JAPAN

Climate Transparency

CLIMATE TRANSPARENCY REPORT COMPARING G20 CLIMATE ACTION AND RESPONSES TO THE COVID-19 CRISIS
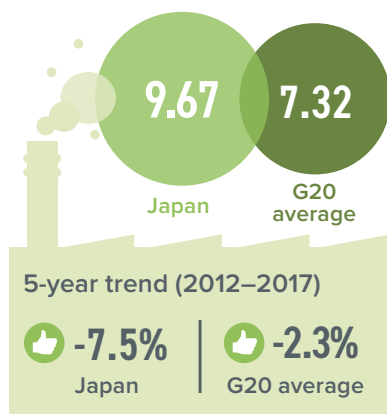
This country profile is part of the **Climate Transparency Report 2020**. Find the full report and other G20 country profiles at: www.climate-transparency.org

PER CAPITA GREENHOUSE GAS (GHG) EMISSIONS ABOVE G20 AVERAGE

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

Japan's per capita greenhouse gas (GHG) emissions are decreasing, but are still well above the G20 average.

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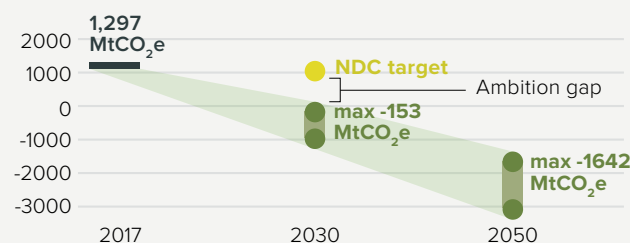
9.67 Japan

7.32 G20 average

5-year trend (2012–2017)

👍 **-7.5%** Japan

👍 **-2.3%** G20 average

NOT ON TRACK FOR A 1.5°C WORLD

1.5°C

Japan's 2030 NDC proposes to limit its emissions to 1,078 MtCO$_2$e. Japan's 'fair-share' range for emissions (excl. land use) is below -153 MtCO$_2$e by 2030 and below -1,642 MtCO$_2$e by 2050. Achieving necessitates strong domestic emissions reduction and significant contributions to global emissions-reduction efforts. Under current policies, Japan's emissions are projected to be at or below the NDC level in 2030. All figures exclude land use emissions and are based on pre-COVID-19 projections.

Japan 1.5°C 'fair-share' pathway (MtCO$_2$e/year)[1&2]

1,297 MtCO$_2$e

NDC target — Ambition gap

max -153 MtCO$_2$e

max -1642 MtCO$_2$e

Source: Climate Action Tracker, 2020

KEY OPPORTUNITIES FOR ENHANCING CLIMATE AMBITION

SET FIRM EMISSIONS TARGETS

Japan submitted its long-term strategy reiterating its 2050 target of reducing GHG emissions by 80% and aiming to achieve net-zero emissions "as early as possible during the second half of the 21st century". Japan needs to set firm targets for net-zero emissions in line with the Paris Agreement by building a decarbonised economy.

REVIEW COUNTER-MEASURES

Reviews on the Plan for Global Warming Countermeasures and the Strategic Energy Plan, both of which are cornerstones for Japan's NDC, have begun. The review should re-consider the assumptions of GDP outlook, economic activities and technological development on which the current NDC is based, and increase its NDC's ambition target prior to a level consistent with the Paris Agreement.

INVEST MORE IN RENEWABLE SECTOR

Although 33% of Japan's power supply is supplied by coal, generation by renewables is increasing with offshore wind and green hydrogen production gathering momentum. Phasing out coal by 2030 would decrease air pollution and import dependency.

RECENT DEVELOPMENTS

👍 On October 26th 2020, PM Suga stated Japan's intention to aim for net zero greenhouse gas emissions by 2050, revise its policy on coal-fired power plants and promote research and development on carbon recycling and second-generation solar photovoltaic technologies.

👎 In March 2020, Japan re-affirmed its previous NDC target of reduction of 26% (from 2013 levels) by 2030, against expectations to submit a more ambitious target. This old target has been assessed by CAT as "highly insufficient" with regard to limiting global warming to 1.5C°.

👍 The Ministry of Economy, Trade and Industry launched a process to review rules on the use of power transmission lines to accelerate the deployment of renewable power generation. Current rules disadvantage solar and wind power suppliers in contrast to nuclear and coal-fired power electricity generation.

References: Nacpil and Wong, 2020; End Coal, 2020; Tamura and Kuriyama, 2020
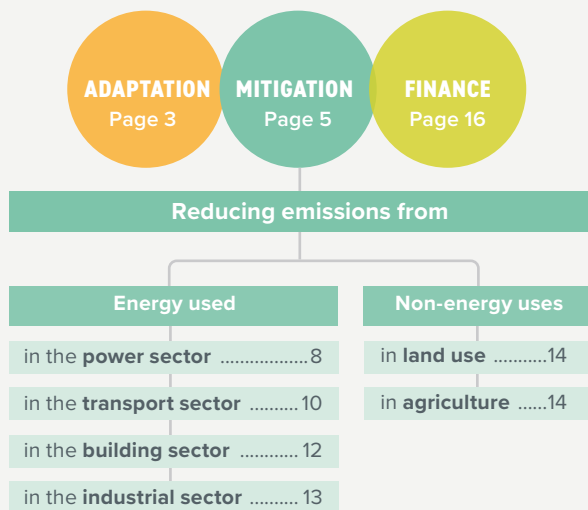
⚙ CORONAVIRUS RECOVERY

On 7 April 2020, the Japanese government announced a JPY 39.5tn (USD 375billion) COVID-19 emergency response package which included the promotion of decarbonisation transformation, while pushing forward the digitalisation of the economy. However, the concrete measures for decarbonisation were limited in terms of scope and budget size. Such measures included JPY 5bn (USD 47million) support for companies reshoring their supply chains to introduce self-consumption renewable energy in Japan, and JPY 1bn (USD 9.5million) for decarbonised and resilient logistics through the promotion of renewable energy and electric vehicles.

References: Nukina, 2020; Cabinet Office, 2020

CONTENTS

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

ADAPTATION Page 3

MITIGATION Page 5

FINANCE Page 16

Reducing emissions from

Energy used

in the **power sector** 8

in the **transport sector** 10

in the **building sector** 12

in the **industrial sector** 13

Non-energy uses

in **land use** 14
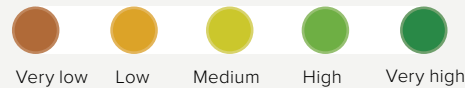
in **agriculture** 14

LEGEND

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

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

Very low Low Medium High Very high

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

Low Medium High Frontrunner

SOCIO-ECONOMIC CONTEXT

Human Development Index

The Human Development Index reflects life expectancy, level of education, and per capita income. Japan ranks very high.
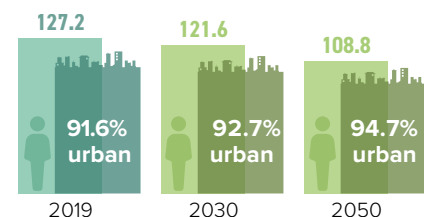
Very high
High
Medium
Low

VERY HIGH
0.915

Data for 2018. Source: UNDP, 2019

Population and urbanisation projections
(in millions)

Japan's population is expected to decrease by about 14% by 2050 and still become more urbanised.

