

PEM Electrolyser for operation with off-grid Renewable Installations



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Project Developer
Innovation Technician (FH_a)



A blue sky with white clouds at the bottom.

WHO ARE
WE?

Aragón Hydrogen Foundation

- **Private, non-profit** organization, created to promote the use of hydrogen as an energy vector.
- Promoted by the Government of Aragon, it was **founded in 2003**
- **Main building:** 1200 m², with offices, labs and warehouse.
- **600 kW** renewable sources installed



Workforce

Multidisciplinary research team

Research & Development

Innovation

Consultancy and training

Business development



ELY4OFF

Supported by	European Commission and Fuel Cells and Hydrogen Joint Undertaking
Grant agreement number	700359
Application area	H2020 Energy
Start date	01/04/2016
End date	31/03/2019
Total Budget (€)	2.315.217,50 €
Stage of implementation	75%, Month 27 of 36

Purpose:

The **demonstration** and **development** of an autonomous **off-grid** electrolysis system linked to **renewable energy sources**.

The **PEMWE industrial prototype** (56 kW) will be **directly linked** to track the solar **photovoltaic** power source producing over 1.5 tonnes of hydrogen per year and **ensuring cold start and rapid response to changes**.

The **demonstration period** in a relevant environment (TRL 6) will last **8 months** and will take place in Huesca, Spain.

Partners:



OBJECTIVES



**Design and
engineering**



**Direct coupling to
RES**



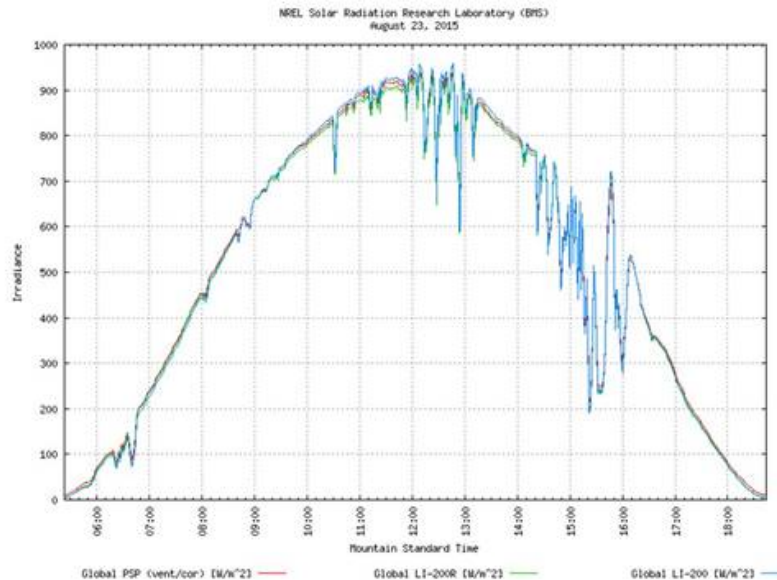
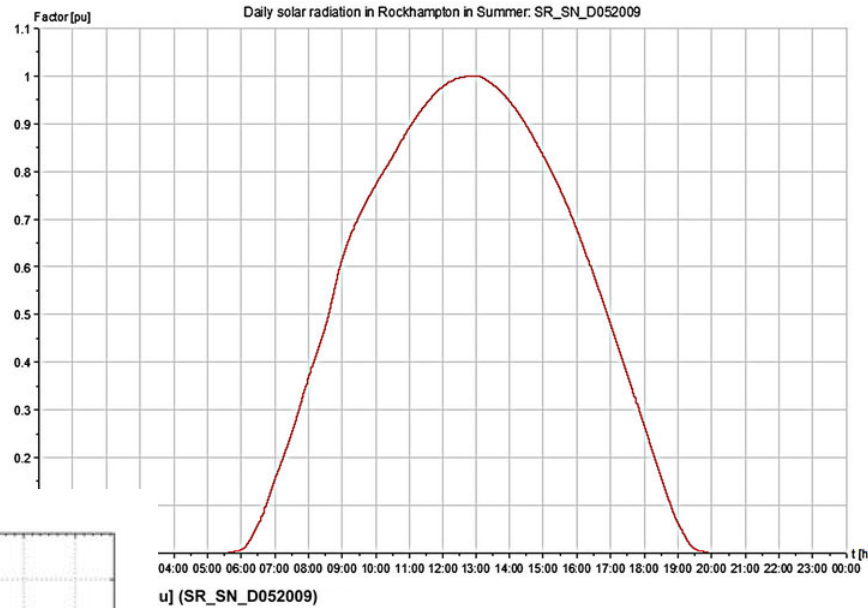
**Overarching
Com.&Cont. System**



