



## BROWN TO GREEN:

## THE G20 TRANSITION TO A LOW-CARBON ECONOMY | 2017

# BRAZIL

This country profile assesses Brazil's past, present - and indications of future - performance towards a low-carbon economy by evaluating emissions, climate policy performance, climate finance and decarbonisation. The profile summarises the findings of several studies by renowned institutions.



### HUMAN DEVELOPMENT INDEX<sup>1</sup>

0.75



0.70

G20 average

Source: UNDP, 2016

### GDP PER CAPITA<sup>2</sup> (\$ (const. 2011, international))

14,444

Brazil



18,373

G20 average

Source: WB databank, 2017

### SHARE OF GLOBAL GDP<sup>2</sup>

2.6%



Global GDP

Brazil

Source: WB databank, 2017

### GHG EMISSIONS PER CAPITA<sup>3</sup> (tCO<sub>2</sub> e/cap)

6.8

Brazil

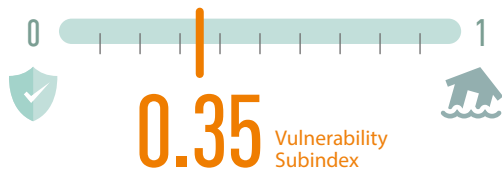


8.3

G20 average

Source: PRIMAP-hist, 2017

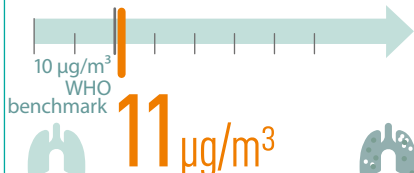
### NOTRE DAME GLOBAL ADAPTATION INITIATIVE (ND-GAIN) INDEX<sup>4</sup>



0.35 Vulnerability Subindex

Source: ND-GAIN, 2015

### AIR POLLUTION INDEX<sup>5</sup> (PM 2.5)



11 µg/m<sup>3</sup>

Source: WB databank, 2017

### SHARE OF GLOBAL GHG EMISSIONS<sup>3</sup>

2.8%



Brazil

Source: PRIMAP-hist, 2017



This country profile is part of the **Brown to Green 2017** report. The full report and other G20 country profiles can be downloaded at:

<http://www.climate-transparency.org/g20-climate-performance/g20report2017>



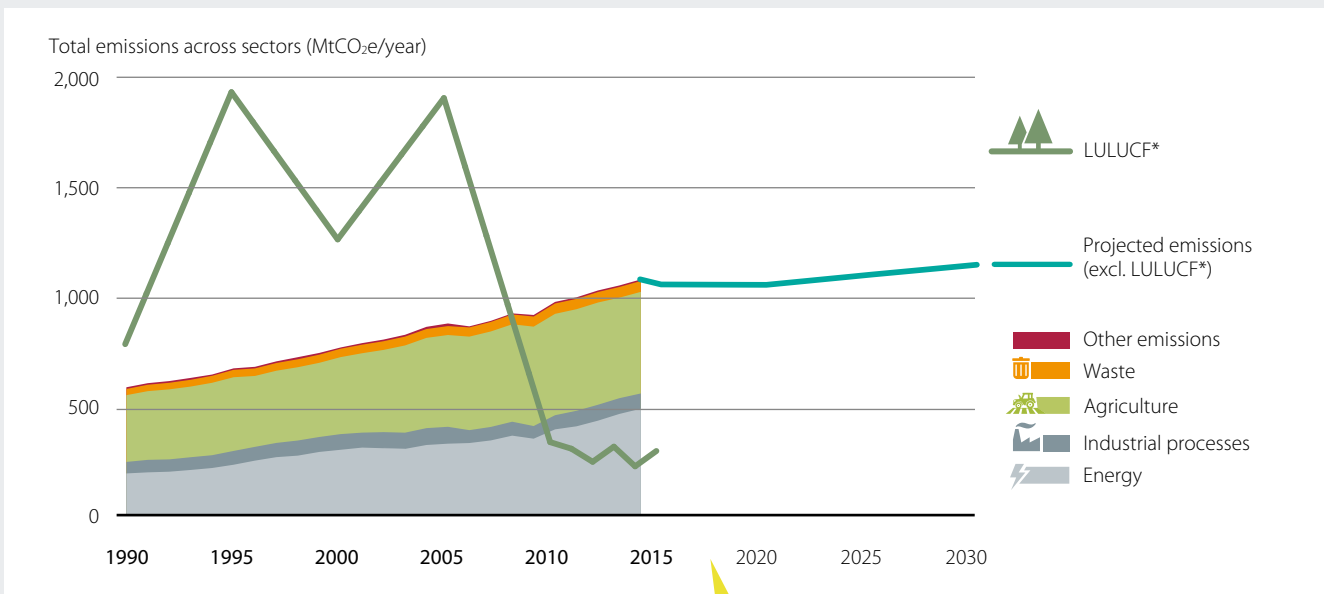
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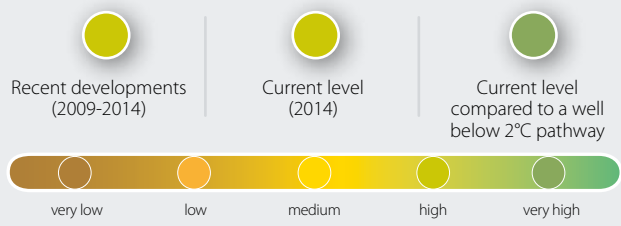


## GREENHOUSE GAS (GHG) EMISSIONS DEVELOPMENT



\*Land Use, Land Use Change and Forestry emissions according to the Climate Action Tracker  
Source: PRIMAP, 2017; CAT, 2017

### CCPI PERFORMANCE RATING OF GHG EMISSIONS PER CAPITA<sup>7</sup>



Source: CCPI 2017 – G20 Edition

Brazil's emissions (excl. LULUCF) have steadily risen since the 1990s and have recently exceeded 1GtCO<sub>2</sub>e annually. The energy (45%) and agriculture (43%) sectors are the largest contributors to GHG emissions. Emissions are projected to increase at a low pace in the next 20 years. The historically high emissions from LULUCF\* have fallen significantly over the last decade.<sup>6</sup>

