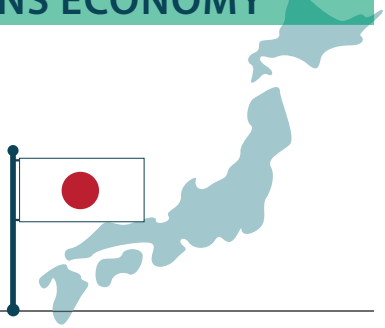
Climate Transparency

BROWN TO GREEN: 2019
THE G20 TRANSITION TOWARDS A NET-ZERO EMISSIONS ECONOMY

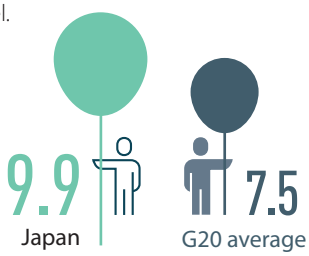
JAPAN



Japan's greenhouse gas (GHG) emissions are – per capita – well above the G20 average.

Japan's total GHG emissions (excl. land use) have decreased recently but not enough to be less than the country's 1990 level.

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



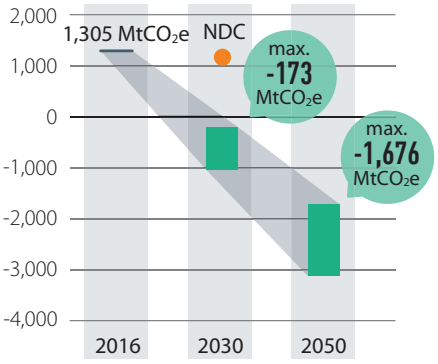
Data for 2016
Source: CAT 2019; PRIMAP 2018; World Bank 2019

Trend (2011-2016) -4% -1%

Japan is not on track for a 1.5°C world. Japan's 2030 NDC proposes to limit its emissions to 1,078 $MtCO_2e$.

According to the Climate Action Tracker, a fair-share range compatible with global 1.5°C IPCC scenarios could be achieved via strong domestic emissions reductions and could be supplemented with contributions to global emissions-reduction efforts. Japan's fair-share range is below -173 $MtCO_2e$ by 2030 and below -1,676 $MtCO_2e$ by 2050. Under current policies, Japan's emissions are projected to be between 1,082 and 1,144 $MtCO_2e$ in 2030. All figures exclude land use.

1.5°C compatible pathway[2]
($MtCO_2e$/year)



Source: CAT 2019

Recent developments[3]

Japan published a long-term strategy in 2019 that aims to reduce GHG emissions by 80% by 2050 and to become carbon-neutral as early as possible in the second half of this century.

The 2030 Strategic Energy Plan envisages the construction of new coal and nuclear plants.

Japan has reduced the unit price for its feed-in-tariff as it aims to reduce the economic costs of its renewable energy support scheme.

Key opportunities for enhancing climate ambition[3]

32% of Japan's electricity supply comes from coal

→ **Japan needs to include the phasing out of coal in its next strategic energy plan.**

#1

Japan spent US$1.8 billion on fossil fuel subsidies in 2017

→ **The country needs to phase out fossil fuel subsidies by 2030 and introduce higher carbon pricing.**

#2

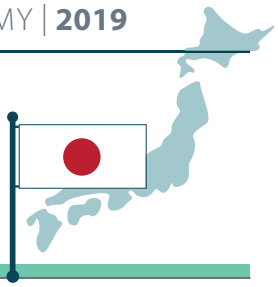
Japan remains one of the largest providers of public finance for coal overseas (US$5.2 bn per year)

→ **The country needs to phase out international finance for coal to keep global warming below 1.5°C and reduce the risk of stranded assets.**

#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*

JAPAN – SOCIO-ECONOMIC CONTEXT



Human Development Index

The Human Development Index reflects life expectancy, level of education, and per capita income. Japan ranks among the highest countries.

Data for 2017 | Source: UNDP 2018

Gross Domestic Product (GDP) per capita

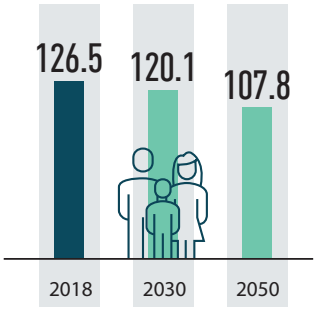
(PPP US$ const. 2018, international)

Data for 2018 | Source: World Bank 2019

Population projections

(millions)

Japan's population is expected to decrease by around 15% by 2050.



Source: World Bank 2019

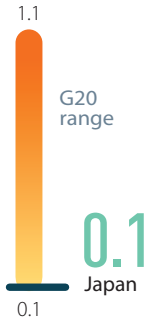
Death through ambient air pollution

(total ambient air pollution attributable deaths)

Almost 55,000 people die in Japan 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 lowest levels in the G20.

54,780
attributable deaths

Data for 2016
Source: World Health Organization 2018



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

JUST TRANSITION[3]

Prior to the Fukushima Daiichi nuclear disaster in March 2011, Japan was on course to reduce its reliance on coal and gas power generation (both imported), and was aiming at increasing the role of nuclear power.

But since the disaster, and the requirement for safety upgrades at all nuclear plants, the resulting absence of nuclear power has meant that Japan has increased its reliance on coal and gas (32% and 35% respectively in the electricity mix in 2017).

Japan submitted its first NDC in 2015 and intends to reduce reliance on coal and gas (to 26% and 27% each in electricity mix in 2030).

Japan mentioned 'just transition' in its long-term strategy, noting that "the Government, local authorities and companies will work together to provide vocational training to the workforce, support for diversification and shifts in business operations, inviting new business and support for placement of the labour force, in order to achieve the transition of the workforce to a decarbonized society smoothly and without delay". However, there is as yet no concrete plan.

Legend for all country profiles

Trends

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

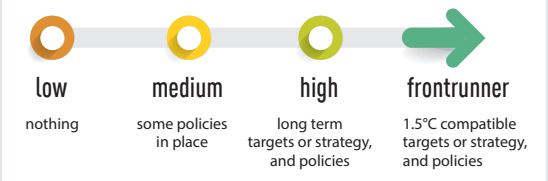
The thumbs indicate assessment from a climate protection perspective.

