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Demo4Grid

Demonstration for Grid Services

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DEMO 4GRID

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Demo4Grid Project Overview

DEMO 4GRID

- Call year: 2016
- Call topic: FCH-02-7-2016 Demonstration of large-scale rapid response electrolysis to **provide grid balancing services** and to **supply hydrogen markets**
- Project dates: 01/03/2017 > 31/08/2023 (72 instead 60 months)
- % stage of implementation 01/11/2023: 100 %
- Total project budget: 7,736,682.50 €
- Clean Hydrogen Partnership max. contribution: 2,932,554.38 €
- Other financial contribution: 1,380,000.00 € Swiss Government
- Partners: DBC DIADIKASIA (GR), FEN SUSTAIN SYSTEMS GMBH (AT), FHA ARAGON (ES), SUNFIRE (former IHT SA) (CH), INYCOM SA (ES), MPREIS WARENVERTRIEBS GMBH (AT)

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Demo4Grid Partners

DEMO 4GRID

Green Energy Center

MPREIS

fen systems

Implementation & Demonstration

Business Case & Dissemination

sunfire®

Pressurized Alkaline Electrolyser

DBC DIADIKASIA BUSINESS CONSULTING

Project Management & Exploitation

Ha FUNDACIÓN PARA EL DESARROLLO DE LAS NUEVAS TECNOLOGÍAS DEL HIDRÓGENO EN ARAGÓN

ELYNTEGRATION

Inycom

Control and Command

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Demo4Grid Project Objectives

- Deploy, operate and demonstrate a beyond state-of-the-art single stack Pressurized Alkaline Electrolyser (PAE) under real market conditions at the production facility of MPREIS

- A business case based on
  - the provision of grid balancing services, capturing of attractive power price opportunities on the spot and intraday market and hydropower energy sources
  - valorization of the electrolytic hydrogen in industrial and FC mobility use.

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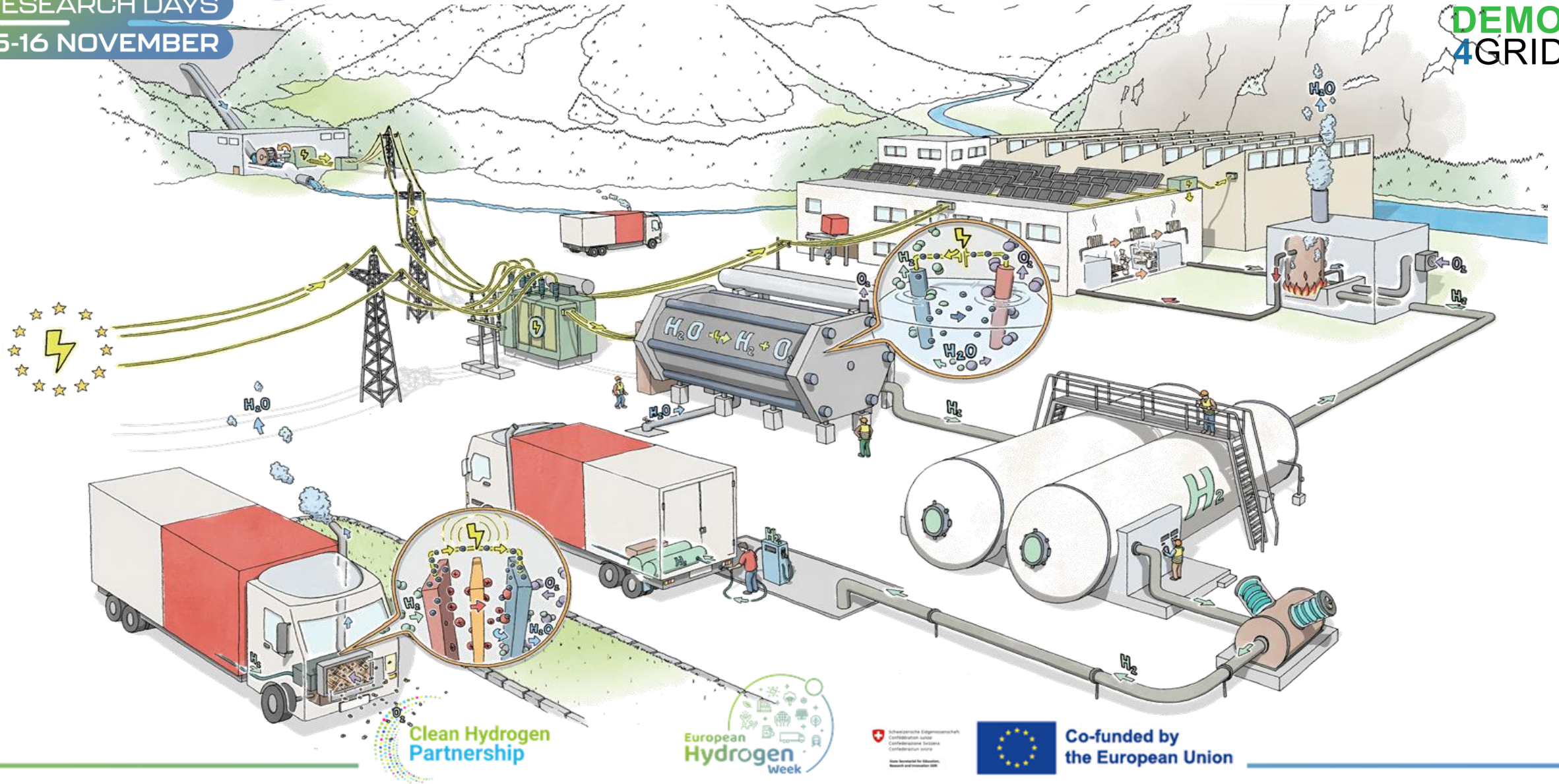
Green Hydrogen for MPREIS, Tyrol & Europe