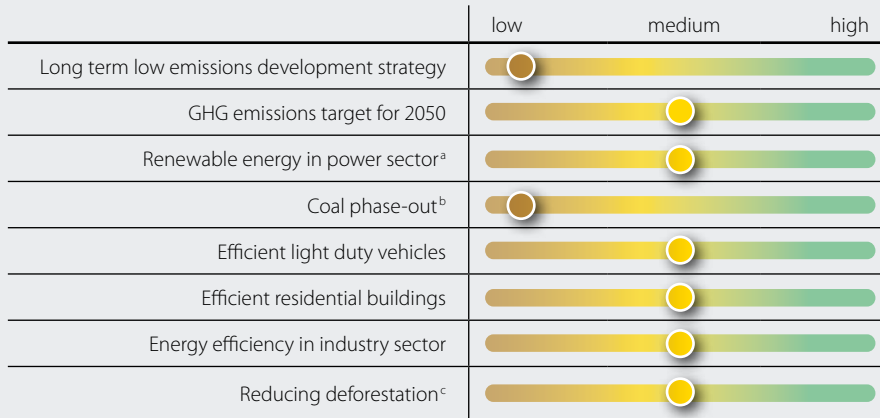


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## CLIMATE POLICY PERFORMANCE

### POLICY EVALUATION <sup>8</sup>



Climate Transparency evaluates sectoral policies and rates them whether they are in line with the Paris Agreement temperature goal. For more detail, see Annex.

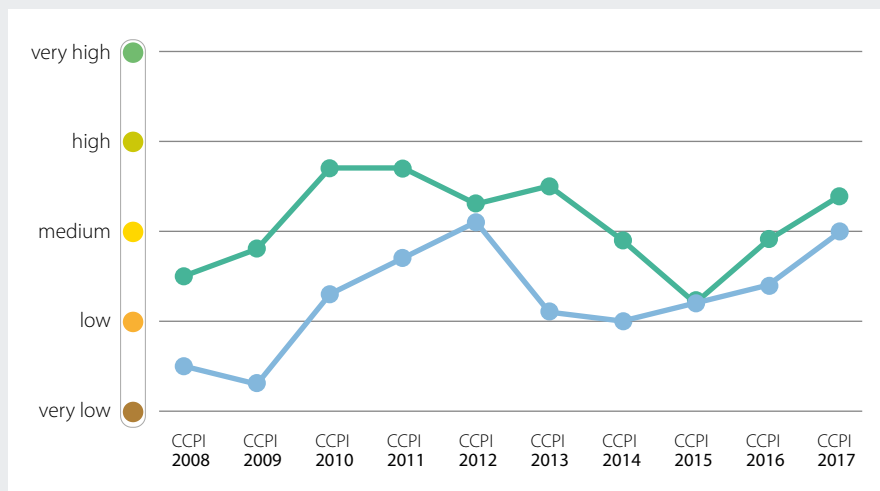
a) Share of renewables in the power sector (2014): 73%  
 b) Share of coal in total primary energy supply (2014): 6%  
 c) Forest area compared to 1990 levels (2014): 90%

Source: own evaluation

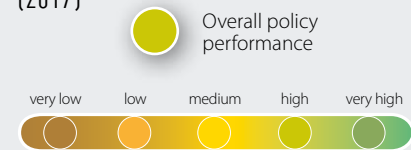
### CCPI EXPERTS' POLICY EVALUATION <sup>9</sup>

Country experts rate Brazil's international climate policy performance as high. On its national climate policy, they rate Brazil relatively high in the renewable energy and forest sectors. However, some experts state that, especially for GHG emissions

and energy use, the targets should be more ambitious to be compatible with a well below 2°C threshold. A plan for phasing out fossil fuel subsidies and an effective carbon price signal are still missing.



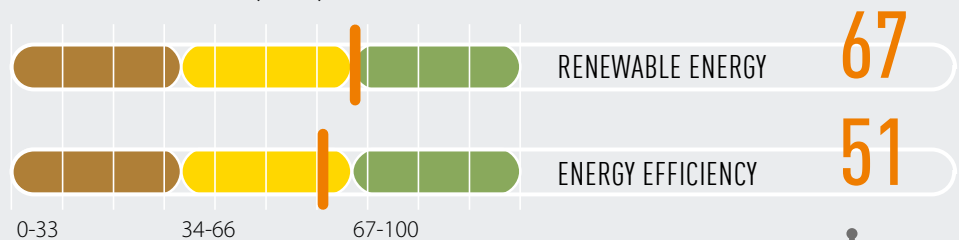
### CCPI EVALUATION OF CLIMATE POLICY (2017)



Source: CCPI 2017 – G20 Edition

### REGULATORY INDICATORS FOR SUSTAINABLE ENERGY (RISE) INDEX

RISE scores reflect a snapshot of a country's policies and regulations in the energy sector. Here Climate Transparency shows the RISE evaluation for Renewable Energy and Energy Efficiency.



