

Country Assessment Report

Country/Region Name- Brazil:

Brazil is the largest country in South America, covering large parts segments of the continent's North, East and Centre. It is bordered by almost every country in South America including Uruguay, Argentina, Paraguay, Bolivia, Peru, Colombia, Venezuela, Guyana, Suriname and French Guinea. It has a population of 210 billion and GDP of over \$1.8 trillion, at a growth rate of 1.3%.

(World Bank 2018)

Economic structure and activity:

Brazil has been suffering from a period of highly depressed economic activity since the country's recession in 2014, which the COVID 19 pandemic will exacerbate further.

The service sector accounts for the largest share of Brazil's GDP (62.3%) and is continuing to grow under the government's recent turn towards high added-value services such as telecommunications and aeronautics. The tourism industry is also an area of high growth, boosted by the recent World Cup and Olympics. Industry contributes 18.44% to Brazil's GDP, with activity diversified across textile, pharmaceutical, automobile, steel, and chemical sectors. The country is well endowed with mineral ore wealth. It is the second largest exporter of iron globally and one of the main producers of aluminium and coal. Agriculture accounts for 4.6% of the nation's GDP. Brazil is home to the largest rainforest in the World- the Amazon, much of which is being converted into land use for livestock, the cultivation of crops and biofuel crops. It is also the world's largest producer of coffee, sugar cane, oranges, as well as one of the biggest growers of soy.

(Statista 2018; Santander 2020)

Top private companies with RE commitments:

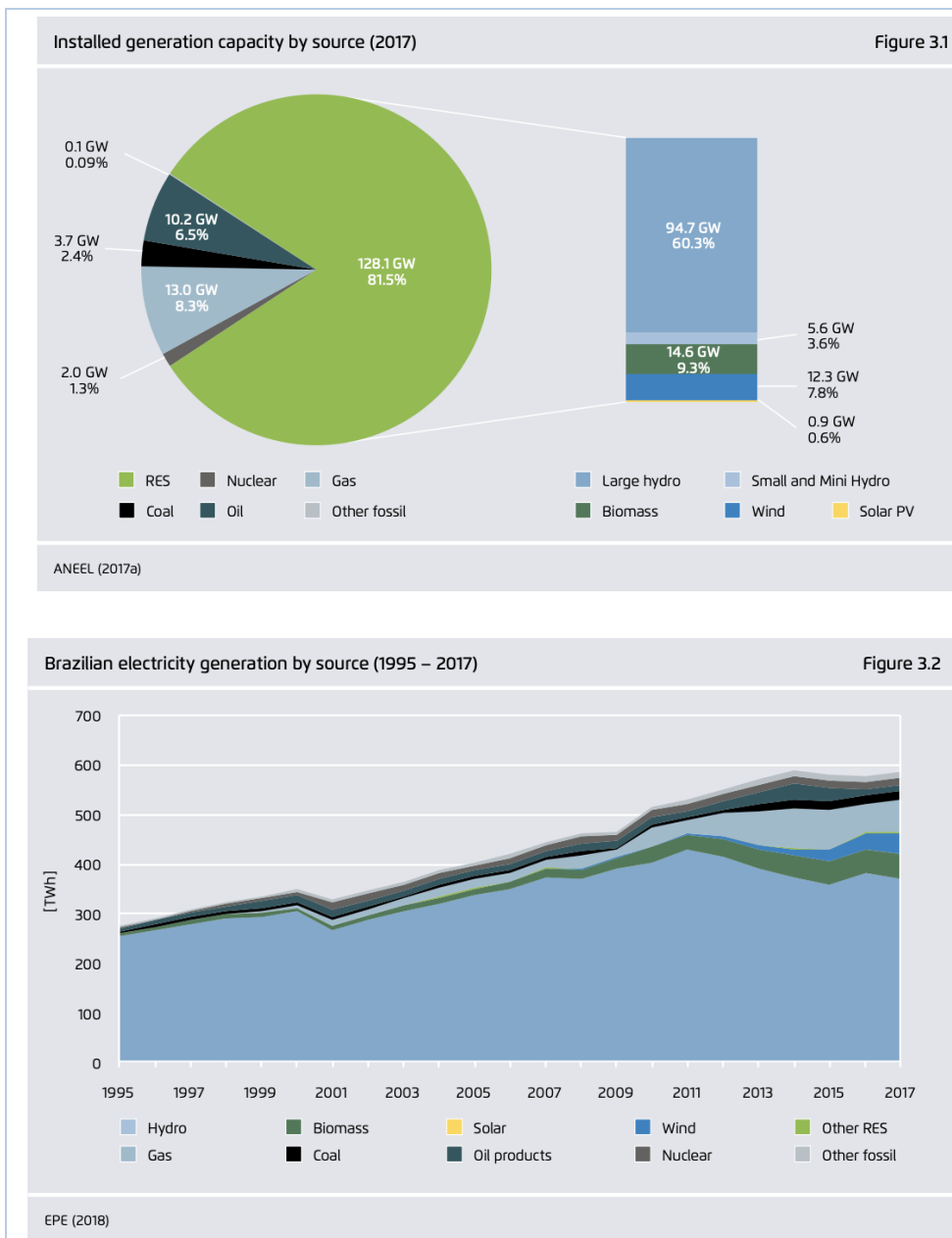
Banco Bradesco (*banking*) - continues to supply 100% of its energy needs from renewable resources. Represents one of the first major financial institutions in the world to make this transition to renewables.