**Long term Backup
system**



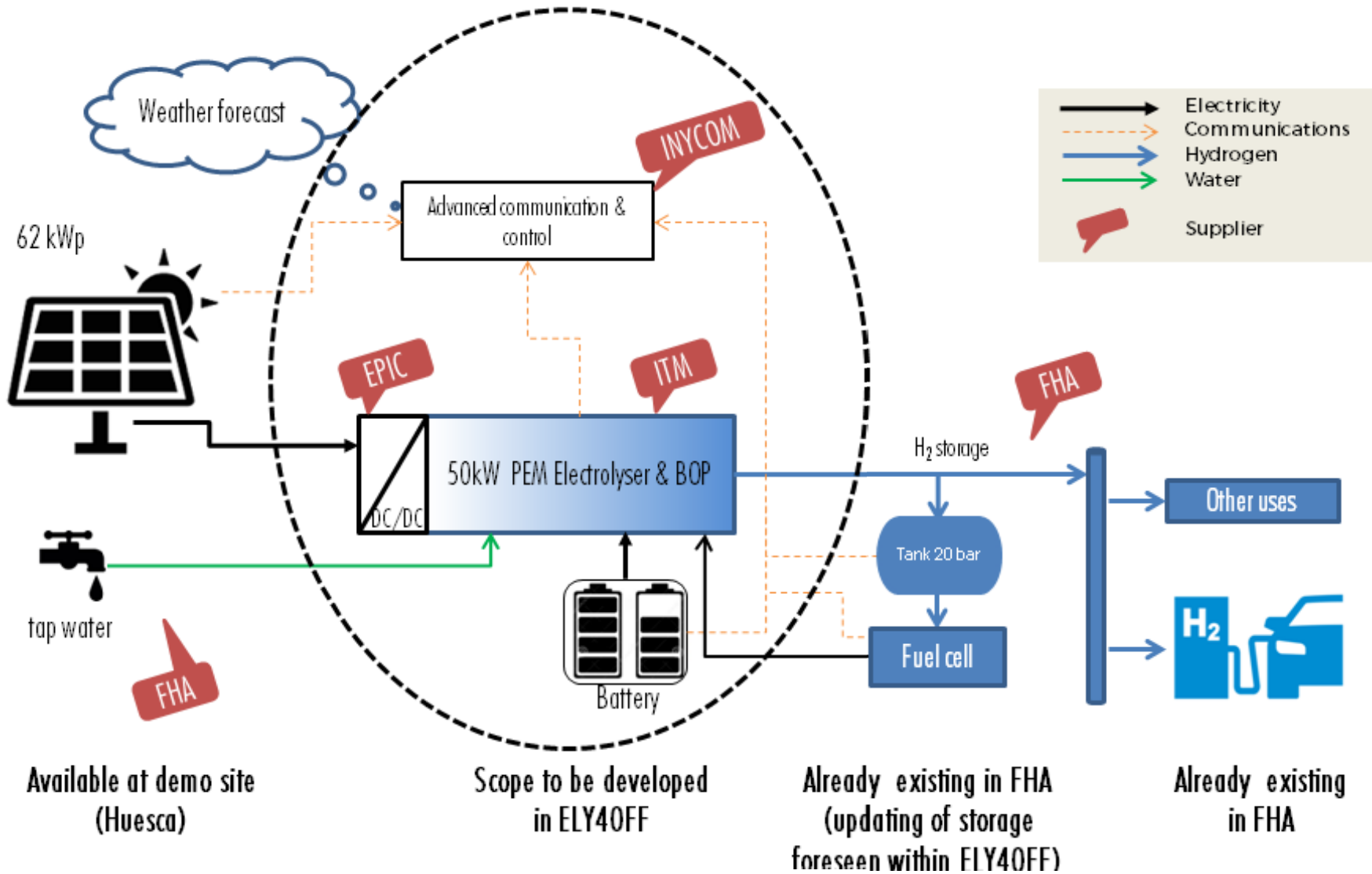
Business Models

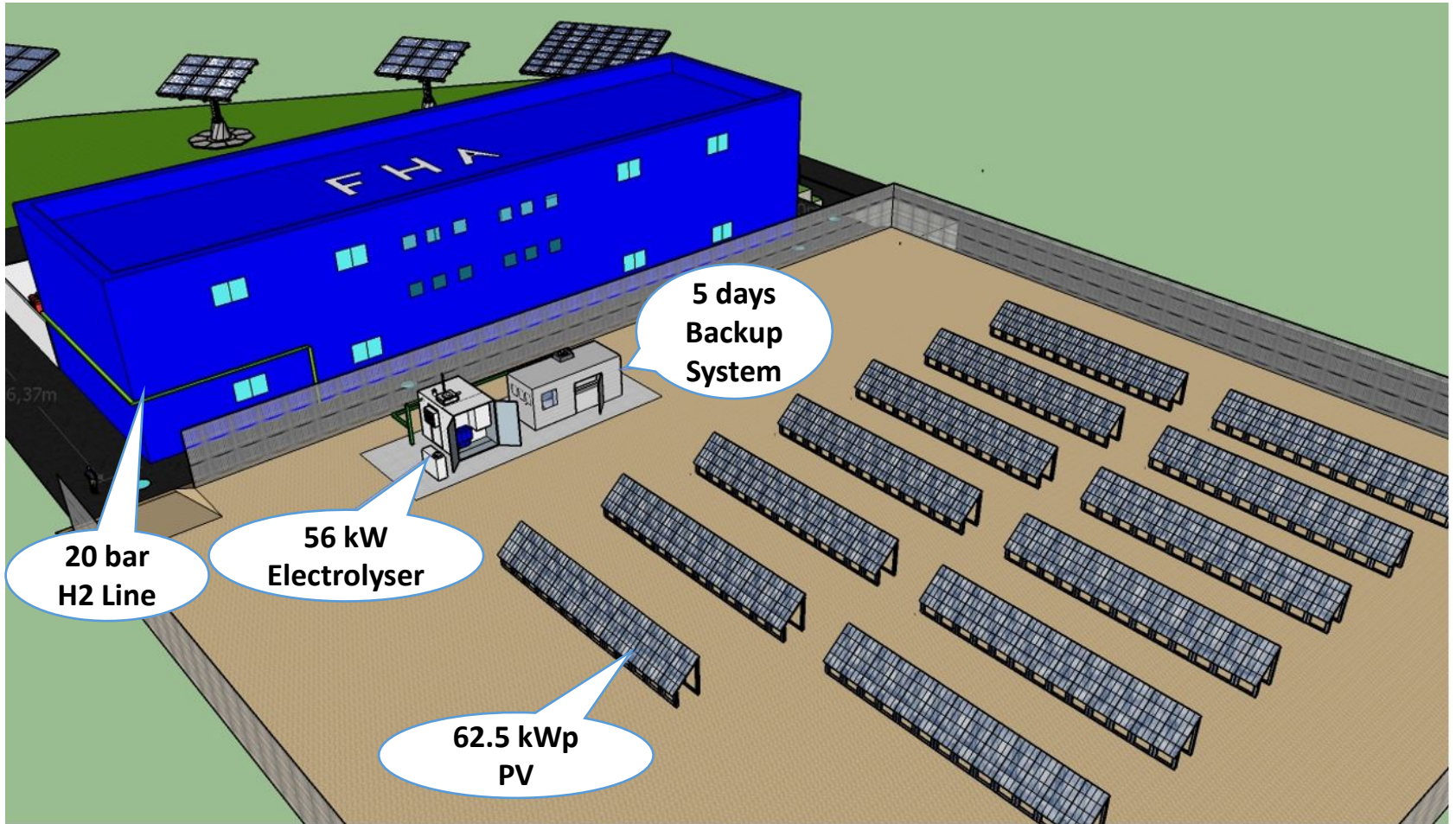