Source: RISE index, 2017

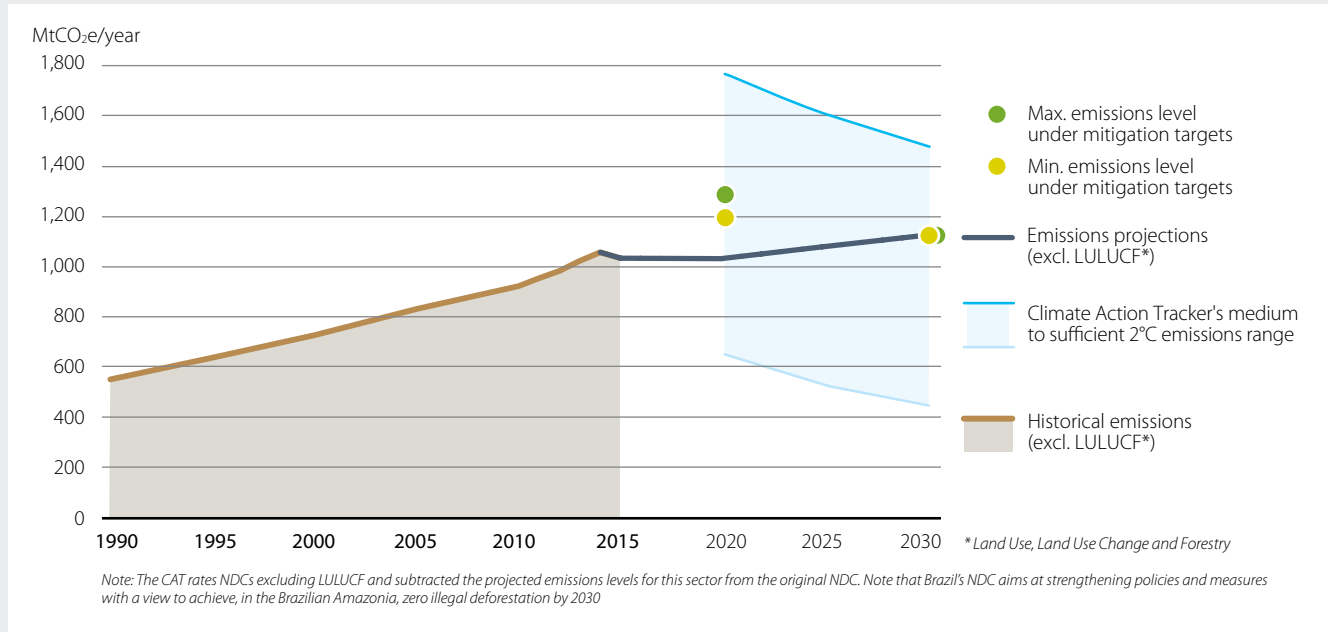


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## CLIMATE POLICY PERFORMANCE

### COMPATIBILITY OF CLIMATE TARGETS WITH A 2°C SCENARIO <sup>10</sup>



Source: CAT, 2017

Brazil is one of the few developing countries that put forward absolute emission reduction targets in their Nationally Determined Contribution (NDC) under the Paris Agreement. The Climate Action Tracker (CAT) finds that Brazil will likely meet its contribution in 2030. Emissions (excl. LULUCF) can increase slightly until 2030. Main reductions would come from reducing deforestation. The CAT rates the NDC as “medium”, meaning that it is at the least ambitious end of a fair contribution to global mitigation and not consistent with meeting the Paris Agreement’s long-term temperature goal unless other countries make much deeper reductions and comparably greater efforts.

### CLIMATE ACTION TRACKER EVALUATION OF NATIONAL PLEDGES, TARGETS AND NDC <sup>10</sup>



Source: CAT, 2017

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## FINANCING THE TRANSITION

### INVESTMENTS

#### INVESTMENT ATTRACTIVENESS

The cancellation of Brazil’s A-3 wind and solar auction in December 2016 demonstrates the effect the sharp decline in energy demand has had on the country, due to the severe recession and political



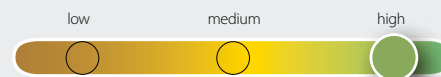
instability (RECAI, 2017). A couple of months earlier, the Brazilian Development Bank announced they would focus on clean energy while cutting support for fossil fuels.

#### ALLIANZ CLIMATE AND ENERGY MONITOR <sup>11</sup>



Source: Allianz, 2017; EY, 2017

#### RENEWABLE ENERGY COUNTRY ATTRACTIVENESS INDEX (RECAI) <sup>12</sup>



#### TREND



# BRAZIL



## FINANCING THE TRANSITION

### GREEN BONDS

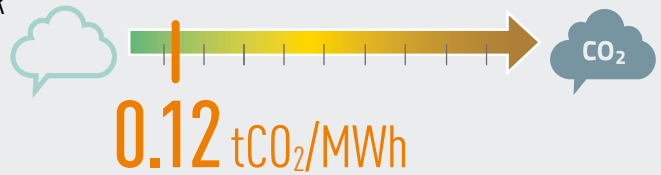
Green bonds are bonds that earmark proceeds for climate or environmental projects and have been labelled as 'green' by the issuer.<sup>13</sup>



Source: calculations done by Climate Bonds Initiative for Climate Transparency, 2017

### EMISSIONS OF NEW INVESTMENTS IN THE POWER SECTOR

This indicator shows the emissions per MWh coming from newly-installed capacity in 2016. The smaller the value, the more decarbonised the new installed capacity.



Source: calculations done by IDDRI for Climate Transparency, 2017

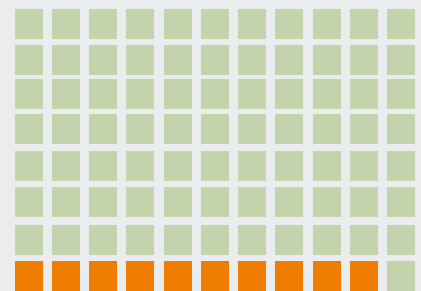
## FISCAL POLICIES

### FOSSIL FUEL SUBSIDIES (FOR PRODUCTION AND CONSUMPTION)<sup>14</sup>

The Brazilian government offers a range of tax and budgetary subsidies for fossil fuel production. Measures benefiting oil and gas producers include special tax incentives for infrastructure development in various regions, as well as a special tax regime for equipment used in the exploration and development of hydrocarbons. Coal enjoys tax exemptions for electricity generation, and coal plants have fuel costs paid until 2027. Over US\$ 25.5 billion in tax exemptions, and over US\$ 2 billion in budgetary support, for production and consumption fossil fuel subsidies, were provided in 2014.



G20 total: **230 billion US\$<sub>2014</sub>**



Source: Calculations done by ODI based on OECD inventory, 2017

### EFFECTIVE CARBON RATE<sup>16</sup>

Specific taxes on energy use comprised the entirety of Brazil's effective carbon rates in 2012 with no explicit carbon tax or emissions trading system. 37% of carbon emissions from energy use were priced, the majority from road transport, but none above EUR 30 /tCO<sub>2</sub>. Energy use in the residential and commercial sector were not priced, but the majority of unpriced emissions were from the industry sector.

