



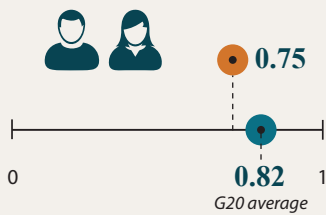
## BROWN TO GREEN: G20 TRANSITION TO A LOW CARBON ECONOMY

# Brazil



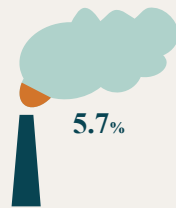
This country profile assesses the Brazil's past, present and indications of future performance towards a low-carbon economy by evaluating emissions, decarbonisation, climate policy performance and climate finance. The profile summarises the respective findings from, amongst others, the Climate Change Performance Index (CCPI, operated by Germanwatch and Climate Action Network Europe), the Climate Action Tracker (CAT, operated by Climate Analytics, NewClimate Institute, Ecofys and Potsdam Institute for Climate Impact Research), and analyses from the Overseas Development Institute (ODI).

### Human Development Index



Source: UNDP, data for 2015

### Share of global GHG emissions



Source: World Bank Indicators, data for 2012

### GHG emissions per capita (tCO<sub>2</sub>e/cap)



### Share of global GDP



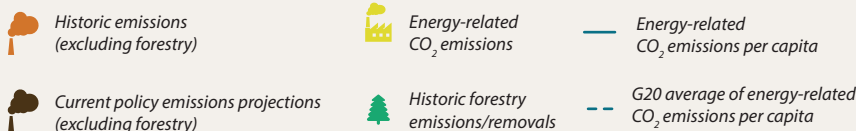
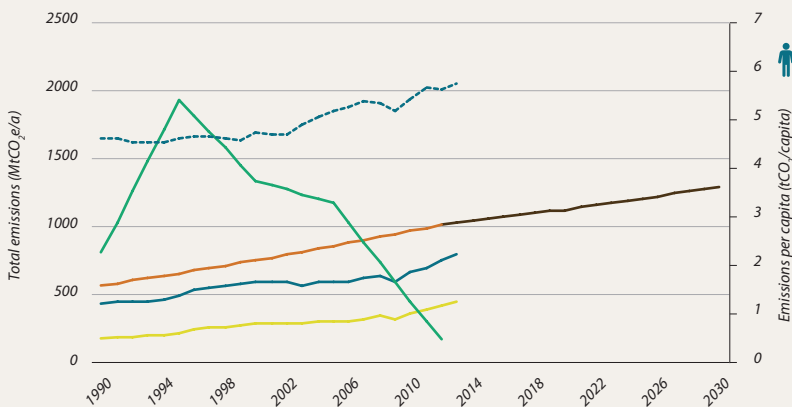
### GDP per capita



Source: IEA, data for 2013

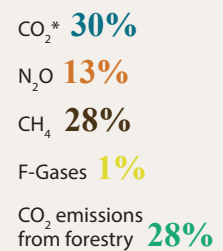
\*World Bank indicators were used as a source of greenhouse gas emissions for all countries to ensure comparability and coverage of most recent years. These estimates differ from what countries report in their national communications. Per capita emissions of Brazil would be 6.4 tCO<sub>2</sub>e/cap in 2010 when using the greenhouse gas emission estimate from the third national communication reported by Brazil. Brazil has not report emission estimates after 2010.

## GREENHOUSE GAS (GHG) EMISSIONS



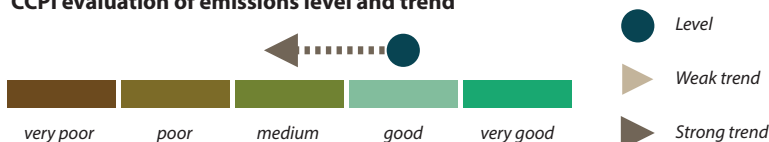
In Brazil, GHG emissions have risen since 1990, a trend likely to continue to 2030. Land use, land-use change and forestry (LULUCF) emissions play a major role in Brazil's GHG profile. At their 1995 peak, they were nearly triple those of all GHG emissions from other sources, but have now declined. Since 2011, LULUCF emissions have been lower than energy-related CO<sub>2</sub>. Energy-related CO<sub>2</sub>/capita have risen, but are well below G20 average. CCPI 2016 rates Brazil's emissions as relatively good, but growing energy-related emissions per capita account for a negative trend.

