Elygrid Project

(Grant Agreement nº 278824)

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www.elygrid.com

PROJECT OVERVIEW

- Improvements to Integrate High Pressure Alkaline Electrolysers for Electricity/H2 production from Renewable Energies to Balance the Grid
- SP1-JTI-FCH.2010.2.1 Efficient alkaline electrolysers
- Duration 38 months, from 01/11/2011 to 31/12/2014
- Budget: 3.701.178,33 € / Funding: 2.105.017,00 €
- Goal: improve TCO of MW alkaline electrolysers
- Project in the last two moths

COORDINATOR:

PROJECT TARGETS AND ACHIEVEMENTS

S/T Goals

Double current density + lower cell voltage

Redesign and optimize AC/DC converter

Optimize stack components, BOP, control

Test and validate

Detect cost improvements and adapt manufacturing

"Smell" the future market and communicate

Avoid future stoppers (RCS, LCA)

PROJECT TARGETS AND ACHIEVEMENTS

MAIP objectives:

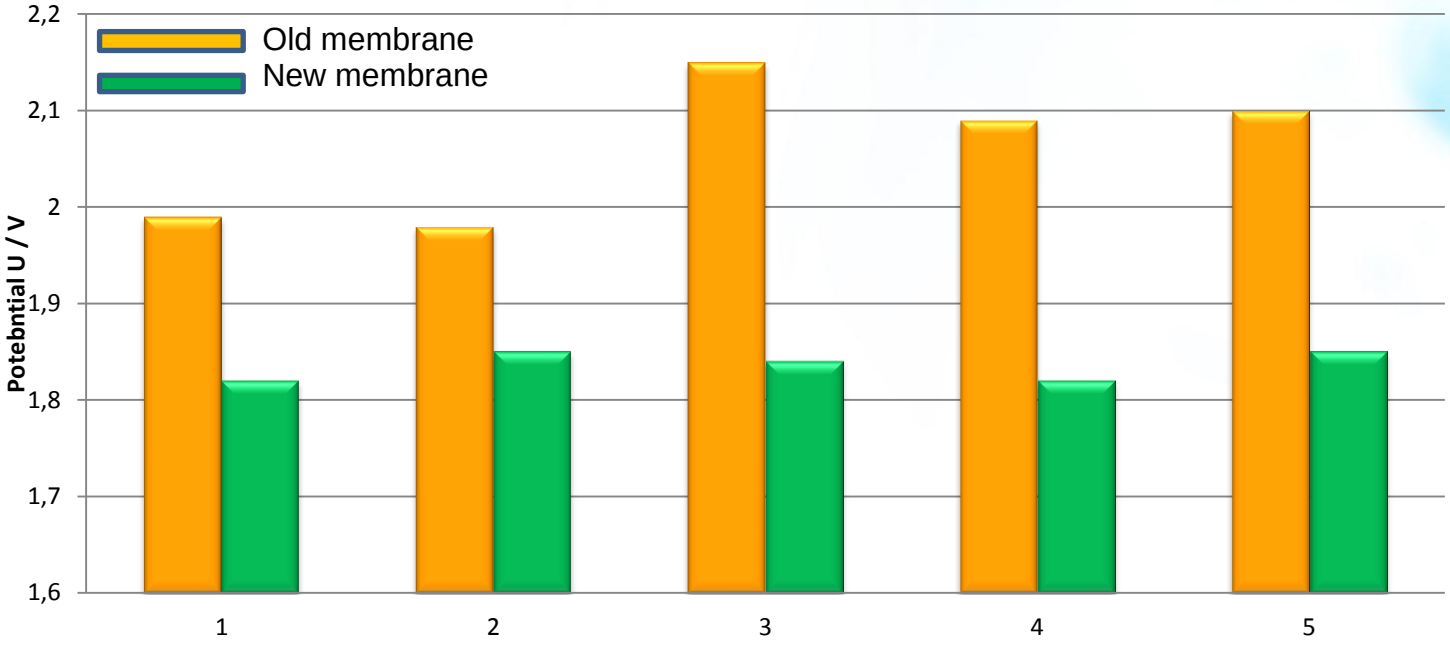
Status before project	AIP target	Project Target	Current status/achievementS	Expected final achievement
SoA (2011) -> 1,6 T/d	2015 target: Unit capacity (Ton/d) = 1,5	Double current density -> double unit capacity	3 Ton/d with current density tested under Elygrid project	100
SoA (2011) -> 70% stack efficiency	2015 target: Efficiency = 68%	10% increase stack efficiency	70% with previous technology 66% with new technology at double current density	90
SoA (2011) -> > 3	2015 target: Cost (M€/(T/d)) = 2.8	25% cost reduction	Assessment of the last BOP improvements	100