EFFECTIVE CARBON RATE IN 2012<sup>17</sup>  
for non-road energy, excluding biomass emissions



Source: OECD, 2016



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## FINANCING THE TRANSITION

### PROVISION OF INTERNATIONAL PUBLIC SUPPORT

Brazil is not listed in Annex II of the UNFCCC, and it is therefore not formally obliged to provide climate finance. While there may be climate-related contributions through bilateral or multilateral development banks, these have not been included in this report.





#### PLEDGE TO THE GREEN CLIMATE FUND (GCF)

		
Obligation to provide climate finance under the UNFCCC	Signed pledge to the GCF (Million US\$)	Pledge per 1000 dollars of GDP (US\$ <sub>2011</sub> (constant))
<b>no</b>	<b>n/a</b>	<b>n/a</b>



Source: GCF, 2017

#### CONTRIBUTIONS THROUGH THE MAJOR MULTILATERAL CLIMATE FUNDS<sup>18</sup>

			
Annual average contribution 2013-2014 (Billion US\$)	Annual average contribution 2013-2014 per 1000 dollars of GDP (Billion US\$)	Adaptation	Mitigation
<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>

Source: Climate Funds Update, 2017

#### BILATERAL CLIMATE FINANCE CONTRIBUTIONS<sup>19</sup>

Bilateral finance commitments (annual average 2013-14) (Billion US\$)	Bilateral finance commitments per 1000 dollars of GDP (annual average 2013-14) (Billion US\$)	Financial instrument (average 2013-2014)				
		Grant	Concessional Loan	Non-Concessional loan	Equity	Other
 <b>n/a</b>	 <b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
		Theme of support (average 2013-14)				
		Mitigation	Adaptation	Cross-cutting	Other	
		<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	

Source: Party reporting to the UNFCCC, 2013-14

#### CLIMATE FINANCE CONTRIBUTIONS THROUGH MULTILATERAL DEVELOPMENT BANKS (MDBs)<sup>20</sup>

MDBs in aggregate spent \$21.2 billion on mitigation and \$4.5 billion on adaptation in developing countries in 2014.

**No national disaggregation available**

Source: MDB report, 2015

#### FUTURE CLIMATE FINANCE COMMITMENTS

Source: "Roadmap to US\$100 Billion" report, 2016.



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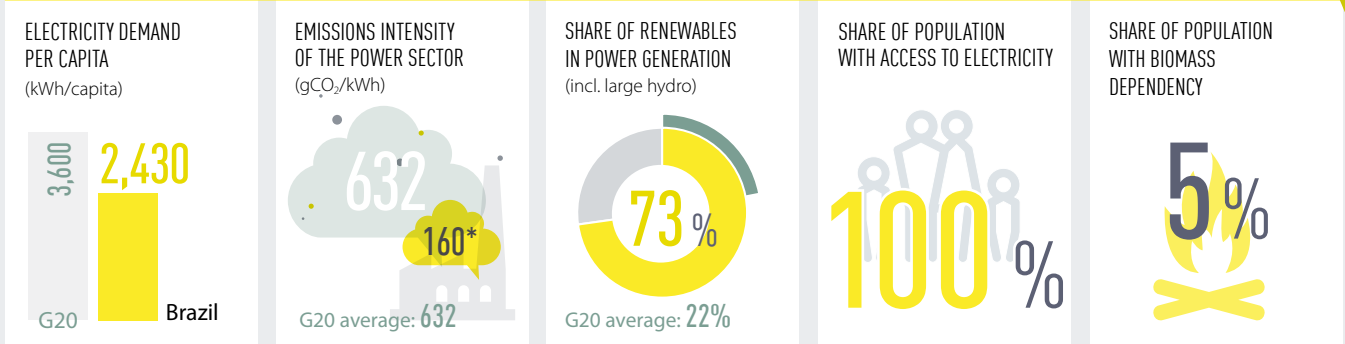