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.

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.



For more information see the Annex and Technical Note

MITIGATION BIG PICTURE

JAPAN

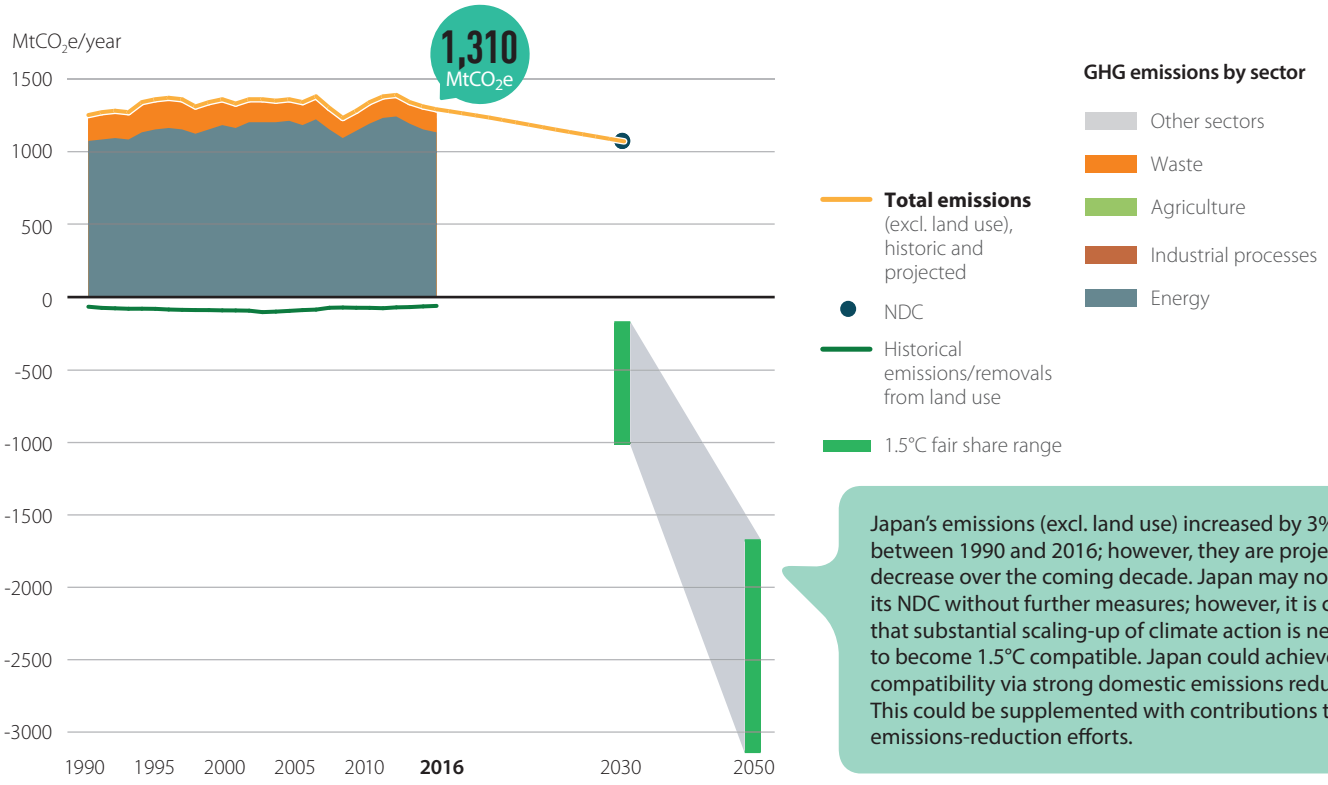
Japan's GHG emissions have increased by 3% (1990-2015) and the government's climate targets for 2030 (-26% compared to 2013) are not in line with a 1.5°C pathway.

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]



Source: PRIMAP 2018; CAT 2019

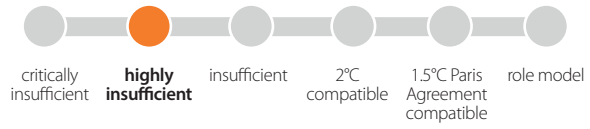
Japan's emissions (excl. land use) increased by 3% between 1990 and 2016; however, they are projected to decrease over the coming decade. Japan may not achieve its NDC without further measures; however, it is clear that substantial scaling-up of climate action is needed to become 1.5°C compatible. Japan could achieve 1.5°C compatibility via strong domestic emissions reductions. This could be supplemented with contributions to global emissions-reduction efforts.

Nationally-determined contribution (NDC): Mitigation

Targets	26.0% of emission reductions by fiscal year 2030 compared to fiscal year 2013 (25.4% reduction compared to fiscal year 2005)
Actions	Actions specified (sectors: industry, transport, energy, waste, agriculture, land use and forestry)

Source: UNFCCC, NDC of respective country

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



Source: CAT 2019

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

Status	Submitted to UNFCCC in 2019
2050 target	80% reduction by 2050 (no base year provided), 'decarbonised society' as early as possible in the second half of this century
Interim steps	–
Sectoral targets	–