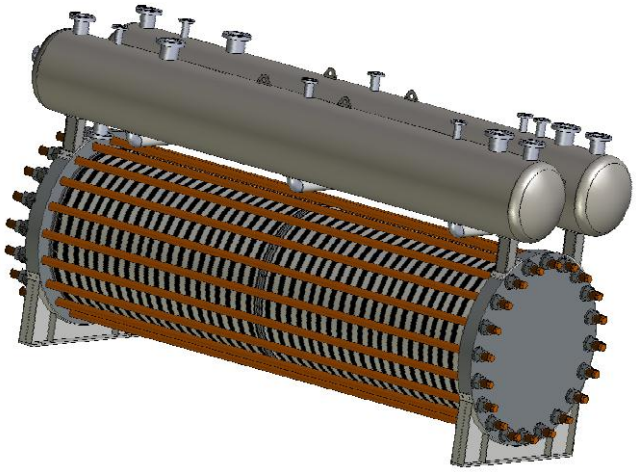
PROJECT TARGETS AND ACHIEVEMENTS

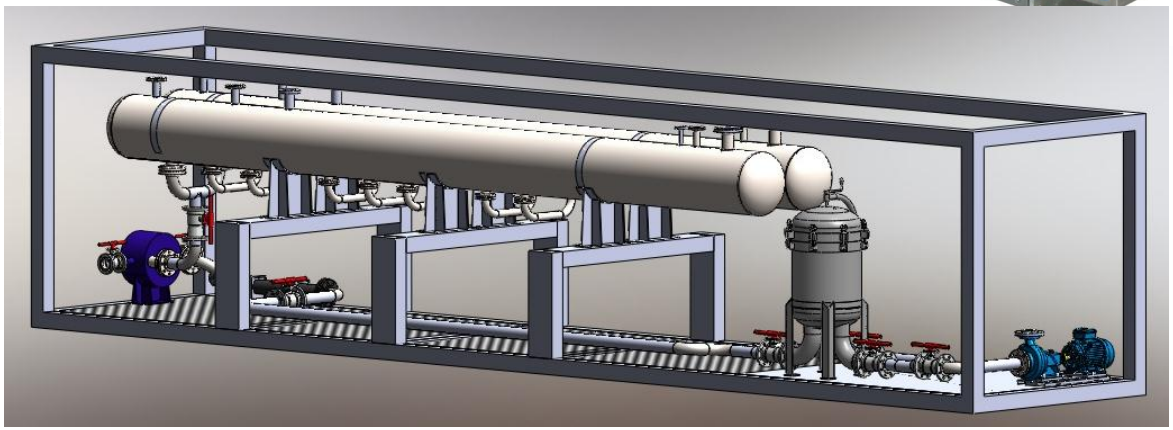
AIP objectives:

Status before project	AIP target	Project Target	Current status/achievementS	Expected final achievement
0.18 A/cm^2	0.75 A/cm^2 with 80% HHV	0. 5 A/cm^2	0. 3-0.4 A/cm^2	Stable operation
25 year lifespan	10 year lifespan	10 year lifespan	Depend on the membrane	75
SoA (2011) -> > 3000 €/Nm3	3000€/Nm^{3}for a complete system	25% cost reduction	Assessment of the last BOP improvements	100
SoA (2011) -> 33 bar	Operating pressure >150 bar	Not applicable to this project	Hydrogen pressure is considered high enough	100