## DECARBONISATION

### SECTOR-SPECIFIC INDICATORS

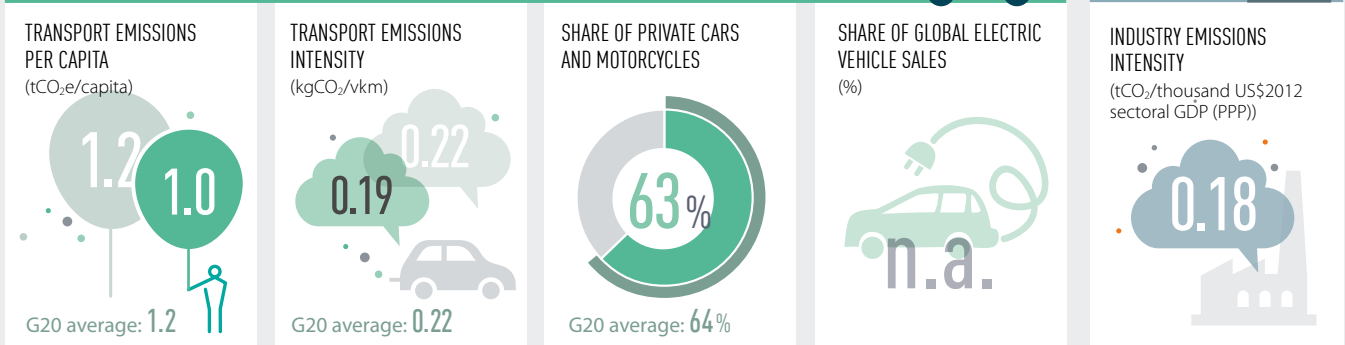


#### POWER SECTOR



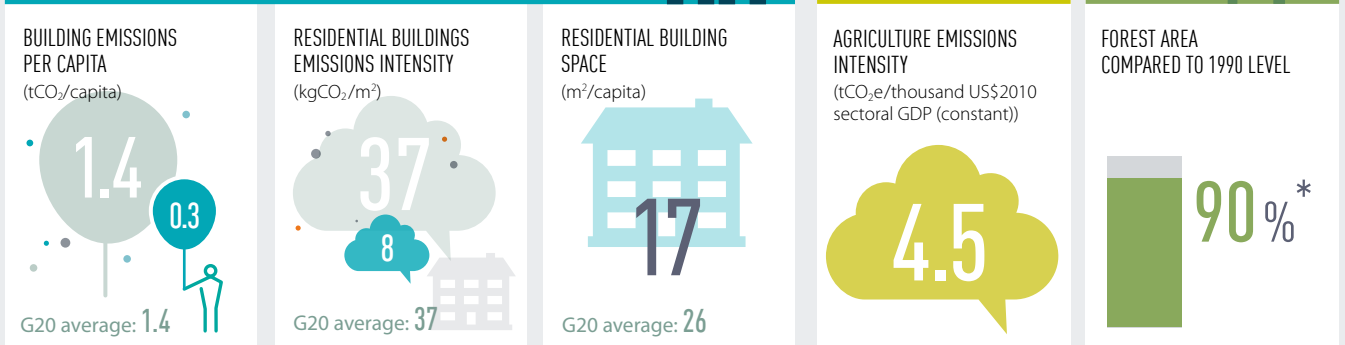
Data from 2014 Source: CAT, 2016  
 Data from 2014 Source: CAT, 2016  
 \*The Ministry of Science and Technology reports emissions intensity of 82 gCO<sub>2</sub>/kWh. This intensity is used for CDM projects under the UNFCCC.  
 Data from 2014 Source: CAT, 2016  
 Data from 2014 Source: IEA, 2016  
 Data from 2014 Source: IEA, 2016

#### TRANSPORT SECTOR



Data from 2014 Source: IEA, 2016  
 Data from 2010 Source: CAT, 2016  
 Data from 2010 Source: CAT, 2016  
 Data from 2014 Source: CAT, 2016

#### BUILDING SECTOR



Data from 2014 Source: CAT, 2016  
 Data from 2010 Source: CAT, 2016  
 Data from 2010 Source: CAT, 2016  
 Data from 2014 Source: PRIMAP, 2017; WorldBank, 2017  
 Data from 2015 Source: CAT, 2016  
 \*Total forest area in the country was 4.9 million km<sup>2</sup> in 2015.

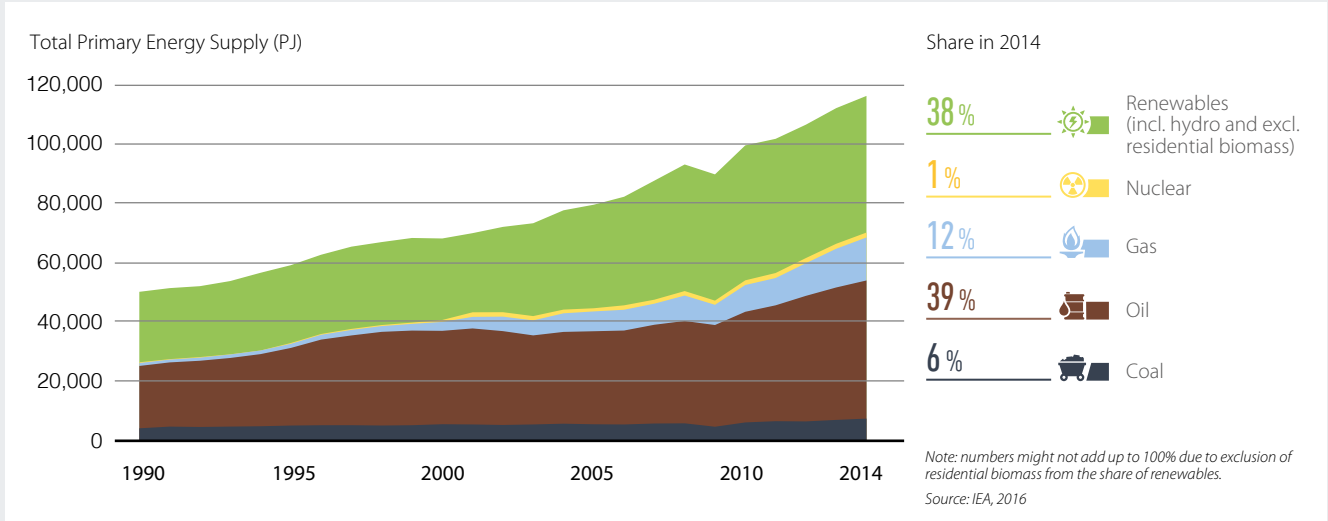


# BRAZIL



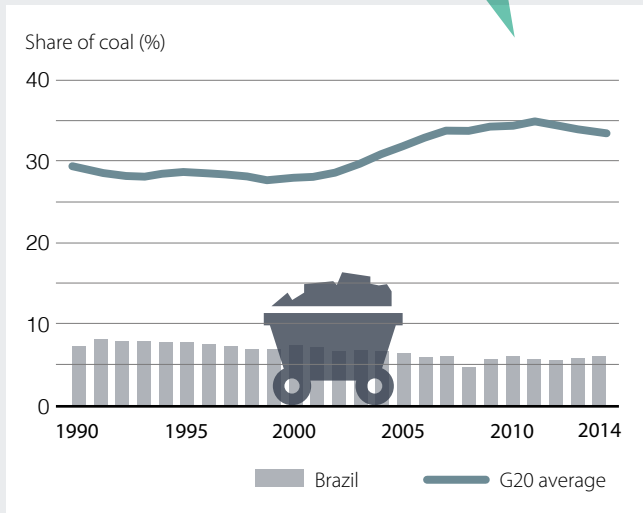
## DECARBONISATION

### ENERGY MIX <sup>21</sup>



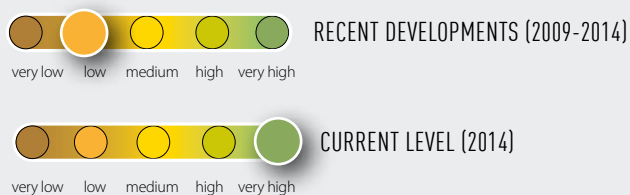
### SHARE OF COAL IN ENERGY SUPPLY <sup>22</sup>

In 2014, Brazil had the 4th lowest share of coal in the G20. Brazil's coal share has been relatively stable since 1990 (between 6% and 8%) but it has shown a small increase over the last 5 years.