127.2 91.6% urban 2019

121.6 92.7% urban 2030

108.8 94.7% urban 2050

Sources: The World Bank, 2019; United Nations, 2018

Gross Domestic Product (GDP) per capita
(PPP constant 2015 international $)

44,038 JAPAN

22,230 G20 AVERAGE

Data for 2019. Source: The World Bank, 2020

Death rate attributable to air pollution

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

0.1 JAPAN

0.1–1.1 G20 RANGE

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 deaths per year

Data for 2016. Source: WHO, 2018

JUST TRANSITION

NEED PLAN TO PHASE OUT COAL

The government has increased its reliance on coal and gas since the Fukushima nuclear disaster in 2011. The government needs to redirect fossil fuel subsidies towards the development of renewable energy and employment transition. In July 2020 there was 48 GW operating coal capacity in Japan and another 9 GW in the pipeline. Japan is one of few OECD countries still expanding coal for power generation. **In its long-term strategy the government has said it will provide vocational training to the workforce, support for diversification and shifts in business operations to achieve the transition of the workforce to a decarbonised society. However, there is as yet no concrete plan linked to a coal phase-out.**

References: The Long-term Strategy under the Paris Agreement, 2019; End Coal, 2020; Shearer 2020.

1. ADAPTATION
ADDRESSING AND REDUCING VULNERABILITY TO CLIMATE CHANGE

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

VULNERABLE TO CLIMATE CHANGE
Japan is vulnerable to climate change and **adaptation actions are needed.**

HIGH COST OF EXTREME WEATHER
On average, 139 fatalities and almost USD 4bn losses occur yearly due to extreme weather events.

SEVERE IMPACTS ON AGRICULTURE SECTOR
With global warming, society and its supporting sectors are increasingly exposed to severe impacts such as heatwaves, and reduction in rainfall and crop duration in the agricultural sector.

ADAPTATION NEEDS

Climate Risk Index

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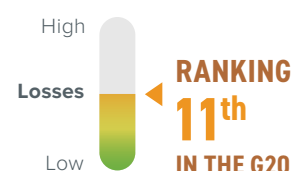
Annual weather-related fatalities

139 DEATHS
0.11 PER 100,000 INHABITANTS

High
Death rate
Low
RANKING 10th IN THE G20

Source: Based on Germanwatch, 2020

Annual average losses (USD mn PPP)

$4,018
0.09 PER UNIT GDP (%)

High
Losses
Low
RANKING 11th IN THE G20

Source: Based on Germanwatch, 2020

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	Very low	Very low	Very low
		% of time in drought conditions	Low	Low	Medium
HEAT AND HEALTH		Heatwave frequency	Very low	Low	High
		Days above 35°C	Very low	Low	Low
AGRICULTURE	**RICE**	Reduction in crop duration	Low	High	Very high
		Reduction in rainfall	Medium	Medium	Medium

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

Note: These indicators are national scale results, weighted by area and based on global data sets. They are designed to allow comparison between regions and countries and therefore entail simplifications. They do not reflect local impacts within the country. Please see technical note for further information.
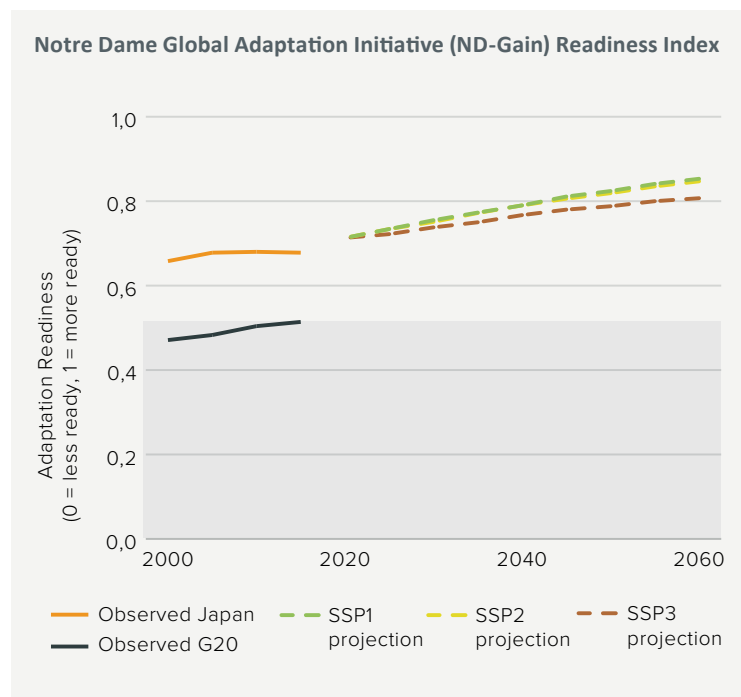
CORONAVIRUS RECOVERY The emergency response package will support Japanese industry to build more resilient supply chains against external shocks like pandemics, through reshoring and diversification of production bases. Though the response package does not explicitly include climate change impacts as external shocks to supply chains, this measure can contribute to the establishment of more climate-resilient supply chains.

Reference: Cabinet Office, 2020

Adaptation readiness

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

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

Adaptation Readiness (0 = less ready, 1 = more ready)

Legend:
— Observed Japan
— Observed G20
-- SSP1 projection
-- SSP2 projection
-- SSP3 projection

Japan exhibits a high average readiness and is well above the G20 average trend from 2000 to 2015. As Japan's governance structures and adaptation readiness are very advanced it makes little difference whether it follows an SSP1 or SSP2 compatible projection. Other socio-economic development, as represented by SSP3, represents a slower rate of adaptation readiness improvement.

The readiness component of the Index created by the ND-GAIN encompasses social (social inequality, ICT 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 solid lines are described as a sustainable development-compatible scenario (SSP1), a middle-of-the-road (SSP2) and a 'Regional Rivalry' (SSP3) scenario.

Source: Andrijevic et al., 2020

ADAPTATION POLICIES

National Adaptation Strategies

Document name	Publication year	Fields of action (sectors)													M&E process
		Agriculture	Biodiversity	Coastal areas and fishing	Education and research	Energy and industry	Finance and insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	
National Plan for Adaptation to the Impacts of Climate Change	2015	●	●	●	●	●	●	●	●	●	●	●	●	●	Revision planned every 5 years

Nationally Determined Contribution (NDC): Adaptation

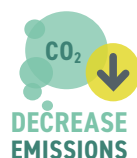| Targets	Actions
Not mentioned	Not mentioned

2. MITIGATION
REDUCING EMISSIONS TO LIMIT GLOBAL TEMPERATURE INCREASE

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

EMISSIONS OVERVIEW

CO₂ DECREASE EMISSIONS

Japan's GHG emissions have been decreasing since 2013, but its **emissions in 2017 are only 3% lower than 1990 levels,** and the government's climate targets for 2030 (-26% compared to 2013) are not in line with a 1.5°C pathway.

Source: Climate Action Tracker, 2020

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.