from Vision

DEMO 4GRID



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Opening Demo4Grid Electrolysis Plant at MPREIS in Völs
https://www.youtube.com/watch?v=uu1VXSiZt24

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Green Hydrogen for MPREIS, Tyrol & Europe

to Reality

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Green Hydrogen for MPREIS, Tyrol & Europe

to Reality

DEMO 4GRID

WIVA P&G Energy Model Region HyWest Regional Green Hydrogen Economy

HyWest

powered by klima+ energie fonds

VORZEIGEREGION ENERGIE

Gas
12 GWh/year
2,400 tons CO2 equivalent/year

Diesel
1,6 Mio l Diesel/year
4,200 tons CO2 equivalent/year

Convenience

Butchery

Cooling

Bakery

Hydrogen Heat

Hydrogen Storage

Hydrogen Logistic

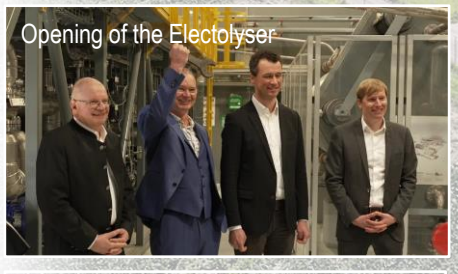
Green Hydrogen Production
3 MW Alkaline Electrolyser up to 1,3 tons H2 per day

Photovoltaics 1 GWh/year

TIWAG Hydropower

Regional Hydropower Plant

Substitution up to **6,600 tons CO2** equivalent/year



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Demo4Grid Electrolysis Plant

Pressurized Alkaline Water Electrolysis (PAE)

- **Nominal power:** 3.2 MW EOL
- **H2 production capacity:** 1300 kgH2 per day
- **Operating pressure:** 31 bar
- **Operating temperature:** 80 °C
- **Heat extraction:** approx. 600 kW @ 65 °C
- **Electrolysis water:** ground water (no drinking water quality!)
- **Balance of Plant** can provide full dynamic ELY operation
- **Purity H2**
  - ***Before gas cleaning:*** 99.8 % by volume
  - ***After gas cleaning***: min. 99.97 % by volume
- **Purity O2:** 99,2 % by volume

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Dual Fuel Burner

Burning Hydrogen or Natural Gas

- **Manufacturer:** Fives Pillard Deutschland GmbH
- **Model:** Burner Pillard LONOxFLAM
- **Thermal Output:** 0.275 to 1.1 MW
- **Fuel**
  - Natural Gas (100 %) or Hydrogen (100 %)
  - → Any mixtures of H2 and natural gas possible, but not tested
- **NOX from burning H2:**
  - Measurements: < 60 mgNOX per Nm^3
  - Legal requirement: ≤ 200 mgNOX per Nm^3
- **Gas Supply pressure:**
  - 0.5 bar for Natural gas
  - 3.7 bar for Hydrogen