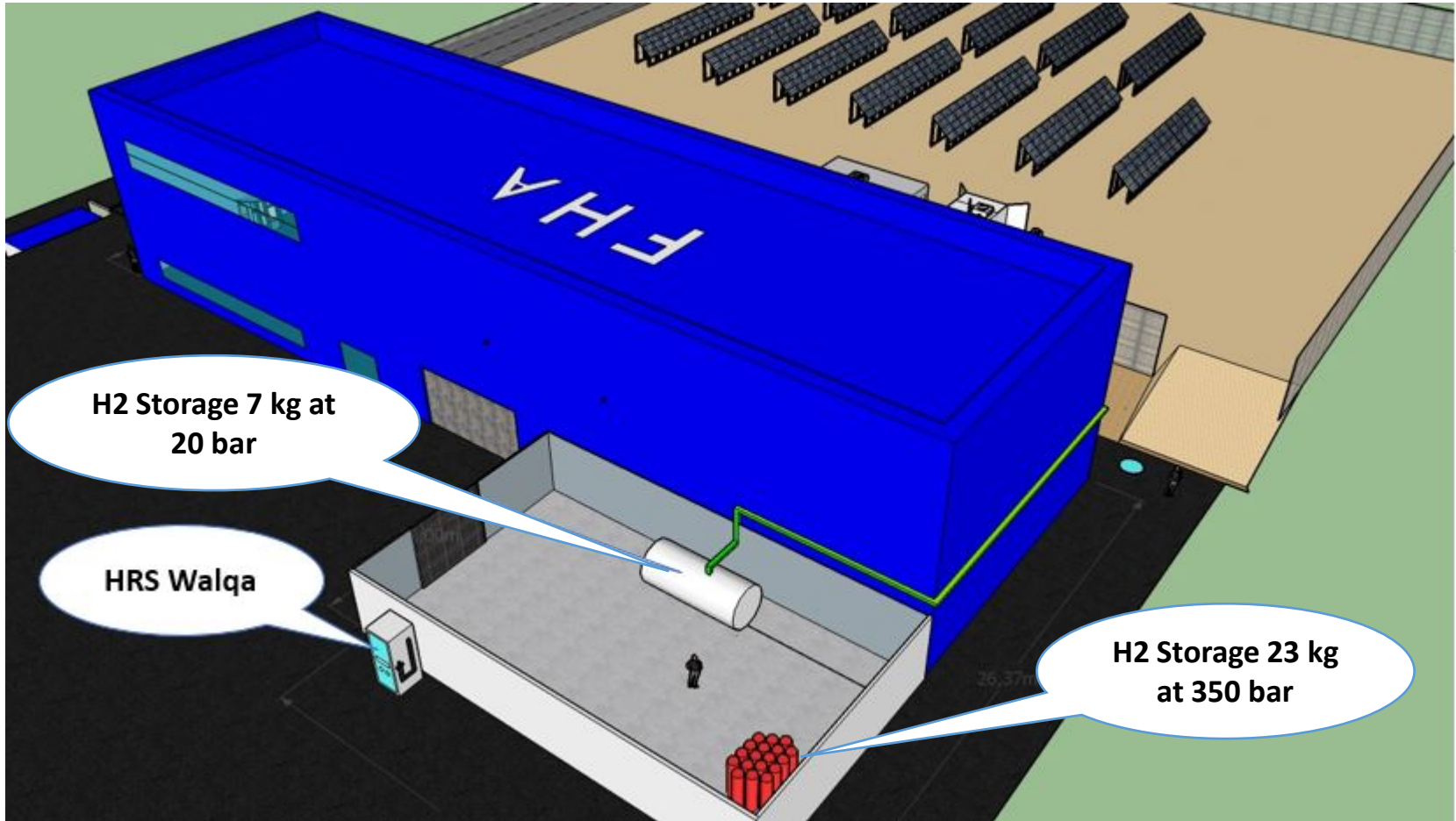
**Highly unreliable and
unpredictable**