Source: IEA, 2016

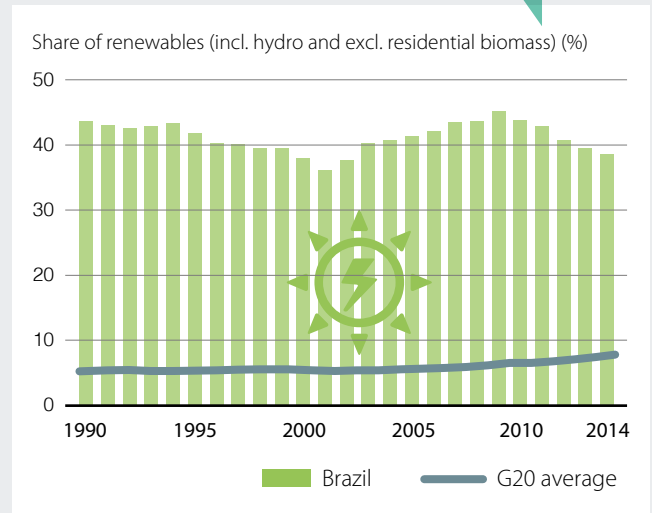
### PERFORMANCE RATING



Source: own evaluation

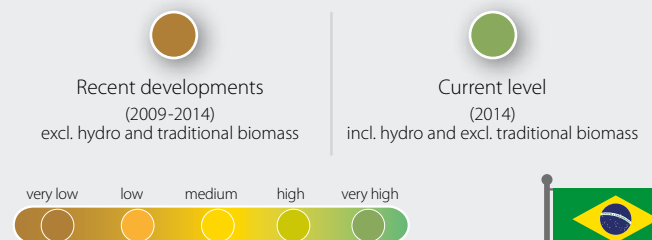
### SHARE OF RENEWABLES IN ENERGY SUPPLY <sup>23</sup>

With a large amount of hydropower and a 38% share of renewables in 2014, Brazil has by far the highest level of renewables in the G20. However, this share has steadily decreased over the last 6 years.



Source: IEA, 2016

### CCPI PERFORMANCE RATING OF THE SHARE OF RENEWABLES<sup>7</sup>



Source: CCPI 2017 - G20 Edition



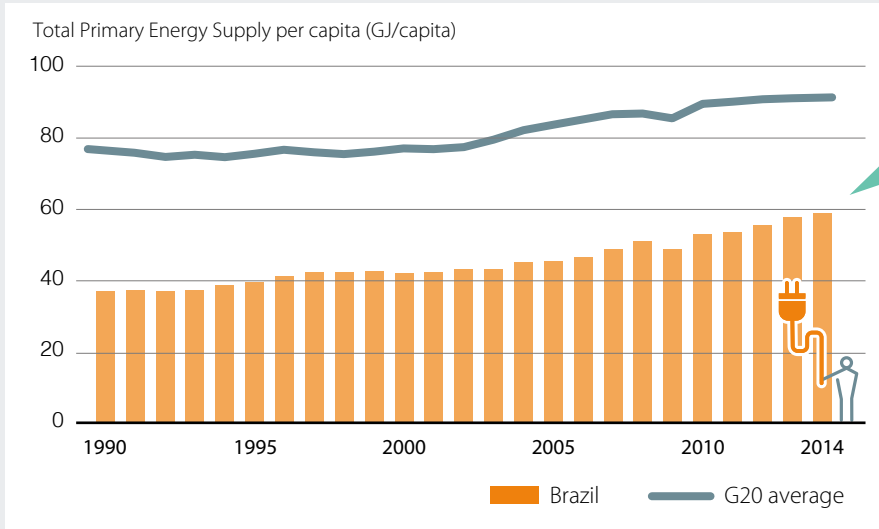


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## DECARBONISATION

### ENERGY USE PER CAPITA<sup>24</sup>



Brazil's energy use per capita is the third lowest in the G20 at 58 GJ/capita in 2014. It has however steadily increased over the past decade.

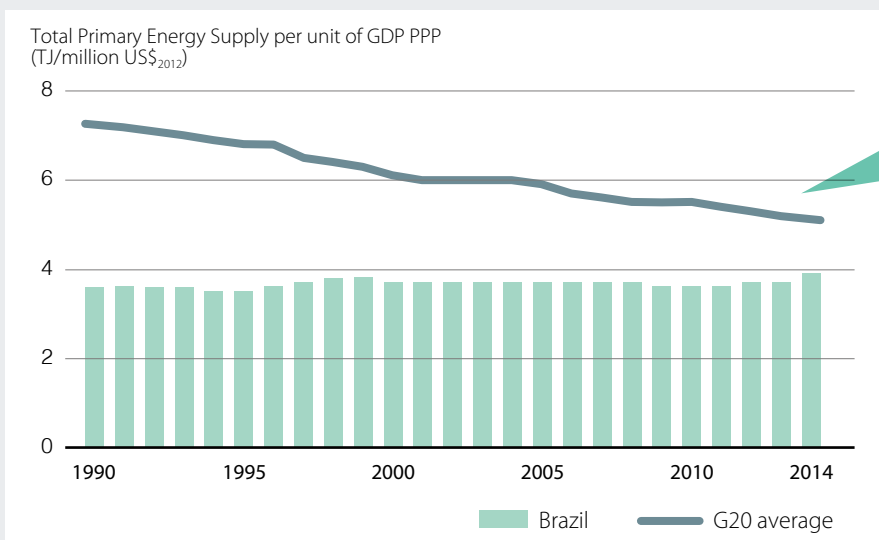
Source: IEA, 2016

### CCPI PERFORMANCE RATING OF ENERGY USE PER CAPITA<sup>7</sup>



Source: CCPI 2017 – G20 Edition

### ENERGY INTENSITY OF THE ECONOMY<sup>25</sup>



The energy intensity of Brazil's economy has remained relatively steady since 1990. It is still below G20 average but has shown a mild increase over the last five years.

