INTERNATIONAL PARTNERSHIP FOR
HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update November, 2017: Brazil

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1. New Policy Initiatives on Hydrogen and Fuel Cell

- The Ministry of Mines and Energy (MME) and the Ministry of Science, Technology, Innovation and Communications (MCTIC) are discussing the possibility of transferring the official representation of Brazil in IPHE from MME to MCTIC. The subject came up during the visit of the Executive Director of IPHE, Mr. Tim Karlsson, to MME, in September, 2017. There is a common understanding that the transversal character of the theme and the stage of development of FCH technologies in Brazil lead the main Brazilian stakeholders in the subject currently to have great interaction with MCTIC, especially universities and research institutes. So, making MCTIC the official representative of Brazil in IPHE would significantly facilitate the involvement of Brazilian agents with the IPHE.

2. Hydrogen and Fuel Cell R&D Update

- The B3 Shipyard, located in Salvador, Bahia, started the construction of a catamaran with capacity for 100 passengers which will be powered by hydrogen and will have electric propulsion. This activity is part of a project from the Hydrogen Laboratory of the Post-graduation and Engineering Research Institute Alberto Luiz Coimbra (COPPE), at the Federal University of Rio de Janeiro (UFRJ) and is financed by Furnas Energy Company, under the R&D Program regulated by the National Regulatory Agency for Electric Energy (Aneel);

- The Hydrogen Laboratory of the Post-graduation and Engineering Research Institute Alberto Luiz Coimbra (COPPE), at the Federal University of Rio de Janeiro (UFRJ) and the Itaipu Technological Park (FPTI) established a partnership for the study and demonstration of the Coppe/UFRJ's hybrid electric-hydrogen bus in FPTI and the Iguaçu National Park. The activities are scheduled for early 2018, and will use the existing infrastructure in FPTI to produce hydrogen by water electrolysis. The partnership was one of the results of the visit of the IPHE Executive Director, Mr. Tim Karlsson, to Brazil.

- The Ministry of Science, Technology, Innovation and Communications (MCTIC) has established a bilateral cooperation with Germany for the development of advanced fuels. The objective of the project is to create an international reference model for the production of alternative fuels from renewable energies with no environmental impacts, for aviation and sectors with no potential for electromobility. The main element of the cooperation is a pilot project, in which these fuels will be generated

and applied as evidence of viability. FCH technologies will play a relevant role in the project. The implementing partners will be MCTIC and the German Aerospace Center (DLR).

3. Demonstration and Deployments Update

- A demonstration of Coppe/UFRJ's hybrid electric bus was held in November 2017 in the city of Volta Redonda, State of Rio de Janeiro, RJ, to test local urban use.

4. Events and Solicitations

- On April 5th, an event occurring in Rio de Janeiro/RJ marked the foundation of the Brazilian Hydrogen Association (ABH). The new entity aims to bring together research institutions, companies and specialists interested in the research, technological development and innovation of themes related to the hydrogen industry. ABH will be part of the International Association for Hydrogen Energy (IAHE) and will support the organization of the 22nd World Hydrogen Energy Conference – WHEC 2018, which will be held in Rio de Janeiro/Brazil.

- In September 2017, IPHE Executive Director, Mr. Tim Karlsson, visited Brazil for a series of events and meetings with some of the main actors related to FCH in Brazil. Mr. Karlsson participated, in September 18th, in the Workshop "The Dawning of the Hydrogen Energy in the World Economy", at the Technological Park of the Federal University of Rio de Janeiro. He made a presentation and participated in a round table together with Mr. Mauricio Tolmasquim, former CEO of Empresa de Pesquisa Energética (EPE) – Brazil's energy research and planning authority. In September 20th, Mr. Karlsson took part at the seminar "International Cooperation on Hydrogen Energy", organized by the Ministry of Science, Technology, Innovation and Communications (MCTIC) at the National Council for Scientific and Technological Development (CNPq), in Brasilia, Federal District. He presented the current state of FCH technologies and policies worldwide for an audience of embassies, government institutions and FCH companies. There were also presentations from national and international companies about their actions related to FCH technologies, and Prof. Paulo Emílio Miranda divulgated the realization of WHEC 2018 in Brazil. In Brasilia, Mr. Karlsson also had meetings with authorities: at the Ministry of Science, Technology, Innovation and Communications (MCTIC); at the National Regulatory Agency for Electrical Energy (Aneel); at the Ministry of Industry, Foreign Trade and Services (MDIC); and at the Ministry of Mines and Energy (MME). In September 22nd, Mr. Karlsson participated in a workshop at the Technological Park of Itaipu, in Foz do Iguaçu, State of Paraná, where he also made a presentation and contributed in a discussion with representatives of Itaipu and some researchers (Ricardo Ferracin and Marcelo Miguel, from Itaipu; Prof. Dr. Helton Alves, from Federal University of Paraná (UFPR) and Prof. Dr. Paulo Emílio Miranda, from Federal University of Rio de Janeiro. After the event, Mr. Karlsson also visited Itaipu Hydropower Plant facilities.