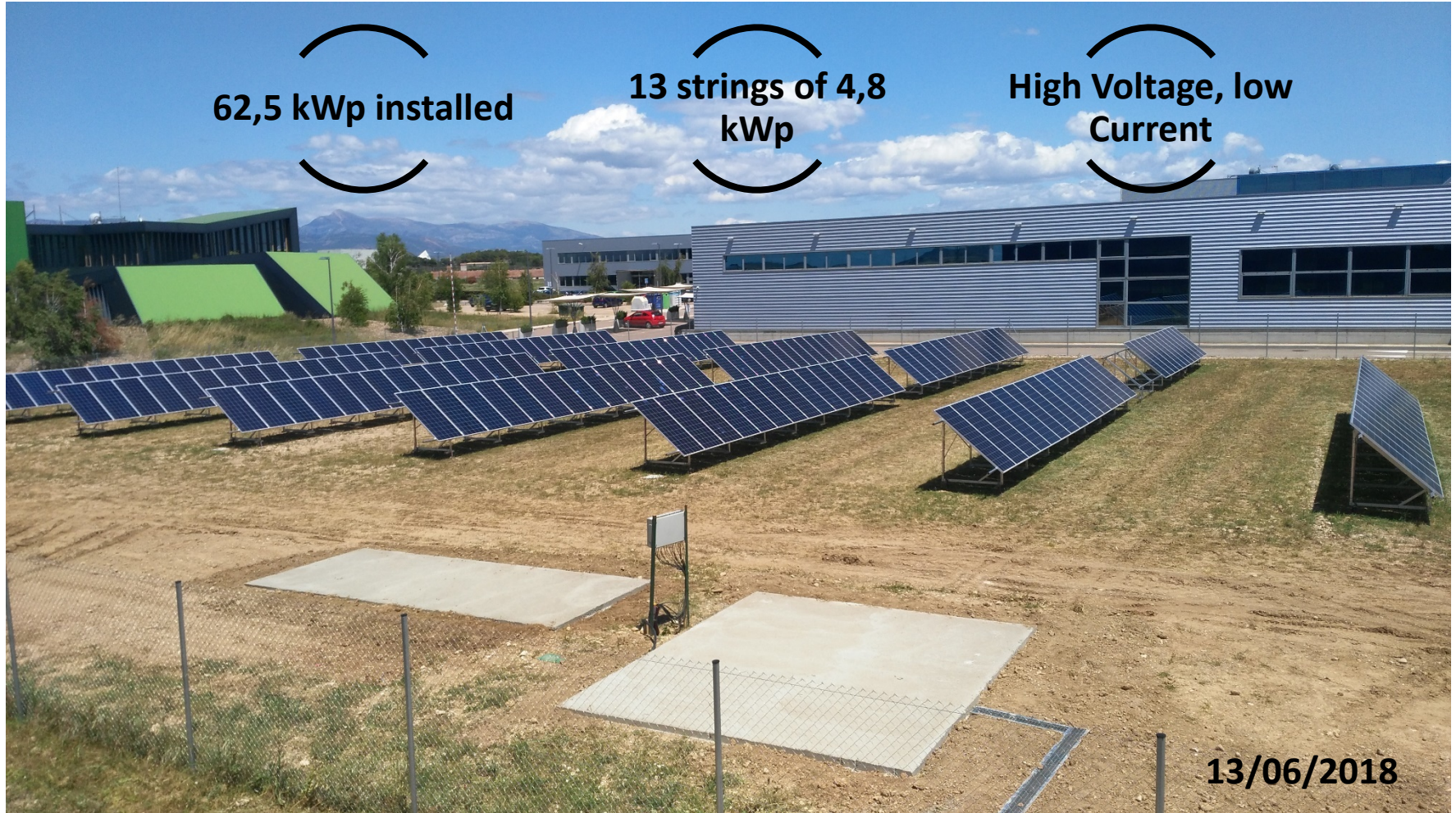
Efficient and reliable production of hydrogen in off-grid installations. ELY4OFF Project







