International Partnership for Hydrogen and Fuel Cells in the Economy

Brazil Update

35th IPHE Steering Committee Meeting

22 – 23 June 2021

Virtual Meeting

Announcements and/or New Initiatives *Brazil*

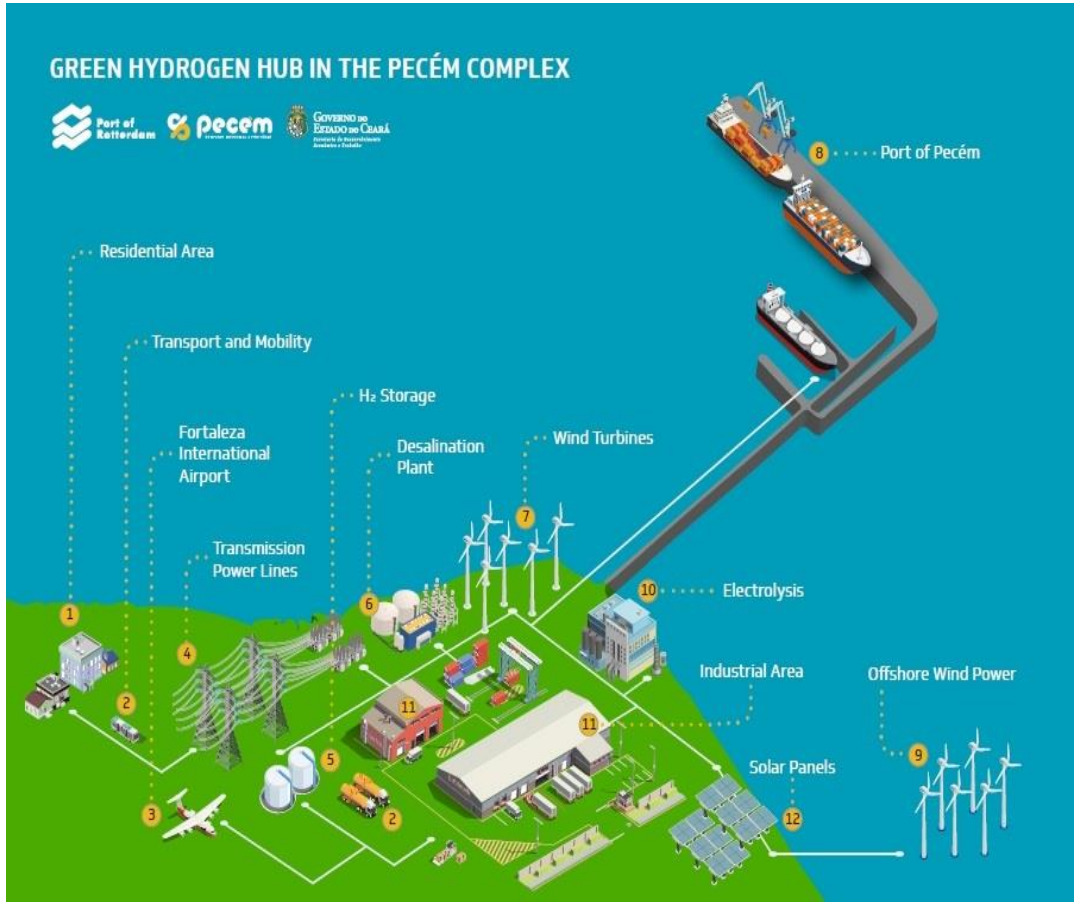
Programa Nacional do Hidrogênio

PNH2

Brazilian Hydrogen Plan (PNH2) is being developed by:

Ministry of Mines and Energy (MME),
Ministry of Science, Technology and Innovations (MCTI),
Ministry of Regional Development (MDR) and the
Energy Research Office (EPE).

Announcements and/or New Initiatives *Brazil*



Green Hydrogen HUB Ceará – Brazil

Project's Ambitions:

- **Electrolysis capacity: 5 GW**
- **Green H2 production: 900,000 tons/year**
- **Area: 200 ha**

Ceará's objective is to become a global player in the production, exportation and distribution of Green Hydrogen for use in several sectors of the economy, such as industry and transport, thus contributing to the reduction of global CO_2 levels and with social, economical, technological and environmental developments.

Project Partners: Ceará State Government, Pecém Port and Industrial Complex (CIPP), Industry Federation of Ceará (FIEC), and Federal University of Ceará (UFC).

MoU with the following companies:

enegix, White Martins, Linde, Praxair, Qair

FIEC Federação das Indústrias do Estado do Ceará – Pelo Futuro da Indústria; ZPE Ceará; Pecém Complexo Industrial e Portuário; UFC; Governo do Estado do Ceará – Secretaria do Desenvolvimento Econômico e Trabalho

Announcements and/or New Initiatives *Brazil*

Green Hydrogen HUB Porto do Açu - Brazil

MoU between Fortescue Future Industries Pty Ltd (FFI) and Porto do Açu Operações SA.

Green hydrogen plant with a capacity of 300 MW to produce 250,000 tons/year of green ammonia using offshore solar and wind power in the coasts of Rio de Janeiro and Espírito Santo States.