PROJECT TARGETS AND ACHIEVEMENTS







RISKS AND MITIGATION

- **Objective target: Efficiency = 68% and 0.75 A/cm^2 with 80% HHV**
- Bottlenecks and risks: unspecified in MAIP (not related to A/cm2) Better defined in the topic (0,75 A/cm^2) The project agreed an increase of the stack efficiency of 10% related to the previous technology (achieved with the new technology) and a current density of 0, 5 A/cm^2. The project has already tested the unit at 0,4 A/cm^2 and it is possible to test at 0,5 but it is not considered as a priority.
- Revision of targets: No
- **Objective target: 10 year lifespan**
- Bottlenecks and risks: It will depend of the lifespan of the membrane. All the other components have higher lifespan but it is difficult to assure that a material developed under the project can have 10 year lifespan.
- Revision of targets: No

RISKS AND MITIGATION

- **Objective target : Operating pressure >150 bar**
- Bottlenecks and risks: This target was mentioned in the topic but not in the project targets. In any case, as electrolysis study remarks, an output pressure of 33 bar is considered a good level of operation.
- Revision of targets: No
- **Objective target: Retention of >90% of initial efficiency over at least 1000 on/off switching cycles**
- Bottlenecks and risks: The testing of new technology at constant operation has been longer than initially expected and it is possible that more tests with new materials at constant operation are needed. For the project, it is priority to find the best material before testing at discontinuous operation.
- Revision of targets: Yes
- Suggested nature of revision: It is priority to find the best material before testing at on/off cycles.

SYNERGIES WITH OTHER PROJECTS AND INITIATIVES

- EMPA obtained a Swiss internal project granted by BFE which is a public funding institution (Bundesamt/federal office of Energy).
- FHA has co-funded with another national project called DESPHEGA which is also related to alkaline electrolysers. The project was granted in the framework of INNPACTO call (Department of Economics and Competitiveness, Spain)
- Contacts done with RESelyser project (FCH-JU) and final event for sharing public results, expectations and possible further collaboration