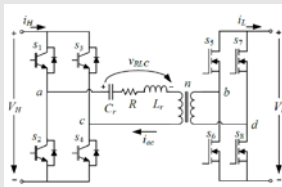






Purpose

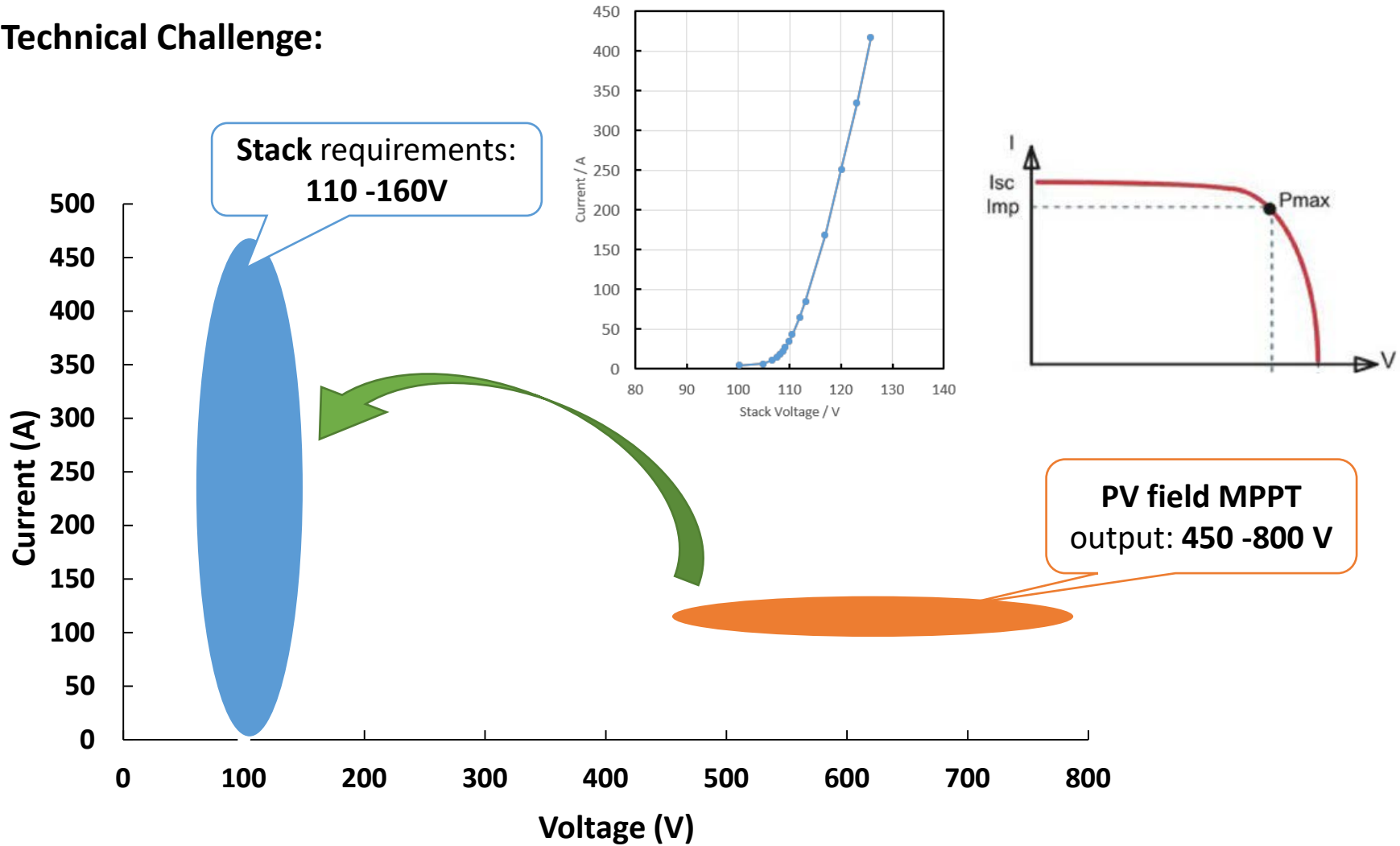
- To adapt the voltage produced by the photovoltaic field to the required voltage of the stack with MPPT (Maximum Power Point Tracking)