Source: Rogelj et al., 2018

GHG emissions across sectors and CAT 1.5°C 'fair-share' range (MtCO₂e/year)

Total GHG emissions across sectors (MtCO₂e/year)

1,297 MtCO₂e

Legend:
- Energy
- Industrial processes
- Agriculture
- Waste
- Other
- Total emissions (excl. land use), historic and projected
- Historical emissions/removals from land use
- NDC target
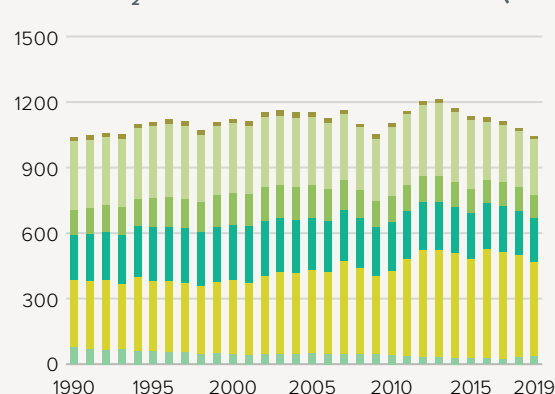- 1.5°C 'Fair-share' range

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

Japan's emissions have decreased by 3% since 1990. However, they have declined from 2013-2018 by 12%. Japan is on track to achieve its NDC with current policy measures; however, its NDC is highly insufficient with regard to keeping global warming within 1.5°C. Japan could achieve 1.5°C 'fair-share' compatibility via strong domestic emissions reductions. This could be supplemented with contributions to global emissions-reduction efforts.
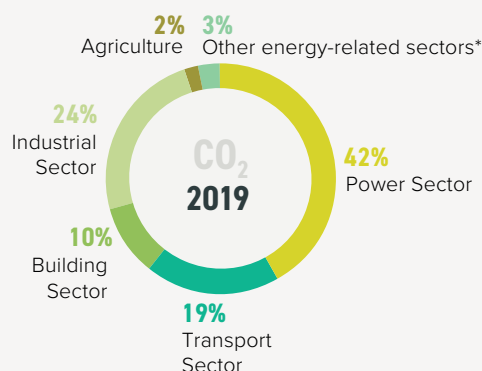
Reference: Kuriyama, Tamura and Kuramochi, 2019

Energy-related CO₂ emissions by sector

Annual CO₂ emissions from fuel combustion (MtCO₂/year)

CO₂ 2019
- 2% Agriculture
- 3% Other energy-related sectors*
- 42% Power Sector
- 19% Transport Sector
- 10% Building Sector
- 24% Industrial Sector

The largest driver of overall GHG emissions are CO₂ emissions from fuel combustion. In Japan, they have been decreasing since 2013. At 42%, the electricity sector is the largest contributor, followed by industries at 24% and transport at 19%.

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

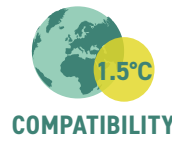*Source: Enerdata, 2020*

☀ CORONAVIRUS RECOVERY   The government is providing JPY 5bn (USD 47m) support to companies that 're-shore' their supply chains and use renewables to become energy self-sufficient, and a further JPY 1bn (USD 9.5m) support for decarbonised and resilient logistics. Support for accelerating the digitalisation of the economy provides opportunities for improving the efficiency of the entire society and economy, thereby reducing energy consumption and GHG emissions.

ENERGY OVERVIEW

87%
OF JAPAN'S ENERGY MIX IS FOSSIL FUELS

Fossil fuels still make up 87% of Japan's energy mix (counting power, heat, transport fuels, etc), which is more than the G20 average of 82%. While the share of renewable energy has almost doubled over the last decade, the carbon intensity of the energy mix has increased over this period, but has been falling in the last five years.
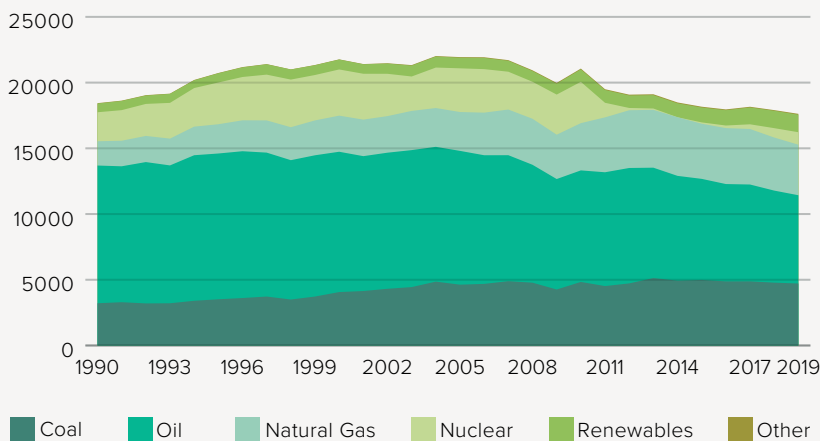*Source: Enerdata, 2020*

1.5°C COMPATIBILITY

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

Source: Rogelj et al., 2018

Energy Mix

Total primary energy supply (PJ)

Coal   Oil   Natural Gas   Nuclear   Renewables   Other

2019

- **22%** Natural gas
- **5%** Nuclear
- **13%** Low carbon
- **8%** Renewables (incl. Hydro)
- **27%** Coal
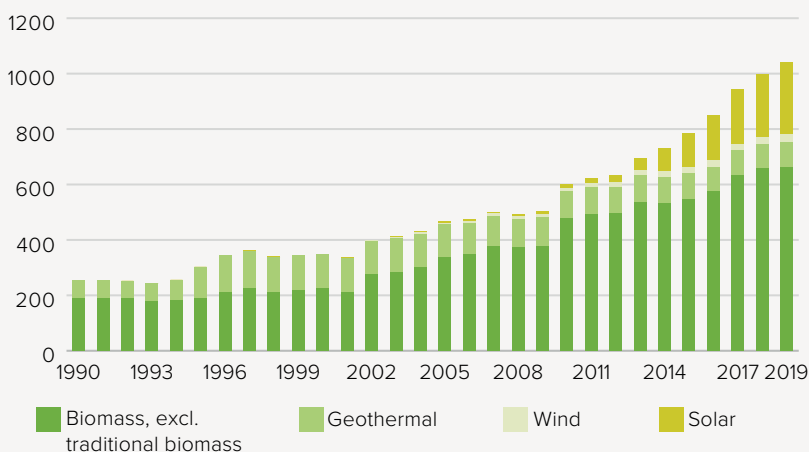- **87%** Fossil fuels
- **38%** Oil

Source: Enerdata, 2020

Due to rounding, some graphs may sum to slightly above or below 100%.
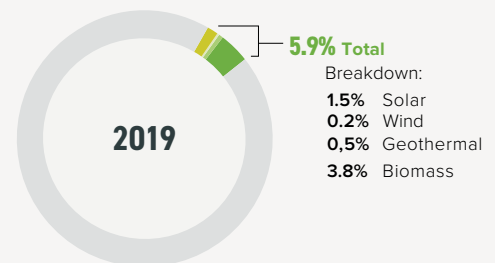
This graph shows the fuel mix for all energy supply, including energy used not only for electricity generation, heating, cooking, but also for transport fuels. Fossil fuels (oil, coal and gas) still make up 87% of Japan's energy mix, which is higher than the G20 average of 82%. The share of renewables in the energy mix increased to 8%.

Solar, Wind, Geothermal, and Biomass Development

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

Biomass, excl. traditional biomass   Geothermal   Wind   Solar

Solar, wind, geothermal and biomass account for 5.9% of Japan's energy supply

2019

5.9% Total
Breakdown:
1.5% Solar
0.2% Wind
0,5% Geothermal
3.8% Biomass

Source: Enerdata, 2020

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

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

5-year trend (2014-2019):   Medium
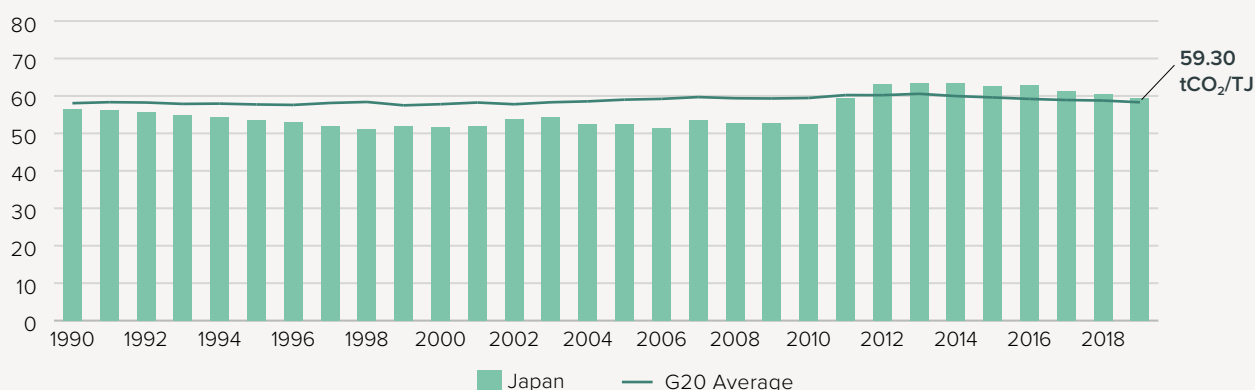
Current year (2019):   Medium