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Demo4Grid Business Case

Power Price Opportunities on Day Ahead Spot Market
Timing is Key

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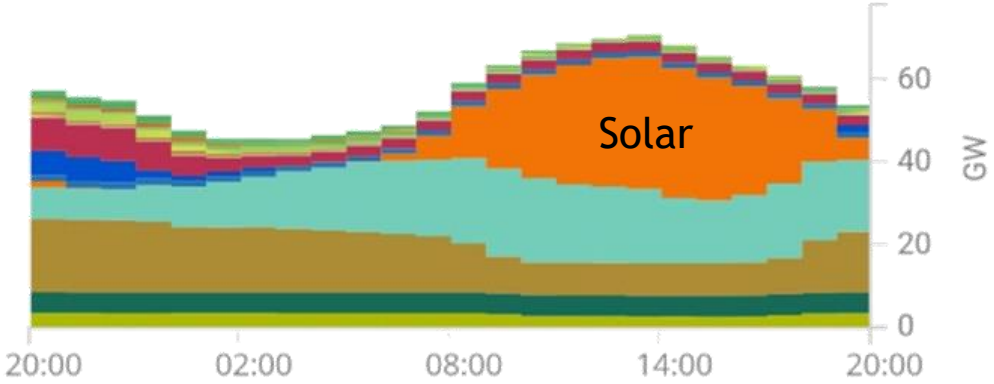
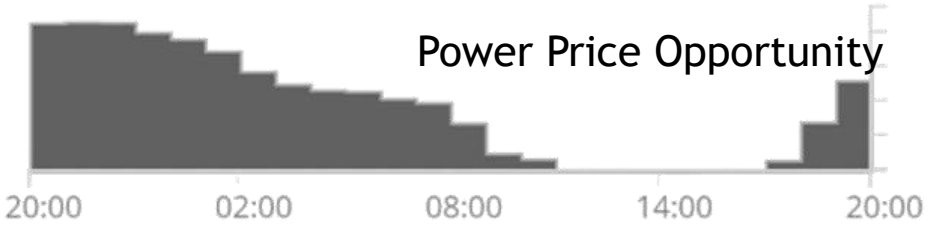
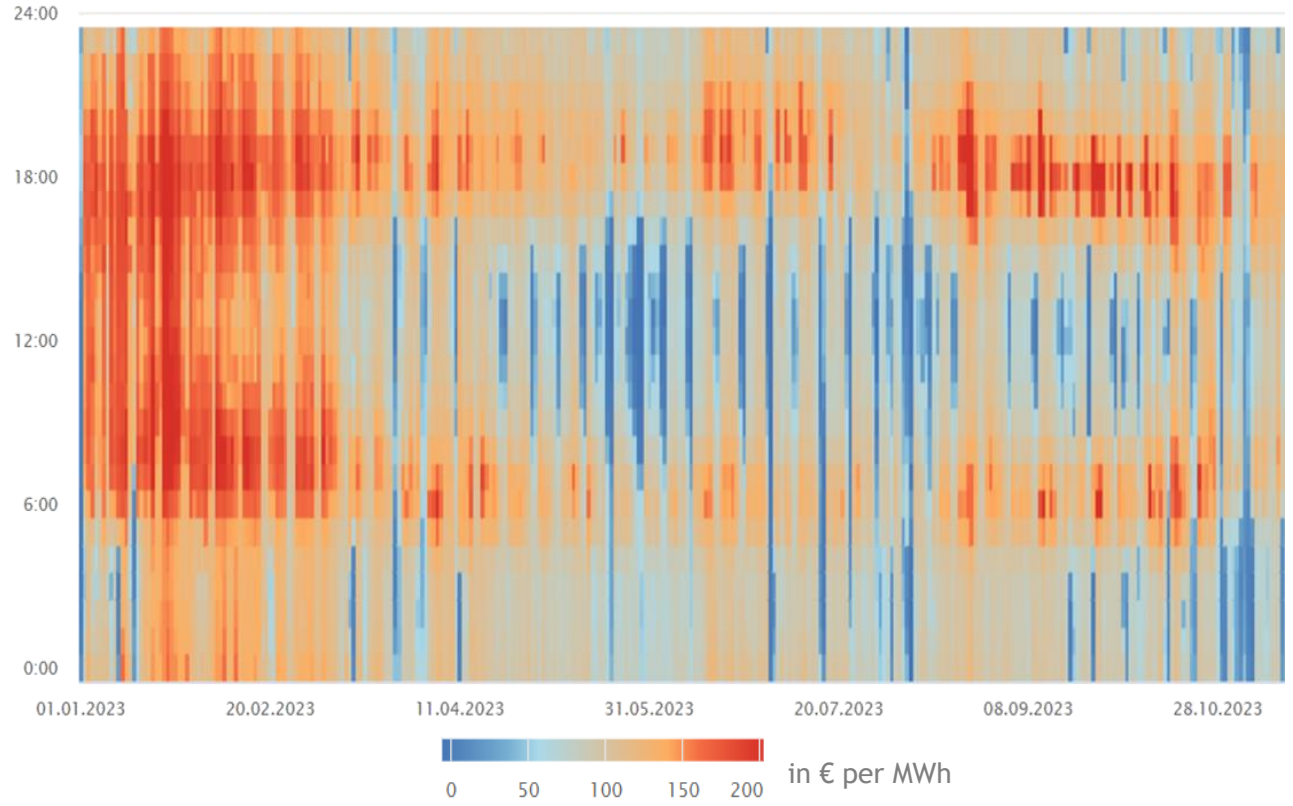
Origin of electricity in the last 24 h