### Composition of GHG emissions



\*CO<sub>2</sub> emissions excl. LULUCF  
Source: Annex I countries: UNFCCC (2015); Non-Annex I countries: IEA (2014) and CAT (2015)

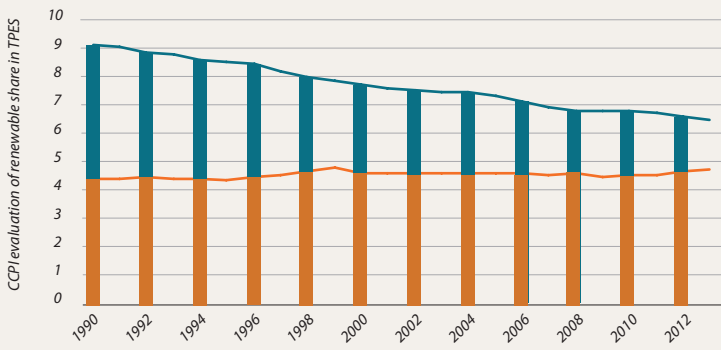
### CCPI evaluation of emissions level and trend



Sources: Past energy related emissions from the Climate Change Performance Index (CCPI); past non-energy and future emissions projections from the Climate Action Tracker (CAT). CCPI calculations are primary based on the most recent IEA data; CAT calculations are based on national policies and country communications.

# DECARBONISATION

## Energy intensity of the economy

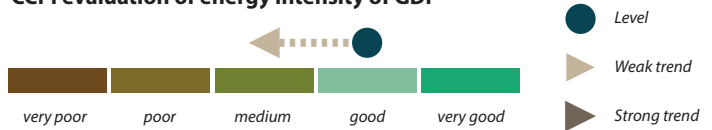


Energy intensity  
Average energy intensity in G20

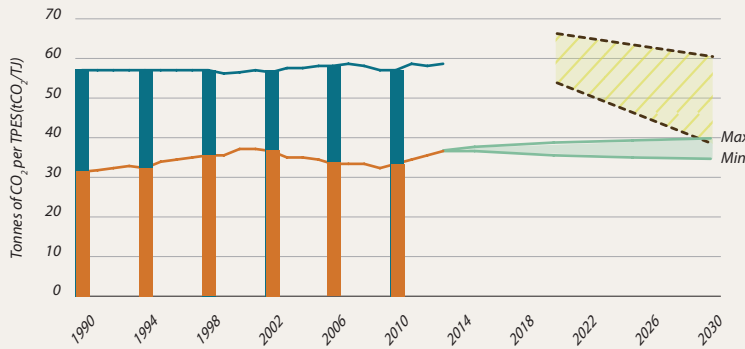
Source: CCPI, 2016

The energy intensity of Brazil's economy (TPES/GDP) has remained at about the same level throughout recent years, in contrast to most G20 countries, which have falling energy intensity rates. Nevertheless, Brazil's energy intensity remains below the G20 average. The CCPI evaluates the energy intensity of Brazil's economy as relatively good, and sees a negative trend.

