout by the Hong Kong government.

Energy Policy Tracker, 2021; OECD-IEA Fossil Fuel Support database, 2020

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

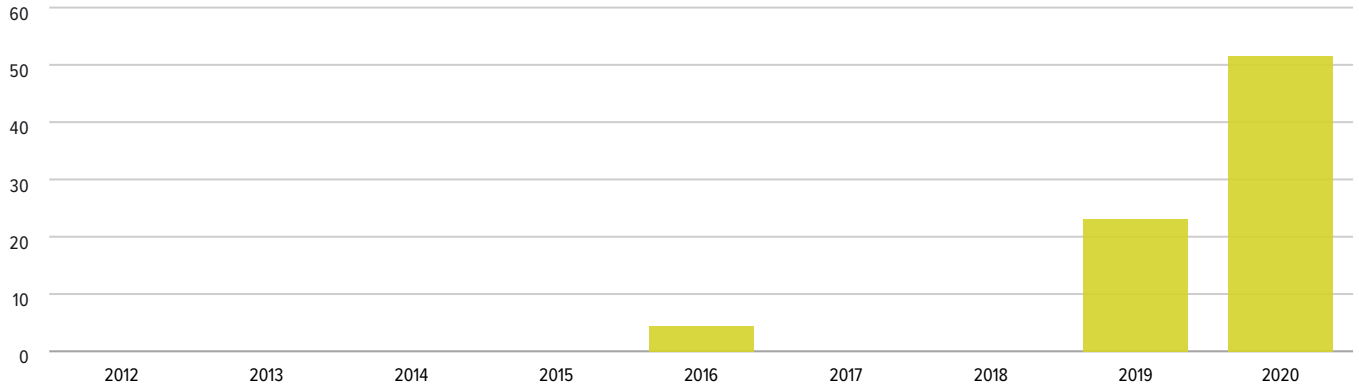
CORONAVIRUS RESPONSE AND RECOVERY

Being the first country to record COVID-19 cases, China saw the earliest government-backed economic responses. In February 2020, the central bank made moves to ensure market liquidity and lowered interest rates. In May 2020, the central government released its annual Government Work Report, announcing RMB 5tn in stimulus spending. Provincial governments were given relatively little direction on how monies should be spent, with the result that much spending was directed towards traditional growth industries, emissions-intensive infrastructure projects, and the building of coal-fired power plants.

Gosens and Jotzo, 2020; Myllyvirta and Li, 2021

Carbon pricing and revenue

(USD millions)



China has been working on the implementation of its national emissions trading scheme (ETS) since its official announcement in December 2017. The scheme was launched in July 2021 and covers 40% of domestic emissions, limited to the power sector. The closing price for carbon emission allowances on the first day of trading was USD 7.9 per tonne. This follows subnational pilot schemes deployed in nine cities and provinces since 2013 covering various sectors. Emissions are priced between USD 2/tCO_2e and USD 12/tCO_2e. Revenue estimates resulting from these schemes are only available for a few jurisdictions.

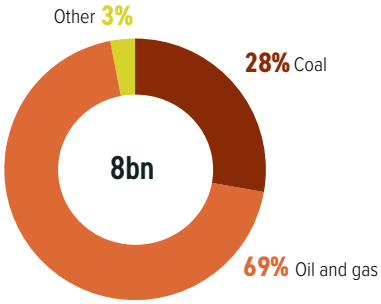
I4CE, 2021; Energy Policy Tracker, 2021

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

USD, per annum (2018-19 average)



Between 2018 and 2019, China was the G20's second largest provider of public finance for fossil fuels – for both oil and gas, as well as coal – with USD 5.5bn a year for oil and gas, USD 2.3bn for coal and USD 252m for 'other'. This included, most notably, USD 2.4bn of financing from China Export and Credit Insurance Corporation for the construction and development of the Ajaokuta-Kaduna-Kano pipeline in Nigeria, as well as a USD 2.5bn loan from the China Development Bank in 2018 to be used by South Africa's state-owned utility company Eskom for the financing of its coal-fired Kusile Power Station.