Energy Prices in the last 24 h



Source: Electricity Map / GER



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Demo4Grid Business Case

Power Price Opportunities on Day Ahead Spot Market
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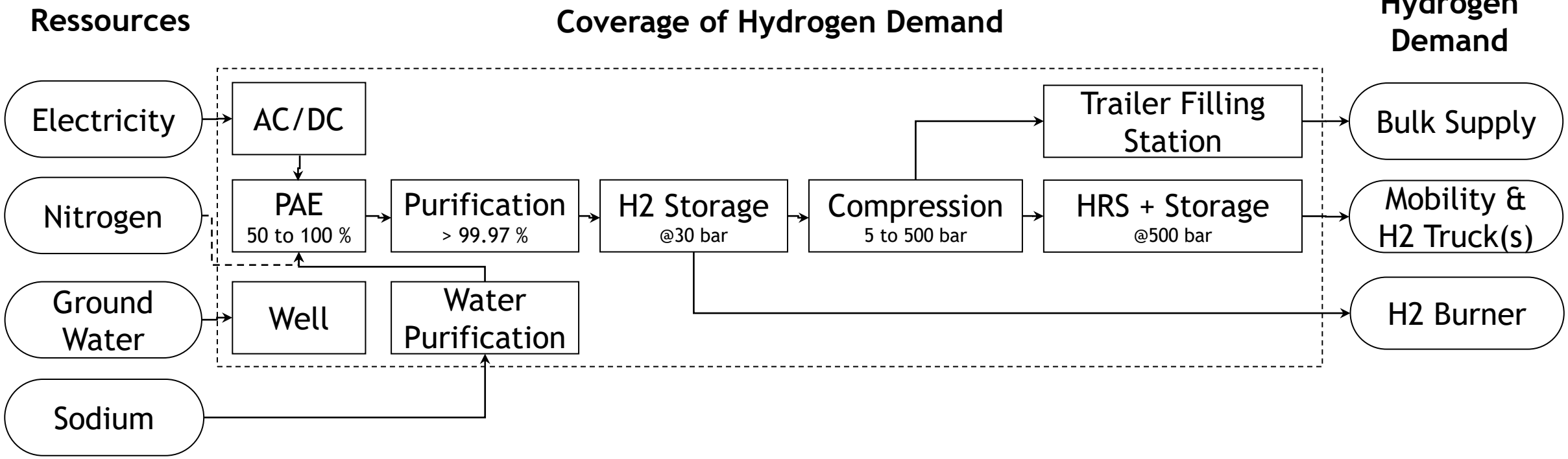

Power Price Opportunity on Day Ahead Spot Market → Program ELY C&C accordingly (hourly)
→ Power on ELY as programmed → Produce until (i) demand is covered and/or (ii) storage is full

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Demo4Grid Dissemination Activities