Vale (*mining*) - set a goal for sourcing 100% of its power needs from renewable energy by 2025.

Oi (telecommunications) - launched a renewable energy project in 2020, involving 25 solar, biomass and hydroelectric mills totalling 123 megawatts in capacity. This plan follows a "distributed generation" model, in which Oi buys clean energy at lower prices. Energy supply from renewable resources has already grown significantly from 15.8% in 2018 and is expected to reach 60% by the end of 2020.

Generation and demand: (e.g. type, MW, TWh)

81.5% of Brazil's installed power capacity derives from renewable energy, as seen below in figure 1. Hydropower accounts for most of this capacity, but its effective capacity will vary annually depending on the precipitation levels. Biomass and wind



are also key contributors amongst Brazil's fleet of renewable generators and are able to compensate for hydro's variability. Figure 2 depicts the actual electricity generated from Brazil's power matrix. Hydropower's effective capacity is considerably less than its overall capacity, mostly due to its dependency on rainfall. Growth in hydro, wind and biomass seems to have stagnated, whilst fossil fuel generation and other renewables are experiencing growth.

Figure 1. Installed electrical capacity by source in 2017 (Agora 2018).

Figure 2. Electrical generation by source in 2017 (Agora 2018).

In 2017, electricity consumption was 0.93 per cent higher the previous year having recorded 526.2 TWh. Excluding the Brazilian energy crisis and other lapse's, consumption has generally grown at 4.4% per year over the last two decades. Electricity consumption is expected to grow to 654 TWh by 2026, with demand tripling its existing rate by 2050 to 1,605 TWh.

Electrical Interconnection and import/export:

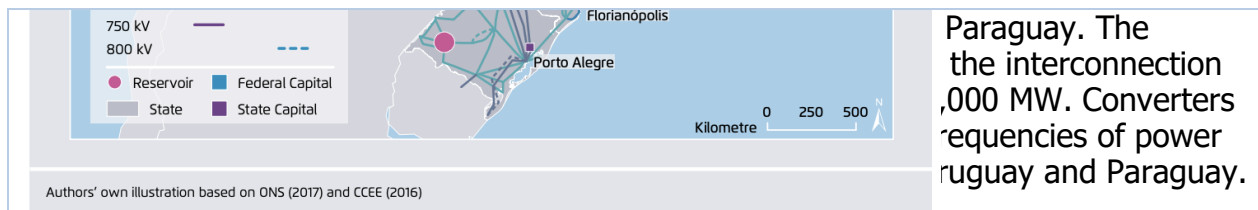


Figure 3. Map of the SIN and its main interconnections (Agora 2018).

Market Structure:

Prior to the power sector reforms, Brazil had a vertically integrated system which was dominated by large public utility companies all owned by either the federal Eletrobras group or government. The model became unsustainable after the debt crisis which impacted Brazil in the late 1980s, necessitating a suite of reforms including the liberalization, commercialisation, and partial privatisation of the power sector.

