

CASE STUDY: BRAZIL

Beyond Fossil Fuels: Fiscal Transition in BRICS

November 2019

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Brazil's dependence on fossil fuels at a glance (2017 data)

\$15,662

GDP per capita, purchasing
power parity in current
international \$
(World Bank, 2019)

55%

Share of fossil fuels in total
primary energy supply
(Annex A in the
main report)

6.8%

General government
revenues from fossil fuel
production & consumption
(Table 1 in this brief)

Proved reserves of fossil fuels. Proved reserves of fossil fuels in Brazil amount to around 16.5 GtCO₂ if extracted, which is equivalent to approximately 40 per cent of the annual global emissions in 2016. Of these reserves, oil is 4.9 GtCO₂, natural gas is 0.8 GtCO₂ and coal, albeit of low quality, is 10.9 GtCO₂ (see Annex A in the main report). Since significant oil deposits were discovered off the coast of Brazil in 2006 (in a geological formation known as *pré-sal*, literally “pre-salt”), high hopes rest on the area in terms of enhancing extraction.

Fossil fuel extraction and use. Among the BRICS economies, Brazil is least dependent on fossil fuels due to the high share of biofuels and hydropower in its energy mix (see Annex A in the main report). Fossil fuels accounted for about 55 per cent of Brazil's domestic energy production and total energy supply in 2016. As in most other emerging economies, Brazil's energy demand is growing and expected to further increase, which makes the government focus on the cheapest available energy sources. Most of Brazil's oil is produced in the states of Rio de Janeiro and Espírito Santo. About a third of Brazil's crude oil is exported; however, since Brazil lacks refining capacity, it imports oil products (International Energy Agency, n.d.). In terms of natural gas, Brazil only partially

Note: This country brief accompanies and refers to a main report: Gerasimchuk, I., Kühne, K., Roth, J., Geddes, A., Oharenko, Y., Bridle, R., & Garg, V. (2019). Beyond fossil fuels: Fiscal transition in BRICS, which can be found [here](#)



covers its consumption needs and imports the rest, mainly from Bolivia (U.S. Energy Information Administration, 2017). Although some low-grade coal is mined and burned for power generation in Southern Brazil, most of the Brazilian coal consumption is covered by imports (Organisation for Economic Co-operation and Development [OECD], 2015a).

The role of the fossil fuel sector in the economy. Oil and gas contributed to 2 per cent of the country's GDP in 2017 (see Table 1 in this country brief). In the State of Rio de Janeiro, this indicator was as high as 15 per cent (IBP, 2017). Taxes and other fees on fossil fuel production and consumption generate 6.6 per cent of the general government revenue (i.e., the joint budget of the federal government, regions, municipalities, social security and other government-managed funds), with the majority of that revenue coming from fossil fuel consumption (see Table 1 in this country brief). The Brazilian oil and gas sector employs about half a million people, around 0.6 per cent of the total jobs in the country (Dedecca, 2014; PricewaterhouseCoopers, 2014). The discovery of pre-salt reserves raised hopes that the sector's contribution to the economy and employment will increase (Brandão 2017; Hugh, 2019).

State-owned enterprises (SOEs) in the fossil fuel sector. Brazil's largest energy company is Petrobras. The Brazilian government owns 64 per cent of capital stock in Petrobras, directly and indirectly (e.g., via the Brazilian Development Bank). Through its stake in Petrobras, the Brazilian government may be exposed to the risk of fossil fuel asset stranding as a result of clean energy competition and climate policies affecting global energy markets (Carbon Tracker Initiative, 2015).

Under the left-wing governments led by Lula da Silva (2003–2010) and Dilma Rousseff (2011–2016), Petrobras was mandated to participate in all pre-salt fields in joint ventures with private companies. However, Petrobras has lacked the capacity to ramp up operations in this new environment, slowing down the pre-salt development; the subsequent governments stopped this practice (see “Government plans on energy and climate”). Two incidents compounded the difficulties: low oil prices in 2015 and a Petrobras corruption scandal (*Lava Jato*), which started in 2014 but is still ongoing. In the latter situation, Petrobras received two loans from the China Development Bank: one for USD 10 billion in 2009 and another for over USD 10 billion in 2016 (Meidan, 2016). The two loans were provided against repayment in oil shipments, locking in Petrobras's need to secure sufficient new oil production.