### CCPI evaluation of energy intensity of GDP



## Carbon intensity of the energy sector

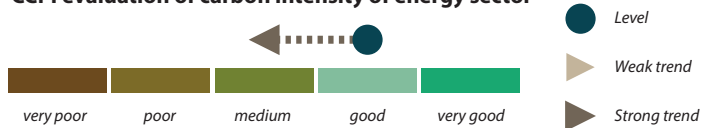


Carbon intensity (past trend)  
Average carbon intensity in G20  
Carbon intensity (current policy projection)  
Global benchmark for a 2°C pathway

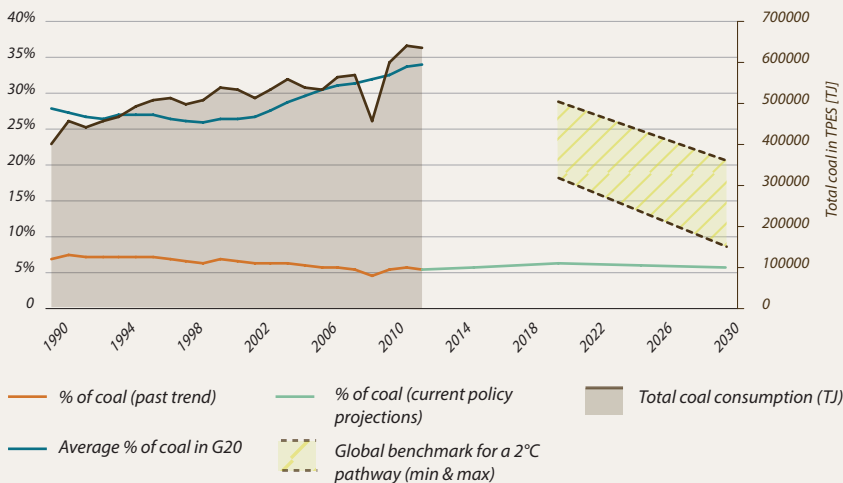
Sources: Past: CCPI; future projections: CAT

Compared to the G20 average, Brazil's carbon intensity of total primary energy supply (CO<sub>2</sub>/TPES) is relatively low. While it has been rising since 2009, it is expected to remain relatively constant in the future. In 2013, CO<sub>2</sub> emissions per TPES were at a level of about 37 tCO<sub>2</sub> per TJ, considered relatively good in the CCPI rating. Due to the increase within the last five years, the CCPI recognises a negative trend.

### CCPI evaluation of carbon intensity of energy sector



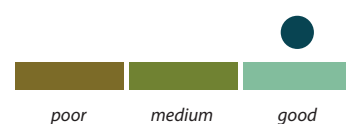
## Share of coal Total Primary Energy Supply (TPES)



Source: CAT

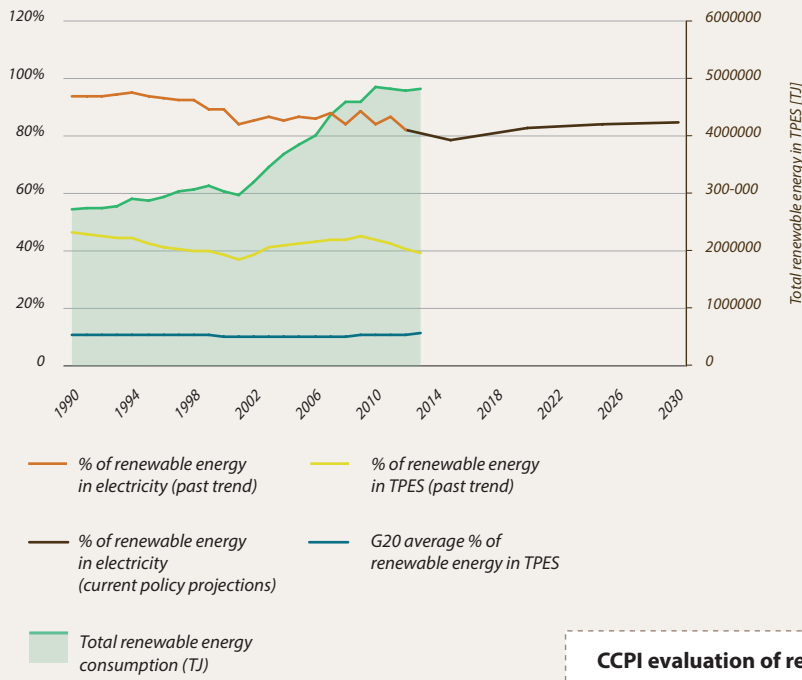
The share of coal in Brazil's total primary energy supply is relatively low. Since 1990 it has varied between 5% and 8%. For future predictions, it is expected that the share will remain on a level of around 6% until 2030.

