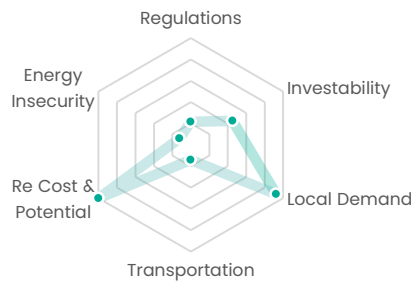
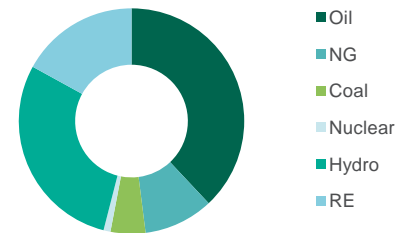


GDP - USD (trn):	1.44
GDP per capita - USD:	6,797
Land area ('000 km2):	8,358
Population density (per km²):	25
Grid emissions factor (gCO ₂ /kWh):	93

Hydrogen Drivers Matrix



Primary Energy Mix



1.1 Regulatory commitment

- Reluctant net zero target of 2060
- No carbon pricing
- No hydrogen strategy
- Very active state govt. in Ceará

0.7 Transportation

- No existing gas or ammonia export infrastructure to prime hydrogen markets in EU/East Asia, or the U.S.

2.3 "Investability"

- BB- rated by S&P
- 124th in WB Ease of Doing Business

5.0 RE cost and potential

- Vast solar, wind and hydro resources but recent energy auctions have priced solar, the cheapest renewable, north of USD23/kWh

4.6 Local demand potential

- 9th largest steel manufacturing
- 8th largest oil refiner
- 8th busiest container port traffic

0.6 Energy insecurity

- Largely energy self-sufficient

Massive green hydrogen developments announced, but concrete offtake or funding needed

In December 2020, Brazil issued the National Energy Plan 2050 that highlights at high level the opportunities presented by hydrogen.

The domestic gas market, previously controlled by Petrobras, is in the midst of deregulation and gas distribution companies today are trying to diversify gas suppliers. In early August Brazil's National Energy Policy Council started appraising plans for new green H₂ regulations, tax incentives and exports. In parallel to the regulatory dialogue, more than USD22bn of potential investments have been announced in the country, predominantly export-focused coastal projects and concentrated in the northeast state of Ceará. Almost all efforts are in early stages, and realisation of these projects would not only depend on Brazilian government support but also on demand ramp up in import markets like the EU.

Brazil possesses vast wind and solar resources, and its electricity grid is one of the cleanest in the world, with 75% of power generated from hydro, wind and nuclear. Transport on the other hand makes up almost half of Brazil's energy-use-related emissions. Given that deforestation accounts for 44% of Brazil's overall carbon emissions, driven in large part by biofuel farming (especially oil seeds), hydrogen could make an outsized decarbonization impact through substituting biofuels in transportation. Biofuels today benefit from carbon price support under the RenovaBio ETS launched in 2019, which hydrogen may have to compete against in the domestic market.

Ceará and Pecém Port mega projects

The state government of Ceará is in multi-front dialogue with international developers on a number of massive green hydrogen projects in the Pecém Port Complex area. The Port is 70% owned by the state and 30% by the Port of Rotterdam, suggesting a natural potential export channel. The state has signed an MOU with French renewable energy company Qair for a 1.2GW offshore wind/296ktpa hydrogen plant that targets 2023 launch. In July this year, it signed an MOU with Fortescue Future Industries¹ for the feasibility study of a USD6bn green hydrogen facility. Australia's Enegix Energy has also announced it will be developing a 3.4GW/600ktpa "Base One" project. In the same port area, EDP has already started with a more modest 3MW electrolyser installation, powered by existing wind and solar projects, that is slated to be operational by end 2022.

Other mega projects

Fortescue and Prumo Logística are conducting feasibility studies for a 300MW electrolyser to produce 250ktpa of ammonia from solar and offshore wind at the Acu port in Rio de Janeiro. Qair has also announced a feasibility study for a USD3.8bn green hydrogen complex at Suape port in Pernambuco.

Brazil-Germany Alliance

Brazil was named as one of six potential green hydrogen partners for Germany under the H2Global CfD program and this alliance has been set up to establish potential areas of hydrogen collaboration. German government organ GIZ is also a supporter of H2 Brasil, an initiative to develop a hydrogen regulation and subsidy framework.

¹Subsidiary of Australian iron ore company Fortescue