Source: own evaluation

Solar, wind, geothermal and biomass account for 5.9% of Japan's energy supply – the G20 average is 6.4%. In the last five years (2014-2019), the share of these sources in total energy supply has increased by around 51%, much more than the G20 average (28%). Modern bioenergy (for electricity, biofuels for transportation and heat) makes up the largest share, but solar is increasing fastest, with supply more than tripling over the last five years.

Carbon Intensity of the Energy Sector

Tonnes of CO$_2$ per unit of total primary energy supply (tCO$_2$/TJ)

59.30 tCO$_2$/TJ

Japan   G20 Average

Source: Enerdata, 2020

Source: Enerdata, 2020

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

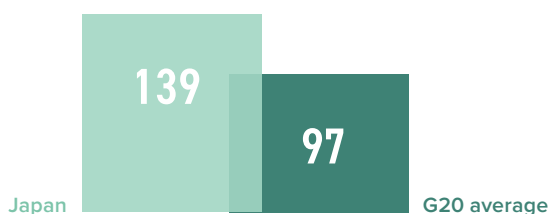5-year trend (2014-2019):   **High**

Current year (2019):   **Medium**

Carbon intensity shows how much CO$_2$ is emitted per unit of energy supply. In Japan, carbon intensity has slightly declined since peaking at around 63 tCO$_2$/TJ in 2014 and with 59 tCO$_2$/TJ is slightly above the G20 average (58 tCO$_2$/TJ). This high level reflects the consistent high share of fossil fuels in the energy mix.

Source: own evaluation

Energy supply per capita

(GJ/capita)

139 Japan

97 G20 average

Sources: Enerdata, 2020; The World Bank, 2019

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

-2.8% Japan | **+1.9%** G20 average

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

Energy use per capita in Japan is, with 139 GJ/capita, well above the G20 average, but is decreasing slowly (-3%, 2014-2019) in contrast to the increasing G20 average of 2%.

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

5-year trend (2014-2019):   **High**

Current year (2019):   **Medium**

Source: own evaluation

Energy intensity of the economy

(TJ/PPP USD2015 millions)

3.22 Japan

4.46 G20 average

Data for 2018. Source: Enerdata, 2020, The World Bank, 2018

Energy intensity of the economy: 5-year trend (2013-2018)

-10.2% Japan | **-11.6%** G20 average

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

Japan's energy intensity is **lower than the G20 average** and has been decreasing at a slightly lower speed (-10%, 2013-2018) as the G20.

Decarbonisation rating: energy intensity compared to other G20 countries

5-year trend (2013-2018):   **Medium**
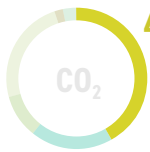
Current year (2018):   **Very high**

Source: own evaluation
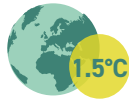
POWER SECTOR

Emissions from energy used to make electricity and heat

Japan still produces 33% of its electricity from coal and still has a further 9.9 GW of coal capacity planned or under construction, with currently 48.3 GW in operation. This is not compatible with a 1.5°C pathway, as coal must be phased out by 2030 in OECD countries.

42% CO$_2$

Share in energy-related CO$_2$ emissions from electricity and heat production

Source: Enerdata, 2020

1.5°C
COMPATIBILITY

Coal and decarbonisation

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

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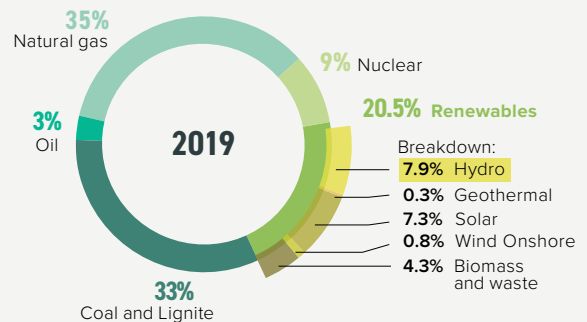
STATUS OF DECARBONISATION

Electricity mix

Gross power generation (TWh)

Coal and Lignite | Oil | Natural gas | Nuclear | Renewables

2019

35% Natural gas
3% Oil
33% Coal and Lignite
9% Nuclear
20.5% **Renewables**

Breakdown:
7.9% Hydro
0.3% Geothermal
7.3% Solar
0.8% Wind Onshore
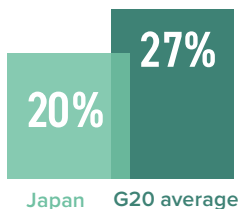**4.3%** Biomass and waste

Source: Enerdata, 2020

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

Japan is increasingly producing power from renewables, which now account for 21% of the power mix. The main renewable sources are hydro and solar power, with the solar power share more than tripling over the last five years. Power generation from fossil fuels is still high at 71%.

Source: Enerdata, 2020

Share of renewables in power generation

(incl. large hydro)

20% Japan
27% G20 average

Source: Enerdata, 2020

Decarbonisation rating: share of renewables compared to other G20 countries

5-year trend (2014-2019): **Medium**

Current year (2019): **Low**

Source: own evaluation

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

👍 **+45%** Japan

👍 **+19.5%** G20 average

Emissions intensity of the power sector

Country vs G20 average (gCO$_2$/kWh)

470 Japan

449 G20 average

Source: Enerdata 2020

For each kilowatt hour of electricity, 470gCO$_2$ are emitted in Japan. This is above the G20 average. The emissions intensity has reduced by around 14% over the past five years, reflecting the increased share of renewables and nuclear in the power mix.

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

👍 **-13.6%** Japan

👍 **-10.3%** G20 average

Decarbonisation rating: emissions intensity compared to other G20 countries

5-year trend (2014-2019): Medium

Current year (2019): Medium

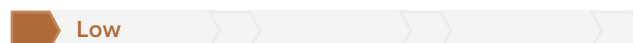*Source: own evaluation*

POLICY ASSESSMENT

Renewable energy in the power sector

Medium

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

Low

In July 2020, Japan reported plans to phase out inefficient coal power plants and shut down over 100 of its existing inefficient coal plants by 2030. However, over 9 GW of coal plants are currently under proposal or construction and more than 30 GW of coal capacity is forecast to remain by 2030.

The 2020 announcement adds little to the 2015 goal of reducing its share of coal power in the electricity mix to 26% (from 32% in 2016) and there remains no commitment to phase out coal entirely by 2030.

Sources: own evaluation, based on Climate Action Tracker, 2020; Tamura and Kuriyama, 2020.
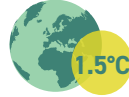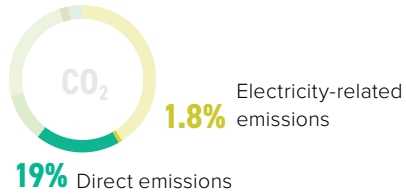
TRANSPORT SECTOR

Emissions from energy used to transport people and goods

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. Emissions per capita and absolute emissions have decreased over the last five years.