Government plans on energy and climate. Regardless of which political force is in power, Brazil actively seeks to boost its oil and gas production and to explore for more oil and gas. The main difference is in how different governments see the role of local content, previously prioritized by the Silva and Rousseff governments, versus foreign participation in these developments. In 2017, the Michel Temer government started awarding licences for development areas outside of joint ventures with Petrobras, including to foreign companies, and held several licensing auctions in the Santos and Campos basins in 2018 (Dolce, 2018; Haidar, 2017). In 2017, the Temer government also introduced an urgent law (*Medida Provisória 795*) that modified the revenue setup for oil and gas activities in Brazil, cutting taxes and abolishing local content requirements while at the same time pardoning billions in tax debt. The Jair Bolsonaro administration, formed in 2019, plans more pre-salt production-sharing auctions while seeking to phase out local content requirements for them (Argus Media, 2019; Maciel, 2018; Viscidi & Graham, 2019). In the electricity sector, the Bolsonaro government seeks to enable coal plants to compete with gas to replace diesel generation contracts by 2020 (Recharge, 2019).



The Brazilian Nationally Determined Contribution under the UN climate efforts foresees a relative reduction of fossil fuel energy use and an absolute reduction in greenhouse gas emissions for 2030 by 43 per cent (based on 2005 levels) (Federative Republic of Brazil, 2016). While an increase in oil extraction for export would be excluded from Brazil's total under the United Nations Framework Convention on Climate Change's current emission accounting procedures, there are concerns about the amount of methane leaking from oil and gas wells, which will add to Brazil's total greenhouse gas emissions (Bouso, 2018).

Fossil fuel production and fiscal space. The Brazilian government's tax and non-tax revenue from fossil fuel production were at 0.8 per cent of the GDP or 2.75 per cent of the general government budget (see Figure 1 and Table 1 in this brief). More than a third of all fiscal revenue from oil extraction in Brazil goes directly to either the states of Rio de Janeiro or its municipalities (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis, 2013). The formula for distribution between producing and non-producing states and the federation has been a topic of heated debate for many years. The State of Rio de Janeiro has always fought for a higher share of revenues and, on several occasions, also raised the tax rates on oil production within its jurisdiction (Reuters, 2016).

Fossil fuel consumption and fiscal space. The Brazilian value-added tax (VAT) (Tax on Commerce and Services or *Imposto sobre Circulação de Mercadorias e Serviços [ICMS]*) is levied at the state level and constitutes the most important source of fossil fuel revenue in Brazil. A federal excise tax on liquid fuels (Contribution for Intervention in the Economic Domain or *Contribuição sobre Intervenção do Domínio Econômico [CIDE]*) was established in 2002, but its rate is comparatively low internationally (OECD, 2015b) and was set to zero between 2012 and 2015. Brazil charges a general tax on electricity (Energy Development Charge or *Conta de Desenvolvimento Energético [CDE]*), but the 2012 tax reform substantially reduced the level of electricity taxes (OECD, 2015a). Authors' calculations indicate that government revenues from taxes on fossil fuel consumption amount to 1.2 per cent of GDP or 4 per cent of the general government revenue (see Figure 1 and Table 1 in this brief). There is no carbon tax in Brazil, although as part of the Partnership for Market Readiness, it is considering the implementation of an emission trading scheme in the future to meet its mitigation targets (International Carbon Action Partnership, 2019). As part of its global exercise, the International Monetary Fund (IMF) estimated the value of under-taxing fossil fuel consumption in Brazil in 2017 at USD 11 billion in terms of climate change effects¹ and USD 9.5 billion in terms of air pollution impacts on human health (Coady, Parry, Nghia-Piotr, & Shang, 2019; IMF, 2018). In other words, the IMF estimates of fossil fuel under taxation are roughly equivalent to entire revenues from fossil fuel production in 2017.

