

CLEAN FACTORY REVOLUTION

McPhy

Driving
clean energy
forward

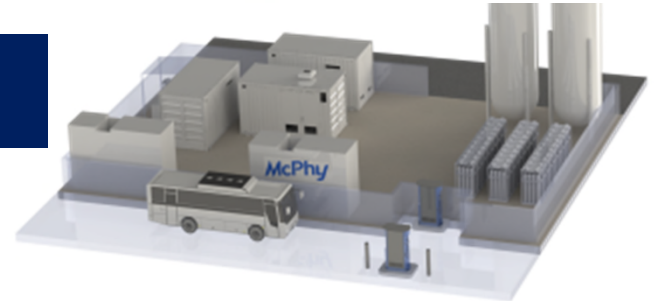
- Identikit
 - **Created in 2008 : 10 years !**
 - 5 sites : France, Germany, Italy, China and USA
- 
- 15 years of R&D
 - 85 employees
 - € 10,1 M in sales revenue for 2017
 - **Flagship Reference :**
 > 13,5 MW Elecrolysis ,
 > 12 HRS in operation
 - **Strong Partners including EDF**



Scalable Electrolyzer for Industry, Energy



Large Hydrogen Refilling Station for Mobility



McPhy Italy :
Manufacturing



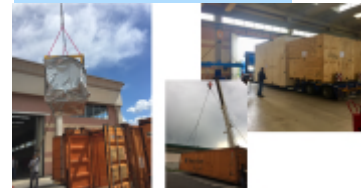
McPhy Germany :
Engineering



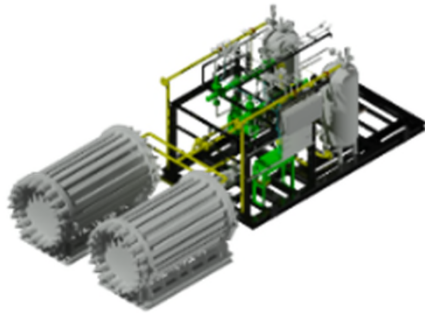
McPhy France :
HRS Center



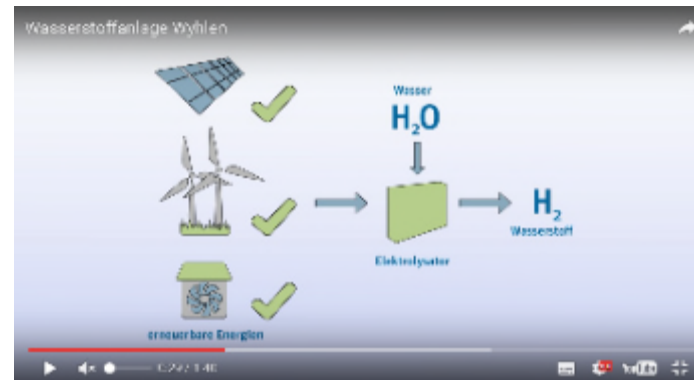
McPhy China:
Sales & Service



PtG | EnergieDienst, ENBW Group (Germany) 1 MW at 30 bar



- First hydrogen project in partnership with Center For Solar Energy
- **2 McLyzer 100 : 200 Nm³/h – 1 MW at 30 bar**
- Delivery end 2017, commissioning in November 2017
- H₂ application : mobility, Industry, Storage

