Brazil grid stabilization

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Dispon?vel em portugu?s

Brazil"s transmission grid is undergoing huge change as it plans to add 3 to 5 GW of renewables each year over the next decade, at a time when transmission capacity is very limited in the region. In this article our Commercial Manager for Brazil, Andr? Priolli, reflects on the uptake of FACTS in the country so far and shares insights from the recent CIGRE XIX ERIAC event hosted in Foz do Igua?u.

Throughout the region of the RIAC (LatAm and Iberian countries), FACTS are in different stages of maturity and deployment, and that was notable during some presentations. I was able to follow a presentation by REE - Red El?ctrica de Espa?a (Spain Transmission System Operator), that showed a clear step by step planning process to evaluate alternatives to optimize the grid, which grid enhancing technologies and FACTS are first picks against traditional new infrastructure. Other countries, such as Colombia, presented similar use cases, in which FACTS were deployed in combination with new infrastructure providing immediate benefits to the short and long-term scenarios.

In Brazil, during 2010-2018 there was a wave of FACTS being used to enable interconnection of renewable energy in new and remote areas of the country, as well as grid stabilization. But it"s clear that we"re now at a turning point in the wide-scale use of these technologies, given the rapid growth in renewables connecting to the grid.

According to transmission planning studies concluded by EPE in 2022, over 15,000 km of new transmission lines and 16 new substations are planned for construction by 2028, represented in Figure [1] on the left. This means an expansion of 8% of the total length of transmission lines in the national interconnected system, and it"s primarily to connect new renewable generation. To build such incremental new infrastructure is a particular challenge and will take time to be in service. The risk of delay, however, can"t be neglected, due to complex construction, permitting processes as well as skilled workforce and companies needed for such projects, that are, at the moment, a scarce and competitive resource .

According to available data by ANEEL, in the Northeast alone, 9 GW of wind and solar projects are already under construction and another 75 GW have submitted their requests to access the grid until 2026 and are in the queue. Important to highlight that these this figure is equivalent of what EPE forecasted for the whole horizon up to 2032, in a optimistic scenario. This difference is mainly the result of a law from 2021 that stablished the end of discounts for interconnection tariffs - Tarifa de Uso do Sistema de Transmiss?o (TUST), for solar projects that requested access to the grid before March 2022. This law resulted, as said in the market, in a "Golden Rush", which many developers anticipated their request for access to guarantee the interconnection tariff subsidy.

On the other hand, according to ONS - Operador Nacional do Sistema (Brazilian independent system operator) - capacity map, the remaining existing transmission capacity in the northeast of Brazil, between 2023 and 2026, is close to zero. To tackle this mismatch Brazilian authorities are considering a competitive process for transmission capacity margin, in order to prioritize the renewable projects in the queue, replacing the current "first in - first out" rule of the queue. It is expected that this process alone will be able to significantly reduce the quantity of projects in the queue and remove non-mature projects from the Golden Rush, but still may not be sufficient to enable all the projects that renewables developers" are bringing forward in Brazil.

The open question is: how to accommodate the connection of new renewable generation to the grid, if there is no transmission capacity until 2027?

In reality, the transmission grid as a whole is not operating that close to its limit. A small number of critical lines or network components will act as bottlenecks that limit the entire system capacity and slows renewable interconnection, even if spare capacity exists elsewhere on the network. FACTS devices that control power flows and/or provide grid stabilization services can remove these bottlenecks and add the required flexibility and support renewable integration. This "additional capacity" on the existing grid will close the gap between the long-term infrastructure and the immediate need for transmission capacity that renewable interconnections require in Northeast of Brazil.

By applying leading FACTS, such as our modular Static Synchronous Series Compensators (m-SSSCs)--SmartValve--power flows can be quickly redirected from overloaded nodes to ones with spare capacity, quickly unlocking transmission capacity, while increasing overall system security and resilience. SmartValve paves the way forward for series-connected FACTS (Flexible Alternating Current Transmission Systems) with a modular, transformerless approach and deployment flexibility to deliver greater solution value.

With its modular standardized design, the m-SSSC is distinct from legacy tailor-made FACTS devices and can be easily expanded or relocated in the future even at different voltage levels as the needs of the transmission system change over time, making it a "no regrets" solution for system planning. The faster delivery and install timeframes, high reliability, capability to provide dynamic services, and its minimal impact on the local environment also contribute to the m-SSSCs to be implemented immediately and not wait until the long-term infrastructure is ready.

Accelerating renewable interconnection with m-SSSCs

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