### Evaluation of coal share in TPES



Source: own evaluation

## Renewable energy in TPES and electricity sector



Total renewable energy in TPES [TJ]

Brazil's share of renewable energy in electricity slightly decreased over the last decade. However, it remains at a very high level with a share of 82% in 2012. According to future projections, the share will slightly increase in the coming years. Due to its large-scale hydro power generation, nearly 40% of its primary energy supply comes from renewable sources, the highest share in the G20 countries. It must be noted that large hydro-power plants raise other environmental and social concerns. The CCPI assessment ranks Brazil as relatively good. Further growth in the renewables sector over the past five years contributes to a positive trend.

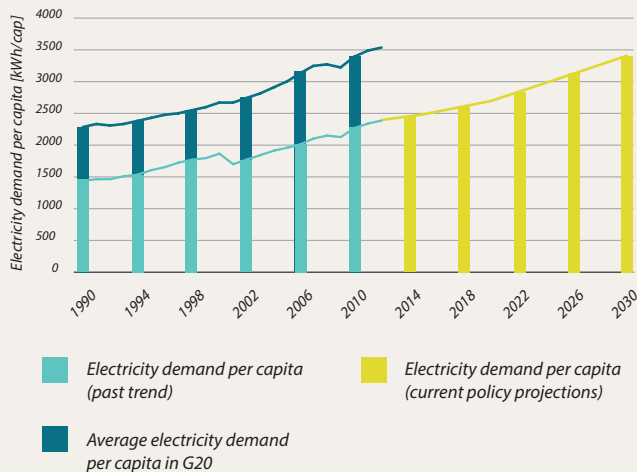
Sources: CCPI and CAT

### CCPI evaluation of renewable share in TPES



## Electricity demand per capita

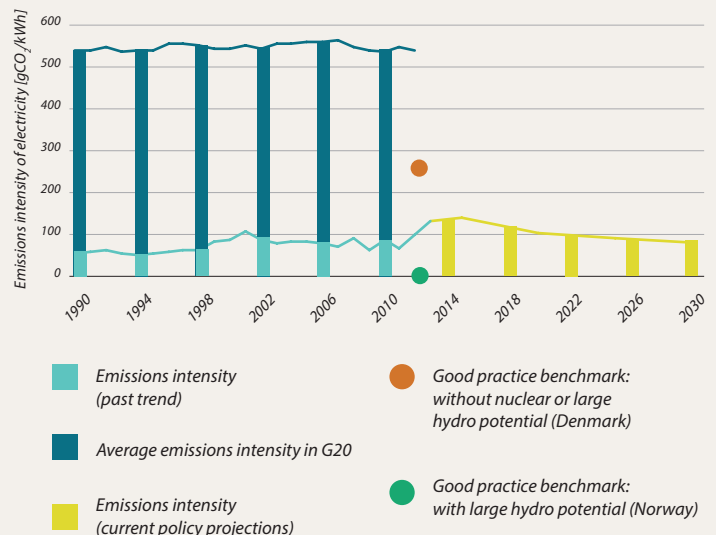
Brazil's electricity demand per capita continuously increased over recent years, but remains relatively low compared to other G20 countries. It is expected that it will further increase until 2030.



Source: CAT, 2015

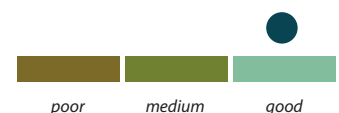
## Emissions intensity of the electricity sector

Brazil's electricity emissions intensity has increased, and today is around 98 gCO<sub>2</sub> per kWh. This relatively low intensity level results from the large hydropower sector and its relatively well-developed renewable energy sector. Future projections show electricity emissions intensity will remain relatively stable.