Fossil fuel subsidies. According to the OECD estimate² (which takes into account both budgetary transfers and government revenue foregone due to tax breaks), fossil fuel subsidies amounted to 0.3 per cent of GDP or 1.1 per cent of Brazil's general government revenue in 2017; at their peak in 2012, they represented 1.4 per cent of GDP (see Figure 1 and Table 1 in this brief). Yet subsidies saw a significant decline, with decreases in both the Program of Social Interaction (*Programas de Integração Social [PIS]*) and Contribution for the Financing of Social Security (*Contribuição para o Financiamento da Seguridade Social [COFINS]*) fuel tax reductions and tax incentives for

¹ The estimate is based on an illustrative value of roughly USD 40/tCO₂.

² The International Energy Agency (2019) applies a different methodology and reports no fossil fuel consumption subsidies in Brazil.



oil companies' infrastructure development from 2011 to 2017.³ Most of these subsidies benefit consumption and include CIDE fuel tax reductions (to limit increases in domestic fuel prices), tax exemptions for coal and natural gas used in electricity generation, and subsidies such as an energy development fund that compensates power plants for high electricity generation costs and subsidizes electricity for lower-income households (OECD, 2015a, 2019). One estimate (not included in the totals in Figure 1 and Table 1 in this brief) suggests that the government spent BRL 68 billion (USD 29 billion) on supporting coal electricity each year in 2013 and 2014 (Observatório do Clima et al., 2016)

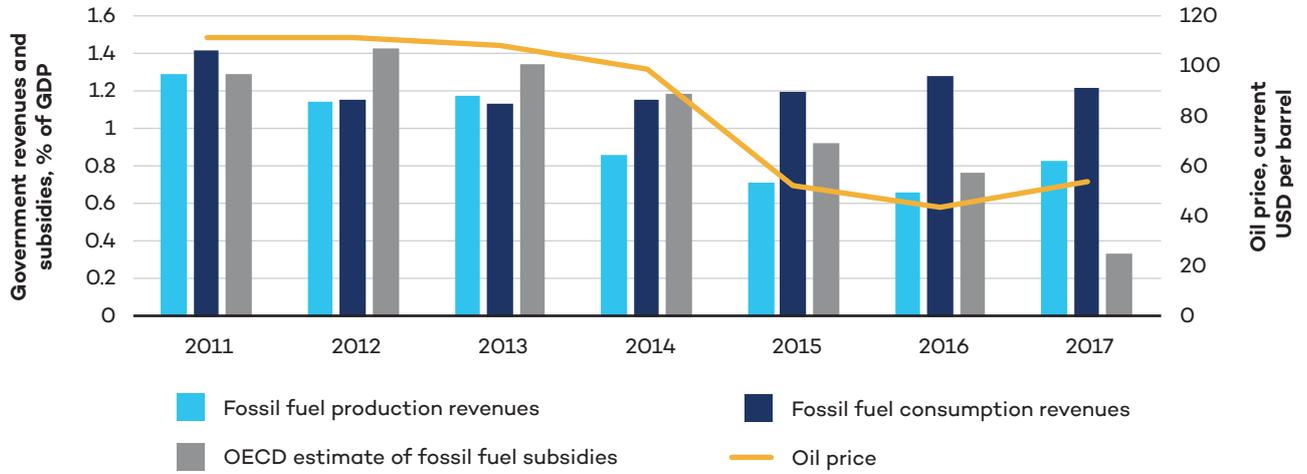
In terms of subsidies to oil and gas production, Brazil provides tax breaks to compensate for higher costs of extraction and downward fluctuations in the world petroleum prices. In 2016, Petrobras listed pending tax disputes with different levels of government for a total value of BRL 156 billion (USD 45 billion), adding more complexity. As pre-salt developments go ahead, the value of government foregone revenue due to oil and gas production subsidies can increase. A law passed at the end of 2017 exempts companies from certain tax payments until 2040, making investments more attractive while reducing government revenue from the sector. A study by legislative consultants estimated the foregone revenue over the course of the planned tax cuts to be over BRL 1 trillion (about USD 300 billion) (Lima, 2017; Observatório do Clima, 2017). This figure has been contested by experts and has been a topic of continued debate.

