

An aerial photograph of a wind farm. In the foreground, a large solar panel is visible on the left side. Below it, a wind turbine with a blue tower and white blades is prominent. Other wind turbines are visible in the background, and the ground is a mix of brown and green fields.

# **Solvay 1 MW PEMFC project**

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Solvay Future Businesses**

**FCH JU  
3<sup>rd</sup> Stakeholders General Assembly  
Brussels, 09-10 Nov. 2010**





- **Installation & operation of a large stationary FC system:**

- 1 MW electrical power (1.7 MW peak power)
- FC system supplier: Nedstack BV
- FC core components (MEA): SolviCore (JV Solvay:Umicore)
- Hydrogen supply & purchase of electricity: Solvin (JV Solvay:BASF)
- Owner: Solvay



- 1 MW (nominal power) PEM power plant:
  - 12 modules x 14 stacks = 168 stacks
  - 1 module → 700 VDC x 120-130 A (nominal power)
  - 1 stack = 10 kW peak power = 75 cells (0.7 V x 0.6 A/cm<sup>2</sup>)
  - 168 stacks x 75 cells/stack = 12,600 MEAs
- Inlet: 750 Nm<sup>3</sup>/h Hydrogen (100 – 200 mbarg)
- Output: 1 MW @ 6 kV
- Turn-key system in two containers, ATEX compliant:
  - 1 x 40 ft CTN with the PEMFC power plant
  - 1 x 20 ft CTN with the inverters & 6 kV transfos

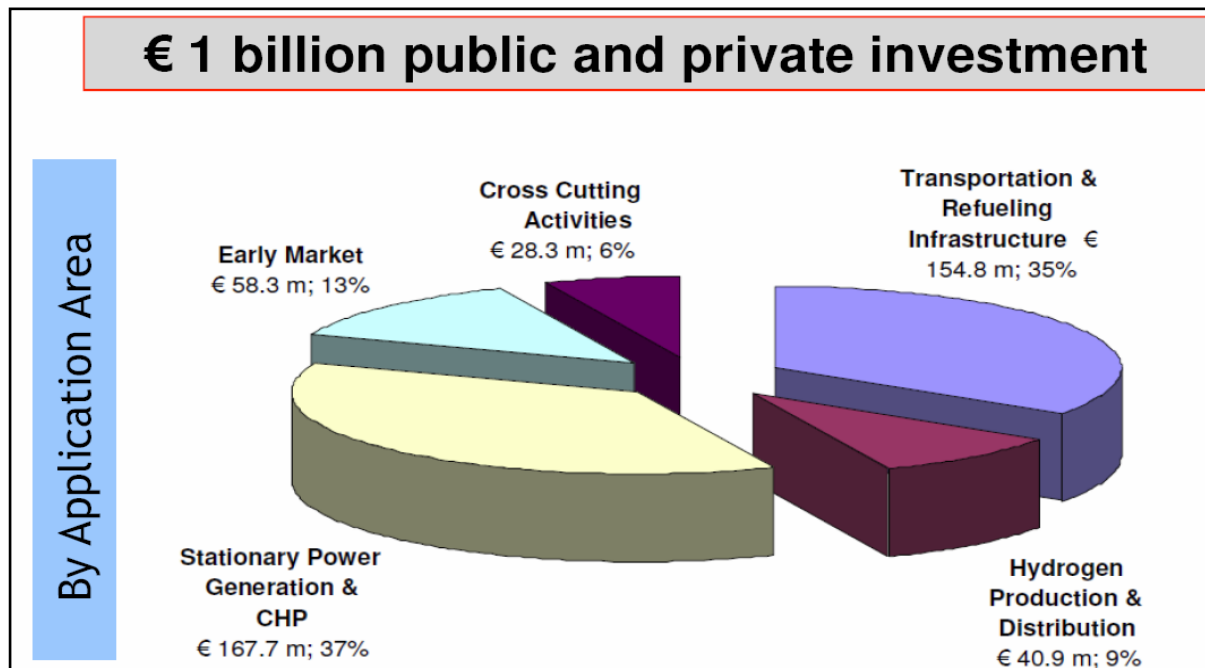
- MEA durability:
  - pre-commercial test in industrial operating conditions
  - large-scale benchmark on statistically meaningful series:
    - ❖ life-time observations over extended periods (1...2 ... years)
    - ❖ "post-mortem" analysis & statistics of degradation mechanisms
    - ❖ frame for testing successive MEA generations
- FC system validation (reliable power supply solution):
  - demonstration of steady power output
  - efficiency of large/complex system
  - simulation of dynamic load cycles