Source: CAT, 2015

### Evaluation of the electricity emission intensity



Source: own evaluation

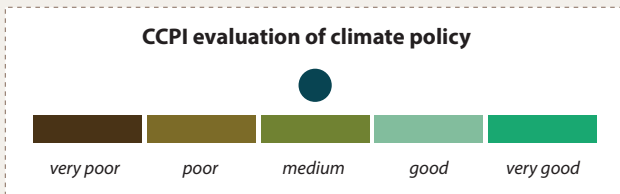
# CLIMATE POLICY PERFORMANCE

## Checklist of the climate policy framework

Low emissions development plan for 2050*	✗
2050 GHG emissions target	✗
Building codes, standards and incentives for low-emissions options	✓
Support scheme for renewables in the power sector	✓
Emissions performance standards for cars	✓
Emissions Trading Scheme (ETS)	✗
Carbon tax	✗

\* understood as decarbonisation plans and not specifically as the plans called for in the Paris Agreement

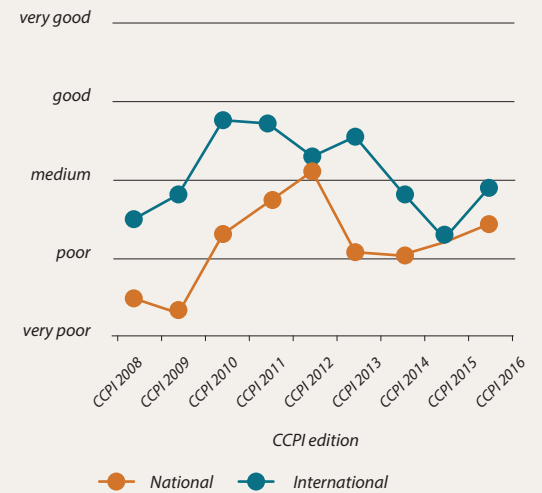
Source: Climate Policy Database, 2016



## Climate policy evaluation by experts

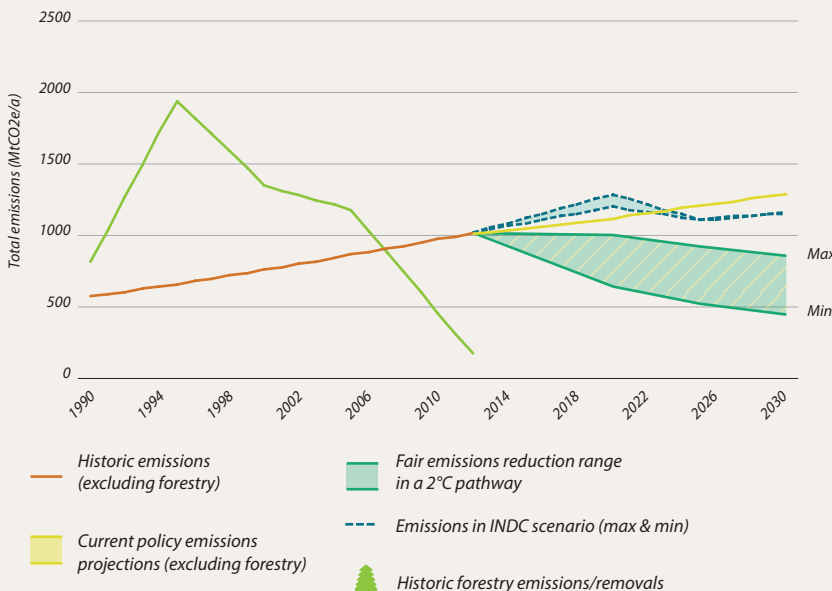
On national policy, experts highlighted Brazil's weak governance and poor appreciation for economic opportunities in low carbon development. On international policy, experts acknowledged the efforts in pushing negotiations, but criticised the poor mitigation ambition and willingness to compromise. Overall, the CCPI rates Brazil's climate policy as medium.