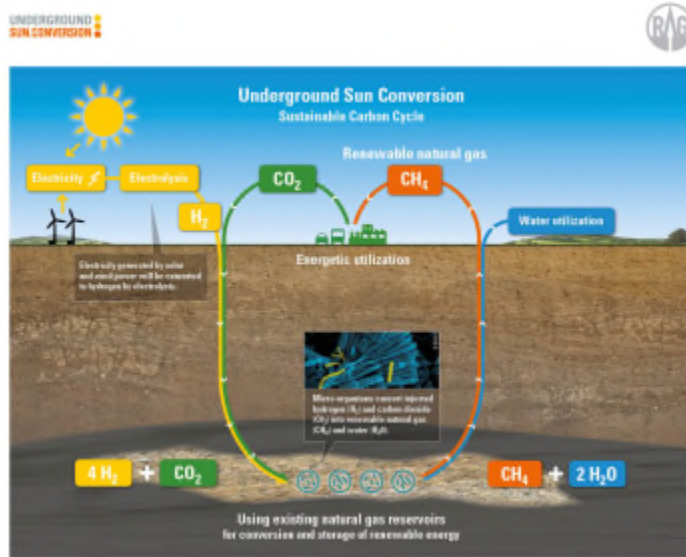


PtG | Jupiter 1000 (Fos sur Mer) 1MW electrolysis for GRT gaz with both Alkaline and PEM technology



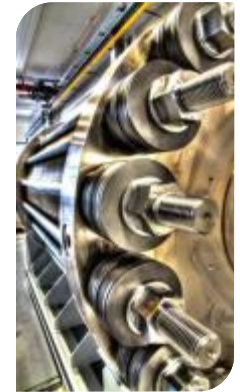
- To be commissioned in 2018, Fos-sur-Mer (France)
- Hydrogen production equipment, Alkaline 30 bar and first reference in PEM

Power to Gas | RAG (Austria) 0,5 MW



- Contract signed with RAG, the Austrian underground gas storage specialist
- To supply the (green) hydrogen generation system for its highly innovative Underground Sun Conversion project
- **1 McLyzer 100-30 | 0,5 MW at 30 bar**
- Delivery and commissioning: T4-2018

McLyzer 100-30



100 Nm³/h
at 30 bar

Proven & reliable
Safe
Simple

Short project description :

<http://www.underground-sun-conversion.at/en/project/project-description.html>



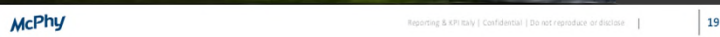
HEBEI – 4/10W Platform – Project in realization

Coupling with Mobility Project



Starting Date
End 2018
4 MW

- Realistic outlook to a 10MW-platform today (HEBEI):
 - Currently the shown layout is equipped with 4 Module of 2 MW with stacks of 0,5 MW
 - Complete showcase for a wind power driven hydrogen plant incl. truck-out infrastructure and future HRS (400 kg)



General Information- P03-17 Italy – Project Status



Power-to-Gas | Hebei (China) 4MW II



河北建设投资集团有限责任公司
Hebei Construction & Investment Group Co., Ltd



Power to Gas | Hebei (China) 4MW III



河北建設投資集團有限公司
Hebei Construction & Investment Group Co., Ltd



PtG | References under operation: Audi (Werlte) - 2013



Industrial hydrogen & Power-to-Gas: Audi, One of the first PtG project in Europe

- Operated by Etogas
- **6 MW atm** Hydrogen production
- In operation since October 2013

McPhy's references in Electrolysis

Key Learnings :
ALKALINE brings robustness
30 bar is a must
Efficiency is key
Flexibility brings value
Modularity is important