Share in energy-related CO_2 emissions from transport sector

Source: Enerdata, 2020

CO_2

1.8% Electricity-related emissions

19% Direct emissions
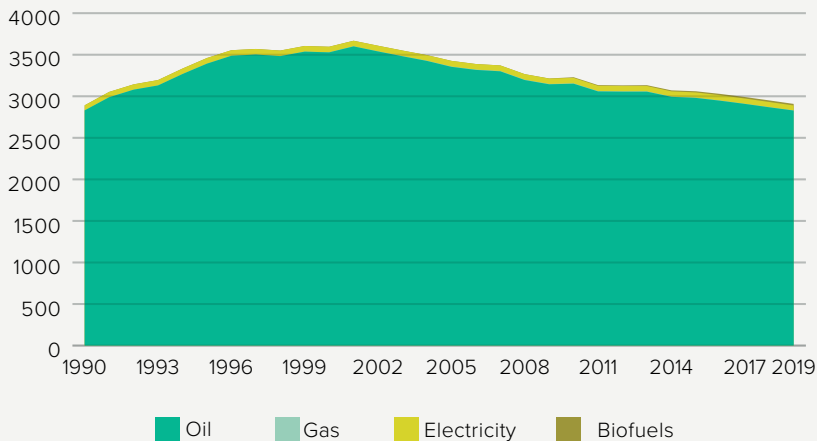
1.5°C

COMPATIBILITY

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

Source: Rogelj et al., 2018
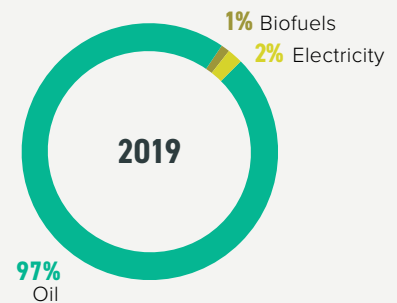

STATUS OF DECARBONISATION

Transport energy mix

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

Oil   Gas   Electricity   Biofuels

1% Biofuels
2% Electricity

2019

97% Oil

Source: Enerdata, 2020

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

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

Transport emissions per capita

excl. aviation (tCO_2/capita)

1.67 Japan

1.16 G20 average

Data for 2018. Source: Enerdata, 2020

Decarbonisation rating: transport emissions compared to other G20 countries

5-year trend (2013-2018):   High

Current year (2018):   Medium

Source: own evaluation

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

👍 **-4.8%** Japan   👎 **+5.5%** G20 average

Aviation emissions per capita[6]

(tCO$_2$/capita)

0.26 Japan
0.16 G20 average

Data for 2017. Source: Enerdata, 2020

Decarbonisation rating: aviation emissions compared to other G20 countries

5-year trend (2012-2017):   Medium

Current year (2017):   Medium

Source: own evaluation

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

+13.5% Japan | **+18.7%** G20 average

Motorisation rate

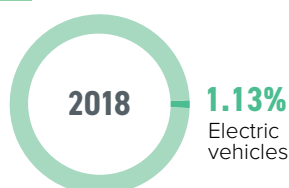**719** VEHICLES PER 1,000 INHABITANTS (2016)

63% of the kilometres travelled in Japan is by car and almost 72% of people have a car.

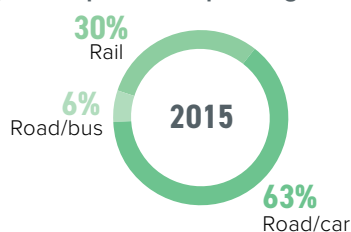*Data for 2016. Source: Vieweg, et al., 2018*

Freight transport

(modal split in % of tonne-km)

9% Rail
4% Air
2015
87% Road

Source: Vieweg et al., 2018

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

2018 — **1.13%** Electric vehicles

Source: IEA, 2019

Passenger transport

(modal split in % of passenger-km)

30% Rail
6% Road/bus
2015
63% Road/car

Source: Vieweg, et al., 2018

POLICY ASSESSMENT

Phase out fossil fuel cars

High

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. In 2019, new fuel economy standards were set for passenger cars to improve by 32% by 2030 compared to the 2016 levels. In addition, 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

Medium

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

Medium

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.
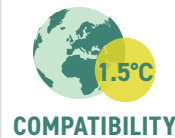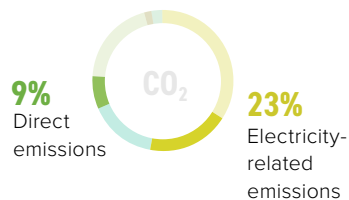
Source: own evaluation

BUILDING SECTOR

Emissions from energy used to build, heat and cool buildings

Japan's direct building emissions – heating, cooling – make up just under 10% of total CO_2 emissions. **Per capita, building-related emissions are nearly double the G20 average.**

Japan's electricity-related emissions in the building sector amount to 23%. Building emissions occur directly (burning fuels for heating, cooking, etc) and indirectly (grid-electricity for air conditioning, appliances, etc.)

Source: Enerdata, 2020

9%
Direct emissions

23%
Electricity-related emissions

1.5°C
COMPATIBILITY

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

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Building emissions per capita

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

2.91
Japan

1.48
G20 average

Building-related emissions per capita are nearly double the G20 average. In contrast to the G20 average, Japan has managed to decrease this level by 4% (2014-2019).
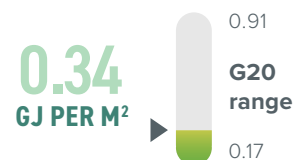
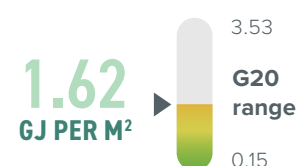*Source: Enerdata, 2020*

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

👍 **-4.09%**
Japan

👎 **+1.82%**
G20 average

Decarbonisation rating: building emissions compared to other G20 countries

5-year trend (2014-2019):   **Medium**

Current year (2019):   **Low**

Source: own evaluation

Residential buildings

Energy use per m²

0.34
GJ PER M²

0.91
G20 range
0.17

Commercial and public buildings

Energy use per m²

1.62
GJ PER M²

3.53
G20 range
0.15

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 range for commercial and public buildings.

Different data year for each country
Source: Castro-Alvarez et al., 2018

POLICY ASSESSMENT

Near zero energy new buildings

High

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, based on METI, 2018c

Renovation of existing buildings

Medium

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 and its COVID-19 response does not include building efficiency or renovation measures. Low-interest loans and rebates are available for construction and retrofit costs for buildings.
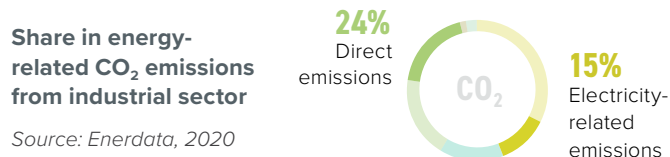
Source: own evaluation, based on Nukina, 2020

INDUSTRY SECTOR
Emissions from energy in the industrial sector

Direct emissions from industry constitute 24% of energy related CO_2 emissions in Japan. This sector is comparatively energy efficient, and industry emissions have been steadily decreasing in Japan since 2013.