- WHEC 2018 will occur in Rio de Janeiro, June 17 – 22, 2018, hosted by the Post-graduation and Engineering Research Institute Alberto Luiz Coimbra (COPPE), at the Federal University of Rio de Janeiro (UFRJ) (http://www.whec2018.com). The deadline for abstracts submission has been shifted to December 11th, 2017. Abstracts evaluation will be done in parallel to their reception in this period. We invite interested

authors to contribute an abstract under the motto “Power and biomass to hydrogen” – See Call for Abstracts brochure at https://www.whec2018.com/Media/2/WHEC%202018_Brochure_Call%20for%20abstracts_online.pdf.

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

6. Regulations, Codes & Standards Update

- Brazilian Association of Technical Standards (ABNT) has established the Technical Committee CEE-67 on hydrogen technologies and fuel cells. This mentioned committee is a mirror of ISO Technical Committee TC-197 “Hydrogen Technologies” and also deals with the scope of IEC Technical Committee TC-105 “Fuel Cells”. Some of most prominent Brazilian institutions, researchers and professionals from HFC related matters are members of it.

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Summary Country Update [Month Year]: [Country Name]

Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
Fuel Cell Vehicles[1]				
FC Bus		4 HFC buses and 1 hybrid HFC bus		
Fuel Cell Trucks[2]				
Forklifts				
H_2 Refueling Stations	**Target Number**	**Current Status**	**Partnerships, Strategic Approach**	**Policy Support**
70 MPa On-Site Production				
70 MPa Delivered				
35 MPa On-Site Production		1 hydrogen production and refuelling station. Another refuelling station is under construction.		

[1] Includes Fuel Cell Electric Vehicles with Range Extenders
[2] As above

35 MPa Delivered				
Stationary	**Target Number[3]**	**Current Status**	**Partnerships, Strategic Approach**	**Policy Support**
Small[4]				
Medium[5]				
Large[6]				
District Grid[7]				
Regional Grid[8]				
Telecom backup				
H_2 Production	**Target[9]**	**Current Status**	**Partnerships, Strategic Approach**	**Policy Support**
Fossil Fuels[10]		2 fuel processors under construction (one using ethanol and another one using natural gas)		

[3] Targets can be units installed and/or total installed capacity in the size range indicated
[4] <5 kW (e.g., Residential Use)
[5] 5kW – 400 kW (e.g., Distributed Residential Use)
[6] 0.3MW – 10 MW (e.g., Industrial Use)
[7] 1MW – 30 MW (e.g., Grid Stability, Ancillary Services)
[8] 30MW plus (e.g., Grid Storage and Systems Management)
[9] Target can be by quantity (Nm^3, kg, t) and by percentage of total production; also, reference to efficiency capabilities can be a target
[10] Hydrogen produced by reforming processes

Water Electrolysis[11] (PEM, Alkaline, SOEC)		1 hydrogen production (water electrolysis) and refueling station.		
By-product H_2				
Energy Storage from Renewables	**Target[12]**	**Current Status**	**Partnership, Strategic Approach**	**Policy Support**
Power to Power[13] Capacity				
Power to Gas[14] Capacity				

[11] Please indicate if targets relate to a specific technology (PEM, Alkaline, SOEC)
[12] Can be expressed in MW of Installed Capacity to use the electricity from renewable energy generation, and Annual MWh of stored energy capacity
[13] Operator has an obligation to return the electricity stored through the use of hydrogen back to electricity
[14] 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)