



# INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

## IPHE Country Update April 2019: Brazil

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<b>Covered Period</b>	December 2018 – April 2019

### 1. New Initiatives, Programs, and Policies on Hydrogen and Fuel Cells

- I. Memorandum of Understanding on the establishment of a partnership to develop projects on sustainable and nonpolluting mobility initiative for buses and ships signed between The Hydrogen Laboratory of Coppe – Universidade Federal do Rio de Janeiro – LABH2/COPPE/UFRJ - and the City Hall of Maricá (Rio de Janeiro, Brazil). Additional information in English is available at:  
<https://www.marica.rj.gov.br/2018/12/14/prefeitura-e-coppe-ufrj-assinam-memorando-de-entendimento-para-utilizacao-de-onibus-hibrido>
- II. The state of Paraná (Brazil) is the first state of Brazil that extinguished the IPVA (Tax on Property of Automotive Vehicles) and is planning on extinguishing the ICMS (Tax on Circulation of Goods and Transportation and Communication Services) for electric cars, which could include fuel cell vehicles. Available at:  
<https://www.folhadelondrina.com.br/cidades/parana-anuncia-isencao-de-impostos-para-carros-eletricos-2936438e.html> (Portuguese only).

### 2. Hydrogen and Fuel Cell R&D Update

- I. According to the Web of Science website during the year of 2018 there were in the field around 80 publications in Brazil.
- II. R&D Update: Current Projects
  - Electrical energy production using biohydrogen and biogas; PETROBRAS.
  - Technical and economic feasibility analysis of hydrogen generation unit and new routes for production of H<sub>2</sub>; PETROBRAS.
  - Synergy development between hydro and solar power sources and seasonal and intermittent energy storage with hydrogen and electrochemical systems; FURNAS.
  - Efficiency analysis of complementary energy storage next to hydroelectric power plants using electrochemical and hydrogen storage technologies; Companhia Energética de São Paulo (CESP).

### 3. Demonstration, Deployments, and Workforce Developments Update

- I. Demonstrations
  - Production-ready prototypes of two ships: an Electric-Hybrid Ferry Boat (for vehicles and passengers) and a Catamaran for 100 passengers, possessing



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electrical propulsion power system with on-board generation using hydrogen or ethanol and embarked electrical energy storage system with batteries; LABH2/COPPE/UFRJ/FURNAS-Aneel/TRACEL.

- Energy generation with fuel cell and energy storage as hydrogen to supply power to a substation and for electrical mobility; LABH2/COPPE/UFRJ/Itaipu Technological Park (PTI)/ TRACEL.

#### 4. Events and Solicitations

- The XIV Hydrogen - Power Theoretical and Engineering Solutions International Symposium – HYPOTHESYS2019, will be held in Foz do Iguaçu, at Itaipu, from April 24th to 26th, 2019. Additional information is available at: <http://www.hypothesis.ws/index.php>.
- 1<sup>st</sup> Brazilian Association for Hydrogen Energy (ABH2) Conference, November 7 - 8<sup>th</sup>, 2019. Rio de Janeiro, Brazil. Additional information is available at: <http://www.abh2.com.br/congressoabh2>

#### 5. Investments: Government and Collaborative Hydrogen and Fuel Cell Funding

- The projects in the items 2 and 3 above totalize 33,244,846.82 (USD) in investments on the field.
- Establishment of the U.S.-Brazil Energy Forum, March 19<sup>th</sup>, 2019. Additional information is available at: <https://www.energy.gov/articles/establishment-us-brazil-energy-forum>

#### 6. Regulations, Codes & Standards, and Safety Update

Nothing new to report for this period.



## Summary Country Update April 2019: Brazil

Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Support Mechanism
Fuel Cell Vehicles <sup>1</sup>	One (1) by 2020	Shipping passenger under development	Tracel, LABH2/COPPE/UFRJ and FGV	Government and Industry Co-funding.
FC Bus	Two (2) by 2020	4 HFC buses and 1 hybrid HFC bus	Itaipu, Tracel, LABH2/COPPE/UFRJ	
Fuel Cell Trucks <sup>2</sup>				
Forklifts				
H <sub>2</sub> Refueling Stations	Target Number	Current Status	Partnerships, Strategic Approach	Support Mechanism
70 MPa On-Site Production				
70 MPa Delivered				
35 MPa On-Site Production		1 hydrogen production and refueling station.		

<sup>1</sup> Includes Fuel Cell Electric Vehicles with Range Extenders

<sup>2</sup> As above



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		Another refueling station is under construction.		
35 MPa Delivered				
Stationary	Target Number <sup>3</sup>	Current Status	Partnerships, Strategic Approach	Support Mechanism
Small <sup>4</sup>				
Medium <sup>5</sup>		5 kW FC under development	IPEN and INT.	Brazilian financing agencies: Finep and CNPq (both from MCTIC) and Fapesp (São Paulo State financing agency)
Large <sup>6</sup>				
District Grid <sup>7</sup>				
Regional Grid <sup>8</sup>				
Telecom backup				

<sup>3</sup> Targets can be units installed and/or total installed capacity in the size range indicated

<sup>4</sup> <5 kW (e.g., Residential Use)

<sup>5</sup> 5kW – 400 kW (e.g., Distributed Residential Use)

<sup>6</sup> 0.3MW – 10 MW (e.g., Industrial Use)

<sup>7</sup> 1MW – 30 MW (e.g., Grid Stability, Ancillary Services)

<sup>8</sup> 30MW plus (e.g., Grid Storage and Systems Management)



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H <sub>2</sub> Production	Target <sup>9</sup>	Current Status	Partnerships, Strategic Approach	Support Mechanism
Fossil Fuels <sup>10</sup>		2 fuel processors under construction (one using ethanol and another one using natural gas).		
Water Electrolysis <sup>11</sup> (PEM, Alkaline, SOEC)		1 hydrogen production (water electrolysis) and refueling station.		
By-product H <sub>2</sub>				
Energy Storage from Renewables	Target <sup>12</sup>	Current Status	Partnership, Strategic Approach	Support Mechanism

<sup>9</sup> Target can be by quantity (Nm<sup>3</sup>, kg, t) and by percentage of total production; also, reference to efficiency capabilities can be a target

<sup>10</sup> Hydrogen produced by reforming processes

<sup>11</sup> Please indicate if targets relate to a specific technology (PEM, Alkaline, SOEC)

<sup>12</sup> Can be expressed in MW of Installed Capacity to use the electricity from renewable energy generation, and Annual MWh of stored energy capacity



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Power to Power <sup>13</sup> Capacity				
Power to Gas <sup>14</sup> Capacity				

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<sup>13</sup> Operator has an obligation to return the electricity stored through the use of hydrogen back to electricity

<sup>14</sup> Operator has the opportunity to provide the stored energy in the form of hydrogen back to the energy system through multiple channels (e.g., merchant product, enriched natural gas, synthetic methane for transportation, heating, electricity)