Brazil

Latin America & Caribbean

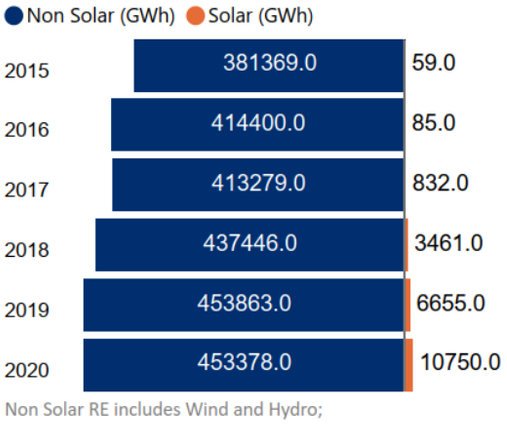
Ease of doing Solar classification

Achiever

Electricity Consumption in kWh/capita (2020)	Average PVout in kWh/kWp/day (2020)	Cumulative Solar Capacity in MW (2021)
2922.7	**4.4**	**13054.9**

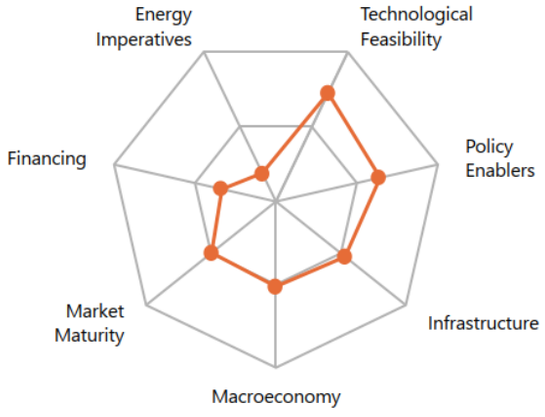
Getting Electricity Score (2020)	NDC Target by 2030 in % (base year 2005)	Human Development Index (2021)
72.8	**50.0**	**0.8**

Renewable Energy Generation by Source

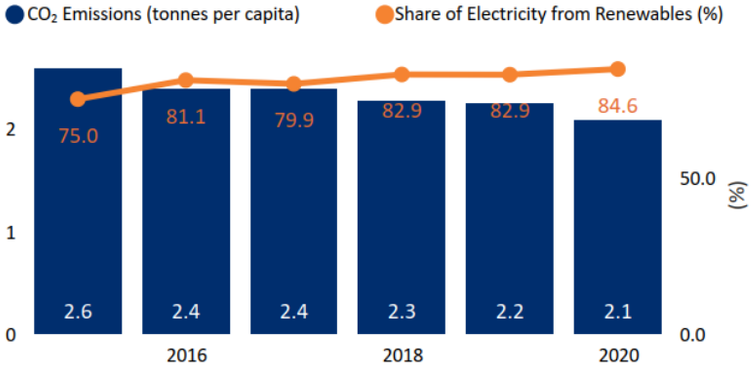


Non Solar RE includes Wind and Hydro;

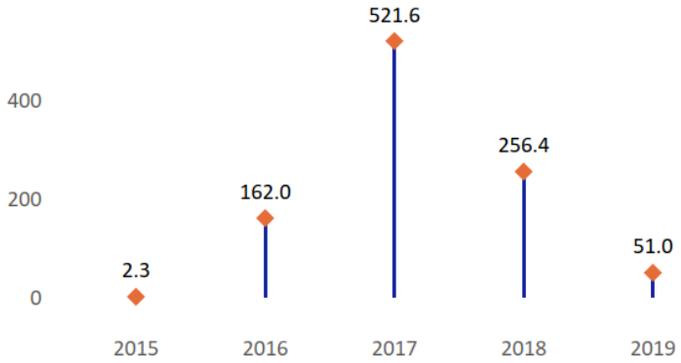
Performance against 7 Drivers



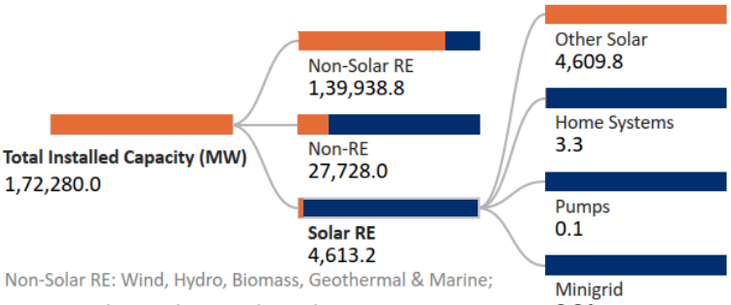
CO_2 Emissions vs Electricity share from Renewables