MCPHY WILL HAVE INSTALLED

13.5 MW

**OF HIGH CAPACITY
 ELECTROLYZERS**

**= 6 TONS OF CLEAN HYDROGEN
 PRODUCED PER DAY**

Audi | 6 MW | 2013

Prenzlau | 0.5 MW | 2013

H2Ber | 0.5 MW | 2014

Hebei | 4 MW | 2017

EnergieDienst | 1 MW | 2017

Jupiter 1000 | 1 MW | 2018

RAG | 0.5 MW | 2018

Alc, ATM
Alc, ATM
Alc, 30 b
Alc, 30 b
Alc, 30 b
Alc, 30 b + PEM
Alc, 30 b

Focus on
 Alkaline
 Pressurized
 Technology

McPhy : last up-date

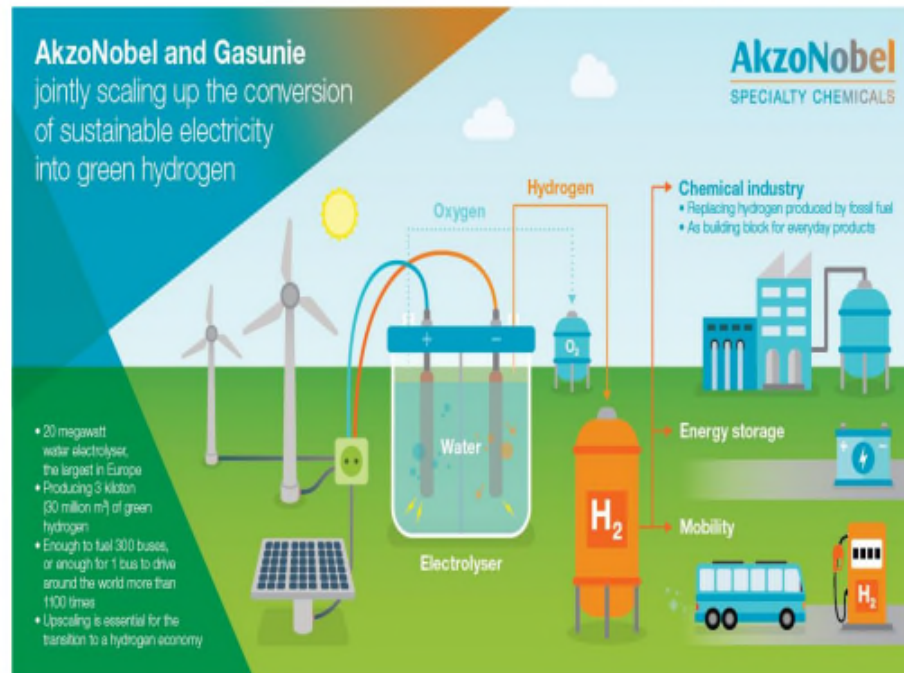
- Sept/2017 : after 2 years of R&D and Industrial ramp-up: Launch of 20/100 MW Platform
- April/2018 :
 - Strategic partnership and supply agreement with DeNora, world leader on Electrodes
 - Qualification by key industrial companies including AkzoNobel & Gasunie
- - H2 Ber Test : confirmation of Energy Efficiency > 3.500 hours of test (Italy-Germany)



Press release

McPhy announces with its technological partner De Nora a long-term supply agreement of advanced electrode packages

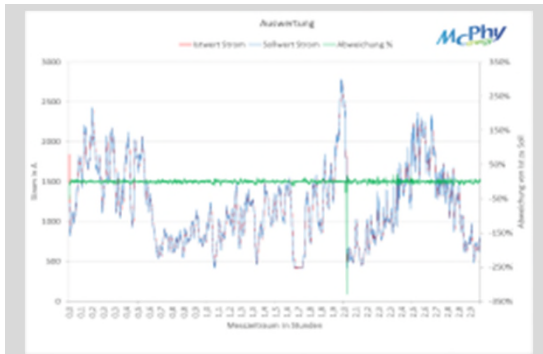
- Through the introduction of the proprietary electrodes of De Nora inside the high-pressure water electrolysis of McPhy, the quantity of hydrogen produced doubles with the same stack size and specific energy consumption.
- An unrivalled electrolysis platform offering key benefits for clients: high energy efficiency, reduced foot print, drastic improvement of competitiveness.
- McPhy can now respond to the different needs of Industry, Transportation and Energy sectors with systems ranging from few MW up to 100 MW and over.
- This new generation of alkaline water electrolysis has already been selected by major industrial players.





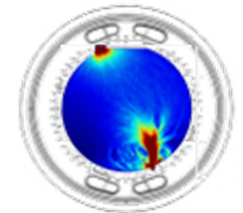
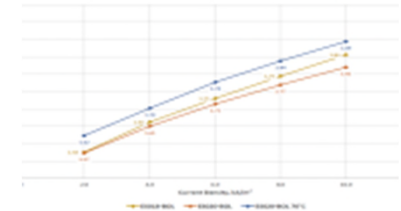
Augmented McLyzer
Our new generation of electrolyzers

Design and specification matching with industrial use & energy market



An innovative solution combining the reliability of ALKALINE and the flexibility of PEM