### PERFORMANCE RATING



Source: own evaluation

Source: IEA, 2016

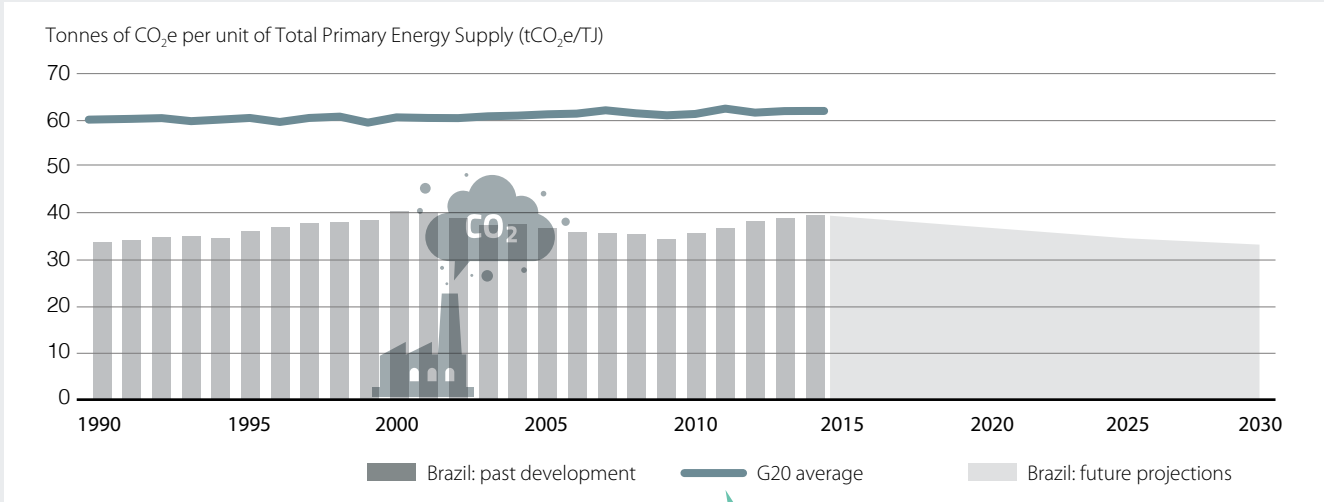


# BRAZIL



## DECARBONISATION

### CARBON INTENSITY OF THE ENERGY SECTOR <sup>26</sup>



Source: IEA, 2016

### PERFORMANCE RATING

very low low medium high very high



RECENT DEVELOPMENTS (2009-2014)

very low low medium high very high



CURRENT LEVEL (2014)

Source: own evaluation

The carbon intensity of Brazil's energy sector has historically been significantly below the G20 average, and remains at only 2/3 of this average (40 tCO<sub>2</sub>/TJ).

# ANNEX



## KEY INDICATORS

- 1) The Human Development Index (HDI) is a composite index published by the United Nations Development Programme (UNDP). It is a summary measure of average achievement in key dimensions of human development. A country scores higher when the lifespan is higher, the education level is higher, and GDP per capita is higher. Data for 2016.
- 2) Gross Domestic Product (GDP) per capita is calculated by dividing GDP with midyear population figures. GDP is the value of all final goods and services produced within a country in a given year. Here GDP figures at purchasing power parity (PPP) are used. Data for 2015.
- 3) PRIMAP-hist combines several published datasets to create a comprehensive set of greenhouse gas emissions pathways for every country and Kyoto gas covering the years 1850 to 2014 and all UNFCCC member states as well as most non-UNFCCC territories. The data resolves the main IPCC 1996 categories. Data for 2014.
- 4) The ND-GAIN index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. It is composed of a vulnerability score and a readiness score. In this report, we display the vulnerability score, which measures a country's exposure and sensitivity to the negative impact of climate change in six life-supporting sectors – food, water, health, ecosystem service, human habitat and infrastructure. In this report, we only display the vulnerability score of the index. Data for 2015.
- 5) Average level of exposure of a nation's population to concentrations of suspended particles measuring less than 2.5 microns in aerodynamic diameter, which are capable of penetrating deep into the respiratory tract and causing severe health damage. Data for 2015.

## GREENHOUSE EMISSIONS (GHG)

- 6) This indicator gives an overview of the country's emissions profile and the direction the country's emissions are taking under current policy scenario.
- 7) The Climate Change Performance Index (CCPI) aims to enhance transparency in international climate politics. On the basis of standardised criteria, the index evaluates and compares the climate protection performance of countries in the categories GHG emissions, renewable energy and energy use. It assesses the recent developments, current levels, policy progress and the compatibility of the country's current performance and future targets with the international goal of limiting global temperature rise well below 2°C.

## CLIMATE POLICY PERFORMANCE:

- 8) The table below displays the criteria used to assess a country's policy performance. For the sector-specific policy criteria the 'high' rating is informed by the Climate Action Tracker (2016) report on the ten steps needed to limit warming to 1.5°C and the Paris Agreement.
- 9) The CCPI evaluates a country's performance in national climate policy, meaning the performance in establishing and implementing a sufficient policy framework, as well as international climate diplomacy through feedback from national climate and energy experts.
- 10) The Climate Action Tracker is an independent, science-based assessment that tracks government emissions reduction commitments and actions. It provides an up-to-date assessment of individual national pledges, targets and NDCs and currently implemented policies to reduce greenhouse gas emissions.

## FINANCING THE TRANSITION

- 11) The Allianz Climate and Energy Monitor ranks G20 member states on their relative fitness as potential investment destinations for building low-carbon electricity infrastructure. The investment attractiveness of a country is assessed through four categories: policy adequacy, policy reliability of sustained support, market absorption capacity and the national investment conditions.
- 12) The Renewable Energy Country Attractiveness Index (RECAI) produces scores and rankings for countries' attractiveness based on macro drivers, energy market drivers and technology-specific drivers which, together, compress a set of 5 drivers, 16 parameters and over 50 datasets. For comparability purposes with the Allianz Monitor index, we divided the G20 members included in the latest RECAI ranking (May 2017) in two categories and rate the top half as "high performance" and the lower half as "medium performance".
- 13) The green bonds country indicator shows which countries are active in the green bond market by showing green bonds per country as a percentage of the overall debt securities market for that country. Green bonds were created to fund projects that have positive environmental and/or climate benefits.
- 14) The data presented is from the OECD inventory: [www.oecd.org/site/tadffss/](http://www.oecd.org/site/tadffss/) except for Argentina and Saudi Arabia for which data from the IEA subsidies database is used. The IEA uses a different methodology for calculating subsidies than the OECD. It uses a 'price-gap' approach and covers a sub-set of consumer subsidies. The price-gap approach compares average end-user prices paid by consumers with reference prices that corresponds to the full cost of supply.