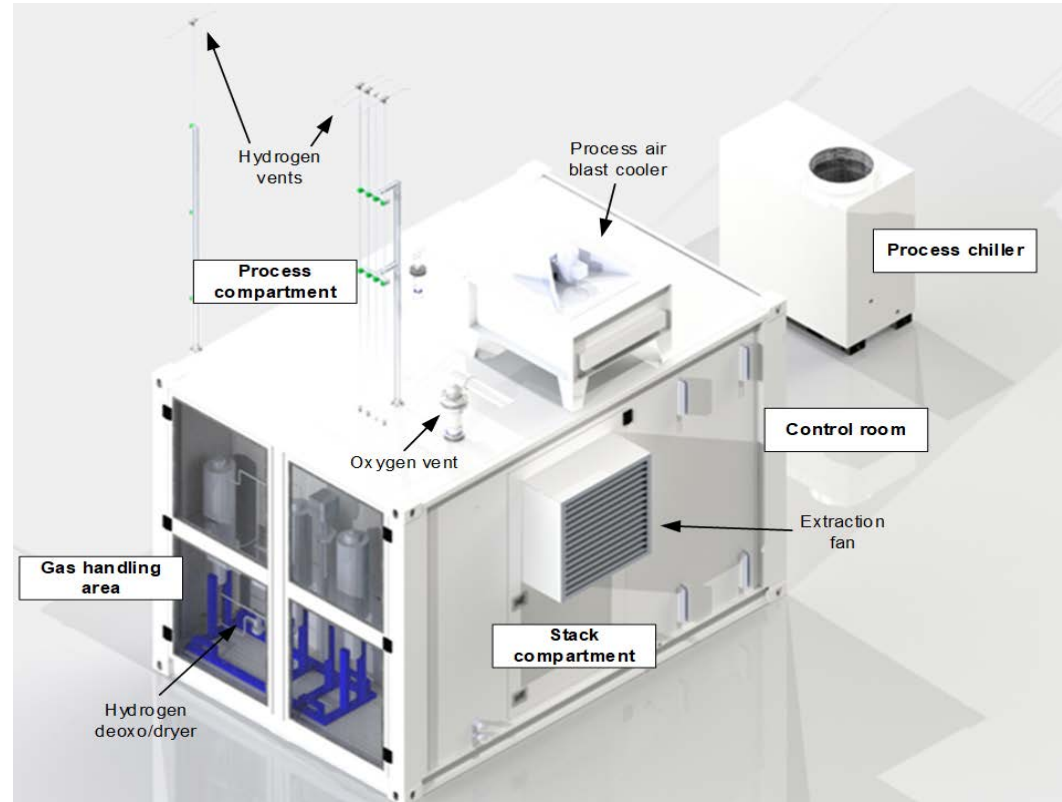
Innovation

- Capable of following RES variability quickly
- Novel electronic structure
- Very High Efficiencies > 92% along all the operating conditions

Technical Challenge:

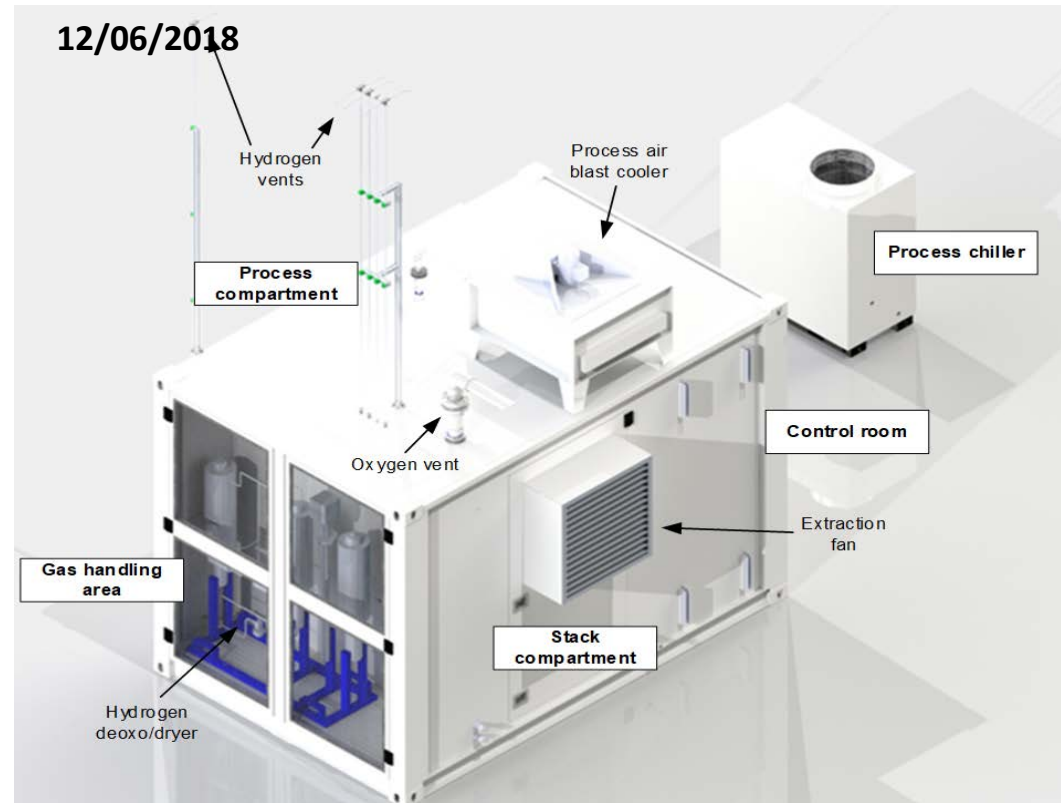


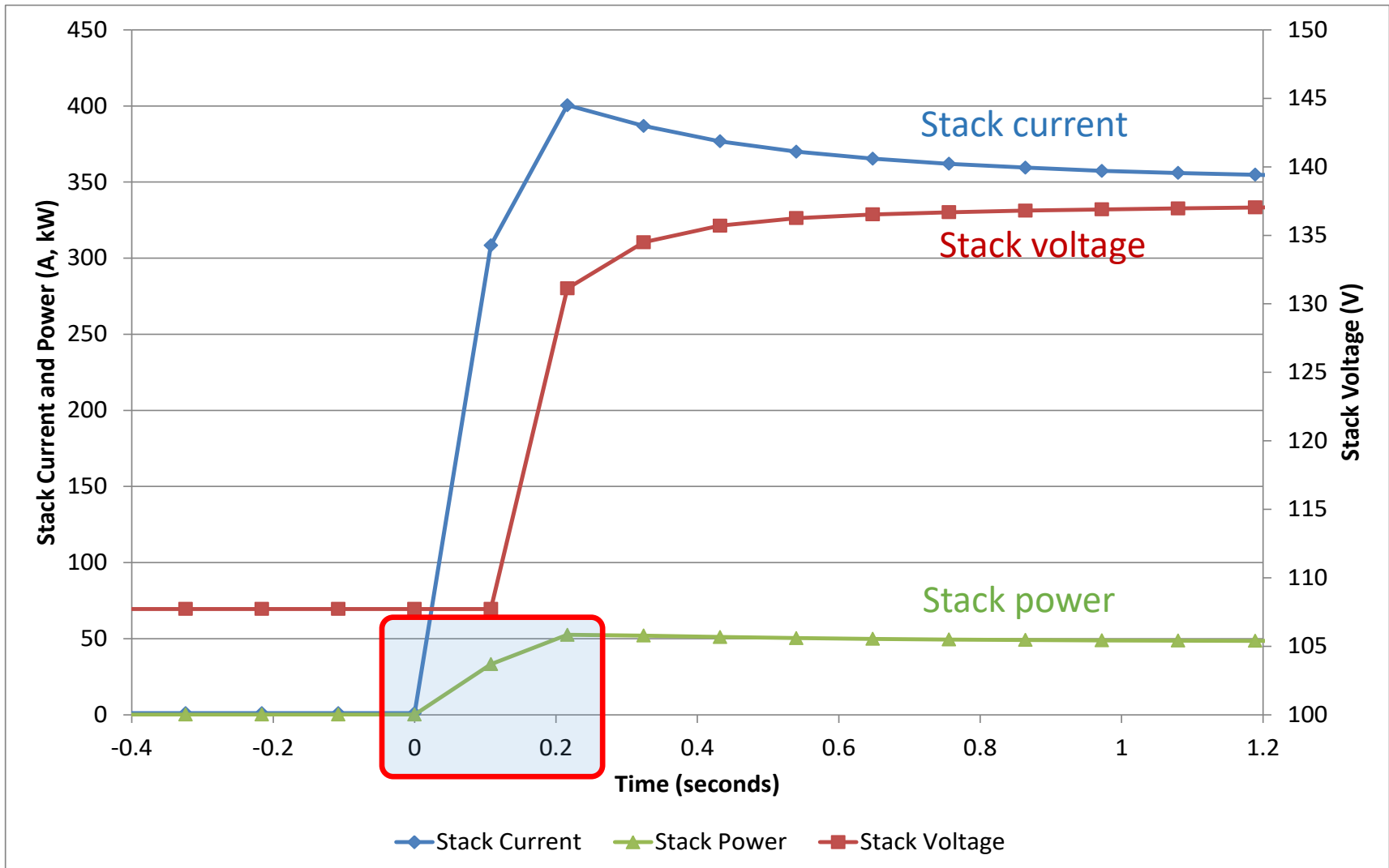
Parameter	HGas
Number of Stacks	1
Min H2 Prod (kg/24hrs)	3
Max H2 Prod (kg/24hrs)	28
Water Consump. (l/kg H ₂)	15
Operating Pressure (bar)	20
System Efficiency at Maximum Load (kWh/kg)	62
Cold Start (sec)	300
Warm Start (sec)	30
Modulation (sec)	2
Hydrogen Purity	99.999% - ISO 14687-2:2012
Electrolyser Packaging	13' ISO Container
Temperature Range (°C) ²	-15 to + 40
Water Quality	Drinking Water
Certification	CE



PEM ELECTROLYSER

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Batteries

96 kWh capacity

During nights and
clouds

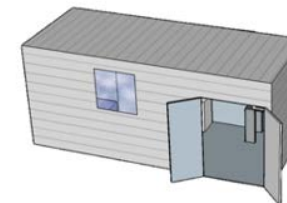
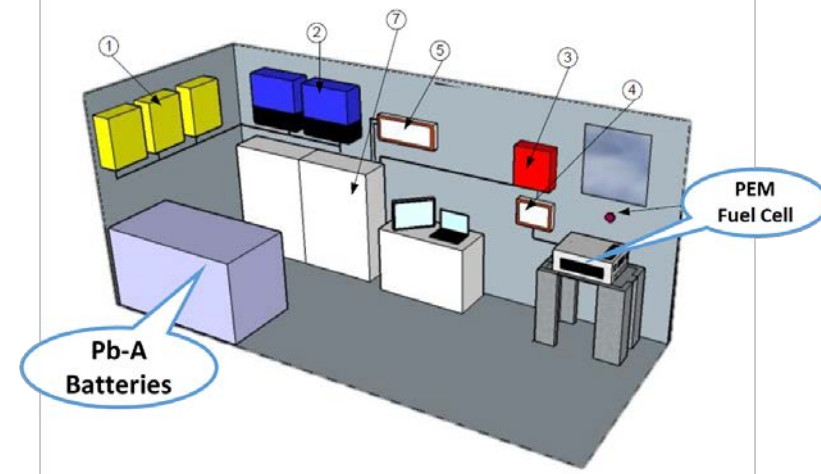
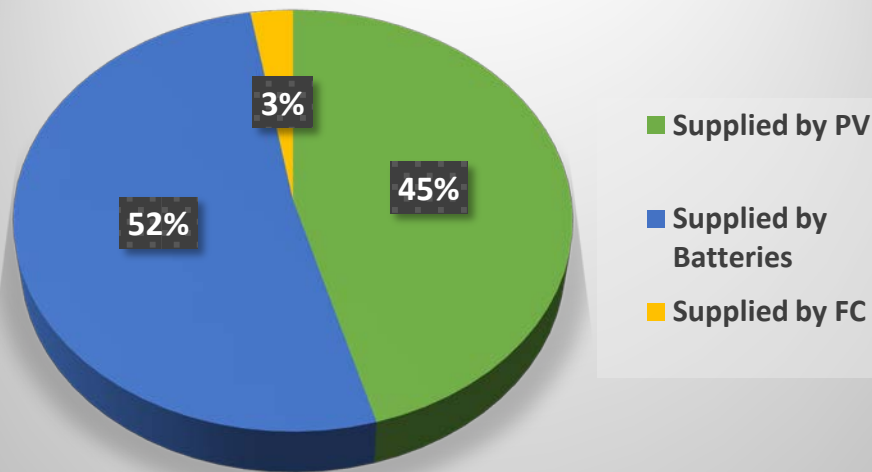
Fuell Cell