Oil Change International, 2020 *Due to rounding, some graphs may sum to slightly above or below 100%*

Provision of international public support

China is not listed in Annex II of the UNFCCC and is, therefore, not formally obliged to provide climate finance. Despite this, China continues to provide international public finance via the Global Environment Facility (GEF) Trust Fund. In its first Biennial Update Report (BUR) to the UNFCCC, China included a chapter on its South-South cooperation, though did not do so in its recent second BUR. While China may channel international public finance towards climate change via multilateral and other development banks, that has not been included in this report.

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.

There has been some encouraging progress by Chinese authorities on greening the country's financial system. In June 2020, the People's Bank of China (PBOC), China Securities & Regulatory Commission (CSRC) and the National Development & Reform Commission (NDRC) announced a unified green bond guideline for the Green Bonds Endorsed Project Catalogue. In April 2021 the Catalogue was updated, removing fossil fuel production and consumption projects and increasing the number of climate-friendly projects through green bonds issuance.

The PBOC has also taken up finance reforms and innovative pilot programmes and has targeted nine cities in six provinces until 2020 (Peoples Bank of China press release, 2020). In June 2021, PBOC also launched a Green Finance Evaluation Programme to grade Chinese banks based on their green bonds holding. The results will inform the PBOC's policy and prudent management tools.

In January 2021, the China Banking and Insurance Regulatory Commission issued measures for the regulatory rating of asset management companies with additional credits to green and environmental, social, and governance (ESG) investments.

Also, in January 2021, the Bank of China Limited issued its very first Transition Bond in accordance with the International Capital Markets Association Climate Transition Finance Handbook 2020 and the Technical Expert Group Final Report of the EU Taxonomy with inclusion of principles like "avoidance of carbon lock-in" and "do no significant harm". The bank raised USD 780m in two phases, and the proceeds will be used to finance or refinance eligible projects.

China Banking and Insurance Regulatory Commission, 2021

Nationally Determined Contribution (NDC): Finance

Conditionality	Not applicable
Investment needs	Not specified
Actions	A number of actions are listed under "Increasing Financial and Policy Support" that promote a carbon emissions trading market
International market mechanisms	No contribution from international credits for the achievement of the target

ENDNOTES

Where referenced, "Enerdata, 2021" refers to data provided in July 2021. 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/g20report2021

1 The '1.5°C compatible pathway' is derived from global cost-effective pathways assessed by the IPCC's SR15, selected based on sustainability criteria, and defined by the 5th-50th percentiles of the distributions of such pathways achieving the long-term temperature goal of the Paris Agreement. Negative emissions from the land sector and novel negative emissions technologies are not included in the assessed models, which consider one primary negative emission technology (BECCS). In addition to domestic 1.5°C compatible emissions pathways, the 'fair-share' emissions reduction range would almost always require a developed country to provide enough support through climate finance, or other means of implementation, to bring the total emissions reduction contribution of that country down to the required 'fair-share' level.

2 '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 LULUCF, which under the new IPCC 2006 Guidelines is integrated into Agriculture, Forestry, and Other Land Use (AFOLU).

3 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.

4 The selection of policies rated and the assessment of 1.5°C compatibility are primarily informed by the Paris Agreement and the IPCC's 2018 SR15. The table below displays the criteria used to assess a country's policy performance.

5 The 1.5°C 'fair-share' ranges for 2030 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, 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. In order to maintain comparability across all countries, this report harmonises all data with PRIMAP, 2021 dataset to 2018. However, note that Common Reporting Format (CRF) data is available for countries which have recently updated GHG inventories. Where countries submitted updated NDC targets before August 2021, these have been analysed and included.

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 4.	Low	Medium	High	Frontrunner
Renewable energy in power sector	No policies 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 targets and policies 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 policies 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 fuel-based light-duty vehicles by 2035 worldwide
Phase out fossil fuel heavy-duty vehicles	No policies	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	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
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 policies or incentives 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

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