Source: Enerdata, 2020

Share in energy-related CO_2 emissions from industrial sector

Source: Enerdata, 2020

24% Direct emissions

15% Electricity-related emissions

CO₂

1.5°C
COMPATIBILITY

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

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Industry emissions intensity[7]
(tCO_2e/USD2015 GVA)

0.28 Japan

0.71 G20 average

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

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

👍 **-17%** Japan

👍 **-12%** G20 average

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

5-year trend (2011-2016): **High**

Current year (2016): **Very high**

Source: own evaluation

Carbon intensity of cement production[8]
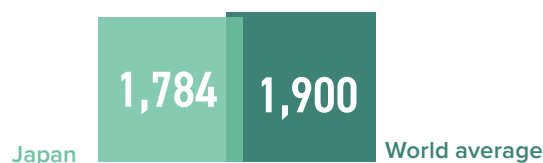($kgCO_2$/tonne product)

No data available — Japan

614 World average

Data for 2016. Sources: CAT decarbonisation Data Portal, 2020

Carbon intensity of steel production[8]
($kgCO_2$/tonne product)

1,784 Japan

1,900 World average

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

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

POLICY ASSESSMENT

Energy Efficiency

Frontrunner

The country has developed a mix of regulatory measures, voluntary actions, and financial incentives to successfully encourage energy efficiency in industry. The Act on the Rational Use of Energy (revised in 2018) covers 90% of industrial use of energy. The Act outlines 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, appoint an energy manager, and report their energy use annually.

Sources: own evaluation, based on METI, 2018a; OECD/IEA, 2017

LAND USE SECTOR

Emissions from changes in the use of the land

NET SINK OF EMISSIONS

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.

1.5°C COMPATIBILITY

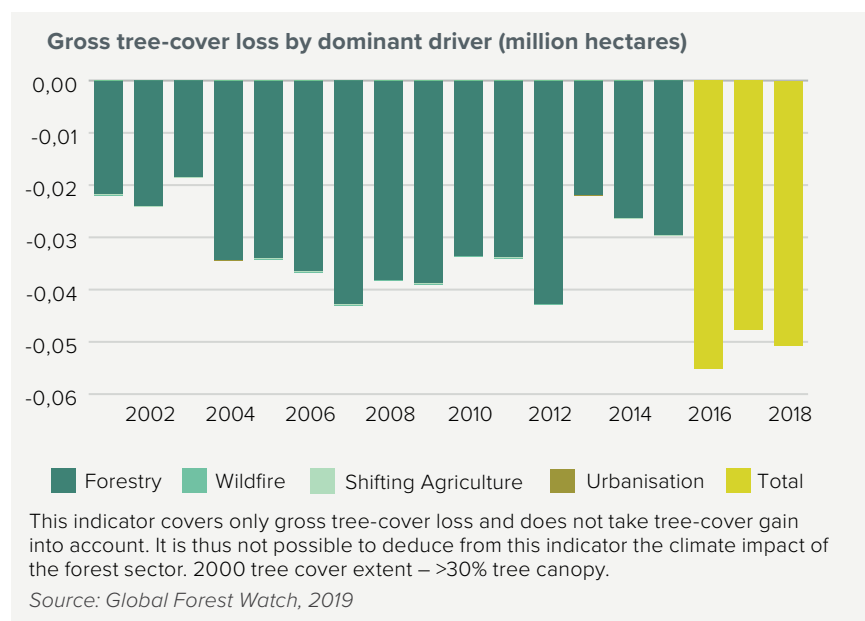**Global deforestation needs to be halted** and changed to net CO_2 removals by around 2030.
Source: Rogelj et al., 2018

Global tree-cover loss

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

Forestry Wildfire Shifting Agriculture Urbanisation Total

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. 2000 tree cover extent – >30% tree canopy.
Source: Global Forest Watch, 2019

From 2001 to 2018, Japan lost **630 Mha of tree cover**, equivalent to a 5.2% decrease since 2000. This does not take tree-cover gain into account.

POLICY ASSESSMENT

Target for net-zero deforestation

Medium

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 27.8m tonnes of CO_2 by 2030.

Sources: own evaluation, based on The Forest Environmental Tax in Japan, 2017; Climate Action Tracker, 2019

AGRICULTURE SECTOR

Emissions from agriculture

DIETARY SHIFTS ARE NEEDED

Japan's agricultural emissions are mainly **from rice cultivation, livestock manure and digestive processes in animals (enteric fermentation).** A 1.5°C 'fair-share' pathway requires dietary shifts, increased organic farming and less fertiliser use.
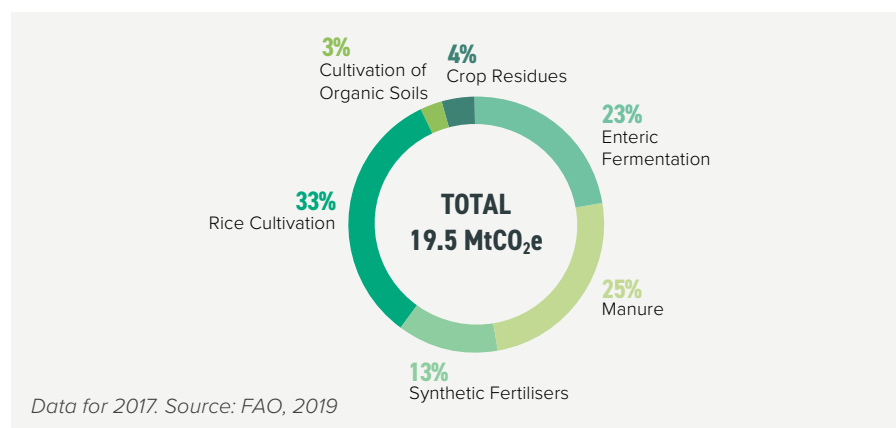
1.5°C COMPATIBILITY

Methane emissions (mainly enteric fermentation) need to decline by 10% by 2030 and by 35% by 2050 (from 2010 levels). Nitrous oxide emissions (mainly from fertilisers and manure) need to be reduced by 10% by 2030 and by 20% by 2050 (from 2010 levels).
Source: Rogelj et al., 2018

Emissions from agriculture (excluding energy)

3%
Cultivation of Organic Soils

4%
Crop Residues

23%
Enteric Fermentation

33%
Rice Cultivation

TOTAL 19.5 MtCO₂e

25%
Manure

13%
Synthetic Fertilisers

Data for 2017. Source: FAO, 2019

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

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

MITIGATION: TARGETS AND AMBITION

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

AMBITION: 2030 TARGETS

Nationally Determined Contribution (NDC): Mitigation

Targets	Actions
26.0% of emission reductions by 2030 compared to 2013	Actions specified in the following sectors: industry, transport, energy, waste, agriculture, land use and forestry

Climate Action Tracker (CAT) evaluation of NDC and actions

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

NDCs with this rating fall outside of a country's 'fair-share' range and are not at all consistent with holding warming to below 2°C let alone with the Paris Agreement's stronger 1.5°C limit. If all government NDCs were in this range, warming would reach between 3°C and 4°C.

Japan's continued reliance on fossil fuel power plants and its coal plant construction plans remain a major concern. Coal could continue to supply up to a a third of Japan's electricity in 2030 without a stronger push for additional renewables in the energy mix and structural changes to accommodate them. Japan's CAT rating is based on the emission reduction commitments in its NDC. If the CAT were to rate Japan's projected emissions levels in 2030 under current policies, the rating would fall between "Highly insufficient" and "Insufficient."