The CCPI evaluates a country's performance in national and international climate policy through feedback from national energy and climate experts.

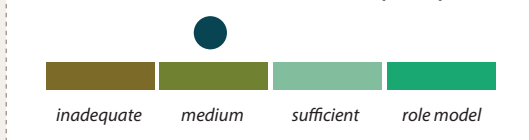


Source: CCPI, 2016

## Compatibility of national climate targets (INDCs) with a 2°C scenario



## CAT evaluation of Brazil's Intended National Determined Contributions (INDC)



Source: CAT, 2015

Brazil submitted its Intended Nationally Determined Contribution (INDC) on 28 September 2015. Its target is to reduce net GHG emissions by 37% below 2005 levels by 2025, after accounting for the Land Use, Land Use Change and Forestry (LULUCF) sector. The INDC also has an "indicative contribution" to reduce emissions by 43% below 2005 levels by 2030, including LULUCF. It outlined steps to help meet the targets, including a share of 45% renewables in the total energy mix by 2030.

After excluding LULUCF, the Climate Action Tracker estimates the INDC will result in an increase in emissions of about 36% above 2005 levels by 2025. Based on this target, it rates Brazil "medium," meaning it is inconsistent with limiting warming to below 2°C - unless other countries make much deeper reductions and comparably greater effort.

According to the CAT's assessment, Brazil is very close to meeting its INDC targets under current policies. For example, the 45% renewable energy target represents a very small improvement relative to baseline projections. Currently implemented policies lead to about 41% of renewables in Brazil's energy mix by 2030, close to today's level of 41.3%.

## FINANCING THE TRANSITION

### Investment attractiveness



Allianz Energy and Climate Monitor

LOW

RECAI\* (E&Y index)  
Category (own assessment)

MEDIUM

Trend\*\*



\*Adapted from RECAI and re-classified in 3 categories (low, medium, high) for comparison purposes with Allianz Monitor.

\*\*Taken from RECAI issue of May 2016

Climate Transparency rates Brazil's investment attractiveness as low to medium, due to weak long-term renewables targets, inadequate (financial) support policies for renewable energy development and unambitious past political action. While strongly relying on hydropower, Brazil has a low market absorption capacity for other renewables, despite a recent plan to increase non-hydro renewable capacity by 12GW by 2018.

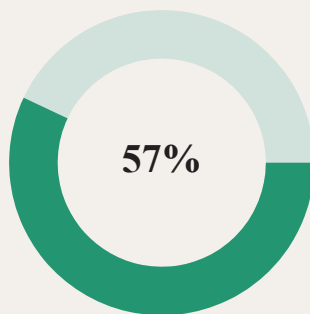
Sources: Allianz Energy and Climate Monitor and RECAI reports

The Allianz Energy & Climate 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. The Renewable Energy Country Attractiveness Index (RECAI) produces score 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.

### Historical investments in renewable energy and investment gap

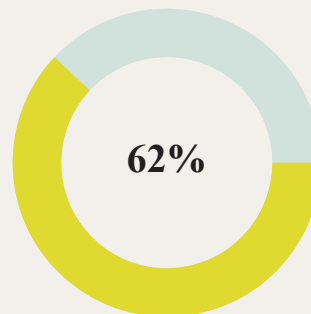
This section shows Brazil's current investments in the overall power sector (including distribution and transmission) as well as in renewable energy expressed as the share of the total annual investments needed to be in line with a 2°C compatible trajectory.

#### Investments in the power sector



% of current investments in the power sector compared to the investment needs under a 2°C pathway

#### Investments in renewable energy for the power sector



% of current investments for renewable energy in the power sector compared to the investment needs under a 2°C pathway

Source: Adapted from WEIO, 2014<sup>(1)</sup>

<sup>(1)</sup> WEIO (2014) compares annual average investments from 2000 to 2013 with average annual investments needed from 2015 to 2030 under a 2°C scenario

### Carbon pricing mechanisms

#### Emissions Trading Schemes (ETS)

An ETS caps the total level of GHG emissions and allows industries to trade allowances based on their marginal abatement cost. By creating a supply and demand for allowances, an ETS establishes a market price for GHG emissions.

