

DEVELOPMENT AND IMPLEMENTATION OF METHYCENTRE PROJECT

Bruno FOURNEL^a, Janick BIGARRE^a, Thierry LAGUIONIE^a, Fabien AUPRETRE^b, Yannick BONIN^c, Diane DEFRENNE^c

^aAffiliation: CEA Le Ripault 37260 MONTS, France

^bAffiliation: AREVA H2GEN, 8 Avenue du Parana, 91940 Les Ulis, France

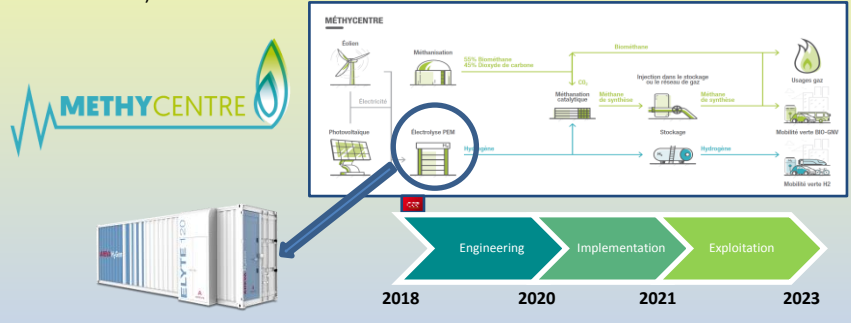
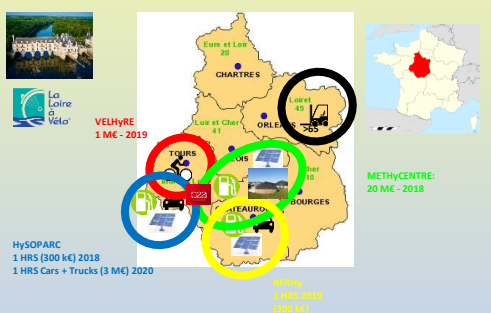
^cAffiliation : STORENGY, 12 Rue Raoul Nordling, 92270 Bois-Colombes, France

e-mail of corresponding author: bruno.fournel@cea.fr



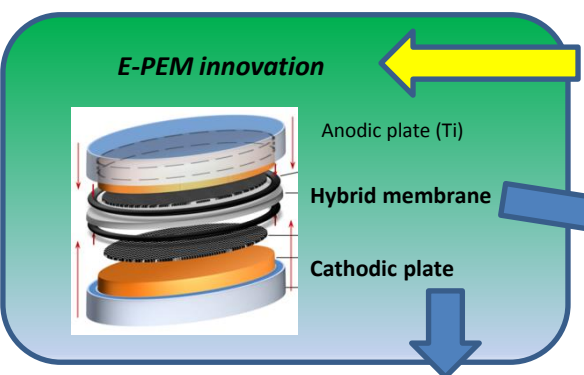
METHYCENTRE project

METHYCENTRE is a 5 years power to gas demonstration project started in 2018. It is the first large scale Power to Gas project in France combining Methanization from agricultural wastes and catalytic Methanation.
Two other French industrial scale projects address Power to Gas : JUPITER 1000, led by GRT-gaz launched in 2017 which is based on a combination of gaseous catalytic Methanation step green H₂ and an industrial CO₂ source and HYCAUNAI (2018, Burgundy Region) which is based on a combination of Methanization (landfill gas) and biological Methanation step.
Both METHYCENTRE and HYCAUNAI are led by STORENGY (ENGIE). METHYCENTRE demonstrator will be commissioned close to the STORENGY natural gas geological storage facility in Céré la Ronde (100 km eastern from Tours)

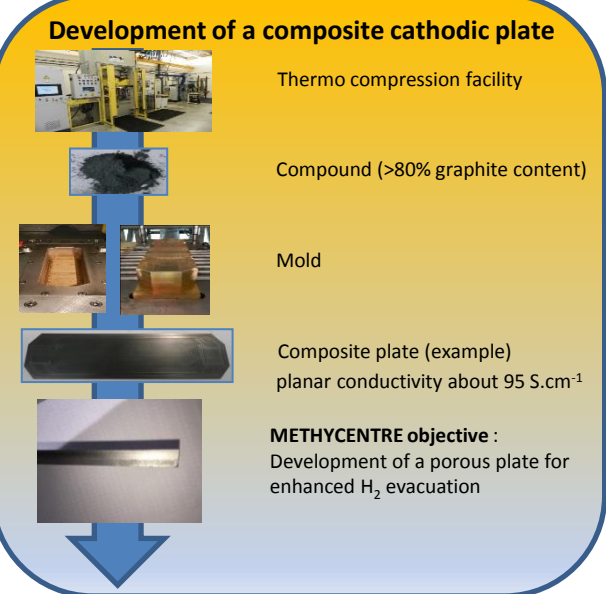


METHYCENTRE is one of the H₂ projects deployed in Region Centre Val de Loire

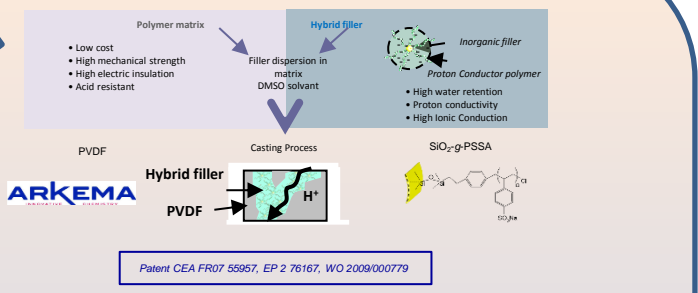
The project includes a 250 kW PEM electrolyzer supplied by AREVA H2 GEN



Additional 20 kW electrolysis facility will be implemented by 2021. Both 250 kW and 20 kW electrolyzers will run in parallel. The aim of the experimental 20 kW facility is to assess the performance of new components and to consolidate the supply chain of these components.



Development of a new hybrid membrane

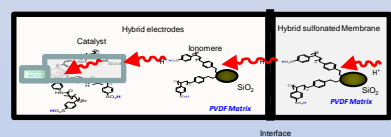


	NRE211	NHM
Density (g/cm ³)	1.95	1.40
Water Uptake (Wt%)	18	100
Swelling (z and x,y) (%)	11 8	33 35
IEC (meq/g)	0.95	1.86
Hydration number at 25°C (λ)	11	40
Proton conductivity immersed at 25°C (mS/cm)	48	67
H ₂ crossover at 25°C (mA/cm ²)	0.8	0.3

- Higher current density (+40% vs NAFION)
- Low H₂ permeability (-50% vs NAFION)

METHYCENTRE Main Objectives :

- Swelling reduction
- Lixivation of nanoparticles reduction : reticulation of PVDF
- Development of a Membrane Electrode Assembly based on a common conducting polymer (PSSA)



Enhanced Membrane / Electrode compatibility & Higher Pt recyclability

Perspectives beyond METHYCENTRE

Composite plate : move from thermocompression to injection process (cost reduction x2 and more)

Membrane : build up a robust and cost efficient supply chain including roll to roll process (cost reduction targeted : X4 compared to NAFION)