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

TRANSPARENCY: FACILITATING AMBITION

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

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

NDC Transparency Check recommendations
For more visit www.climate-transparency.org/ndc-transparency-check

To comply with the Paris Agreement by ensuring clarity, transparency and understanding, it is recommended that Japan provides following additional information in further NDC updates compared to NDC submitted in 2015 and updated on 31 March 2020:

- Provide reference to peaking or net-zero emissions

- Provide information on the circumstances under which the Party may update the values of the reference indicators

- Add additional details on domestic institutional arrangements, public participation and engagement with local communities and indigenous peoples, in a gender-responsive manner

AMBITION: LONG-TERM STRATEGIES

Status	Submitted June 2019
2050 target	80% reduction (no base year provided)
Interim steps	-
Sectoral targets	-
Net-zero target	"as early as possible during the second half of the 21st century"
Net-zero year	Not specified

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

3. FINANCE
MAKING FINANCE FLOWS CONSISTENT WITH CLIMATE GOALS

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

NO EXPLICIT CARBON PRICE   Japan spent USD 1.9bn on fossil fuel subsidies in 2019, mostly on petroleum and natural gas. Japan has no explicit carbon price

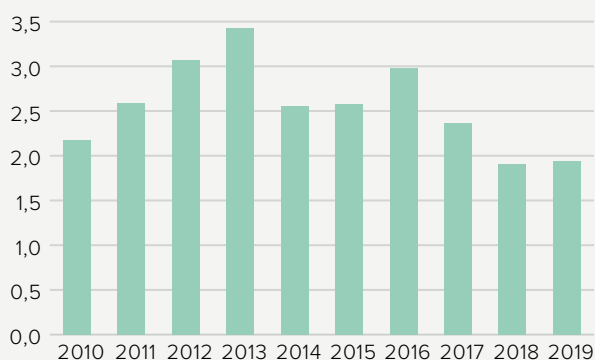**1.5°C COMPATIBILITY**   Investment in green energy and infrastructure needs to outweigh fossil fuel investments by 2025.

Source: Rogelj et al., 2018

FISCAL POLICY LEVERS

Fiscal policy levers **raise public revenues and direct public resources.** Critically, they can shift investment decisions and consumer behaviour towards low-carbon, climate-resilient activities by reflecting externalities in the price.

Fossil Fuel Subsidies

Japan Fossil fuel subsidies (USD billions)

Source: OECD-IEA Fossil Fuel Support database, 2020

Fossil Fuel Subsidies by fuel type

Subsidies by fuel type

22% Natural gas
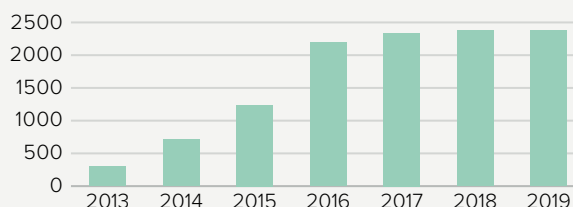**2%** Coal
76% Petroleum
2019

Source: OECD-IEA Fossil Fuel Support database, 2020
Due to rounding, some graphs may sum to slightly above or below 100%.

Carbon Pricing and Revenue

Japan's 2012 national carbon tax covers 68% of domestic emissions and generated USD 2.4bn in 2019. Emissions cover all fossil fuels but were priced at a very low nominal price for 2019 (USD 2.63/ tCO$_2$e). Moreover, subnational emissions trading schemes have been in place since 2010 and 2011 for the Saitama and Tokyo provinces, respectively. Under these schemes, 18-20% of emissions are covered and priced at around USD 6/tCO$_2$. No consistent revenue estimates are available for the subnational schemes.

Carbon revenues (USD millions)

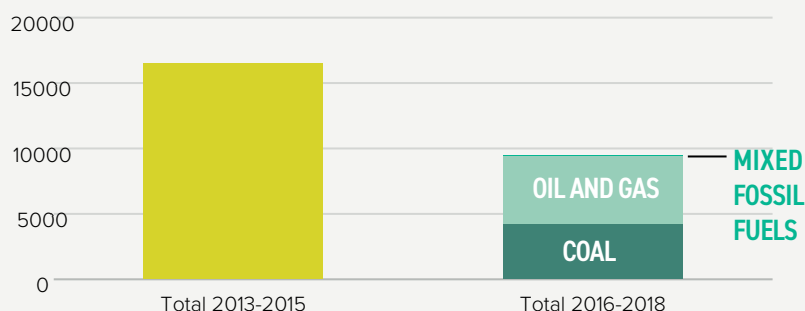*Sources: I4CE, 2019; OECD, 2018.*

☼ CORONAVIRUS RECOVERY

Japan has passed USD 2.2tn in fiscal measures but only a very small fraction of this has been allocated to green measures.

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

Public finance provided to fossil fuels (in USD millions)

The database used to estimate public finance for fossil fuels is a bottom-up database, based on information that is accessible through various online sources and is, therefore, incomplete.

Source: Oil Change International, 2020

Between 2016 and 2018, Japan provided an average of USD 4.2bn per year and USD 5.3bn per year in public finance support to the coal and the oil and gas sectors, respectively. This amounted to a total average public finance support for fossil fuels of USD 9.5bn. In spite of marking a progress in comparison to the overall finance provided over the previous period 2013-2015 (an average of USD 16.5bn per year), Japan was the third largest G20 supporter of fossil fuels between 2016 and 2018. The country dramatically exploited loopholes of coal financing restrictions. Despite the OECD Coal Agreement placing restrictions on export credits for coal plants in 2017, Japanese export credit agencies still increased their support for coal by pushing through approvals before the OECD agreement's start date and using the other considerable loopholes in the Agreement. Moreover, Japan is currently planning to add at least 22 new coal-fired power plants within the country.

Provision of international public support

(annual average 2017 and 2018)

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

Bilateral, regional and other channels
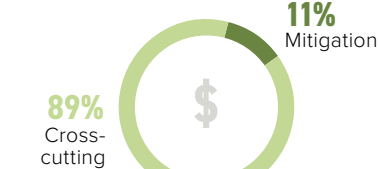
Annual average contribution

10,188.22 MN USD

Theme of support:

10% Adaptation
86% Mitigation
3% Cross-cutting

Multilateral climate finance contributions

Annual average contribution

224.41 MN USD

Theme of support:

11% Mitigation
89% Cross-cutting

Core / General Contributions

Annual average contribution:

1,840.86 MN USD

Japan's total climate finance contribution was the largest amongst G20 countries in absolute value. It is also the highest contributor of bilateral climate finance relative to GDP. Since the 2013/14 period, its bilateral and multilateral climate flows have increased over time, while core and general contributions continue to decrease slowly. Most funding is delivered through bilateral channels including the Japanese Bank for International Cooperation (JBIC) and JICA, and climate finance remains heavily biased towards mitigation. At the Green Climate Fund pledging meeting for its replenishment in late 2019, Japan announced it would match its previous contribution of USD 1.5bn.

FINANCIAL POLICY AND REGULATION

Financial policy and regulation

Through policy and regulation governments can **overcome challenges to mobilising green finance**, including: real and perceived risks, insufficient returns on investment, capacity and information gaps.

Category	Instruments	Objective	Under Discussion/ implementation	None identified		
Green Financial Principles	n/a	This indicates political will and awareness of climate change impacts, showing where there is a general discussion about the need for aligning prudential and climate change objectives in the national financial architecture.	🟢			
			Mandatory	**Voluntary**	**Under Discussion/ implementation**	**None identified**
Enhanced supervisory review, risk disclosure and market discipline	Climate risk disclosure requirements	Disclose the climate-related risks to which financial institutions are exposed			🟠	
	Climate-related risk assessment and climate stress-test	Evaluate the resilience of the financial sector to climate shocks				🔴
Enhanced capital and liquidity requirements	Liquidity instruments	Mitigate and prevent market illiquidity and maturity mismatch		🟡		
	Lending limits	Limit the concentration of carbon-intensive exposures				🔴
		Incentivise low carbon-intensive exposures				🔴
	Differentiated reserve requirements	Limit misaligned incentives and canalise credit to green sectors				🔴

In 2020, Japan's Ministry of the Environment published an update to the 2017 Green Bond Guidelines whereby its scope has been expanded to cover green loan and sustainability linked loans. In 2017 a study group on long-term investment evaluating 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. 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. In October 2019, during the first summit of the TCFD, the country started a discussion on effective and efficient corporate disclosure of climate-related information and their use by financial institutions. The Bank of Japan and the Financial Service Agency are both members of the NGFS.