#### Carbon Tax

A Carbon tax directly sets a price on carbon by defining a tax rate on GHG emissions or – more commonly – on the carbon content of fossil fuels. Unlike an ETS, a carbon tax is a price-based instrument that pre-defines the carbon price, but not the emissions reduction outcome of a carbon tax.

Although Brazil has no carbon pricing system yet in place, the government is currently exploring possibilities of using a national Emissions Trading Scheme to more cost-effectively meet its voluntary greenhouse gas reduction commitment.

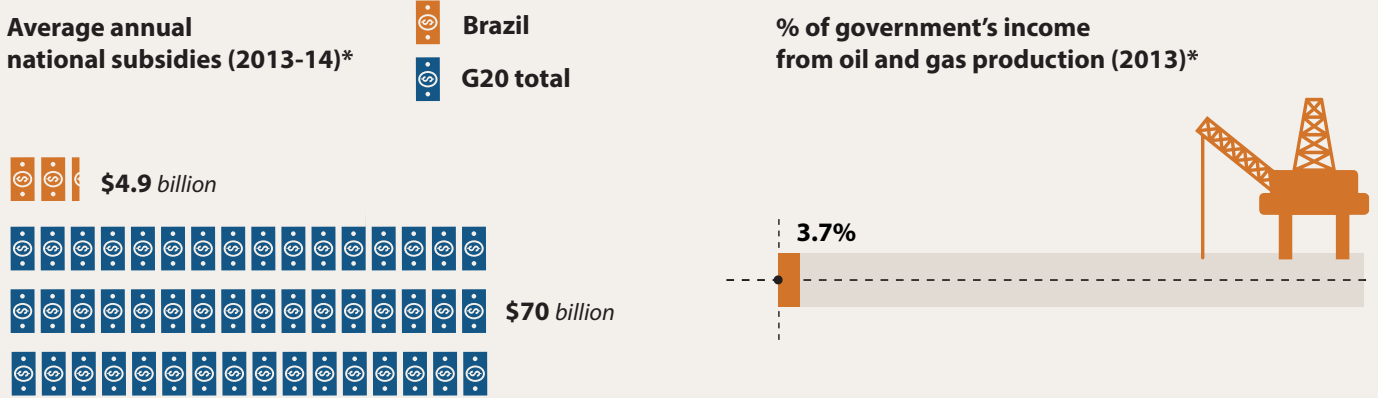
At the subnational level, Rio de Janeiro and Sao Paulo are considering implementing ETS schemes to curb emissions from energy-intensive sectors. However, political opposition has significantly delayed and further postponed their implementation.



Sources: World Bank and Ecofys, 2016; other national sources

## Fossil fuel subsidies

Petrobras, where the government holds the controlling interest, is Brazil's largest oil and gas producer, producing over 5 times the combined of all Brazil's 34 private oil and gas companies. The government offers a range of tax and budgetary subsidies for fossil fuel production, including preferential loans for oil and gas producers through Petrobras and the Brazilian Development Banks (BNDES). OECD data indicates a sharp decline in government direct spending on the extraction of petrol and natural gas in 2014. Paying the fuel costs for national coal power plants - a temporary mechanism resulting from the transition in regulatory models in the power industry - is expected to end in 2027.



Source: ODI, 2015

\*The indicators above refer only to subsidies for fossil fuel production, and include direct spending (e.g. government budget expenditure on infrastructure that specifically benefits fossil fuels), tax expenditure (e.g. tax deductions for investment in drilling and mining equipment) and other support mechanisms (e.g. capacity mechanisms).

## Public climate finance

Brazil is not listed in Annex II of the UNFCCC, and it is therefore not formally obliged to provide climate finance. While climate-related spending by multilateral development banks may exist, it has not been included in this report.