- Large scale PEMFC systems:
  - valorisation of vented hydrogen at chlor-alkali plants (European market potential = 60 MW)
  - peak power demand
- Market extensions:
  - all stationary applications:
    - ❖ BPS (telecom & data centres)
    - ❖ replacement of diesel gensets, ...
  - heavy duty transport: hybrid FC busses & boats
- European Premiere in PEMFC (1.7 MW peak power)

- In line with European JTI Industry Group targets

Stationary Power & CHP	2010	<ul style="list-style-type: none"><li>• 3 - 7MW electrical capacity installed for pre-commercial demonstration phase</li></ul>
	2015	<ul style="list-style-type: none"><li>• 100 MW electrical capacity installed</li><li>• Cost of 5 000 - 6 000 €/kW (Micro CHP FC) and 1,500 - 2,500€/kW for commercial/industrial units</li></ul>

**€ 1 billion public and private investment**



- Cooperation with Institute for Energy, Joint Research Center (Petten):
  - Design of test programmes and procedures
  - Reporting procedure according draft European template
  - Test of 10 kW stack before installation in Antwerp



- FC system supply
- JV Solvay(50):Umicore(50)
- MEA supply
- JV Solvay(75): BASF(25)
- Hydrogen supply (by-product from Antwerp chlor-alkali plant)
- Coordinator of Hydrogen region Flanders-South-Netherlands