Source: UNFCCC, LTS of respective country

MITIGATION ENERGY

JAPAN

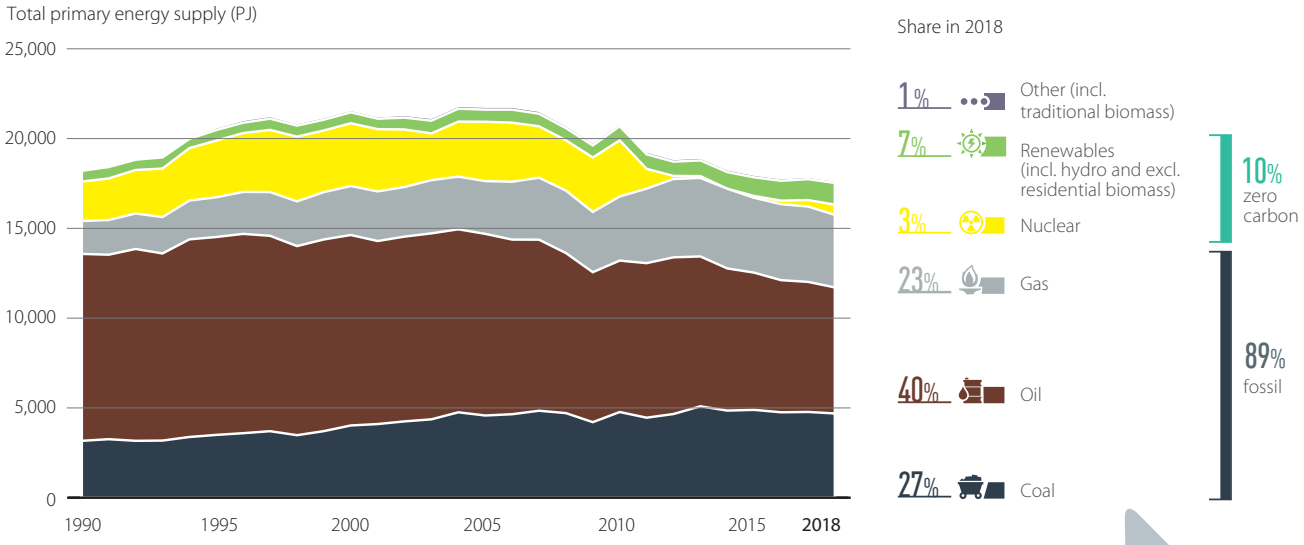
Fossil fuels still make up 89% of Japan's energy mix (including power, heat, transport fuels, etc). Renewables have increased only marginally over the last few decades.

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

1.5°C[6]

Source: IPCC SR1.5 2018

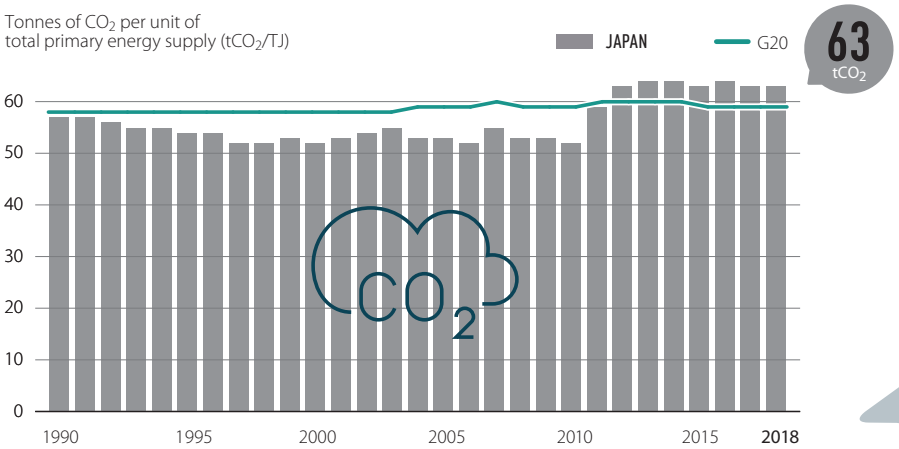
Energy mix[7]



Source: Enerdata 2019

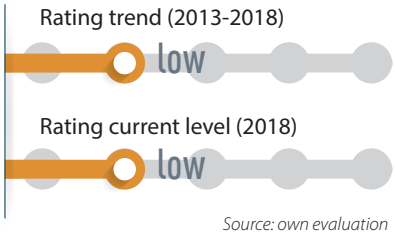
This graph shows the fuel mix for all energy supply, including energy used for electricity generation, heating, cooking, and transport fuels. Fossil fuels (oil, coal and gas) still make up 89% of the Japanese energy mix. This is above the G20 average of 82%.

Carbon intensity of the energy sector



Source: Enerdata 2019

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



Source: own evaluation

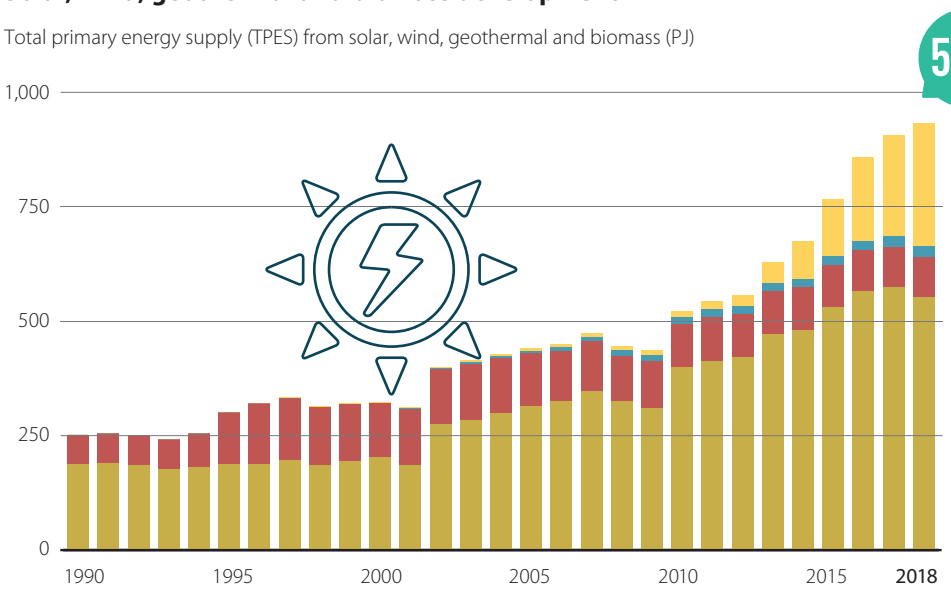
Carbon intensity shows how much CO_2 is emitted per unit of energy supply. In Japan, carbon intensity has remained almost constant at around 63 tCO_2/TJ over the last six years and is slightly above the G20 average ($59tCO_2/TJ$). This high level reflects the consistent high share of fossil fuels in the energy mix.