DEMO 4GRID

Plant Visitors
311
from Feb 23
to Aug 23

Workshops
8
from Feb 23
to Aug 23

Publications*
20
from March 17
to Aug 23

Website Visitors
543.910
from March 17
to Aug 23

29-08-23 - HTL Bregenz


24-05-23 - WKO Vlbg


04-10-23 - AMETHyst


11-09-23 - BRG in der Au

"Hydrogen in Grid Balancing: The European Market Potential for Pressurized Alkaline Electrolyzers" https://www.mdpi.com/1452760
"Establishment of Austria's First Regional Green Hydrogen Economy: WIVA P&G HyWest" https://www.mdpi.com/2260342

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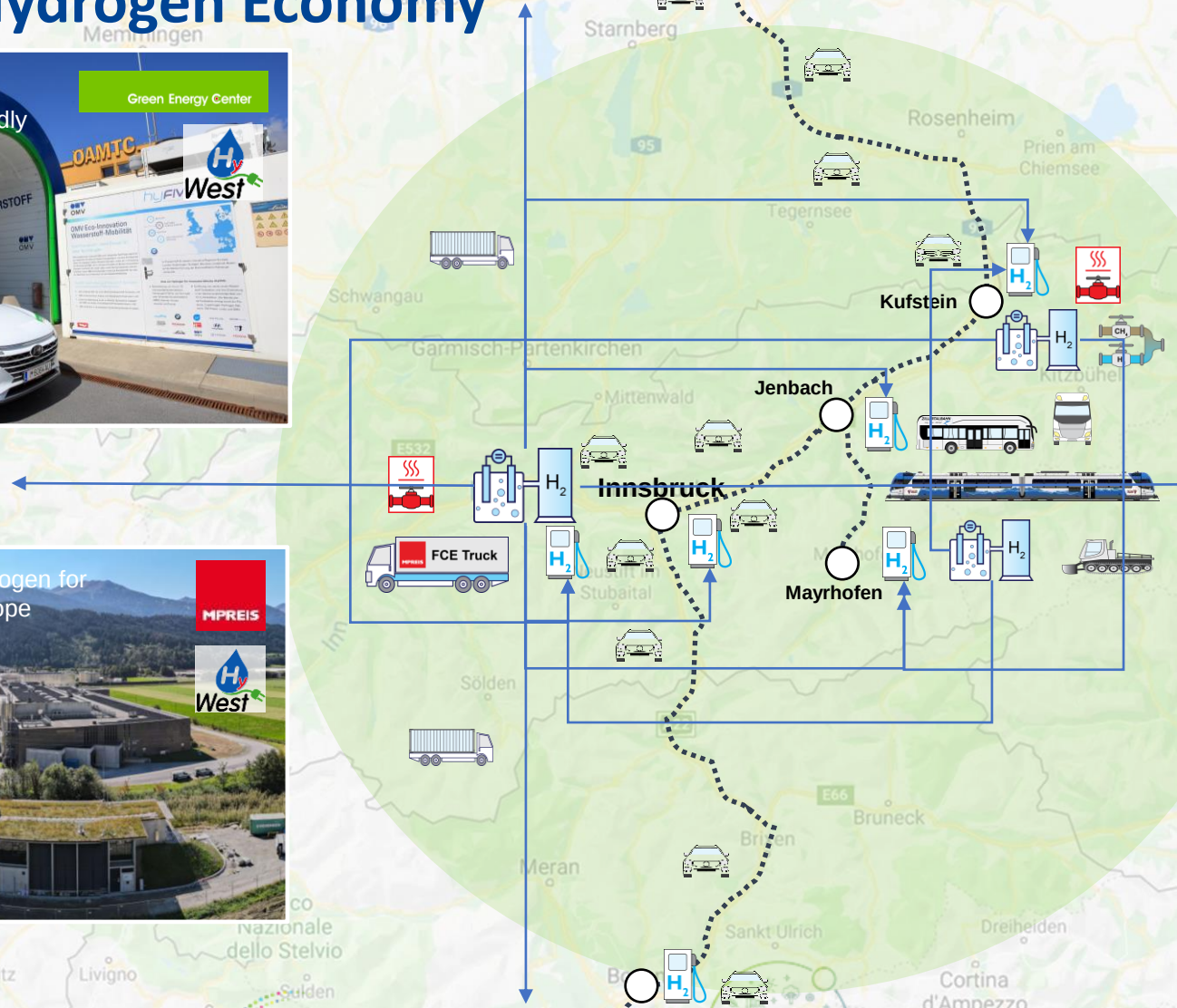
Outlook: Establishment Green Hydrogen Economy

Green Energy Center



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