Brazil – Profile June 2021

Status of Deployments

- 1 Hybrid HFC Bus
- 1 HRS (35 MPa on-site production);
- 3 ongoing projects:

i) Hydrogen-based energy storage plant built to store 200 MWh/year;

ii) Hydrogen-based energy storage plant built to store 730 MWh/year;

iii) A 100 passengers hydrogen fuel cell catamaran

Leading Government Initiatives

- **Brazilian Hydrogen Plan (PNH2)**
  - Ministry of Mines and Energy (MME), Ministry of Science, Technology and Innovations (MCTI), Ministry of Regional Development (MDR) and the Energy Research Office (EPE)

Deployment Goals

Under evaluation by the Government (PNH2)

Goals or Focus Areas

- For Hydrogen Production:
  * Natural gas and ethanol reforming
  * Water electrolysis using renewable energies
  * Waste biomasses

- For use:
  * Heavy Vehicles
  * Ammonia/fertilizer production
  * Blending with natural gas

Funding

Estimated from Government:
U$ 100 million for next 5 years

Thank you

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Highlight to Include in IPHE Newsletter *Brazil*

Programa Nacional do Hidrogênio

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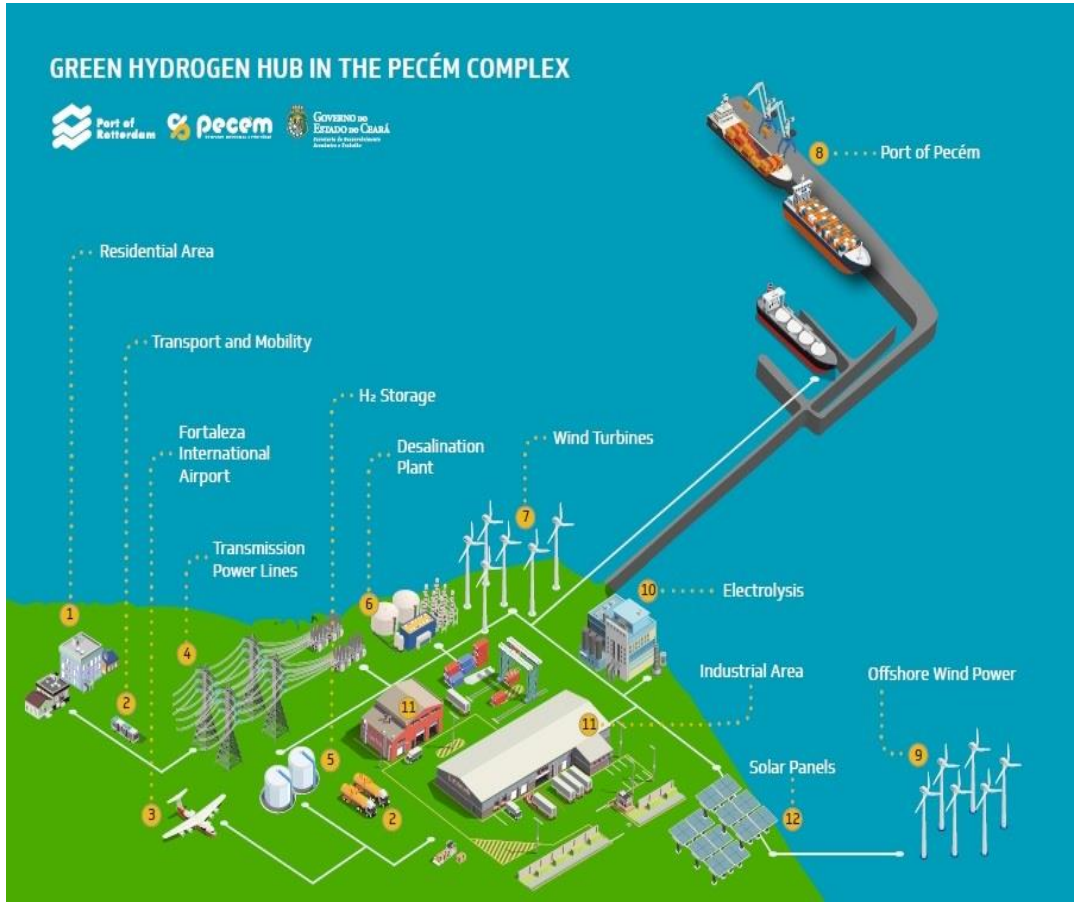

Green Hydrogen HUB Ceará – Brazil (in operation by 2025)

- Electrolysis capacity: 5 GW
- Green H2 production: 900,000 tons/year
- Area: 200 ha

Highlight to Include in IPHE Newsletter *Brazil*

Green Hydrogen HUB Porto do Açu – Brazil (in operation by 2026)

- Green hydrogen plant
- 300 MW to produce 250 thousand tons/year of green ammonia
- Offshore solar and wind power
- Coasts of Rio de Janeiro and Espírito Santo States

Status of Applications and Goals *Brazil*

Application	Status (As of *June, 2021*)	Goal (For *Year*)
1) H_2 Applications		
a. Energy Storage (e.g. MW, GW of capacity)	7 MWh/day	
b. Electrolyzers (e.g. MW, GW of capacity)	48 kW	
c. Other (e.g., Steel, Marine, Fertilizer, etc.)		
2) Transportation		
a. Light Duty Vehicles		
b. Medium and Heavy Duty Vehicles		
c. Buses	1	
d. Trains		
e. Forklifts		
3) Stationary		
a. Residential		
b. Commercial		
c. Back Up Power		
4) Other (applicable to your country and not covered in the categories listed above)		