MITIGATION ENERGY

JAPAN

Solar, wind, geothermal and biomass development[8]

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



Source: Enerdata 2019

Share of TPES in 2018

- 1.52% Solar
- 0.14% Wind
- 0.50% Geothermal
- 3.13% Biomass, excl. traditional biomass

Solar, wind, geothermal and biomass account for 5% of Japan's energy supply – the G20 average is 6%. In the last five years, the share of these sources in total energy supply has increased by around 61%, much 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]

Source: own evaluation

Energy supply per capita

Total primary energy supply per capita (GJ/capita)

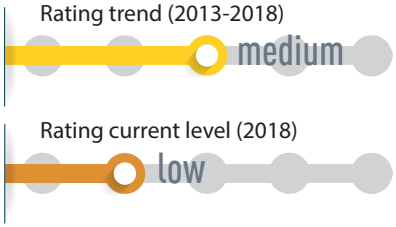
The level of energy supply per capita is closely related to economic development, climatic conditions and the price of energy.

At 140 GJ/capita, energy supply per capita in Japan is well above the G20 average (98 GJ/capita), but is decreasing (-5%, 2013-2018) in contrast to the increasing 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]



Source: own evaluation

MITIGATION ENERGY

JAPAN

While Japan's economy remains less energy intensive than the G20 average, energy supply per capita is still comparatively high and energy-related CO_2 emissions are only decreasing slightly.

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)

3.57	4.86
Japan	G20 average

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

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

This indicator quantifies how much energy is used for each unit of GDP. This is closely related to the level of industrialisation, efficiency achievements, climatic conditions or geography. Japan's energy intensity is below the G20 average and has decreased by an amount (-11%, 2013-2018) similar to the G20 average.

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

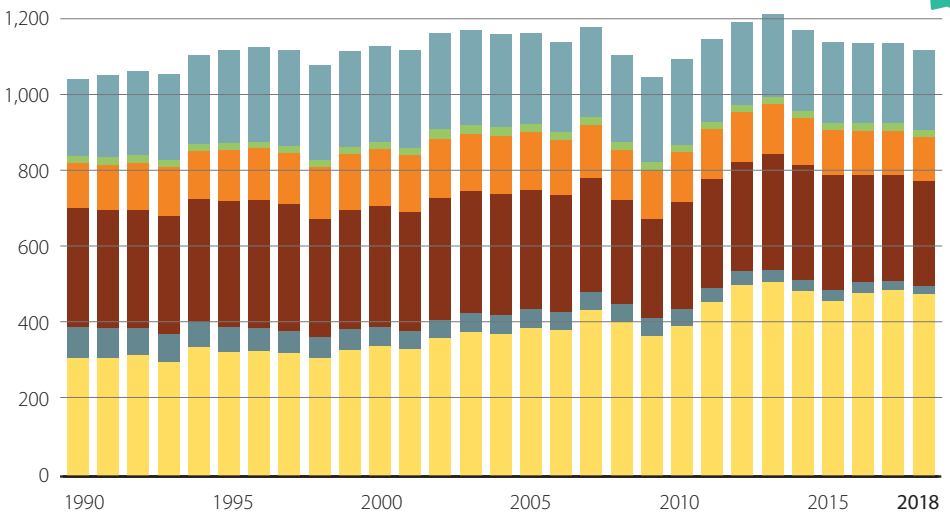
Rating trend (2013-2018): high

Rating current level (2018): medium

Source: own evaluation

Energy-related CO_2 emissions[9]

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



Share of total energy-related CO_2 emissions in 2018

- 19% Transport
- 2% Agriculture
- 10% Buildings
- 25% Industries (incl. autoproducers)
- 2% Other energy sector
- 43% Electricity and heat

Source: Enerdata 2019

The largest driver of overall GHG emissions are CO_2 emissions from fuel combustion. In Japan, they have recently started to decrease again. At 43%, the electricity sector is the largest contributor, followed by industries at 25% and transport at 19%.

MITIGATION POWER SECTOR

JAPAN

! Japan still produces 32% of its electricity from coal and plans to add a further 6.6 GW of coal capacity. This is not compatible with a 1.5°C pathway, as coal will have to be phased out soon.

Share in energy-related CO_2 emissions

43%

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]

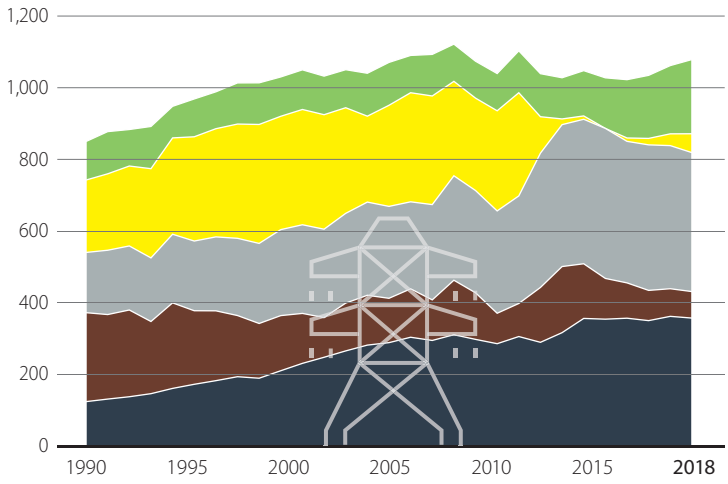
1.5°C[6]

Source: IPCC SR1.5 2018; Climate Analytics 2016; Climate Analytics 2019

STATUS OF DECARBONISATION

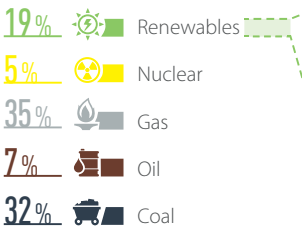
Power mix

Gross power generation (TWh)

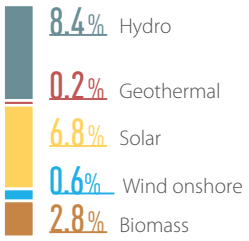


Source: Enerdata 2019

Shares in 2018



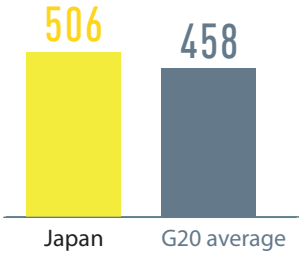
Renewables shares



Japan is increasingly producing energy from renewable sources, which now make up 19% of the electricity mix – the G20 average is 25%. The main renewable sources are hydro and solar power. They have mostly replaced nuclear power. Power generation from fossil fuels has increased considerably (now 74%).