HORIZONTAL ACTIVITIES

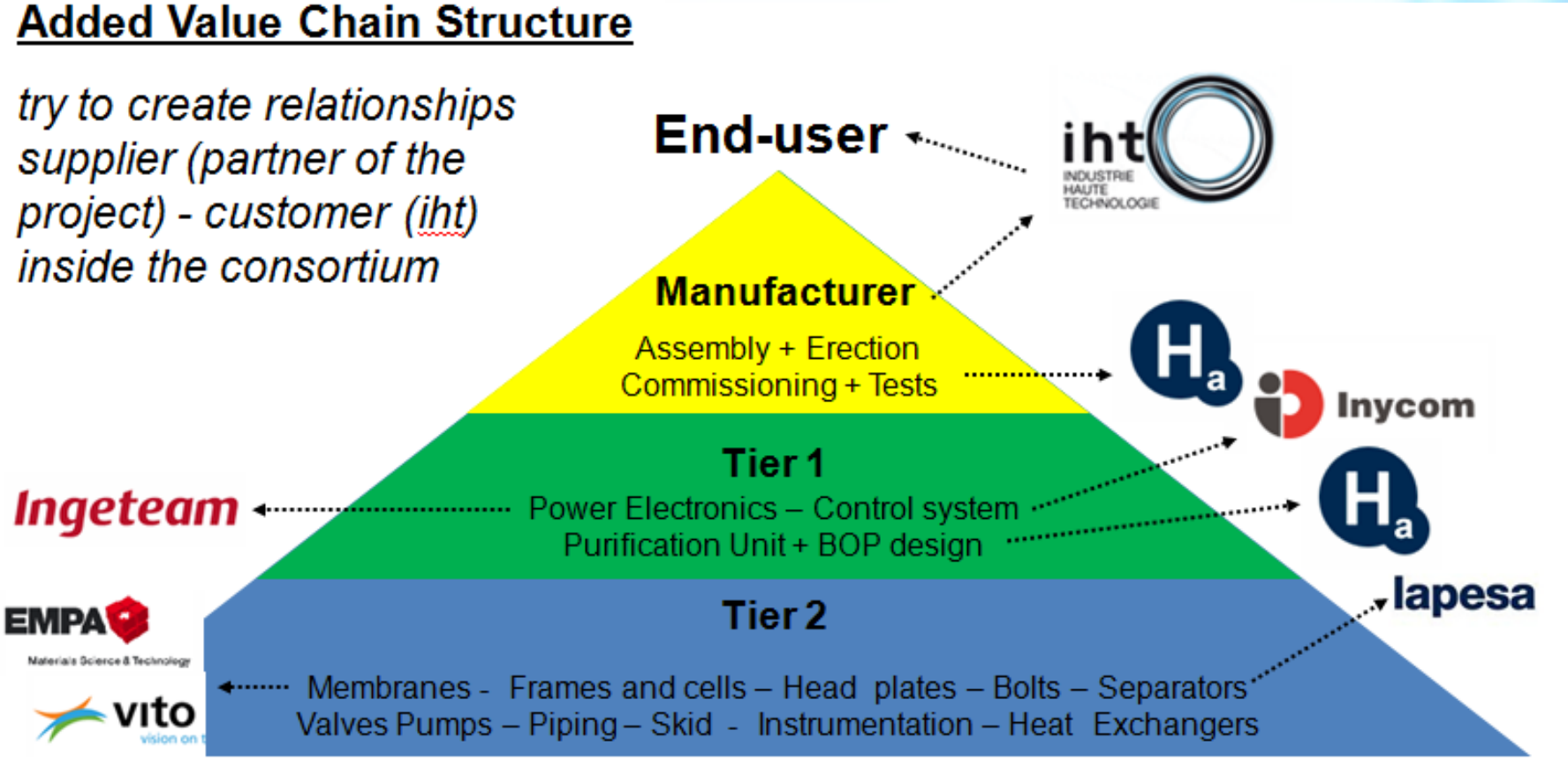
- Training and education
  - Different post-doc and PhD students are working in the project in different WPs: membrane development, power electronics and balance of plant optimization
- Safety, Regulations, codes and standards
  - The project has developed a document with the main regulations, codes and standards which must be taken into consideration in order to design an electrolyser. This document will be public.
- Public awareness
  - The project has a website www.elygrid.com where all general information, news and public papers and presentations can be downloaded

DISSEMINATION ACTIVITIES

- Conference presentations
  - Elygrid Project presents in the: IPHE Workshop Seville, November 2012. 4th EUROPEAN PEFC & H2 FORUM, July 2013. International Conference on Hydrogen Safety 2013, September 2013. Review days (2011-2014). 8TH International Symposium Hydrogen & Energy, February 2014. EUROPEAN HYDROGEN ENERGY CONFERENCE 2014, March 2014. WHEC 2014 (two oral presentations&one poster). Iberconnapice, October 2014.
- Workshops organized by the project
  - The project attended the workshop called “Water electrolysis day” organized by the FCH-JU
  - Final event at the end of the project with RESelyser project
- Publications
  - LCA papers: previous analysis and final results
  - Paper from modeling results and BOP optimization

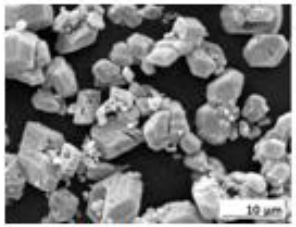
EXPLOITATION PLAN/EXPECTED IMPACT

- "go-to-market" Target: validation of improved technology with a several MW electrolyser unit size at competitive price



EXPLOITATION PLAN/EXPECTED IMPACT

Future projects



Materials

Test bench130 mm
(real conditions)

Concept validation (real size – except power)

Functionality
(lab conditions)

Demo trials
(outside Elygrid)

Market