4.5 kW power

Several days

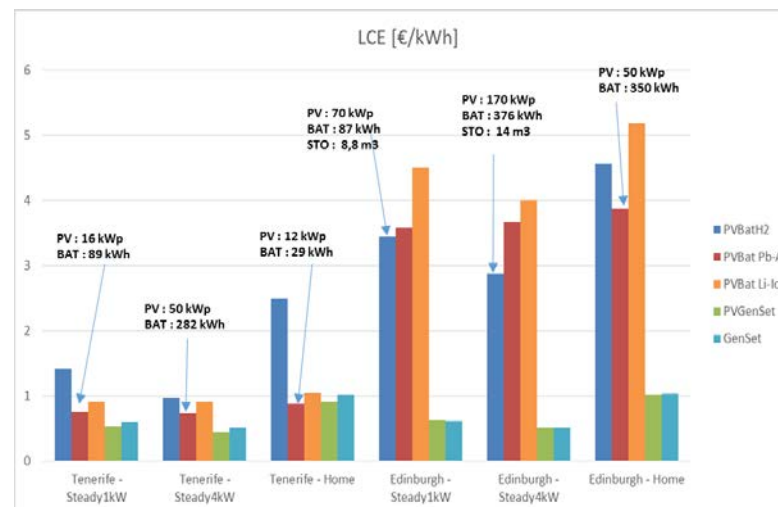
Up to 5 days of
autonomy

Essential consumptions per year



Microgrid Module

- ✓ A large-scale **reduction** of kWh required for **frost protection** has been achieved in the BoP
- ✓ The entire system has been modelled by a novel Software developed by CEA TECH → best configuration of the microgrid.
- ✓ One specific business case related to "**electrification of isolated areas**" has been evaluated through time-step simulations.

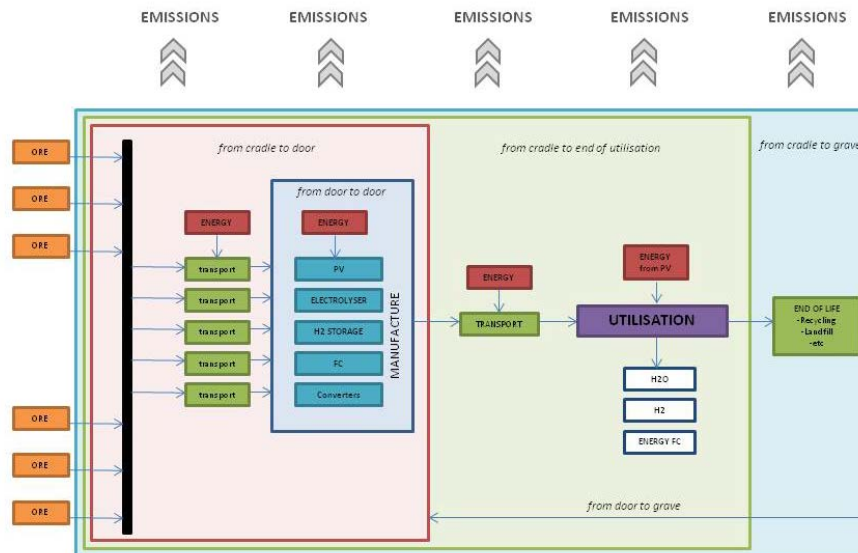


- ✓ May-July 18: **erection, commissioning and first start up.**
- ✓ Aug 18 – March 19: **demo period** on FHA's facilities in Huesca



19/06/2018

- ✓ **Life Cycle Assessment** of the system and **Cost analysis** (CAPEX/OPEX)



- ✓ **Business models:** gas injection to grid, H2 mobility and industrial applications
- ✓ 3 technical workshops to engage **stakeholders**



European
Commission



Many tanks for your attention,

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www.ely4off.eu