Earmarked funds. Earmarking (hypothecation) of fossil fuel funds is very common in Brazil. In terms of revenues from fossil fuel production, oil and gas royalties are earmarked to be spent on education (75 per cent) and health care (25 per cent) (OECD, 2009). Other oil revenues are mainly spent on balancing the federal budget. Further, Brazil attempted to establish a Sovereign Wealth Fund in 2008 with an initial value of BRL 14 billion (USD 7.6 billion). The fund heavily invested in Petrobras shares in 2010 to help finance pre-salt exploration. These shares were sold two years later at a 40 per cent loss to help meet the government's fiscal target. The Temer government liquidated the fund in 2018 (Máximo, 2018).

In terms of revenues from fossil fuel consumption, the revenue from the federal excise tax on liquid fuels (CIDE) is earmarked for environmental programs, transport infrastructure and fuel subsidies. A general tax on electricity (CDE) has multiple objectives, mainly addressing equal access to electricity, but also to support the use of Brazilian coal for electricity generation. In particular, the Fuel Consumption Fund reimburses the difference between the northern region's high cost of electricity generation and the national average cost. The Energy Development Fund, partly financed by a charge on electricity distribution companies, supports five diesel and coal-fired power plants (OECD, 2015a). Yet, it is possible that some of this earmarking will be reduced under the Bolsonaro government. A bill that has just passed through Congress is doing away with some of the earmarking for healthcare and education, with an estimated USD 16 billion to be withdrawn in the next 10 years to fund the production of pipelines instead (Boldrini, 2019).

³ Some of this decline is also linked to a lack of reporting and data for 2017 for certain subsidies.

Figure 1. Government revenues versus subsidies to fossil fuels in Brazil as a percentage of GDP



Source: Authors' calculations based on Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (n.d.); Ministério da Economia (n.d.); Petrobras (n.d.); OECD (2019); World Bank, 2019.

Table 1. Government revenues versus subsidies to fossil fuels in Brazil in 2017

	BRL billion	USD billion	Percentage of GDP	Percentage of general government revenue
GDP	6,554	2,054	100.0%	332.1%
Total general government⁴ revenue	1,975	619	30.1%	100.0%
Fossil fuel revenues:	134	42	2%	6.8%
Total revenues from fossil fuel production⁵:	54	17	0.8%	2.8%
Tax and non-tax revenues from oil and gas production, including:	26.8	8.4	0.4%	1.4%
Royalties	15.3	4.8	0.2%	0.8%
Special participation	11.3	3.5	0.2%	0.6%
Payment for and withholding of areas	0.2	0.1	0.003%	0.01%
Royalties on coal production	0	0	0%	0%
PIS-COFINS paid by Petrobras	27.4	8.7	0.4%	1.4%
Total revenues from fossil fuel consumption⁶:	80	25	1.2%	4.1%
VAT (ICMS) on petroleum products	74.4	23.3	1.1%	3.8%
Specific tax (CIDE) on petroleum products	5.8	1.8	0.1%	0.3%
Fossil fuel subsidies:				
OECD estimate (direct transfers and tax expenditure):	22	6.9	0.3%	1.1%
Fossil fuel production subsidies	1	0.3	0.01%	0.05%
Fossil fuel consumption subsidies	21	6.6	0.3%	1.05%

Source: Authors' calculations based on Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (n.d.); Ministério da Economia (n.d.); Petrobras (n.d.); OECD, 2019; World Bank, 2019.

⁴ General government includes federal government, regional governments, local governments, social security and other government-managed funds.

⁵ The total for revenues from fossil fuel production is a conservative estimate since it relies on the structure of government reporting whereby some data are not disaggregated.

⁶ The total for revenues from fossil fuel consumption is a conservative estimate since it relies on the structure of government reporting whereby some data are not disaggregated. In particular, an Energy Development Fund (through an electricity tax) was excluded from the calculations as it is both a source of revenue for the government and also a subsidy for electricity access for lower-income households.



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