

# Brazilian Grid Uses Mobile Transmission Towers to Ensure Power System Supply

*Equatorial Pará Brazil ensures shorter restoration times for the power system in the event of an unforeseen situation on a transmission line.*

CALIFORNIA, USA, December 22, 2023 /EINPresswire.com/ -- Equatorial Pará, a company of the Equatorial Group, is the first energy distributor in Brazil to acquire and operate mobile transmission towers, to ensure a shorter restoration time of the power system in the event of an unforeseen situation on the transmission lines, to avoid customers not have sufficient power supply during longer periods of power system maintenance.

Brazil's National Electric System Operator (ONS) recently issued a letter stating that this followed a failure of the country's interconnected system (SIN) operating network at 8:31 a.m. local time on Aug. 15, 2023, resulting in a widespread blackout. The SIN data showed that the load on Brazil's national power system dropped by 25.9 percent within 10 minutes.

In recent years, Brazil has experienced several large-scale power outages and power restrictions, affecting the normal life of residents and reigniting the controversy over the privatization of electric utilities in Brazil.

Source Article from [http://paper.people.com.cn/zgnyb/html/2023-08/28/content\\_26014877.htm](http://paper.people.com.cn/zgnyb/html/2023-08/28/content_26014877.htm)



Brazilian cable workers routinely inspect overhead cables



Rapid development of the number of transmission towers in Brazil

Power outages paralyze social functioning for a short period

Local time on August 15, Brazil's national power system load in 10 minutes fell about 16 million kilowatts, more than 1/4 of the system's energy, power outages in just 2 hours led to a large paralysis of the country's operation.

In terms of geographic distribution, the load on the North Brazilian grid dropped 83.8%, the load on the Northeast grid dropped 44.4%, the load on the Southeast and Midwest grids dropped 19%, and the load on the Southern grid dropped 15.5%. at 12:36 on August 15, ONS reported that 55% of the load on the Northern grid had been restored, 81% of the load on the Northeast grid had been restored, and 100% of the load on the Southern and Southeast grids had been restored. At 14:49 on the same day, all power was restored to the Brazilian grid, and the entire event lasted 6 hours and 29 minutes from occurrence to end, with the SIN losing 19,101 MW of load.

Weak grid may lead to frequent power outages

According to ZMS statistics, including this large-scale blackout, in Brazil in the past 15 years, the cumulative scale of the blackout has reached seven times.

The causes of the accidents are mainly external force majeure, the grid's own line and protection device failure, grid structure weakness, power sector negligence, as well as failure to adequately predict the risk, and so on.

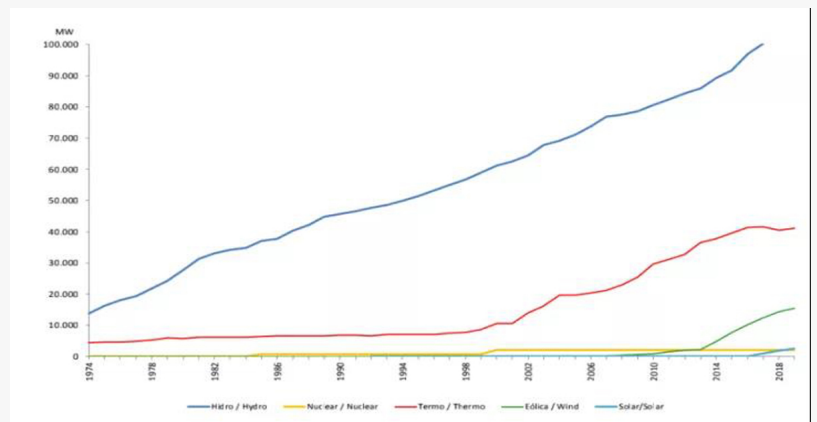
For example, the large-scale blackout in 2009 was the worst blackout to occur in the Brazilian



Brazil used to rely on energy generation to accelerate annual electricity production



Brazilian power workers are putting the final touches on transmission towers



Brazil's annual electricity generation has been growing steadily.

State.

At that time, five high-voltage power lines at the Itaipu hydroelectric power plant short-circuited due to severe weather conditions of heavy rainfall and lightning, resulting in sudden blackouts in Rio de Janeiro and São Paulo, two of Brazil's largest cities, as well as in the surrounding areas. The blackout covered about half of Brazil's land area and affected 18 states, with a loss of 24,000 megawatts (MW) of grid load, which accounted for about 40% of the total load of the Brazilian power grid at that time.

Data source [https://en.wikipedia.org/wiki/2009\\_Brazil\\_and\\_Paraguay\\_blackout](https://en.wikipedia.org/wiki/2009_Brazil_and_Paraguay_blackout)

Oil & Gas: Sub-salt resources are abundant, and production capacity is limited by the level of technology.

In terms of Brazil's primary energy consumption structure, despite the high share of clean energy, fossil energy accounts for half of energy consumption - 52.7% in 2021, with oil accounting for the highest share of 35.5%, an increase of 4.3 percentage points from the previous year. The share of oil is the highest, at 35.5%, an increase of 4.3 percentage points over the previous year. Brazil is extremely rich in fossil resource endowment, especially oil and gas resources. As of the end of 2020, Brazil's proven oil reserves will be about 11.9 billion barrels, second only to Venezuela, ranking second in South America.