The new model failed to secure sufficient investment, prompting the 2004 New Industry Law which effectively unbundled the sector, separating generation, transmission and distribution. Privatisation was suspended, but legislation provided incentives for private sector participation, resulting in the roll-out of IPPs.

Brazil's SIN consists of four subsystems: South (S), Southeast/Centre-West (SE/CO), Northeast (NE) and North (N). It is operated by the independent National System Operator (ONS) and regulated by the ANEEL.

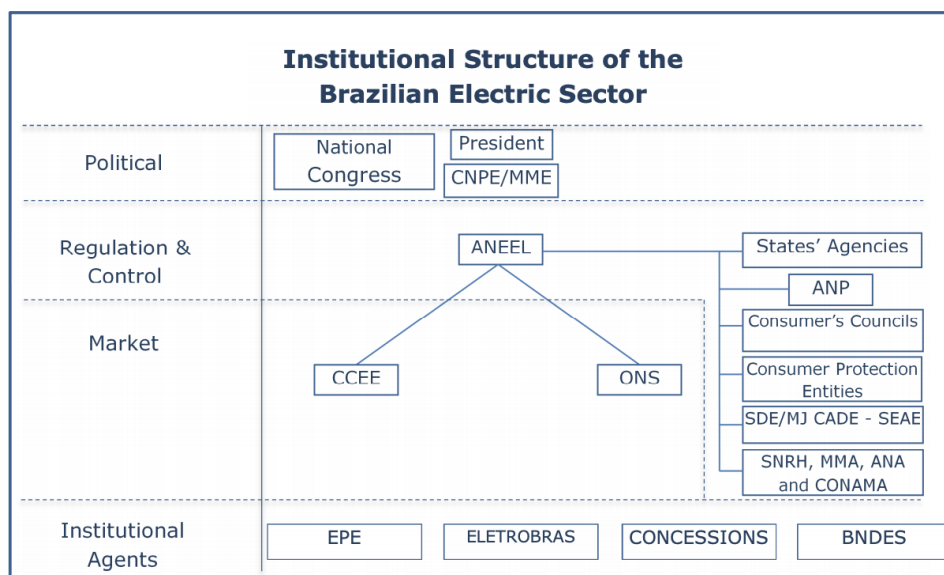


Figure 4. Market structure of Brazil's power sector (Transfer LBC 2015).

(Agora 2018)

Responsible Government Department: (include key contacts)

Ministry for Mines and Energy (MME) is the main government institution concerning the power sector and is responsible for formulating energy policy, regulating and supervising the sector, as well as fostering development opportunities.

National Council for Energy Policy (CNPE) is a multi-ministerial board chaired by the Minister of MME. It acts as an advisory board to the government vis a vis energy policy design, focussing particularly on security of supply and development of the nation's energy resources.

Energy Research Office (EPE) is a public entity which is mandated to conduct technical/feasibility studies and provide input on the government's energy planning on behalf of the MME. It also provides technical support for the auctioning of generation capacities.

The National Agency for Electrical Energy (ANEEL) regulates and supervises generation, transmission, distribution, and commercialisation of electricity in Brazil. It sets transport and consumption tariffs, ensuring the financial and economic feasibility of power-related concessions. It also arbitrates administrative disputes between companies operating in the power sector.

The Chamber of Electricity Commercialisation (CCEE) is a non-profit, private and legal entity regulated and supervised by the ANEEL. It is responsible for overseeing the commercialisation of power for the SIN. CCEE is also mandated to execute energy auctions, maintaining the records of all energy contracts.

The independent National System Operator (ONS) is a non-profit, private legal entity, regulated and supervised by the ANEEL. It is responsible for determining and organising the dispatching of generators based on their merit order and cognisance of grid constraints, resource availability and climate projections. It also supports energy planning by proposing grid expansions and any other measures to improve the SIN.