- **30 bar** high pressure production
- **Reduced foot print** : 44 m² / MW
- **BOP optimization**
- **High purity of H₂ : 99,9%**
- $\text{Cos}\phi > 0,9$ from 15% to 110% of load range
- High efficiency with High current density @ 9.000 A/m²
- Fast dynamic response enabling Service System :
 Nominal Load : 0% to 100% < 30 sec.
 Off Peak : 100% to 0% < 5 sec.
- Mature and industrialize products
- Optimized CAPEX and OPEX

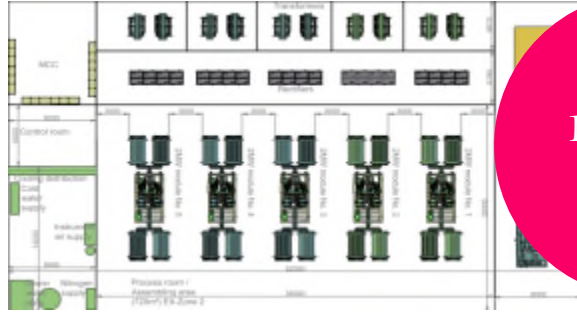


Multi MW platforms : McPhy Innovation

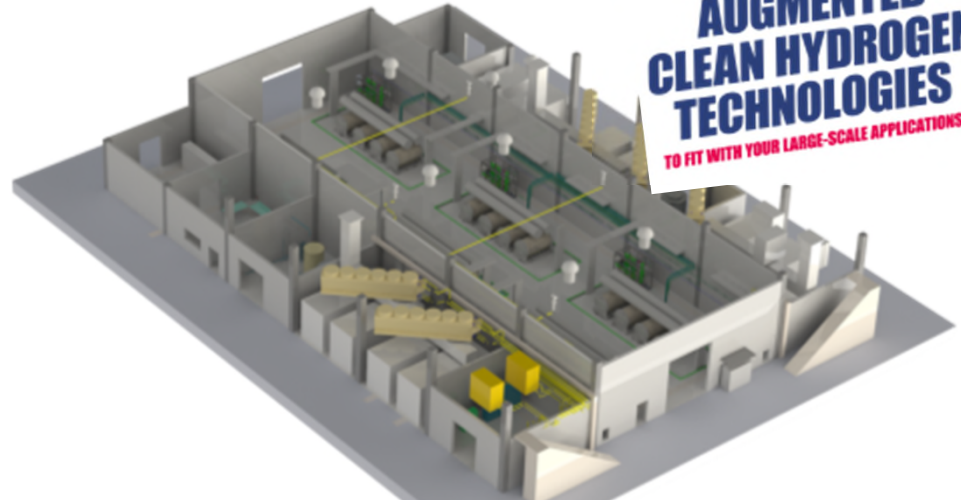
Before : 10 MW
> 1.000 m2



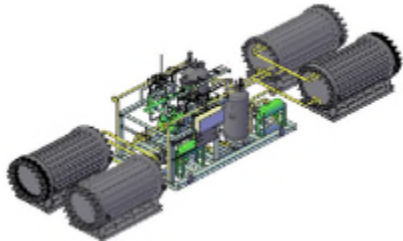
Now : 20 MW
< 900 m2



13,5 MW
reference

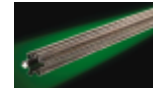
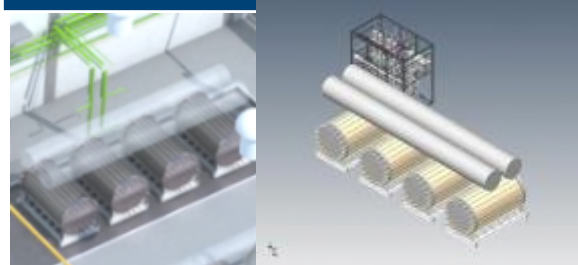


Before : Stack Design 2 MW



2 years of
R&D

Now : Stack Design 4 MW



Best In Class
Electrode &
Stack Design

20 MW cluster: an optimized architecture easy to integrate in industrial context