Hydropower: Drought affects output, plans to reduce the proportion of power generation

Regarding power supply and consumption, Brazil's power supply is generally on a growth trend, but the increase is relatively small. from 2011 to 2021, Brazil's power generation capacity increased from 531.8 TWh to 654.4 TWh, with an average annual growth rate of 2.1%. In terms of electricity consumption, except for 2020, from 2014 to 2021, Brazil's electricity consumption increased from 474.82 TWh to 496.26 TWh, an increase of about 4.5%. Brazil's power generation mix is highly clean, with hydroelectricity dominating, followed by biomass, wind, and natural gas. By the end of 2020, hydroelectricity will account for 64% of total power generation.

New energy: "Wind power" is ready to go, but urgently need to strengthen the policy

In September 2015, the Brazilian Ministry of Mines and Energy released the "2015-2024 Brazilian Energy Development Plan", clearly the development of renewable energy as one of the main directions of energy reform, and clear that "by 2024, Brazil will be added to the installed capacity of 27 million kilowatts of [wind power and solar power](#), hydroelectricity, 7 million kilowatts, and 27 million kilowatts, respectively. " the goal.

Source <https://www.thesmartere.com.br/news/brazils-2050-national-energy-plan-decentralize-decarbonize-digitalize>

Mobile Transmission Towers Address Brazil's Power Distribution Imbalances and Shortages



A traditional transmission tower is a metal structure that supports a series of cables that transmit electricity.

The mobile transmission tower, which looks like a truck, on the other hand, is a traction device that uses a hydraulic structure to be able to function as a transmission tower in [place of a traditional 69kV or 138kV](#) tower when it has been damaged or is being repaired.

The use of mobile transmission towers can reduce power system restructuring time by approximately five hours.

## Transmission Tower Development Turns Power Supply Around

In recent years, with the rapid development of the Brazilian economy, the Brazilian transmission grid has gradually expanded, with the total length of transmission lines increasing from 89,000km in 2007 to 1,000,000km in 2010, and the total length of transmission lines increasing from 1,000,000km in 2010 to 1,000,000km in 2011

The total length of transmission lines has increased from 89,000km in 2007 to 103,000km in 2011, and it is expected that 168 new lines will be built by 2021, increasing the total length of transmission lines.

By 2021, Brazil is expected to build 168 new lines, increasing the total length of transmission lines to 150,500km.

Otávio Nascimento, head of maintenance at Equatorial Pará and manager of the project, said that the new mobile towers will be able to meet service demands when there are anomalies in the regular towers, which ensures that customers are not left without power for long periods while repairs are carried out on the traditional towers.

The mobile towers will be a complementary alternative to the original line structure without system downtime, thus ensuring power supply quality metrics and increasing customer satisfaction.

## Putting Transmission Towers to Work

The transmission tower is the support point of the overhead line. A single circuit on the transmission tower is a single-circuit transmission tower, and two circuits on the transmission tower are double-circuit transmission towers. A single circuit is a circuit with one power supply for one load; a double circuit is a circuit with two power supplies for one load.

Generally, enterprises with high requirements for power supply reliability, or important substations in the region, use double circuit power supply, to protect one of the power supply outages for some reason, the other power supply can continue to supply power.

However, the general requirements of power supply reliability are not high for small and medium-sized users tend to use a single power supply.

Transmission towers for towering structures are susceptible to tilt deformation, and uneven settlement requirements of the foundation are also high.

The commonly used structural forms of transmission tower foundations are independent foundations, expanded foundations, and pile foundations, and the structural form of transmission tower mainly adopts steel structure.

Conventional transmission towers and foundation structures are difficult to adapt to the surface movement and deformation of the coal mining area, which may cause the transmission tower to be skewed or even overturned.

With the continuous growth of global power demand, and due to the shortage of land resources on earth and environmental protection requirements, the transmission tower line path selection, along the line of housing and other facilities demolition and relocation of the problem is also increasingly serious.

So large-capacity, high-voltage transmission lines have been the rapid development of the same tower with the emergence of multi-loop lines, as well as [higher voltage levels of AC 750, 1000kV, and DC  \$\pm\$  800kV transmission lines](#).

All these make the tower tend to be large, The tower design load is also increasingly large, and commonly used hot rolled steel angle in the strength and specifications are difficult to meet the requirements of the use of a large load tower.

Planned investment funding for mobile transmission towers developed by the Government

The cost of installing transmission towers varies depending on the lot, materials, amount of power, and construction time, and it is not possible to give a fixed price, which depends mainly on factors such as the construction location and the complexity of the lot conditions.

Basically, for low-voltage 500 kW or above, the installation cost per ton is between RMB 5,000 and RMB 11,000, and you need to check with the local power company for the specific price.

While for high voltage above 500 kW, the installation cost per ton is between RMB 8,000 - 13,000. In addition, the installation work of the electric power tower needs to be carried out by a professional electric power company to ensure the quality of the installation work. Usually, the power company will provide all the installation materials, and it needs to be based on the user's installation location natural environment, or other circumstances for the additional configuration of the new installation of power pylons, so the specific installation costs need to be communicated with the power company.

Therefore, the installation cost and safety of transmission towers are also very difficult for some cable shortage areas, thus funding for mobile transmission towers developed by the government becomes an issue.

Equatorial Pará carried out this work with the Lactec Institute, one of the largest research, technology, and innovation centers in Brazil, through the Digital and Innovative Enterprise Management and the Engineering and Regional Maintenance Management.

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