Nationally Determined Contribution (NDC): Finance

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

ENDNOTES

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

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

2 The 1.5°C fair share ranges for 2030 and 2050 are drawn from the CAT, which compiles a wide range of perspectives on what is considered fair, including considerations such as responsibility, capability, and equality. Countries with

1.5°C fair-share ranges reaching below zero, particularly between 2030 and 2050, are expected to achieve such strong reductions by domestic emissions reductions, supplemented by contributions to global emissions reduction efforts via, for example, international finance. On a global scale, negative emissions technologies are expected to play a role from the 2030s onwards, compensating for remaining positive emissions. The CAT's evaluation of NDCs shows the resulting temperature outcomes if all other governments were to put forward emissions reduction commitments with the same relative ambition level.

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

4 The Decarbonisation Ratings assess the current year and average of the most recent five years

(where available) to take account of the different starting points of different G20 countries.

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

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

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

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

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

BIBLIOGRAPHY

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

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

Cabinet Office. (2020). "Emergency Economic Measures to Cope with COVID-19: Cabinet Decision on April 7, 2020, Amended on April 20, 2020." Government of Japan. https://www5.cao.go.jp/keizai1/keizaitaisaku/2020/20200407_taisaku.pdf.

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

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

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

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

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

End Coal. (2020). Global Coal Public Finance Tracker. Available at: https://endcoal.org/finance-tracker/.

Enerdata. (2020). *Global Energy and CO$_2$ data.* Grenoble, France. https://www.enerdata.net/research/energy-market-data-co2-emissions-database.html

Food and Agriculture Organisation (FAO). (2019). *FAOSTAT: Agriculture Total.* Rome, Italy. http://www.fao.org/faostat/en/#data/GT

Germanwatch. (2019). *Global Climate Risk Index 2020. Who Suffers Most from Extreme Weather Events?* Bonn, Germany. http://www.germanwatch.org/

Global Energy Monitor. (2020). Global Coal Plant Tracker. https://globalenergymonitor.org/coal/global-coal-plant-tracker/

Global Forest Watch. (2019). *Global Annual Tree-Cover Loss by Dominant Driver.* https://www.globalforestwatch.org/

Gütschow, J. et al. (2019). The PRIMAP-hist national historical emissions time series (1850-2017), V.2.1. GFZ Data Services. https://doi.org/10.5880/PIK.2019.018

Institute for Climate Economics (I4CE). (2019). *Global Carbon Account 2019*. Paris, France. https://www.i4ce.org/wp-core/wp-content/uploads/2019/05/i4ce-PrixCarbon-VA.pdf

International Energy Agency (IEA). (2019). *Global Electric Vehicle Outlook 2019: Scaling-up the Transition to Electric Mobility.* https://www.iea.org/reports/global-ev-outlook-2019

Kuriyama, A., Tamura, K. and Kuramochi, T. (2019). "Can Japan Enhance its 2030 Greenhouse Gas Emission Reduction Targets? Assessment of Economic and Energy-Related Assumptions in Japan's NDC", *Energy Policy*, (130), pp. 328-340.

METI. (2018a). Cabinet Decision on the Bill for the Act of the Partial Revision of the Act on the Rational Use of Energy. 9 March, 2018, Ministry of Economy, Trade and Industry, Japan.

METI. (2018b). Strategic Energy Plan (Provisional Translation). Tokyo, Japan: Ministry of Economy, Trade and Industry.

METI. (2018c). "Japan's Fifth Strategic Energy Plan (provisional translation)", Ministry of Economy Trade and Industry, p. 91.

METI. (2019). Promising Sea Areas and Sites Selected for Targeted Promotion. Ministry of Economy, Trade and Industry.

Nacpil, L. and Wong, S. (2020). "No Time for Loopholes: Japan Must Immediately End All Overseas Coal Finance", Climate Home News. https://www.climatechangenews.com/2020/07/17/no-time-loopholes-japan-must-immediately-end-overseas-coal-finance/

Nukina, Y. (2020). "Japan's Planned Relief Packages Lack Any Mention of Energy Transition", Climate

Scorecard. https://www.climatescorecard.org/2020/05/japans-planned-relief-packages-lack-any-mention-of-energy-transition/

OECD. (2018). *Effective Carbon Rates 2018: Pricing Carbon Emissions Through Taxes and Emissions Trading.* https://doi.org/10.1787/9789264305304-en and country profile supplement; https://www.oecd.org/tax/tax-policy/effective-carbon-rates-all.pdf

OECD-IEA. (2020). *OECD Analysis of Budgetary Support and Tax Expenditures. Fossil Fuel Support Database.* http://www.oecd.org/fossil-fuels/data/

OECD-IEA. (2017). Renewables 2017 Analysis and Forecasts to 2022. www.iea.org.

Oil Change International. (2020). *Shift the Subsidies Database.* http://priceofoil.org/shift-the-subsidies

Parra, P. et al. (2018). Science Based Coal Phase-Out Timeline for Japan: Implications for Policymakers and Investors. Berlin. Available at: https://climateanalytics.org/media/coalphaseout-2018-en-report_1.pdf.

Rogelj, J. et al. (2018). "Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development", in Masson-Delmotte, V. et al. (eds) *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change.* Geneva, Switzerland: IPCC. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter2_Low_Res.pdf

Japan Forest Information Review. (2017). The Forest Environmental Tax in Japan. https://jsfmf.net/english/policy/Forest_ETax/Forest_Etax0.html

Tamura, K. and A. Kuriyama. (2020). "Commentary on Japan's Policy Plan for Phasing Out Inefficient Coal-fired Power Plants". IGES: Hayama. https://www.iges.or.jp/jp/pub/phase-out-inefficient-coal/en

United Nations. (2018). *World Urbanisation Prospects*. Geneva: The Population Division of the Department of Economic and Social Affairs of the United Nations. https://population.un.org/wup

United Nations Department of Economic and Social Affairs, Population Division. (2020). *World Population Prospects, 2019 Highlights.* https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf

United Nations Development Programme (UNDP). (2019). Human Development Index Ranking | *Human Development Reports*. New York, USA: UNDP. http://hdr.undp.org/en/content/2019-human-development-index-ranking

Vieweg, M., et al. (2018) *Towards Decarbonising Transport: 2018 Stocktake on Sectoral Ambition in the G20.* Berlin: Agora Verkehrswende, GIZ. https://www.agora-verkehrswende.de/

The World Bank. (2020). *GDP, PPP* (current international $). Washington, DC: USA. https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD

The World Bank. (2019). *Population, total.* Washington, DC: USA. https://data.worldbank.org/indicator/SP.POP.TOTL

The World Health Organisation (WHO). (2018) *Global Health Observatory data repository | By category | Deaths by country.* Geneva, Switzerland. https://apps.who.int/gho/data/node.main.BODAMBIENTAIRDTHS?lang=en

World Steel Association. (2018). *Steel's Contribution to a Low-Carbon Future and Climate-Resilient Societies.* Brussels, Belgium. https://www.worldsteel.org/

ABOUT CLIMATE TRANSPARENCY

Climate Transparency

For more information on the country profile for Japan, please contact:
Climate and Energy Area Institute for Global Environmental Strategies (IGES)
Kentaro TAMURA (PhD) Director, tamura@iges.or.jp

PARTNERS

DATA PARTNERS

FUNDERS

Supported by:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag