BRAZIL

Climate Transparency

CLIMATE TRANSPARENCY REPORT **COMPARING G20 CLIMATE ACTION AND RESPONSES TO THE COVID-19 CRISIS** 2020

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

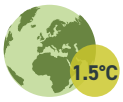
PER CAPITA GREENHOUSE GAS (GHG) EMISSIONS BELOW G20 AVERAGE

Brazil's GHG emissions have more or less plateaued over the past decade. Per capita emissions are just below the G20 average, and are on a downward trend.

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

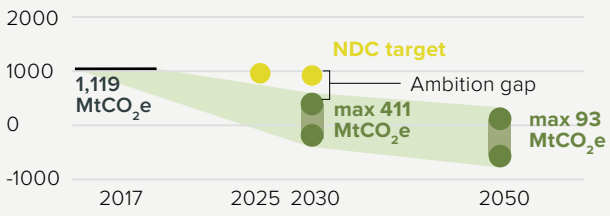
GHG emissions (incl. land use) per capita (tCO_2e/capita)[1]

NOT ON TRACK FOR A 1.5°C WORLD



Brazil needs to reduce its emissions to below 411 $MtCO_2e$ by 2030 and to below 93 $MtCO_2e$ by 2050 to be within its 1.5°C 'fair-share' compatible pathway. Under Brazil's 2025 NDC target, its emissions would only be limited to 991 $MtCO_2e$ (in 2025) and 890 $MtCO_2e$ (in 2030). Due to the increase in deforestation emissions Brazil is not on track to meet its economy-wide NDC targets and will miss its 2020 deforestation targets by a large margin. All figures exclude land use emissions and are based on pre-COVID-19 projections.

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



Source: Climate Action Tracker, 2019

KEY OPPORTUNITIES FOR ENHANCING CLIMATE AMBITION

PREVENT ILLEGAL DEFORESTATION

Urgently reinstate and strengthen **policies on monitoring and preventing illegal deforestation, including on indigenous lands.**

INVEST IN A RAIL SYSTEM

Invest in a rail system for both passengers and load transport, and develop a plan for the **electrification of the transport sector.**

PROMOTE SUSTAINABLE AGRICULTURE

Develop a post-2020 plan for **implementing mitigation in the agriculture sector, including restoring degraded pastureland and promoting sustainable methods.**

RECENT DEVELOPMENTS

The latest electricity capacity auction in October 2019 resulted in three quarters of the 3 GW contracted capacity going to renewable energy (of which 1,040 MW was wind and 530 MW was solar). Solar offered the cheapest prices on the auction.

The Brazilian government cut the budget for key forest protection monitoring and enforcement and has rolled back numerous environmental protection policies. Rates of illegal deforestation are continuing to rise, with over a third of deforestation in 2019 taking place on public lands.

Plans to develop oil and gas projects in the Solimões basin are being prioritised by the Brazilian government, potentially threatening a large block of Amazon rainforest. The government's 10-year energy plan (2019-2029) foresees an increase in gas-powered generation, with 77% of investments in energy infrastructure going to oil and gas.

References: Sánchez Molina and Bellini, 2019; Ministério de Minas e Energia, 2019; Philip M. Fearnside, 2020; Angelo and Rittl, 2019; Climate Action Tracker, 2019; Observatório do Clima, 2020a

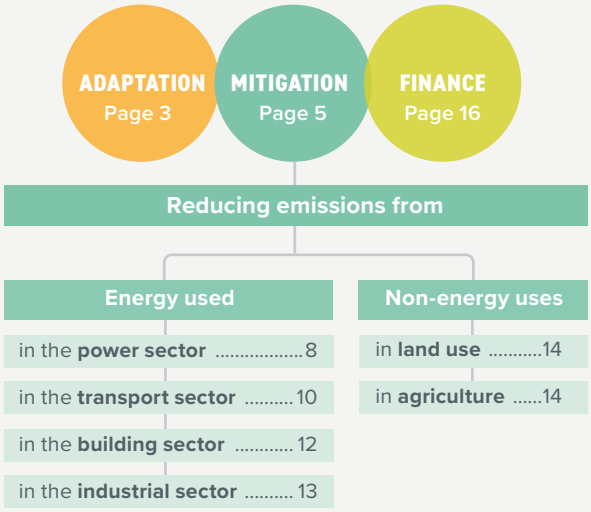
CORONAVIRUS RECOVERY

By the beginning of October 2020, Brazil was the second hardest-hit country by COVID-19, with approximately 5 million cases and about 150,000 deaths. The federal government provided important financial support for up to 126 million poor people (60% of population) from April to August and is planning to extend it until the end of the year. This financial support was key to assure that this important segment of the population could survive while economic activities were severely curtailed.

Reference: Governo do Brasil, 2020

CONTENTS

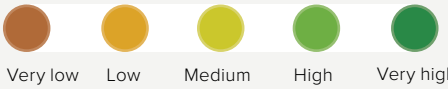
We unpack Brazil's progress and highlight key opportunities to enhance climate action across:



LEGEND

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

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



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

SOCIO-ECONOMIC CONTEXT

Human Development Index

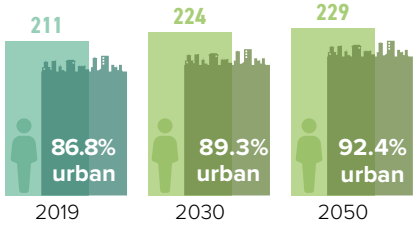
The Human Development Index reflects life expectancy, level of education, and per capita income. Brazil's high score masks high inequality levels.

Data for 2018. Source: UNDP, 2019

Population and urbanisation projections

(in millions)

Brazil's population is expected to increase by approximately 8% by 2050 and become even more urbanised.



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

Gross Domestic Product (GDP) per capita

(PPP constant 2015 international $)

Data for 2019. Source: The World Bank, 2020

Death rate attributable to air pollution

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

0.2 BRAZIL

0.1–1.1 G20 RANGE

Data for 2016. Source: WHO, 2018

Over 50,000 people die in Brazil every year as a result of outdoor air pollution, due to stroke, heart disease, lung cancer and chronic respiratory diseases. Compared to the total population, this is still one of the lower levels in the G20.

51,821 deaths per year

JUST TRANSITION

JOB CREATION IN RENEWABLE ENERGY

The Brazilian National Adaptation Plan to Climate Change, published in 2016 under the previous administration, recognises the need to achieve a just transition, but does not offer a clear strategy on how to achieve it. In Brazil, energy transition began decades ago with the first oil crisis in the 1970s, which is possibly why a just transition is not in the spotlight. Renewables are not new in the country and already contribute a large share of energy generation. However, the government has recently been investing heavily in oil and gas exploration and production. This risks lock-in to carbon intensive infrastructure and jobs that will need to be phased out in the longer term. **A green energy transition in Brazil has many potential opportunities to be a just one. Growth in Brazil's renewable energy sector has substantial potential for job creation, with more jobs created than lost in the fossil fuel industry.** Distributed renewable power generation can also increase electricity access in rural areas, and can provide income and jobs in unproductive areas. At the same time, reducing fossil fuel consumption (e.g. coal power plants, internal combustion engines) can lead to cleaner air and water, with associated health benefits.

References: Government of Brazil, 2016; Wills and Westin, 2018

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

Brazil is vulnerable to climate change and adaptation actions are needed.

HIGH COST OF EXTREME WEATHER

On average, 145 fatalities and almost USD 1.72bn losses occur yearly due to extreme weather events.

SEVERE CLIMATE EVENTS

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

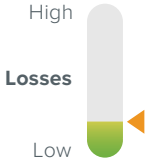
ADAPTATION NEEDS

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

0.08 PER 100,000 INHABITANTS

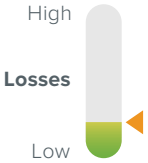


RANKING 16th IN THE G20

Source: Based on Germanwatch, 2019

Annual average losses (USD mn PPP)

0.06 PER UNIT GDP (%)



RANKING 16th IN THE G20

Source: Based on Germanwatch, 2019

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

Impact ranking scale:

Very low · Low · Medium · High · Very high

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

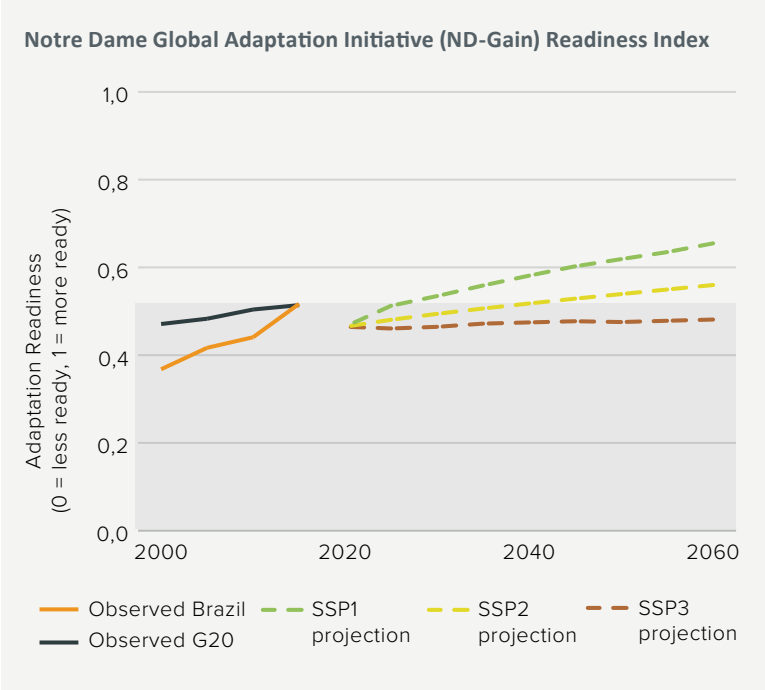
Source: Water, Heat and Health: own research. Agriculture: Arnell et al., 2019.

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 In the last few years, Brazil has faced a strong recession and a rapidly increasing fiscal deficit. Due to the budget ceiling passed in 2016 by the Congress, there is little space for increasing expenses or additional investments. The government is currently discussing with the Congress ways to circumvent this situation and liberate resources to be invested in the COVID-19 recovery. There have been no discussions about considering environmentally-friendly requirements once funds are eventually released.

Adaptation readiness

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



Brazil's observed adaptation readiness is well below the G20 average. Socio-economic developments in line with SSP1 would produce improvements in readiness to bring it in line with the 2015 G20 average between 2040 and 2045.

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

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

Source: Andrijevic et al., 2020

ADAPTATION POLICIES

National Adaptation Strategies

Document name	Publication year	Fields of action (sectors)												M&E process
		Agriculture	Biodiversity	Coastal areas and fishing	Education and research	Energy and industry	Finance and insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	
National Adaptation Plan for Climate Change	2016	●	●	●		●		●	●	●		●		●	Assigned to the Executive Group on Climate Change.

Nationally Determined Contribution (NDC): Adaptation

Targets

Not mentioned

Actions

Actions specified in the following sectors: agriculture, biodiversity and ecosystems, cities and urban development, disaster risk management, industry and mining, infrastructure, vulnerable populations, water resources, health, food and nutritional security, coastal zones

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

CO_2 DECREASE EMISSIONS

Brazil's emissions, excluding forestry, have risen by 84% since 1990 (and by 11% since 2010). The government's climate target for 2030 (-43% below 2005 levels) is **not in line with a 1.5°C 'fair-share' compatable pathway.**

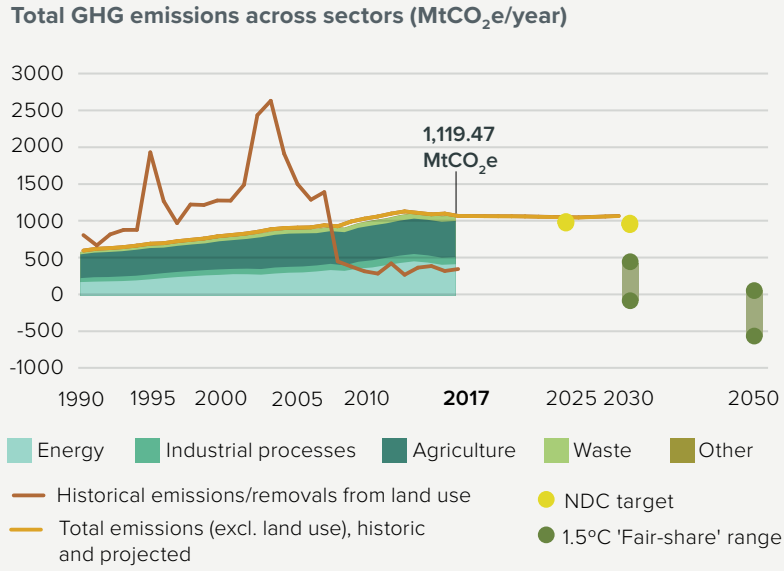
Source: Climate Action Tracker, 2019

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

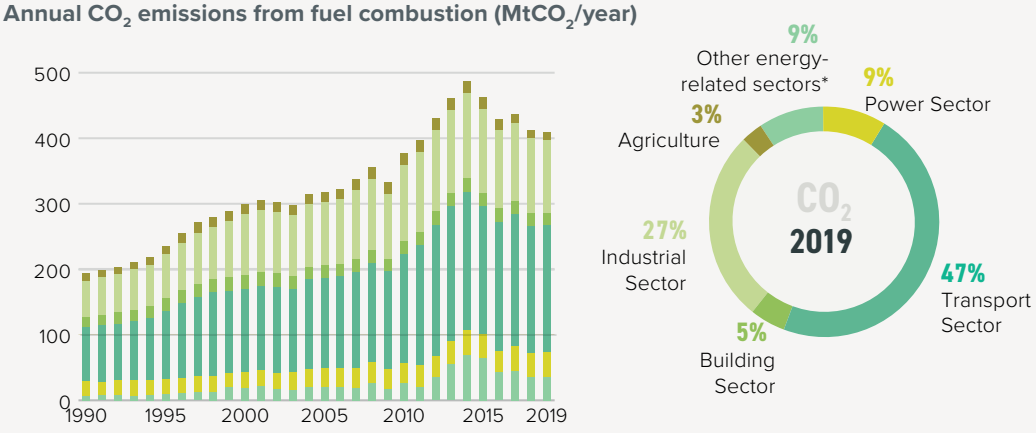
GHG emissions across sectors and CAT 1.5°C 'fair-share' range ($MtCO_2e$/year)



Brazil's emissions (excl. land use) have increased by 84% between 1990 and 2017. Emissions growth has plateaued in recent years, but is expected to resume growing until at least 2030. **Brazil will need to scale up climate action to meet its 2025 NDC and indicative 2030 target, with even more effort required to become 1.5°C 'fair-share' compatible**. Progress made between 2005 and 2012 in reducing emissions from deforestation has been partially reversed in recent years as deforestation rose 122% from 2012 to 2019. Projections to 2030 are uncertain but could see a continuation of current levels or, **if forest governance continues to weaken, a substantial increase in emissions.**

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

Energy-related CO_2 emissions by sector



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

The third largest driver of GHG emissions, after deforestation and agriculture, are energy-related CO_2 emissions from fuel combustion. In Brazil, energy sector CO_2 emissions peaked in 2014 and have remained relatively stable since 2016. The transport sector is the largest contributor, with 47% of the share.

Source: Enerdata, 2020

CORONAVIRUS RECOVERY

The government has provided financial support to the airline industry without any conditions for a green recovery. A lack of specific support for renewable energy providers may leave them at a disadvantage relative to larger fossil fuel companies. With mounting domestic and international pressure to reduce deforestation rates, the Bolsonaro administration has placed a moratorium on burning and has brought in the military to boost the environmental enforcement capacities that the administration severely weakened over the past few years.

References: Mongabay, 2020; Observatório do Clima, 2020a; Vivid Economics, 2020; World Bank, 2020

ENERGY OVERVIEW

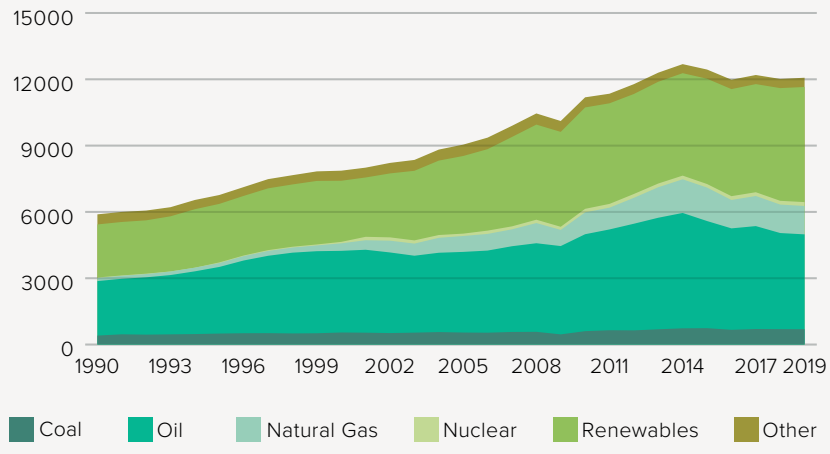
Fossil fuels make up 52% of Brazil's energy mix (including power, heat, transport fuels, etc). Due to the high share of renewables, Brazil's energy mix is much less carbon intensive than the G20 average.

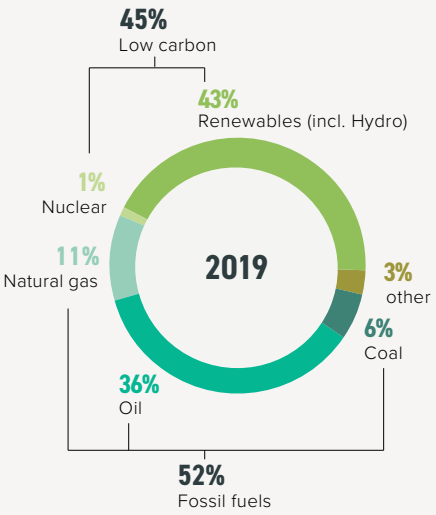
The share of **fossil fuels in the global primary energy mix needs to fall to 67% by by 2030 and to 33% by 2050** (and to substantially lower levels without Carbon Capture and Storage).

Source: Rogelj et al., 2018

Energy Mix

Total primary energy supply (PJ)





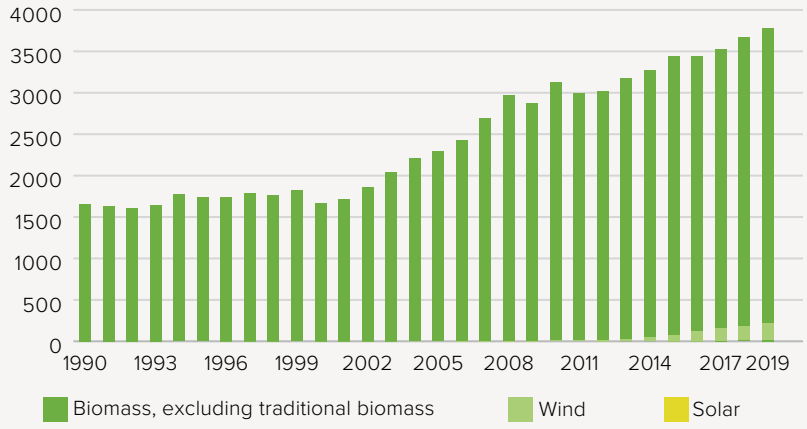
Source: Enerdata, 2020

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

This graph shows the fuel mix for all energy supply, including energy used for electricity generation, heating, cooking, and transport fuels. Fossil fuels (oil, coal and gas) make up 52% of the Brazilian energy mix, which is well below the G20 average. This is due to Brazil's high use of renewable energy.

Solar, Wind, Geothermal, and Biomass Development

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



Solar, wind, geothermal and biomass account for 31% of Brazil's energy supply

31.3 % Total

Breakdown:
0.2% Solar
29.4% Biomass
1.7% Wind

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): Low

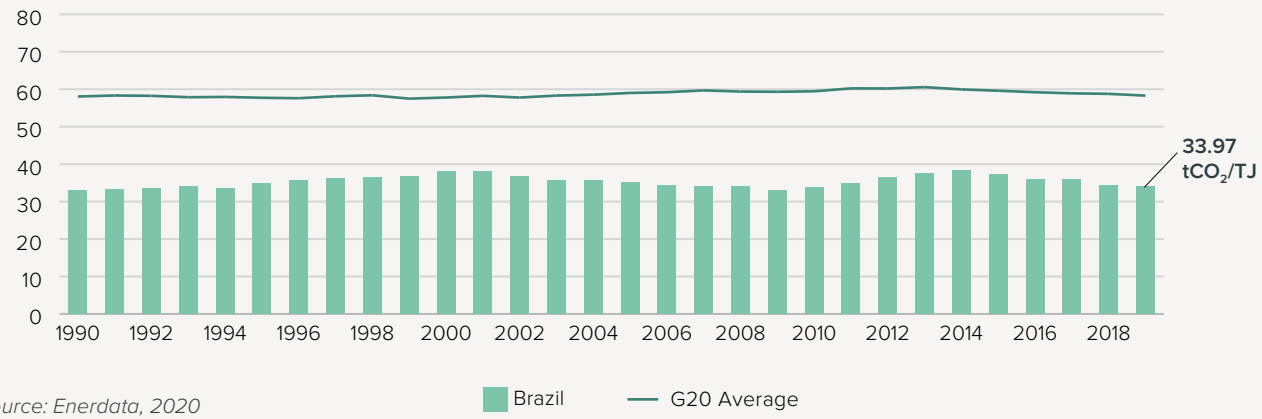
Current year (2019): Very high

Source: own evaluation

Solar, wind and biomass account for 31% of Brazil's energy supply – the G20 average is only 6%. In the last five years, the share of these sources in total energy supply has increased by around 20%, less than the G20 average (+28.1%, 2014-2019). Bioenergy (for electricity, and biofuels for transport and heat) makes up the largest share.

Carbon Intensity of the Energy Sector

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



Source: Enerdata, 2020

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

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

Current year (2019): Very high

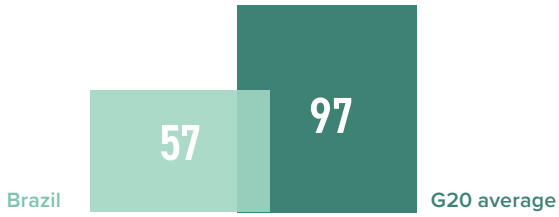
Carbon intensity shows how much CO_2 is emitted per unit of energy supply.

Brazil's energy sector has one of the lowest carbon intensities in the G20, reflecting the high share of hydropower and biofuels in the energy mix. Since 2014, Brazil's carbon intensity has been on a slight downward trend.

Source: own evaluation

Energy supply per capita

(GJ/capita)



Sources: Enerdata, 2020; The World Bank, 2019b

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

-8.4% Brazil | +1.9% G20 average

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

At 57 GJ/capita, energy supply per capita in Brazil is well below the G20 average and has followed a downward trend over the past five years (-8.4%, 2014-2019), in contrast to the increasing G20 average of 1.9%.

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

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

Current year (2019): High

Source: own evaluation

Energy intensity of the economy

(TJ/PPP USD2015 millions)

Data for 2018. Source: Enerdata, 2020

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

+1.7% Brazil | -11.6% G20 average

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.

Brazil's energy intensity remains below the G20 average, but increased by 1.7% from 2013 to 2018, in contrast to the G20's downward trend of 11.6%.

Decarbonisation rating: energy intensity compared to other G20 countries

5-year trend (2013-2018): Very low

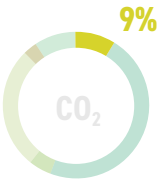
Current year (2018): High

Source: own evaluation

POWER SECTOR

Emissions from energy used to make electricity and heat

Only 9% of Brazil's CO_2 emissions are from electricity and heating. Brazil produces 82% of electricity from renewable energy sources, mostly from hydropower. There are plans to increase the share of wind and solar in the electricity mix.



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

Source: Enerdata, 2020

Coal and decarbonisation

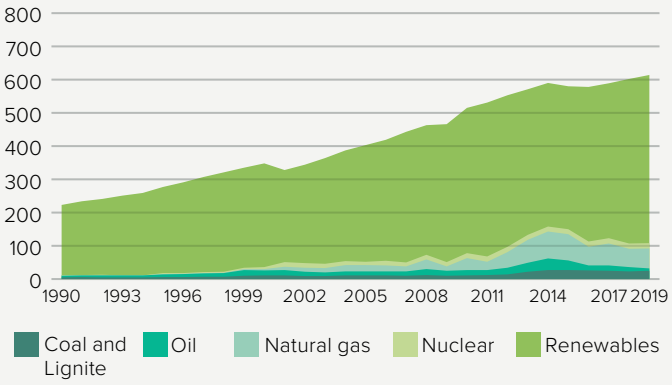
Worldwide, **coal use for power generation needs to peak by 2020**, and between 2030 and 2040, all the regions of the world need to phase out coal-fired power generation. **Electricity generation has to be decarbonised before 2050**, with renewable energy the most promising alternative.

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

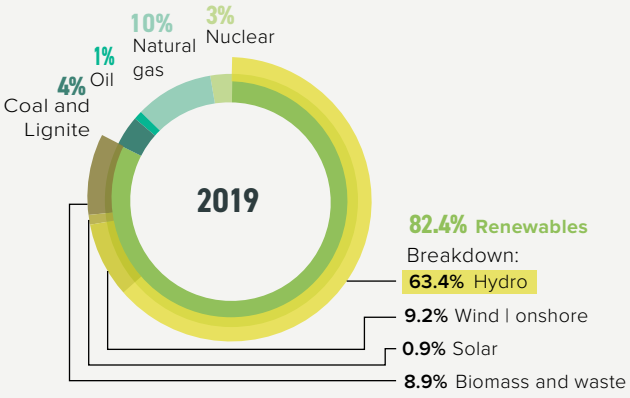
STATUS OF DECARBONISATION

Electricity mix

Gross power generation (TWh)



Source: Enerdata, 2020

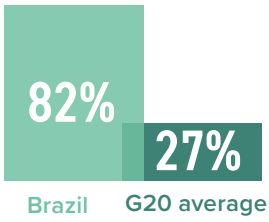


Due to rounding, some graphs may sum to slightly above or below 100%.

Brazil generates 82% of its power from renewable sources – the highest level in the G20 – and around 63% from hydropower alone. Fossil fuels (oil, coal and gas) account for only a small share, although generation from coal and gas has increased over the past decade.

Share of renewables in power generation

(incl. large hydro)



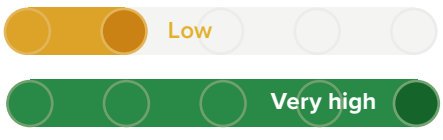
Source: Enerdata, 2020

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

+14% Brazil

+19.5% G20 average

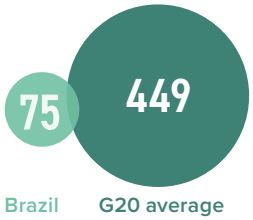
Decarbonisation rating: share of renewables compared to other G20 countries



Source: own evaluation

Emissions intensity of the power sector

Country vs G20 average (gCO_2/kWh)



Source: MCTIC, 2020

Emissions intensity: 5 year trend (2014-2019)

-47.1%
Brazil

-10.3%
G20 average

For each kilowatt hour of electricity, 75gCO_2 are emitted in Brazil. This is less than a fifth of the G20 average, reflecting the high share of renewables in Brazil's power generation. Emissions intensity has decreased by 47% from 2014-2019, much higher than the decrease in the G20 rate (10%). Power generation from oil in Brazil has declined since 2014, while renewables generation has grown by almost a fifth.

Decarbonisation rating: emissions intensity compared to other G20 countries

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

Current year (2019): Very high

Source: own evaluation

POLICY ASSESSMENT

Renewable energy in the power sector

High

Brazil already has a high share of hydropower and aims to increase the share of other renewables to 23% by 2030. In 2019, solar energy was included in Brazil's electricity capacity auction for the first time. The latest 10-year Energy Plan 2029 envisages an installed capacity of 8.4 GW of solar and 24.4 GW of wind by 2029. At the end of 2019 the government published a 2050 Energy Plan outlining Brazil's long-term strategy for the energy sector.

References: own evaluation, based on Ministério de Minas e Energia, 2019; Climate Action Tracker, 2019

Coal phase-out in the power sector

Medium

Brazil's power sector has a relatively small but stable contribution from coal power generation (~4%). According to the latest 10-year Energy Plan, some coal plants will retire before the end of the decade, but others will likely be brought online (up to 1.5 GW of capacity additions) such that capacity in 2029 will be about 2 GW (compared with 3.6 GW today).

References: own evaluation, based on Ministério de Minas e Energia, 2019

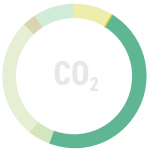
TRANSPORT SECTOR

Emissions from energy used to transport people and goods

CO_2 emissions from the transport sector peaked in 2014, but still contribute almost half of Brazil's energy-related CO_2 emissions. Despite the large proportion of biofuels in the sectoral energy mix (24%), fossil fuels still dominate. In order to stay within a 1.5°C limit, passenger and freight transport need to be further decarbonised.

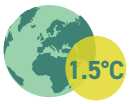
Share in energy-related CO_2 emissions from transport sector

Source: Enerdata, 2020



0.04% Electricity-related emissions

47% Direct emissions



COMPATIBILITY

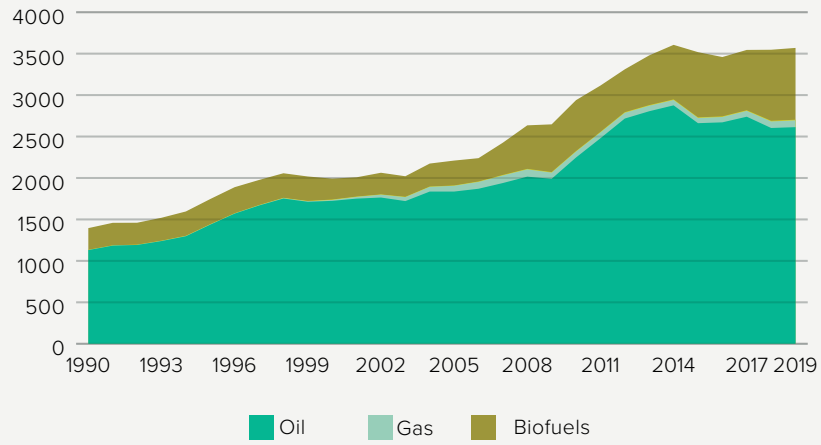
The proportion of low-carbon fuels in the transport fuel mix must increase to about 60% by 2050.

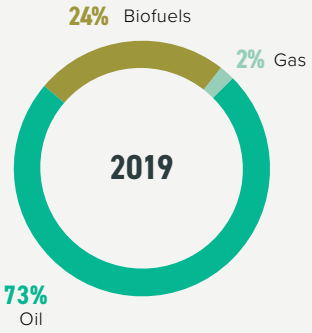
Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Transport energy mix

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





Source: Enerdata, 2020

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

Electricity and biofuels make up 24.5% of the energy mix in transport – the highest level in the G20. However, with biofuels contributing 24.3% and electricity only 0.2%, Brazil is lagging well behind other G20 countries in electric vehicle deployment.

Transport emissions per capita

excl. aviation (tCO_2/capita)

Data for 2018. Sources: Enerdata, 2020; The World Bank, 2019b

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

-10.5% Brazil

+5.5% G20 average

Decarbonisation rating: transport emissions compared to other G20 countries

5-year trend (2013-2018): High

Current year (2018): High

Source: own evaluation

Aviation emissions per capita[6]

(tCO_2/capita)

Data for 2017. Source: Enerdata, 2020

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

-12.8% Brazil | +18.7% G20 average

Decarbonisation rating: aviation emissions compared to other G20 countries

Source: own evaluation

Motorisation rate

162 VEHICLES PER 1,000 INHABITANTS (2014)

Source: Vieweg et al., 2018

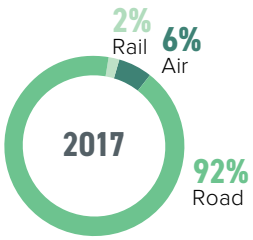
Market share of electric vehicles in new car sales (%)

0.02% MARKET SHARE OF ELECTRIC VEHICLES

Data for 2018. Source: IEA, 2019

Passenger transport

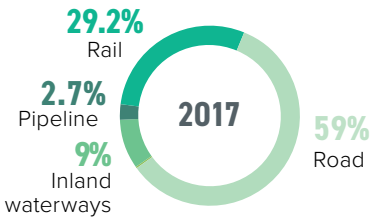
(modal split in % of passenger-km)



Data for 2017. Source: Vieweg et al., 2018

Freight transport

(modal split in % of tonne-km)



Data for 2017. Source: Vieweg et al., 2018

POLICY ASSESSMENT

Phase out fossil fuel cars

Medium

In its NDC, the government set out plans to almost double the use of biofuels, although it has no plans for phasing out fossil fuel cars. The "Rota 2030" regulation, published in 2018, has set a mandatory efficiency improvement target of 11% by 2022 for vehicles and supports EVs through tax incentives. However, the market share of EVs in new car sales is very low, and the government does not anticipate EVs playing a big role before 2030. Instead, Brazil is focused on increasing the use of bioethanol and biodiesel.

References: own evaluation, based on Empresa de Pesquisa Energética, 2019; Pavlenko and Araujo, 2019

Phase out fossil fuel heavy-duty vehicles

Medium

Emissions standards for HDVs in Brazil were updated in 2012. However, a more stringent standard was announced in late 2018 and will come into force in 2023, making Brazil the last major automotive market to adopt one equivalent to Euro VI. However, Brazil has no strategy for reducing absolute emissions from freight transport, and Brazil's freight infrastructure remains inefficient.

References: own evaluation, based on Basso, 2019

Modal shift in (ground) transport

Medium

The 2012 Brazilian Urban Mobility Policy aims to increase the use of public transport and non-motorised travel in urban areas, and mandates large cities to develop mobility plans. Very few cities have finalised or implemented their plans, but the government recently released USD 60mn funds for urban mobility projects in 13 cities. For freight transport, the Plan for Logistics and Transportation aims to increase the share of rail from 25% in 2005 to 35% in 2025.

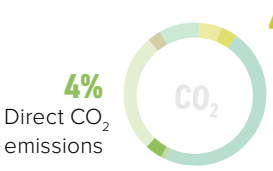
References: own evaluation, based on Nassar, 2018; BNamericas, 2020

BUILDING SECTOR

Emissions from energy used to build, heat and cool buildings

Brazil's building emissions – counting heating, cooking and also electricity use – make up 5% of energy-related CO_2 emissions. Direct emissions, for example from heating and cooking, make up 4% of CO_2 emissions, while electricity-related building emissions make up 4% of CO_2 emissions from electricity. Per capita, building-related emissions are well below the G20 average.

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



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

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Building emissions per capita

(incl. indirect emissions) (tCO_2/capita)

Source: Enerdata, 2020

Building-related emissions per capita are little over a tenth of the G20 average. In contrast to the G20 average, which has grown by nearly 2% over the past five years (2014-2019), **Brazil has managed to reduce building emissions per capita by 37%.**

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

-37.4% Brazil | +1.82% G20 average

Decarbonisation rating: building emissions compared to other G20 countries

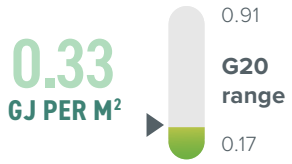
5-year trend (2014-2019): Very high

Current year (2019): Very high

Source: own evaluation

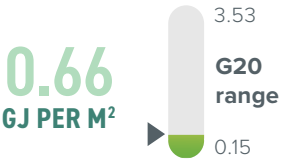
Residential buildings

Energy use per m²



Commercial and public buildings

Energy use per m²



Building emissions are largely driven by how much energy is used in heating, cooling, lighting, household appliances, etc. In Brazil, energy use per m² is in the lower half of the G20 range for residential buildings and in the lowest quarter for commercial and public buildings.

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

POLICY ASSESSMENT

Near-zero energy new buildings

Medium

Brazil has voluntary building codes as well as rating systems (e.g. the Zero Energy Standard). It also requires the disclosure of energy use for new residential and non-residential buildings. Building codes, however, fall under the authority of municipalities, making coordination at the national level difficult, and there is no strategy for requiring all new buildings to adhere to near-zero energy standards.

Reference: own evaluation, based on Basso, 2019

Renovation of existing buildings

Low

There are no policies related to energy retrofitting of existing buildings in Brazil.

Reference: own evaluation

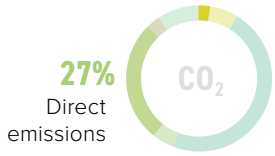
INDUSTRY SECTOR

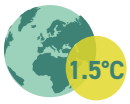
Emissions from energy in the industrial sector

Industry-related emissions make up 27% of energy-related CO_2 emissions in Brazil (as of 2019). Brazil's industrial emissions peaked in 2014, but have not declined far from this peak. Policies for reducing industrial emissions are insufficient to bring Brazil on a 1.5°C track.

Share in energy-related CO_2 emissions from industrial sector

Source: Enerdata, 2020





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

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Industry emissions intensity[7]

(tCO_2e/USD2015 GVA)

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

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

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

Source: own evaluation

Carbon intensity of cement production[8]

($kgCO_2$/tonne product)

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

Data for 2016. Sources: CAT decarbonisation data portal, 2020; Climate Action Tracker, 2019

Carbon intensity of steel production[8]

($kgCO_2$/tonne product)

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

Data for 2016. Sources: World Steel Association, 2018; CAT decarbonisation data portal, 2020

POLICY ASSESSMENT

Energy Efficiency

The 2011 National Policy on Energy Efficiency (PNEf) aims to improve energy efficiency in industry, among other sectors. However, according to the International Energy Agency (IEA), only 7% of Brazil's industrial energy use is covered by mandatory energy efficiency policies (as of 2017), despite the many opportunities in this sector. Since 2013, when Brazil passed its Industrial Sector Plan for Mitigation (2012-2020), there have been no new policies for improving industrial energy efficiency.

Reference: own evaluation, based on Climate Laws, 2020

LAND USE SECTOR

Emissions from changes in the use of the land

NET SINK OF EMISSIONS

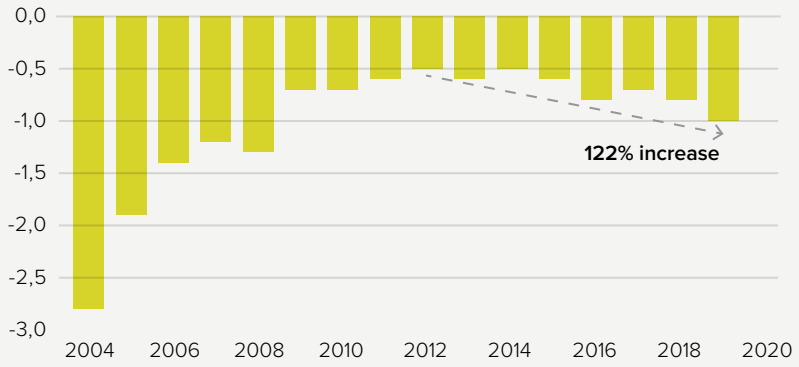
In order to stay within the 1.5°C limit, Brazil needs to make the land use and forest sector a net sink of emissions, e.g. **by halting the deforestation of the Amazonian rainforest, fighting illegal logging, and restoring destroyed forest areas.**

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



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: INPE, 2020

Deforestation rates have been on the rise in Brazil since 2012: between 2012 and 2019, deforestation has increased by 122%. According to Brazil's National Institute for Space Research (INPE), more than 1 Mha of land was deforested in Brazil between August 2018 and July 2019; an increase of 34% above the previous year, and the highest rate of deforestation seen since 2008. Indigenous lands were particularly affected, with a growth in deforestation by 90%. Increasing deforestation is linked to a weakening of institutional and legal frameworks for environmental protection, including budget cuts for monitoring and enforcement agencies and an easing of appeal processes against fines for illegal logging. Illegal deforestation on public lands has been encouraged by periodic amnesties that conferred ownership rights to land grabbers in the last decades.

Sources: Azevedo-Ramos et al., 2020; INPE, 2020; Observatório do Clima, 2020b

POLICY ASSESSMENT

Target for net-zero deforestation

Low

According to Brazil's NDC, Brazil aims to restore and reforest 12m hectares of forest, to achieve zero illegal deforestation by 2030 and to compensate for GHG emissions from legal suppression of vegetation by 2030. However, recent budget cuts for monitoring and enforcement agencies and a roll-back of environmental regulations show that Brazil is going in the wrong direction with regards to achieving net-zero deforestation.

Reference: own evaluation

AGRICULTURE SECTOR

Emissions from agriculture

DIETARY SHIFTS ARE NEEDED

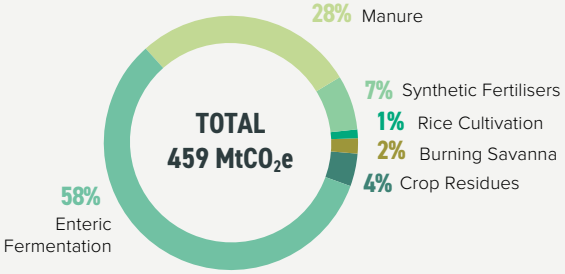
Agriculture contributes approximately one third of GHG emissions in Brazil. Agricultural emissions mainly come from livestock manure, digestive processes in animals, and the use of synthetic fertilisers. A 1.5°C 'fair-share' pathway requires dietary shifts, increased organic farming, and less fertiliser use.

1.5°C COMPATIBILITY

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

Source: Rogelj et al., 2018

Emissions from agriculture (excluding energy)



Data for 2017. Source: FAO, 2019

In Brazil, the largest sources of GHG emissions in the agricultural sector are livestock manure, digestive processes in animals (enteric fermentation), and the use of synthetic fertilisers. Recovering degraded pastures, improved manure management practices, dietary changes and a more efficient use of fertiliser could help reduce emissions in this sector.

Reference: Stabile et al., 2020

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 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

37% GHG emissions reduction compared to 2005 by 2025, 43% by 2030 (decarbonisation of the economy by the end of the century)

Actions

Actions specified in the following sectors: energy, land use and forestry, agriculture, industry, transport

Climate Action Tracker (CAT) evaluation of NDC and actions

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

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

To peak emissions and rapidly decrease levels afterward as required by the Paris Agreement, Brazil will need to reverse the current trend of weakening climate policy by sustaining and strengthening policy implementation in the forestry sector and accelerating mitigation action in other sectors — including a reversal of present plans to expand fossil fuel energy sources.

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

- Clarify if revisions in the National Inventory will affect absolute emission targets
- Explicitly mention the length of the time frame or the period of implementation
- Provide information on institutional arrangements for developing and implementing the NDCs, incl. consultation processes, public participation, and engagement with local communities and indigenous peoples, in a gender-responsive manner.

AMBITION: LONG-TERM STRATEGIES

Status	The Brazil Forum for Climate Change submitted a proposal for reaching net-zero emissions by 2060 to former president Michel Temer in December 2018. As yet, there is no evidence that President Bolsonaro intends to follow up on this.
2050 target	No
Interim steps	No
Sectoral targets	No
Net-zero target	Brazil's NDC mentions that Brazil will strive to decarbonise the economy by the end of the century

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

Brazil's fossil fuel subsidies totalled USD 8.0bn in 2019, mainly for petroleum. The country has no explicit carbon pricing scheme, but requires financial institutions to disclose climate risks.

1.5°C COMPATIBILITY

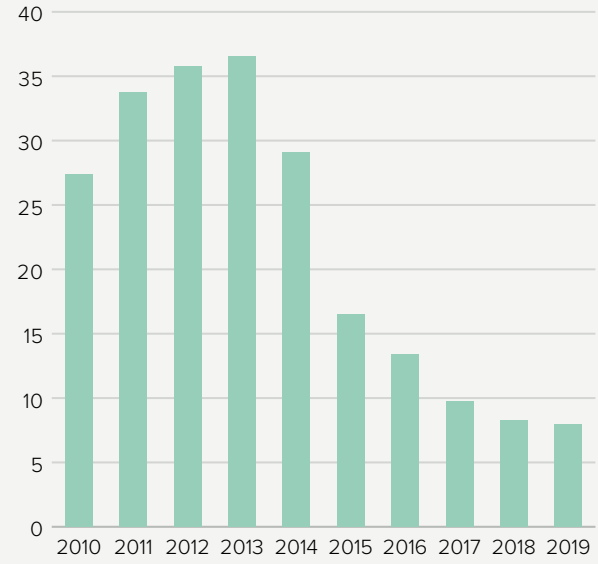
Investment in green energy and infrastructure needs to outweigh fossil fuels investments by 2025.

Source: Rogelj et al., 2018

FISCAL POLICY LEVERS

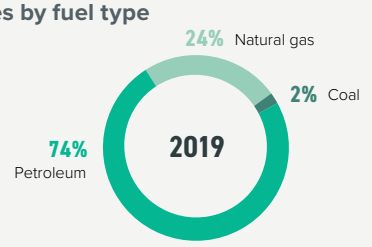
Fiscal policy levers raise public revenues and direct public resources. Critically, they can shift investment decisions and consumer behaviour towards low-carbon, climate-resilient activities by reflecting externalities in the price.

Fossil Fuel Subsidies



Source: OECD-IEA Fossil Fuel Support database, 2020

Fossil Fuel Subsidies by fuel type



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

In 2019, Brazil's fossil fuel subsidies totaled USD 8bn (compared to USD 27.4bn in 2010 and the last decade's peak of USD 35.7bn in 2012). 68% of the subsidies quantified were for the consumption of fossil fuels, and the remainder for their production. The highest amount of quantified subsidies was for petroleum, at USD 5.9bn, followed by natural gas, at USD 1.9bn. The largest subsidy is the Special Tax Regime for Goods used in the Exploration and Production of Oil and Natural Gas Fields (REPETRO), resulting in a USD 2.1bn subsidy to petroleum and natural gas.

Carbon Pricing and Revenues

No data available

No explicit carbon pricing scheme has existed in Brazil from 2007 to 2019. Brazil is considering implementing a national carbon tax or emissions trading scheme. However, the level of pricing for permits or taxation has yet to be determined, alongside the proposed start date and sectors to be covered.

CORONAVIRUS RECOVERY

The Brazilian government has approved a financial support programme for 2020, including a reallocation of budget for health expenditures and temporary income support for informal workers and the self-employed.

The Brazilian government has introduced a number of policy measures to protect energy supply during the crisis, including rules for new syndicated loans for the sector. Power auctions scheduled for 2020 have been postponed, which may cause challenges for renewable energy developers. Additional support will be needed for renewable and distributed energy providers, many of whom are small companies and are likely to be severely affected by declining demand.

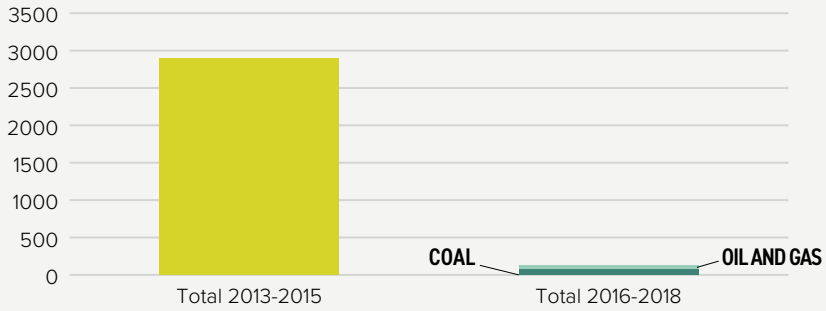
Source: World Bank, 2020

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, Brazil provided an average of USD 72m per year in public finance for the coal sector and USD 56m per year for the oil and gas sector, totalling around USD 128m per year in public finance directed to fossil fuels. This compares favourably to the previous period 2013-2015, when a total of USD 2.9bn is estimated to have been directed on average every year to the fossil fuel sector coming from the country's public finance institutions. Brazil does not have an Export Credit Agency but provides export credits through the Brazilian Development Bank (BNDES); this is the public finance institution predominantly financing fossil fuels in the country. Coal-fired power plants are also being financed through other channels.

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

No data available

Theme of support:

No data available

Multilateral climate finance contributions

No data available

Theme of support:

No data available

Core / General Contributions

No data available

Brazil is not listed in Annex II of the UNFCCC and is therefore **not formally obliged to provide climate finance.** Despite this, Brazil continues to provide international public finance for mitigation via the Global Environment Facility (GEF) Trust Fund, although Brazil's last commitment was not deposited in 2017 and was carried forward to the next replenishment cycle (GEF, 2018). While Brazil may channel international public finance towards climate change via multilateral and other development banks, this has not been included in this report.

FINANCIAL POLICY AND REGULATION

Financial policy and regulation

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

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

Between 2008 and 2011, the Central Bank of Brazil (BCB) issued a series of industry-specific green banking regulations to prioritise investment in certain sectors. **It was also the world's first banking regulator to request banks to monitor environmental risks as part of the implementation of Basel III's Internal Review for Capital Adequacy**. In 2014, the BCB published a mandatory resolution on environmental, social and governance (ESG) standards for financial institutions, strengthening risk management and requiring private banks to implement ESG policies. The private insurance regulator (SUSEP), responsible for the supervision of insurance, private pension funds and capital markets, called for implementation of the TCFD in 2017. **In 2018, the BCB published a resolution enhancing the obligation to disclose the integration of ESG consideration in investment policies with a requirement to integrate ESG issues in regular risk management processes, whenever possible**. A member of the Sustainable Banking Network (SBN) since 2012, the BCB also recently joined also the NGFS.

Nationally Determined Contribution (NDC): Finance

Conditionality	Further actions beyond the current NDC are conditional
Investment needs	Not specified
Actions	Not mentioned
International market mechanisms	Brazil reserves its position in relation to the possible use of any market mechanisms

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.

Angelo, C. and Rittl, C. (2019). *Is Brazil on the Way to Meet its Climate Targets?* http://www.observatoriodoclima.eco.br/wp-content/uploads/2019/09/Is-Brazil-on-the-way-to-meet-its-climate-targets_-1.pdf

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.

Azevedo-Ramos, C. et al. (2020). "Lawless Land in No MLn's Land: The Undesignated Public Forests in the Brazilian Amazon", *Land Use Policy,* 99, p. 104863.

Basso, L. (2019). "Brazilian Energy-Related Climate (In) action and the Challenge of Deep Decarbonisation", *Revista Brasileira de Politica Internacional.* INSTBRASILEIRORELACOESINT, 62(2).

BNamericas. (2020). *Brazil Urban Mobility Projects Move Ahead Despite Coronavirus* – BNamericas. https://www.bnamericas.com/en/analysis/brazil-urban-mobility-projects-move-ahead-despite-coronavirus

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. (2019). Brazil, *In CAT December 2019 Update.* Berlin: Climate Analytics, New Climate Institute. https://climateactiontracker.org/countries/brazil/

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

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

Climate Analytics. (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 Laws. (2020). *Brazil: Industrial Sector Plan for Mitigation and Adaptation to Climate Change.* https://climate-laws.org/cclow/geographies/brazil/policies/industrial-sector-plan-for-mitigation-and-adaptation-to-climate-change

ClimateWorks Foundation. (2016). *Carbon Transparency Initiative.* http://cti.climateworks.org/

Empresa de pesquisa energética. (2019). *Eletromobilidade e biocombustíveis* – Documento de Apoio ao PNE 2050. http://www.mme.gov.br/documents/36208/478430/17.+Eletromobilidade+e+Biocombustíveis.pdf/4116e9df-6ab1-f714-5787-3f087fbc47bf

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

Fearnside, Philip M. (2020). *"Brazilian Government Office Responds to Fearnside's BR-319 Oil and Gas Commentary"*, Mongabay. https://news.mongabay.com/2020/04/brazilian-government-office-responds-to-fearnsides-br-319-oil-gas-commentary/

GEF. (2018). *Financial Considerations for the GEF-7 Replenishment* (Prepared by the GEF Trustee), GEF/R.7/16. https://www.thegef.org/sites/default/files/council-meeting-documents/GEF-7 – Financial Considerations for the GEF-7 Replenishment - GEF_R.7_1..__.pdf

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

Governo do Brasil. (2020). *Auxílio Emergencial tem impacto positivo na vida de 126 milhões de brasileiros.* https://www.gov.br/pt-br/noticias/assistencia-social/2020/08/auxilio-emergencial-tem-impacto-positivo-na-vida-de-126-milhoes-de-brasileiros

Government of Brazil. (2016). *National Plan of Adaptation.* https://www.mma.gov.br/clima/adaptacao plano-nacional-de-adaptacao

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

ICAP. (2020). *Brazil, ETS Detailed Information*, June 2020 update.

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

INPE. (2020). *TerraBrasilis PRODES* (deforestation). http://terrabrasilis.dpi.inpe.br/app/dashboard/deforestation/biomes/legal_amazon/rates

Ministério da Ciência, T. e I. MCTIC. (2020). Fator médio – Inventários corporativos. http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_corporativos.html

Ministério de Minas e Energia. (2019). *Plano Decenal de Expansão de Energia 2029* (PDE 2029). Brasilia. http://www.mme.gov.br/c/document_library/get_file?uuid=a18d104e-4a3f-31a8-f2cf-382e654db-d20&groupId=36189.

Mongabay. (2020). "International Investors Urge Brazil to Take Real Action to Stop Deforestation". https://news.mongabay.com/2020/07/international-investors-urge-brazil-to-take-real-action-to-stop-deforestation/

Nassar, A. (2018). "Strengthening Urban Mobility Planning in Brazil", NewCities. https://newcities.org/the-big-picture-strengthening-urban-mobility-planning-in-brazil/

Observatório do Clima. (2020a). *How Threatened is the Environment Under the Bolsonaro Administration, So Far?* A Brief Context About Environmental Policy in Brazil, Sixteen Months into the Bolsonaro Administration. http://www.observatoriodoclima.eco.br/wp-content/uploads/2020/06/Doc-Response-OC2.pdf

Observatório do Clima. (2020b). INPE consolida dado e desmatamento sobe ainda mais. http://www.observatoriodoclima.eco.br/inpe-consolida-dado-e-desmatamento-sobe-ainda-mais/

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

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

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

Pavlenko, N. and Araujo, C. (2019). *Opportunities and Risks for Continued Biofuel Expansion in Brazil.* www.theicct.org.

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

Sánchez Molina, P. and Bellini, E. (2019). "Average Solar Power Price in Brazilian A-6 Auction Reaches $20.52/MWh", *PV Magazine.*

Stabile, M. C. C. et al. (2020) "Solving Brazil's Land Use Puzzle: Increasing Production and Slowing Amazon Deforestation", *Land Use Policy.* Elsevier Ltd, 91, p. 104362.

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/

Vivid Economics. (2020). *Green Stimulus Index* – June 2020 Update.

Wills, W. and Westin, F. F. (2018). "Climate Transparency Policy Paper Energy Transition in Brazil", pp. 1-14.

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 Bank. (2020*). COVID-19 in Brazil: Impacts and Policy Responses.* Washington, DC: USA. https://www.worldbank.org/en/country/brazil/publication/covid-19-in-brazil-impacts-policy-responses

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 Brazil, please contact:
CentroClima/COPPE/UFRJ
William Wills, wwills@lima.coppe.ufrj.br

PARTNERS

CENTRO CLIMA – Centro de Estudos Integrados sobre Meio Ambiente e Mudanças Climáticas – COPPE / UFRJ

CLIMATE ANALYTICS

FARN – Fundación Ambiente y Recursos Naturales

GERMANWATCH

icm – Iniciativa Climática de México

IESR – Institute for Essential Services Reform

IGES – Institute for Global Environmental Strategies

IDDRI

NEW CLIMATE INSTITUTE

HUMBOLDT-VIADRINA Governance Platform

ODI

teri

DATA PARTNERS

Agora Verkehrswende

Climate Action Tracker

CCPI – Climate Change Performance Index

Enerdata – intelligence + consulting

FUNDERS

climateworks FOUNDATION

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag

European Climate Foundation

WORLD BANK GROUP