Emissions intensity of the power sector

(gCO_2/kWh)



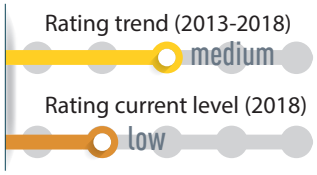
Data for 2018 | Source: Enerdata 2019

Trend (2013-2018)

-8% Japan

-11% G20 average

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

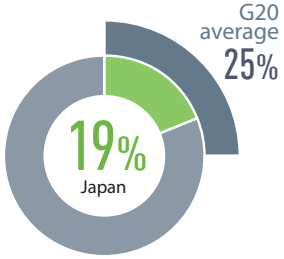


Source: own evaluation

For each kilowatt hour of electricity, 506gCO_2 are emitted in Japan. This is above the G20 average. Emission intensity has dropped by 8% in the past five years, reflecting the increasing share of renewables.

Share of renewables in power generation

(incl. large hydro)



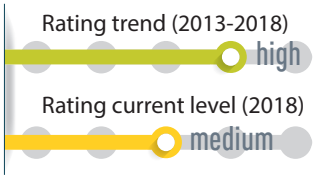
Data for 2018 | Source: Enerdata 2019

Trend (2013-2018)

+54% Japan

+20% G20 average

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



Source: own evaluation

MITIGATION POWER SECTOR

JAPAN

POLICIES[5]

Renewable energy in the power sector

Japan aims to increase the share of renewables in the electricity mix to 22-24% by 2030 (from 15% in 2016). According to Japan's new long-term strategy, renewables will become "a stable main power source", although the government has not set a 2050 target.

Source: own evaluation

Coal phase-out in the power sector

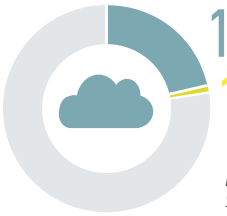
In 2015, Japan set a goal of reducing its share of coal power in the electricity mix to 26% (from 32% in 2016) and to phase out inefficient coal power plants. However, 8.7 GW of coal capacity is currently under construction and Japan has plans to add a further 6.6 GW.

Source: own evaluation

MITIGATION TRANSPORT SECTOR

In Japan, 63% of passenger transport is by private car, and 87% of freight transport is by road. The sector is still dominated by fossil fuels, and electric vehicles make up only 1% of car sales. While some policies have been implemented for reducing fossil fuel use, modal shift policies are generally non-existent.

Share in energy-related CO_2 emissions



Data for 2018 | Source: Enerdata 2019

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

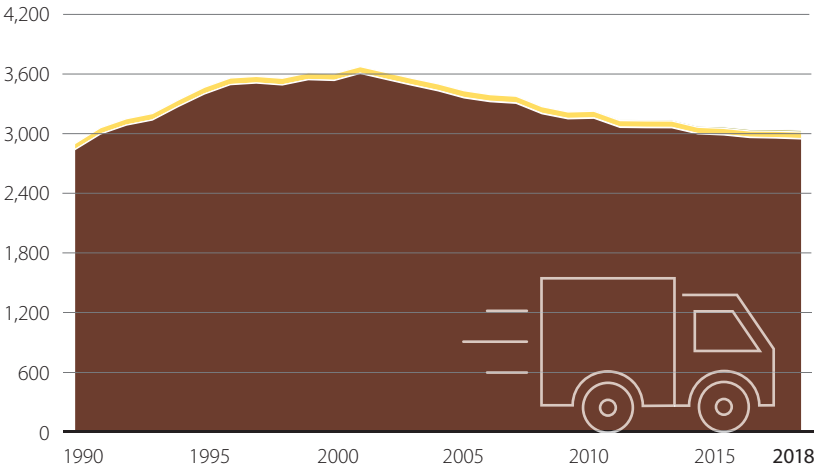
1.5°C[6]

Source: IPCC SR1.5 2018

STATUS OF DECARBONISATION

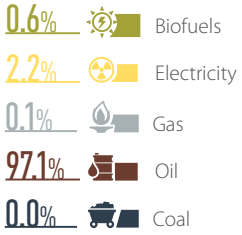
Transport energy mix

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



Electricity and biofuels make up only 3% of the energy mix in transport.

Share in 2018



Source: Enerdata 2019

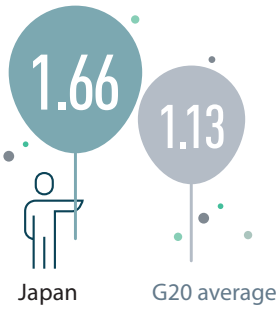
MITIGATION TRANSPORT SECTOR

JAPAN

STATUS OF DECARBONISATION (continued)

Transport emissions per capita[10]

(tCO_2/capita, excl. aviation emissions)



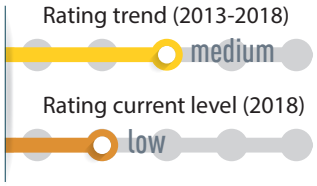
Data for 2018
Source: Enerdata 2019; World Bank 2019

Trend (2013-2018)

-3% Japan

+5% G20 average

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



Source: own evaluation

Aviation emissions per capita[11]

(tCO_2/capita)

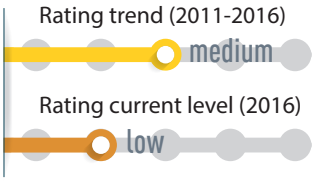
Data for 2016
Source: Enerdata 2019; IEA 2018

Trend (2011-2016)

+4% Japan

+10% G20 average

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



Source: own evaluation

Motorisation rate

(vehicles per 1,000 inhabitants)

719

Data for 2016 | Source: Agora 2018

Market share of electric vehicles in new car sales

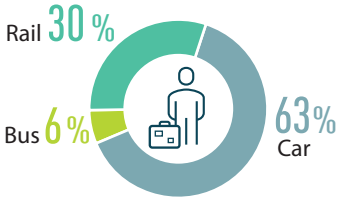
(%)

1.1%

Data for 2018 | Source: IEA 2019

Passenger transport

(modal split in % of passenger km)



Data for 2009 | Source: Agora 2018

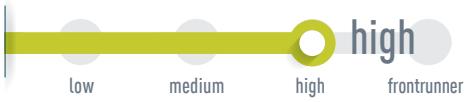
Freight transport

(modal split in % of tonne-km)

Data for 2015 | Source: Agora 2018

POLICIES[5]

Phase out fossil fuel cars



In 2018, the Japanese government announced that by 2050 all cars sold would be electrified (no fossil fuel cars by 2035 would be 1.5°C compatible). The country aims to have electric vehicles account for 20-30% of car sales by 2030. Japan has a fuel efficiency labelling system, and tax breaks and subsidies for low-carbon vehicles.