To endnote 8) Rating

	Criteria description		
	● Low	● Medium	● High
Long term low emissions development strategy	No long term low emissions strategy	Existing long term low emissions strategy	Long-term low emissions strategy submitted to the UNFCCC in accordance with Article 4, paragraph 19, of the Paris Agreement
GHG emissions target for 2050	No emissions reduction target for 2050 (or beyond)	Existing emissions reduction target for 2050 (or beyond)	Emissions reduction target to bring CO <sub>2</sub> emissions to at least net zero by 2050
Renewable energy in power sector	No policy or support scheme for renewable energy in place	Support scheme for renewables in the power sector in place	Support scheme and target for 100% renewables in the power sector by 2050 in place
Coal phase-out	No consideration or policy in place for phasing out coal	Significant action to reduce coal use implemented or coal phase-out under consideration	Coal phase-out in place
Efficient light duty vehicles	No policy or emissions performance standards for LDVs in place	Energy/emissions performance standards or support for LDVs	National target to phase out fossil fuel cars in place
Efficient residential buildings	No policy or low-emissions building codes and standards in place	Building codes, standards and fiscal/financial incentives for low-emissions options in place	National strategy for near-zero energy buildings (at least for all new buildings)
Energy efficiency in industry sector	No policy or support for energy efficiency in industrial production in place	Support for energy efficiency in industrial production (covering at least two of the country's subsectors (e.g. cement and steel production))	Target for new installations in emissions-intensive sectors to be low-carbon after 2020, maximising efficiency
Reducing deforestation	No policy or incentive to reduce deforestation in place	Incentives to reduce deforestation or support schemes for afforestation /reforestation in place	National target for reaching zero deforestation by 2020s

## ANNEX (continued)

G20



- 15) This footnote had to be deleted as the data for the corresponding indicator was not available at the time of publication of this report.
- 16) In addition to carbon pricing mechanisms, emissions trading schemes and various energy taxes also act as prices on carbon, although they are generally not developed with the aim of reducing emissions. The OECD report presents calculations on 'Effective Carbon Rates' as the sum of carbon taxes, specific taxes on energy use, and tradable emission permit prices. The calculations are based on 2012 energy policies and prices, as covered in OECD's Taxing Energy Use database. According to OECD estimates, to tackle climate change emissions should be priced at least EUR 30 (or US\$ 37) per tonne of CO<sub>2</sub> revealing a major 'carbon pricing gap' within the G20.
- 17) The effective carbon rate presented in this country profile does not factor in emissions from biomass, as many countries and the UNFCCC treat them as carbon-neutral. However, in many cases biomass emissions are found to be non-carbon neutral over their lifecycle, especially due to the land use changes they cause.
- 18) Finance delivered through multilateral climate funds comes from Climate Funds Update, a joint ODI/Heinrich Boell Foundation database that tracks spending through major multilateral climate funds. Figures include: Adaptation for Smallholder Agriculture Programme; Adaptation Fund; Clean Technology Fund; Forest Carbon Partnership Facility; Forest Investment Program; Global Environment Facility (5th and 6th Replenishment, Climate Focal Area only); Least Developed Countries Fund; Partnership for Market Readiness; Pilot Program for Climate Resilience; Scaling-up Renewable Energy Program; and the Special Climate Change Fund.
- 19) Bilateral finance commitments are sourced from Party reporting to the UNFCCC under the Common Tabular Format. Figures represent commitments of funds to projects or programmes, as opposed to actual disbursements.
- 20) Data for the MDB spending on climate action includes ADB, AfDB, EBRD, EIB, IDB, IFC and the World Bank. Data is self-reported annually by the MDBs, based on a shared methodology they developed. The reported data includes MDBs own resources and expenditure in EU13, not funding from external sources that are channelled through the MDBs (e.g through bilateral donors and dedicated climate funds that are captured elsewhere). Data reported corresponds to the financing of adaptation or mitigation projects or of those components, sub-components, or elements within projects that provide adaptation or mitigation benefits (rather than the entire project cost). It does not include public or private finance mobilised by MDBs.

## ■ DECARBONISATION

- 21) Total primary energy supply data displayed in this factsheet does not include non-energy use values.
- 22) The share of coal in total primary energy supply reveals the country's historical and current proportion of coal in the energy mix. As coal is one of the dirtiest of fossil fuels, reducing coal's share in its energy mix is a crucial step for a country's transition to a green economy.
- 23) The share of renewable energy in total primary energy supply shows a country's historical and current proportion of renewables in the energy mix. The numbers displayed in the graph do not include residential biomass and waste values. Replacing fossil fuels and promoting the expansion of renewable energy is an important step for reducing emissions.
- 24) TPES per capita displays the historical, current and projected energy supply in relation to a country's population. Alongside the intensity indicators (TPES/GDP and CO<sub>2</sub>/TPES), TPES per capita gives an indication on the energy efficiency of a country's economy. In line with a well-below 2°C limits, TPES/capita should not grow above current global average levels. This means that developing countries are still allowed to expand their energy use to the current global average, while developed countries have to simultaneously reduce it to that same number.
- 25) TPES per GDP describes the energy intensity of a country's economy. This indicator illustrates the efficiency of energy usage by calculating the energy needed to produce one unit of GDP. A decrease in this indicator can mean an increase in efficiency but also reflects structural economic changes.
- 26) This indicator describes the carbon intensity of a country's energy sector (expressed as the CO<sub>2</sub> emissions per unit of total primary energy supply) and gives an indication on the share of fossil fuels in the energy supply.

For more detail on the sources and methodologies behind the calculation of the indicators displayed, please download the Technical Note at:

<http://www.climate-transparency.org/g20-climate-performance/g20report2017>