International Finance received for Clean Energy (Million US Dollars)



Installed Capacity by Source (2019)



Non-Solar RE: Wind, Hydro, Biomass, Geothermal & Marine;
Non-RE: Coal, Natural Gas, Nuclear, Oil, etc.;
Other Solar: Utility Scale Solar, Rooftop etc.;
Data not available for other Solar RE segments;

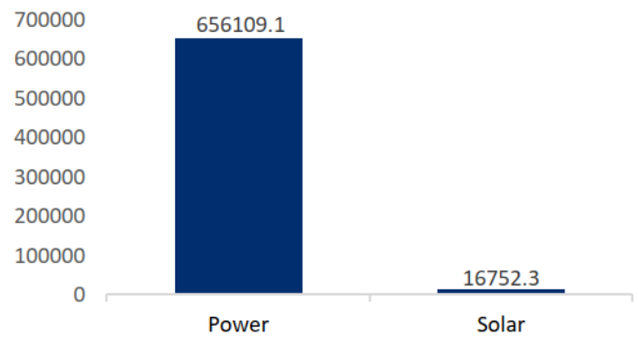
Support for Renewables (2020)

Feed-in-Tariffs for renewable energy supply to the grid?	Net metering/Gross metering policies and regulations?
No	**Yes**

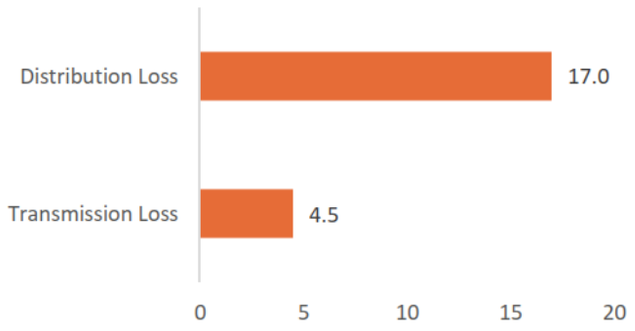
Renewable Energy Certificates?	Renewable Purchase Obligation?
No	**No**

Peak Demand/Load in MW (2021)	Electricity Consumption CAGR in % (2022 - 2026)	Average Capital Cost of Solar PV in USD/MW (2022)
87.2	4.4	3,23,466.0

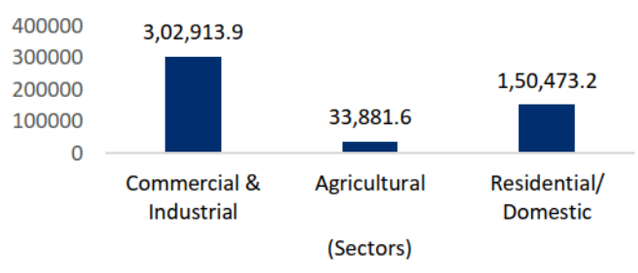
Electricity Generation in GWh (2022)



Average T&D Loss Levels in % (2021)



Electricity Consumption in GWh (2021)



Financial Support Mechanisms (2021)

Duty waivers to solar developers for importing/procuring material from foreign land	Yes
Tax waivers for manufacturers of raw materials (modules, off grid appliances, etc.)	Yes
Credit facilitation for solar energy from financial institutions (FIs)	Yes

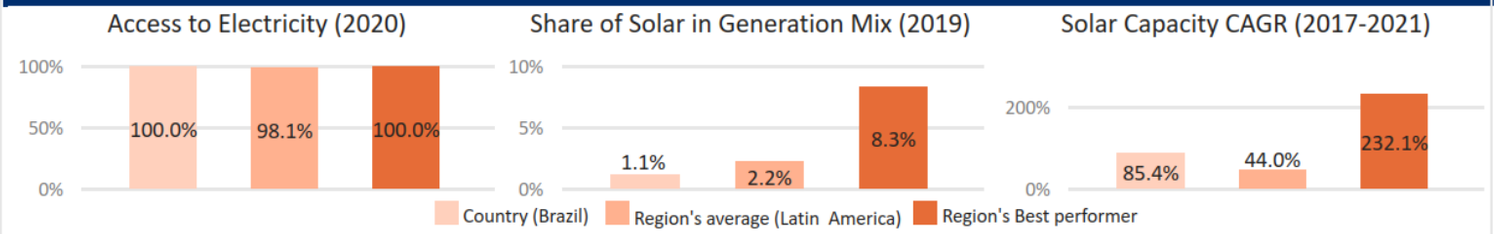
Policies/Schemes for Solar segments (2021)