Source: own evaluation

Phase out fossil fuel heavy-duty vehicles

Japan has no strategy for reducing absolute emissions from freight transport. In March 2019, the government tightened the fuel efficiency standards, requiring manufacturers to enhance efficiency by approximately 13.4% for heavy duty vehicles and 14.3% for buses, compared to the 2015 standards, by 2025.

Source: own evaluation

Modal shift in (ground) transport

Japan states in its long-term strategy that it will facilitate the modal shift from car transport to coastal shipping or rail transport in order to reduce CO_2 emissions and countermeasure labour shortages in the logistics.

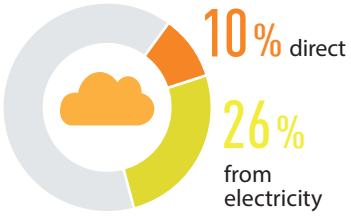
Source: own evaluation

MITIGATION BUILDINGS SECTOR

JAPAN

Japan's building emissions –including heating, cooking and electricity use – make up over a third of total CO_2 emissions. Per capita, building-related emissions are more than double the G20 average. To get on a 1.5°C track, all new buildings need to be near-zero energy, and renovation rates need to increase.

Share in energy-related CO_2 emissions



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)

-5.9% +1%

Trend (2013-2018)

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

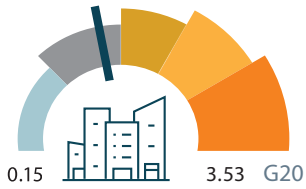
Residential buildings: energy use per m²
(GJ)

0.34 GJ

Data: year different per country | Source: ACEEE 2018

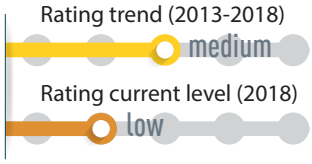
Commercial and public buildings: energy use per m²
(GJ)

1.62 GJ



Data: year different per country | Source: ACEEE 2018

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



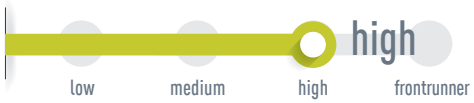
Source: own evaluation

Building-related emissions per capita are more than double the G20 average, reflecting the large floor space per person. In contrast to the G20 average, Japan has reduced this level by 6% (2013-2018).

Building emissions are largely driven by how much energy is used in heating, cooling, lighting, household appliances, etc. In Japan, energy use per m² is in the lower range of the G20 countries for residential building and in the middle one for commercial and public ones.

POLICIES[5]

Near-zero energy new buildings



Japan's 2014 Strategic Energy Plan aims to achieve net-zero energy buildings by 2020 for new non-residential buildings and by 2030 for new public buildings nationwide. For residential buildings, Japan aims to achieve net-zero energy houses for all newly constructed houses on average by 2030 (2020 for all new buildings would be 1.5°C compatible). Grants and subsidies support implementation.

Source: own evaluation

Renovation of existing buildings

Japan's long-term strategy states that existing buildings will be renovated and rebuilt to improve energy efficiency. However, the government has not set quantitative targets. Low-interest loans and rebates are available for construction and retrofit costs for buildings.

Source: own evaluation

MITIGATION INDUSTRY SECTOR

JAPAN

Industry-related emissions make up 40% of CO_2 emissions in Japan. Although the Japanese industry sector is already comparatively energy efficient, emissions need to be significantly reduced to stay within the 1.5°C limit.

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

Data for 2018 | Source: Enerdata 2019

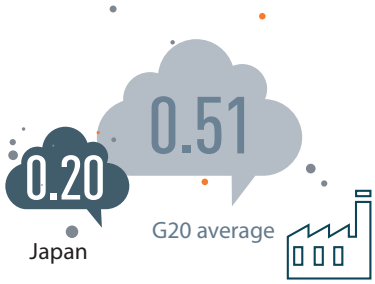
Global industrial CO_2 emissions need to be reduced by 65–90% from 2010 levels by 2050.

1.5°C[6]

Source: IPCC SR1.5 2018

STATUS OF DECARBONISATION

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

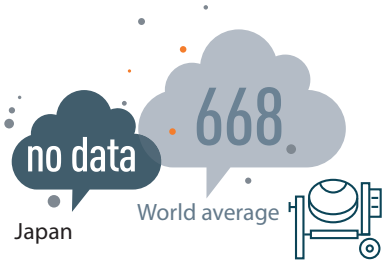


Data for 2016 | Source: Enerdata 2019; PRIMAP 2018; World Bank 2019

-5.3% -10.2%

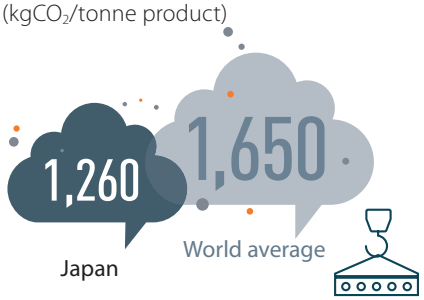
Trend (2011-2016)

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



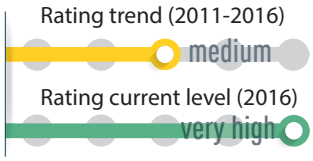
Data for 2015 | Source: CAT 2019

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



Data for 2015 | Source: CAT 2019

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



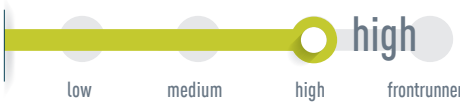
Source: own evaluation

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

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

POLICIES[5]

Energy efficiency



According to the International Energy Agency (IEA), Japan's mandatory energy efficiency policies covered 26-50% of industrial energy use in 2017. However, the Act on the Rational Use of Energy (revised in 2018) covers 90% of industrial use of energy. The Act established energy efficiency benchmarks for industry for sub-sectors such as iron and steel, cement, and electricity supply. Companies covered by the scheme must take measures for energy efficiency and report their energy use annually.

