

## Introduction

An innovative polymer electrolyte membrane electrolyzer (PEMEL) that provides significant improvements in efficiency and operability to satisfy emerging market requirements, is urgently needed for the increased demands of the grid balancing services.

In this context, PRETZEL is offering breakthrough technologies for becoming game changer in the field of water electrolyzers. First tasks on cell development and pressure housing have been accomplished and components specifications and optimization were discussed as a critical point of the project.

An important objective of PRETZEL project is to test and integrate the hydraulic compression technology, already tested in the laboratory scale, under real working conditions which is necessary for commercialization.

### Coordinated by:

German Aerospace Center  
Deutsches Zentrum für Luft- und Raumfahrt e.V.  
(DLR)

Budget: 1,999,088.75 €

Project duration: 01/01/2018-31/12/2020

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PRETZEL project's progresses, publications and events can be followed on our social media profiles

**Twitter:** PElectrolyzer

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# PRETZEL



Novel modular stack  
design for high **PRE**ssure  
PEM water elec**Tro**ly**Zer**  
t**E**chno**L**ogy with wide  
operation range and  
reduced cost  
**PRETZEL**



This project has received funding from the Fuel Cell and Hydrogen 2 Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 779478.



## Objectives

- Develop and manufacture a high pressure PEMEL stack based on the novel principle of hydraulic compression.
- Produce innovative components for the high pressure PEMEL stack that can operate at high temperature and current density.
- Setup and undertake continuous procedures to evaluate the component and stack development process through all phases against the project specifications.
- Integrate the stack with the new components into a high pressure PEMEL test facility to validate the overall performance and operational criteria.
- Disseminate and exploit the project results in order to prepare the market penetration of the new technology.



H<sub>2</sub> for Fuel Cell Test Stations

## Innovations

- Reduction of precious metals
- Production of optimized current collectors with low cost coatings
- Corrosion resistant of BPP without flow field
- High pressure operation reaching 100 bar
- Innovative hydraulic concept for pressurizing and cooling

## Targets

- Increases availability, decreases CAPEX
- Increase of efficiency and reduction of operative costs
- Reduction of bipolar plates (BPP) production costs while taking over the water distribution
- Increasing the power density without mass transport limitation
- Reduction of Ti and reduction of manufacturing costs
- Reduction of compressor costs, increase of system efficiency
- Increases life time and efficiency
- Enables high current density
- Enables durable large active area cells

## Technology Readiness Level



**PEM electrolyzer**  
25 kW, 100 bar, 6 A cm<sup>2</sup>, 80 °C

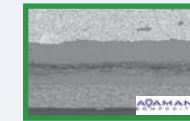
iGas energy GmbH



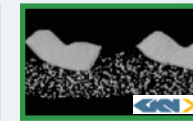
Technology Readiness Level 5



**Stacks**  
WHS

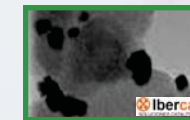


**MEAs**  
Adamant

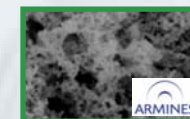


**PCDs**  
GKN Sinter Metals Filters GmbH

Technology Readiness Level 4



**Catalysts**  
Ibercat



**Supports**  
Armines



**Coatings**  
DLR



Technology Readiness Level 3