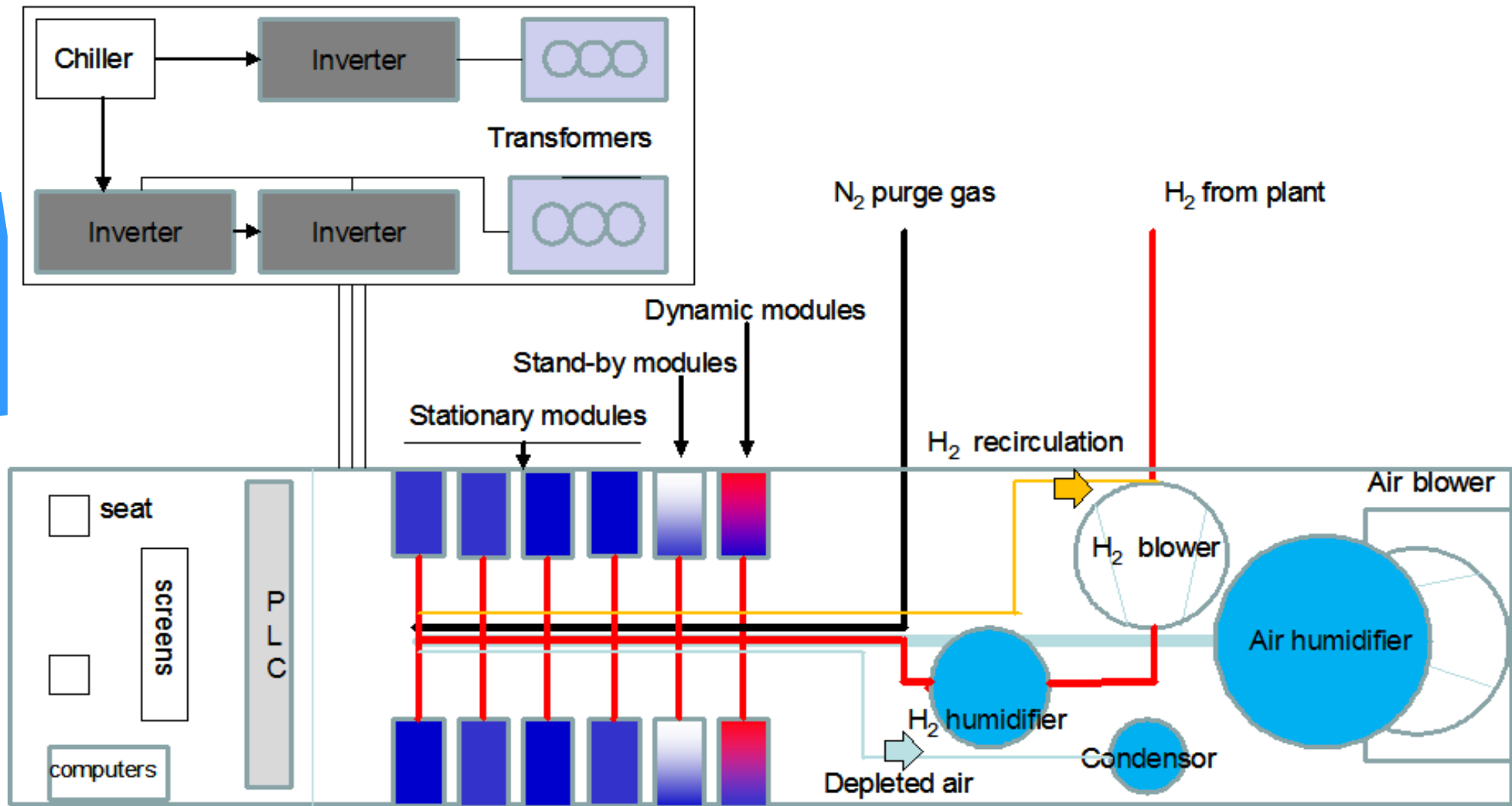


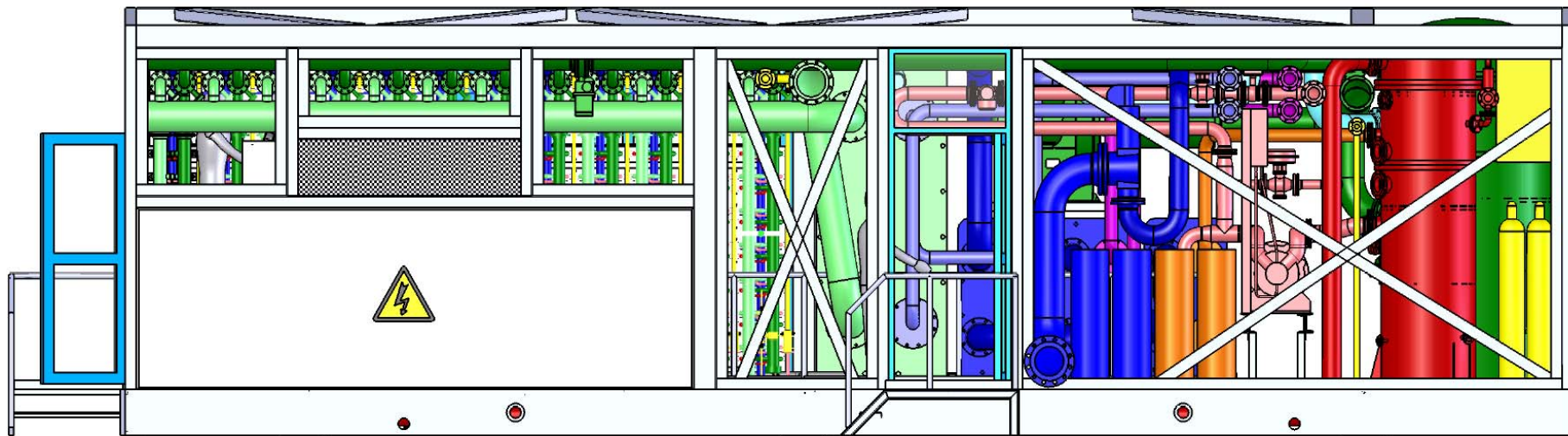
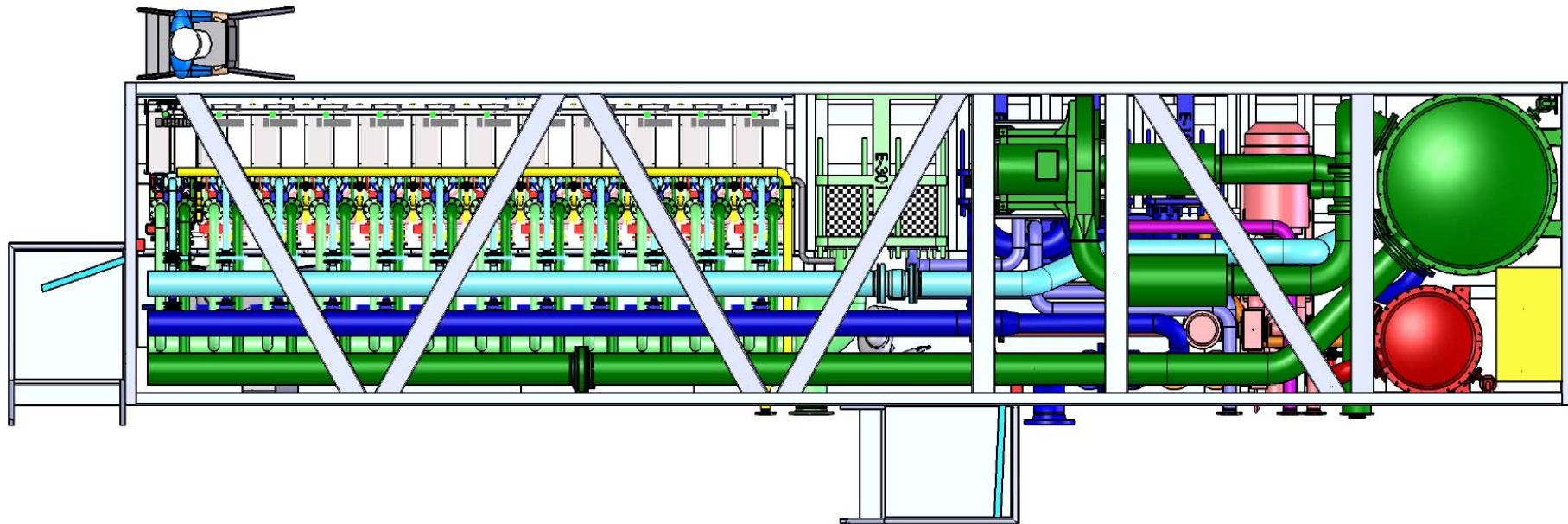
- February 2010: Purchase order
- April 2011: Commissioning & start-up
- July 2011: Full power operation