Source: own evaluation

MITIGATION LAND USE

JAPAN

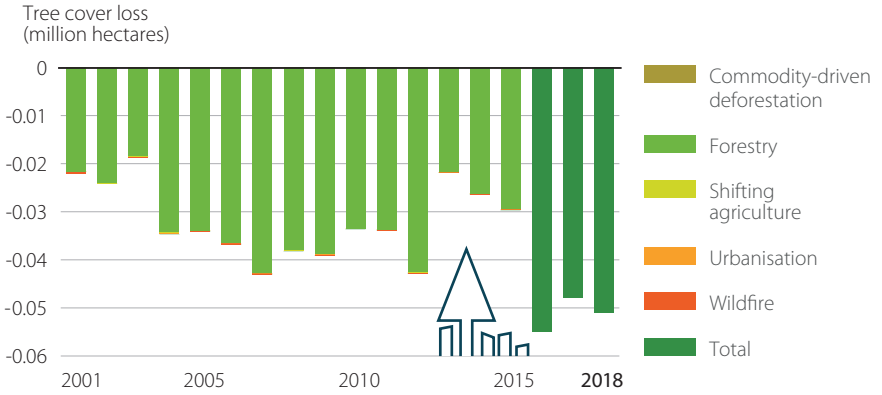
In order to stay within the 1.5°C limit, Japan needs to make the land use and forest sector a net sink of emissions.

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]



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

Japan has a mandatory reporting system of reforestation after harvesting. It has announced that a Forest Environmental Tax will be introduced from 2024. The tax revenue will be used for forest management to help achieve Japan's NDC. The NDC aims at removals by forest carbon sinks of approximately 27.8 million t-CO_2 by 2030.

Source: own evaluation

From 2001 to 2018, Japan lost 663kha of tree cover, equivalent to a **2.5% reduction since 2000**. This does not take tree-cover gain into account.

MITIGATION AGRICULTURE

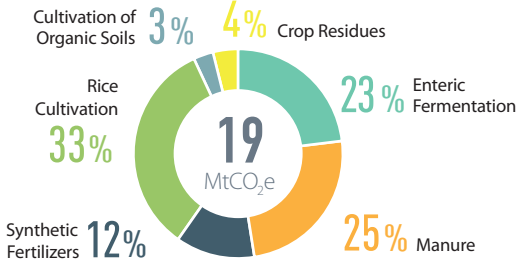
Japan's agricultural emissions are mainly from rice cultivation, digestive processes in animals, and livestock manure. A 1.5°C pathway requires carbon storage in cropland soil as well as the application of organic matter such as compost and green manure on to the soil.

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)



Data for 2016 | Source: FAOSTAT 2019

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

ADAPTATION

JAPAN

- → **Japan is vulnerable to climate change and adaptation actions are needed.**
- → **On average, 79 fatalities and losses amounting to US$2.7 billion occur yearly due to extreme weather events.**
- → **With global warming, society and its supporting sectors are increasingly exposed to severe climate events, such as a reduction in crop duration for rice.**

ADAPTATION POLICIES

Nationally-determined contribution: Adaptation

Targets	Not mentioned
Actions	Not mentioned

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 Plan for Adaptation to the Impacts of Climate Change	2015	x		x	x	x	x	x	x	x	x	x	x	x	Revision planned every 5 years

Source: own research

JAPAN

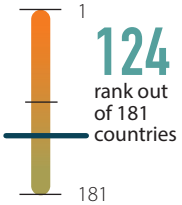
ADAPTATION NEEDS

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	Annual average losses (PPP US$ mn)	Per unit GDP (%)
79	0.1	2,738	0.1



Source: Germanwatch 2018

Japan has already been struck by extreme weather events such as storms, floods, landslides, heat waves, typhoons and droughts. In July 2018, Japan was hit by torrential rains unleashing floods and landslides, killing around 200 people. As highlighted by the numbers from the Climate Risk Index, such extreme weather events result in fatalities and economic losses. Climate change is expected to worsen the intensity, frequency and impacts of such events.

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

			1.5°C	2°C	3°C
Water	% of area with increase in water scarcity				
	% of time in drought conditions				
Heat & Health	Heatwave frequency				
	Days above 35°C				
Agriculture	Rice	Reduction in crop duration			
		Reduction in rainfall			

Source: own research

Source: Based on Arnell et al 2019

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

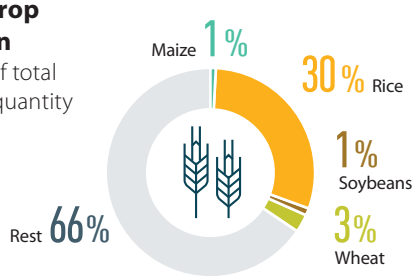
Impact ranking scale

- 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)



Rice represents the largest proportion of crop production out of the four crops analysed (maize, rice, soybeans, wheat). Rice is affected by a drastic reduction in crop duration and a reduction in rainfall.

Data for 2017 | Source: FAOSTAT 2019

FINANCE

JAPAN

Japan spent US$1.8 billion on fossil fuel subsidies in 2017, mainly on petroleum and natural gas, but has generated over US$2 billion revenues through explicit carbon pricing.

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	Not applicable
Investment needs	Not specified
Actions	Not mentioned
International market mechanisms	Accumulated emission reductions or removals by 2030 through markets to be undertaken within the government's annual budget are estimated to be ranging from 50 to 100 million t-CO_2

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

Japan has no overarching national framework for green finance. However, in 2017 a study group on long-term investment evaluating environmental, social and governance (ESG) factors and intangible assets in sustainable growth, produced guidance for companies and investors aimed at driving corporate disclosure. In 2004 an Environmental Rating Loan programme was established by the Development Bank of Japan providing preferential interest rates by evaluating a company's environmental management, while in 2007 Japan began subsidising interest payments on environmental-rating loans. In 2010 sectors and requirements for liquidity support were identified, including those relating to green sectors. In December 2018, the Japanese Ministry of Economy, Trade and Industry (METI) declared its support for the TCFD recommendations, although the timeline for implementing them is not yet clear.

