



## Hydrogen - A Competitive Energy Storage Medium To Enable the Large Scale Integration of Renewable Energies

Seville, 15-16 November 2012

### Improvements to Integrate High Pressure Alkaline Electrolysers for Electricity/H<sub>2</sub> production from RES to Balance the Grid (ELYGRID)

#### Overall Objectives and Budget

ELYGRID Project aims at contributing to the reduction of the total cost of hydrogen produced via electrolysis couple to Renewable Energy Sources, mainly wind turbines, and focusing on mega watt size electrolyzers (from 0,5 MW and up). The objectives are to improve the efficiency related to complete system by 20 % and to reduce costs by 25%. The work will be structured in 3 different parts, namely: cells improvements, power electronics, and balance of plant (BOP). Two scalable prototype electrolyzers will be tested in facilities which allow feeding with renewable energies (photovoltaic and wind). The total budget is of 3.752.760,80 Euro with the JTI contribution of 2.105.017 Euro.

#### ELYGRID tries to reduce Total Cost of Ownership in big size alkaline electrolyzers (0,5 MW and up)

#### Motivation

- Need for new clean energy technologies
- Interest in hydrogen production by means of renewable energy sources
- New developments are necessary to match renewable electricity production with its intermittent nature
- No available technology developed for partial load or intermittent operations within that range of electrolysis power (3-4 MW)
- Current technologies must be redesigned to achieve higher efficiencies and to be reliable, robust and competitive with capacity factors lower than 25%.



IHT Electrolyser – (760Nm<sup>3</sup>/h H<sub>2</sub>)

#### Technical Work Package Structure

Elygrid Project is divided in the following WPs:

- WP1- Management, Monitoring and Assessment.
- WP2 – Cell improvements: Development (synthesis) of advanced materials for electrolysis cell's diaphragms/membranes and electrodes to be used for field testing.
- WP3 – Power Electronics: Study the effect of the electric power supply topology on the electrolyzer efficiency at full and partial loads.
- WP4 – O&M and BOP optimization: identify technical improvements related to BOP (gas/KOH systems, thermal management, production, safety issues)
- WP5 – Field Testing: Implementation of field trials for electrolyzers integrated with RES
- WP6 – Market preparation and Dissemination.

#### Future Work

Continuation of work package development. Field testing in FHA facilities of IHT alkaline electrolyser coupled to RES.

#### Conclusions and major findings

The project has just completed its first year out of three. Important advances have been done in terms of the development of new membranes, power electronics design and BOP optimization.

#### Project Overview

- Dr. Luis Correas, Managing Director, Foundation for the Development of New Hydrogen Technologies in Aragon. +34 974 21 52 58. info@hidrogenoaragon.org
- Aragon Hydrogen Foundation FHA, Industrie Haute Technologie SA IHT, Eidgenössische Materialprüfungs- und Forschungsanstalt EMPA, HELION, Forschungszentrum Juelich GmbH JÜLICH, Vlaamse Instelling voor Technologisch Onderzoek N.V. VITO, Lapesa Grupo Empresarial LAPESA, Instrumentación y Componentes SA. INYCOM, Ingeteam Power Technology SA. INGETEAM, Commissariat à l'Energie Atomique et aux Energies Alternatives CEA
- 11/11 to 10/14
- www.elygrid.com



IHT Electrolyser – Hydrogen Foundation Aragon facilities