- Number of cells per stack: 75
- Nominal stack voltage: 52.5 Volt
- Nominal cell voltage: 700 mV
- Nominal stack current: 120 A
- Cell voltage monitoring unit on top



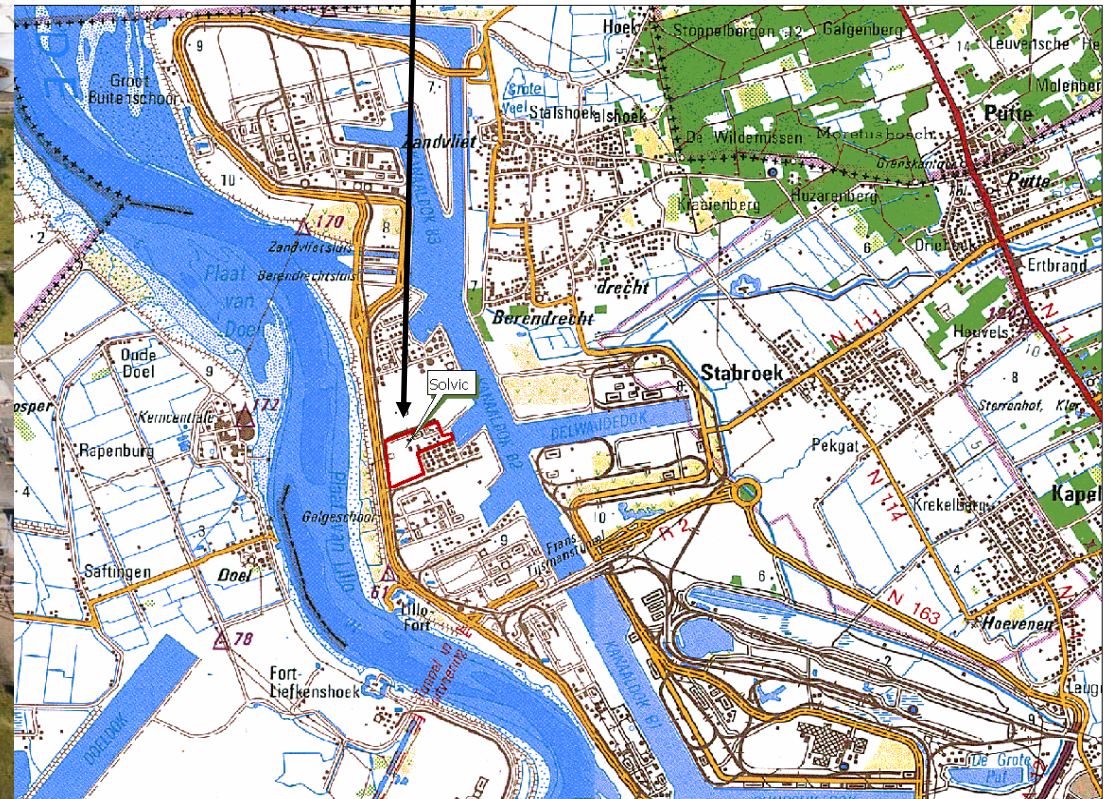








350,000 Tons / yr Chlorine  
10,000 Tons / yr Hydrogen

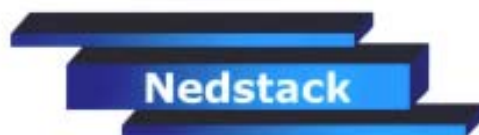




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