FINANCE

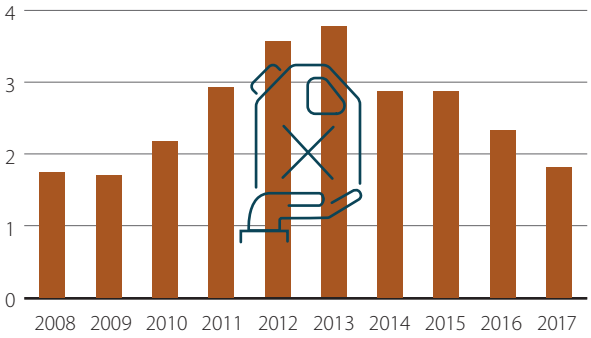
JAPAN

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.

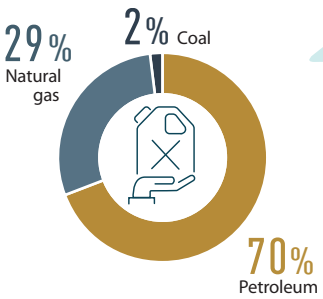
Fossil fuel subsidies

US$ billions



Source: OECD-IEA 2019

Subsidies by fuel type

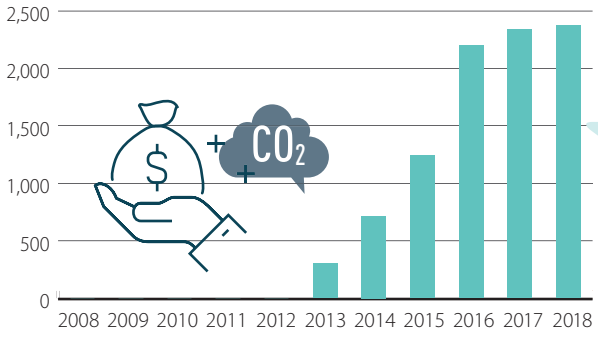


Data for 2017 | Source: OECD-IEA 2019

In 2017, Japan's fossil fuel subsidies totalled US$1.8bn (compared to US$1.8bn in 2008, and the last decade's peak of US$3.8bn in 2013). Of the subsidies quantified, 99% were for consumption of fossil fuels. The highest amount of subsidies were for petroleum, at US$1.3bn, followed by natural gas at US$0.5bn. The largest subsidy was for oil stockpiling by the government in case of a major oil supply disruption (US$3.8bn).

Carbon revenues

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

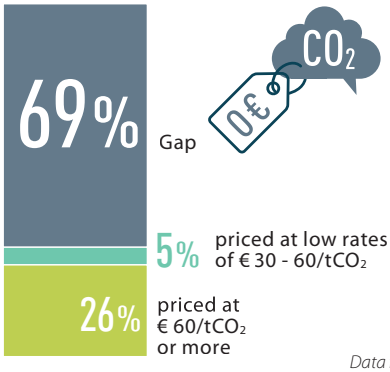


Source: I4CE 2019

Japan's 2012 national carbon tax covered 68% of domestic emissions and generated US$2.4bn in 2018. Japan's 2010-11 subnational emissions trading schemes (it is considering a national scheme) do not have complete revenue estimates. Emissions for these schemes are priced at US$6/t$CO_2$ (in 2019).

Carbon pricing gap[15]

% of energy-related CO_2 emissions



Data for 2015 | Source: OECD 2018

Only 31% of Japan's CO_2 emissions are priced at EUR30 or higher (the low-end benchmark), creating a carbon pricing gap of 69%. This gap is slightly smaller 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

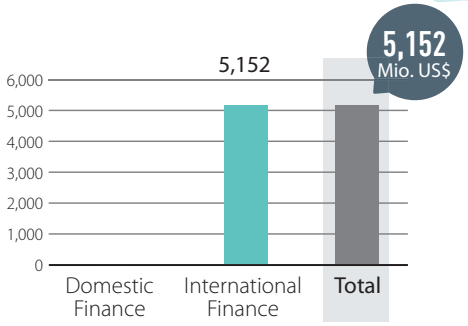
JAPAN

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$)



Between 2016 and 2017, Japan's public finance institutions provided $5.2 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 and Viet Nam.

- 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	Japan is part of the OECD Agreement for export credit agencies to restrict coal financing.

X yes – no not applicable

Source: own research

Provision of international public support[18]

Japan's total climate finance contribution was the largest among the G20 countries in absolute value. It is also the highest contributor of bilateral climate finance relative to GDP. Compared to the 2013/14 period, its bilateral and multilateral climate flows increased in 2015/16, while core and general contributions to the multilateral development banks decreased slightly. Most funding is delivered through bilateral channels, including the Japanese Bank for International Cooperation (JBIC) and JICA, which is heavily concentrated towards mitigation. At the Green Climate Fund pledging meeting for its replenishment in 2019, Japan announced it will match its previous contribution of US$1.5 billion.

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
9,767.9	89%	8%	3%	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			
	Mitigation	Adaptation	Cross-cutting	Other
155.3	14%	1%	85%	0%

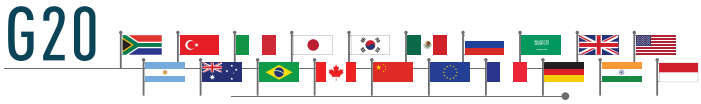
Source: Country reporting to UNFCCC

Core/General Contributions

Annual average contribution (mn US$, 2015-2016)
2,165.3

Source: Country reporting to UNFCCC

ENDNOTES



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

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

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

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

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

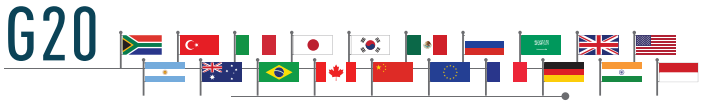
3) See the Brown to Green 2019 Technical Note for the sources used for this assessment.

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)



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

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