Rooftop Solar	Solar Mini Grids	Standalone solar systems	Utility scale solar	Solar Parks	Floating Solar	Solar heating and cooling system	Battery waste management	Green Hydrogen
No	Yes	No	No	No	No	No	No	No

Emerging Technologies/Innovative Models (2021)

Hybrid technologies - combination of two or more technologies to achieve efficient systems (Example: wind + solar PV hybrid systems, solar + storage systems)	Yes
Emerging technologies - the next generation technologies (Example: Artificial Intelligence, Machine learning, Internet of Things, etc.)	Yes
E-mobility/Electric vehicles	Yes

Country's regional performance and characteristics



Areas of Strength → Policy Enablers; Technological Feasibility

Areas of Improvement → Energy Imperatives; Financing

Key Insights

Drivers	Insights
Macro-economy	• Brazil is an upper middle-income country with a GDP per capita (PPP) of USD 16,031 in 2021.[1,4] • Due to COVID-19 Pandemic, the GDP (Real) has contracted by 3.9% in 2020. However, in 2021 it has bounced back growing at a rate of 4.6%.[1] • The inflation rate (CPI) of the country has increased to 8.3% in 2021 from 3.2% levels in 2020.[1] • The general government gross debt to GDP has slightly reduced to 93.0% in 2021 from 98.7% levels in 2020.[1]
Policy enablers	• In April 2021, the country has set its target for net-zero carbon emissions by 2050 which is a decade earlier than its previous target of 2060.[7] • To promote development of RE in the country several incentives/mechanisms like RE auctions, import tax incentives, net metering and VAT incentives are available in the country.[12]
Technological Feasibility	• Brazil receives high levels of solar irradiation (GHI) of 5.3 kWh/m^2/day and specific yield 4.4 kWh/kWp/day indicating very strong technical feasibility for solar in the country.[3] • In 2021, 21.1% of the country's power demand was met through RE sources (excluding large hydro).[4]
Market Maturity	• 100% of the population in Brazil had access to electricity as of 2020.[2] • Agência Nacional de Energia Elétrica (Aneel) is the designated agency that regulates the energy sector in the country.[8] • Brazil is an associate state under the Southern Common Market "MERCOSUR" which aims to encourage the competitive integration of national economies into the global market thus creating commercial and investment opportunities.[9] • The power sector in the country is unbundled into generation, transmission, and distribution with high level participation from private companies.[9]
Infrastructure	• Brazil's power infrastructure has been divided between National Interconnected System (Sistema Interligado Nacional (SIN)) and isolated Amazon region. • The length of total transmission lines reached 1,66,641 ckm in 2021 and it is expected to reach 1,88,566 ckm by 2025.[9] • Brazil has more than 102 power distribution companies with a total network length growing at a CAGR of 1.7% reaching 37,38,824 ckm in 2021 from 31,00,000 ckm in 2010. It is expected to reach 3,91,316 ckm by 2025.[9] • The national grid of the country is interconnected with Argentina, Uruguay, Paraguay and Venezeula.[3] • Between 2022 – 2026, the country plans to invest USD 14.71 Mn for the upgradation of the transmission and distribution sector in the country.[14]
Financing	• According to BNEF's climate scope report 2021, Brazil is the region's 2nd choice for investments in clean energy space.[6] • In 2021, the Brazilian Economy attracted investments worth USD 85 Bn in the energy sector.[10] • In March 2022, the European Investment Bank has signed a EUR 200 Mn loan to finance RE projects in Brazil including construction of 566.5 MW of wind power and 149 MW of solar power plant.[11]
Energy Imperatives	•In 2020, the per capita electricity consumption stood at 2.92 MWh which is relatively lower in comparison to the global average of 3.31 MWh.[6] • The total installed capacity of solar PV witnessed a CAGR of 85.4% reaching 13,055 MW in 2021 from 1104 MW levels in 2017.[7] • The peak demand for electricity in the country has increased to 702.25 TWh in 2021 from 627.88 TWh levels in 2020.[4] • In 2021, the total installed capacity in the country stood at 677.53 GW with a significant share coming from hydro (56.2%), gas (13.4%) and wind (10.6%).[4]