National Agency for Oil, Natural Gas and Biofuels (ANP) is responsible for regulating and supervising oil, gas, and biofuels. Though not directly linked to the electricity sector, ANP affects energy policymaking as a stakeholder in the CMSE. The ANP is linked to the MME and is responsible for regulating and supervising oil, natural gas, and biofuel industries in Brazil.

The key institutional bodies in the Brazilian electricity sector

Figure 2.3

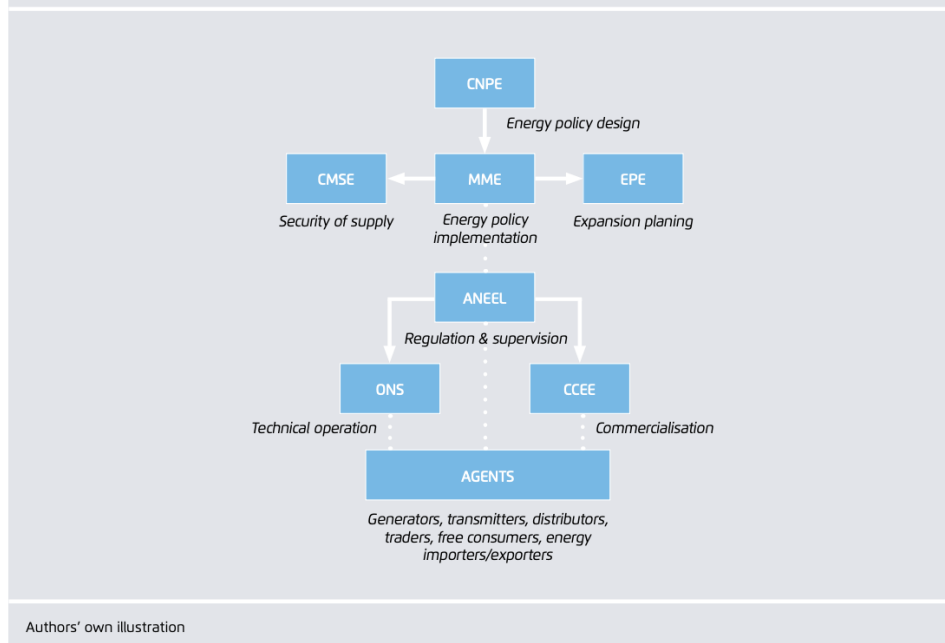


Figure 2. Diagram of how key institutions interact in the Brazilian power sector (Agora 2018).

Existing/Planned Energy Legislation: (is there a CPO)

Electricity Law (108848) - passed in 2004 established the legal framework for the power sector. It created a regulated market for electric companies and procurement process scheme for the regulated distribution companies through an auctioning of PPAs.

(Thomson Reuters 2020)

Environmental Legislation for RE:

Federal Constitution (Article 225) - passed in 1988 provides the legal framework and provisions for all environmental protection in Brazil.

(Thomson Reuters 2020)

Existing/Planned Certificate Systems: (purpose, extent)

Instituto Totum act as the central Issuer of I-RECs in Brazil.

RE market potential:

Brazil is endowed with one of the best hydropower resources in the world. Although, it generates up to 2/3 of the domestic power supply, only 1/3 of its hydropower potential has been harnessed. Much of the remaining potential is situated in Northern Brazil, but its development would bring both social and ecological implications.

Wind power is another promising renewable energy source, particularly in the northeast, coastal areas, and the southern region. Its deployment has grown by 544% since 2013, demonstrating Brazil's commitment to enact its wind potential. Average solar irradiation is between 5.2-5.9 kWh/m² but PV remains significantly underdeveloped in comparison with other renewables.

(Agora 2018)

Market risks and challenges:

The rapid growth in fossil fuel powered electricity generation represents a significant obstacle for Brazil's underdeveloped renewable energy resources, particularly solar PV. Thermal generation remains more a more attractive, reliable, and economically feasible solution to hydro variability than solar, which lacks the necessary regulatory mechanisms and economic incentives to foster development of PV systems.

(Agora 2018)

Extent of Engagement with Government: (brief summary of any contact already made with the national government regarding certification in general and I-REC)

Expected response from Government:

Current Environmental Reporting in Energy:

Any other Relevant Information:

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Preparation Date	

Code Manager Observation

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