

CLUSTER “PLATFORM POWER TO GAS”



AGENTSCHAP
INNOVEREN &
ONDERNEMEN



POWERTOGAS
Industry Cluster Flanders

Samen voor sterk innoveren

General meeting

October 4, 2017
Mechelen



- 10.00-10.15: Intro and presentation new member: Optimum CPV
- 10.15-10.45: Cluster-activities
 - Status project teams
 - Project proposals (to be) submitted
 - Joint booth at Hannover Messe?
 - Visit PtG project 2018
- 10.45-11.00: Study H2 for Flanders as assignment from VEA:
 - Content proposal and proposed way of working
- 11.00 -12.00: Roadmaps and running activities for Heavy Duty mobility on H2
 - Presentation E-trucks (Ben Cornelis)
 - Presentation VDL (Ruud Bouwman)

OPTIMUM CPV

Company name: Optimum CPV bvba

Main activities:

Composite Pressure Vessels:

- engineering, design, development
- prototyping and testing
- homologation
- (small) series production

Experiences with H2:

CPV's developed for cars:

80li/700bar

68li/700bar

50li/700bar

CPV's developed for busses/trucks

157li/350bar

Specific topics of interest within the cluster:

Hydrogen storage systems (cars, busses, transport, fueling stations, etc)



OPTIMUM CPV™

COMPOSITE PRESSURE VESSEL

OPTIMUM CPV

Background:

Founded by Axel Seifert & Mike Skinner in 2010

Background in Filament Winding manufacturing technique for composites

3 main activities

Simulation & programming software for filament winding Compositcad

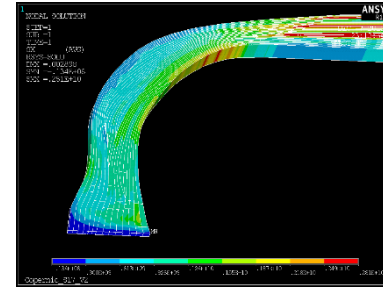
Seminars & symposia on filament winding and CPV's

Product design & development using filament winding:
mostly CPV's for

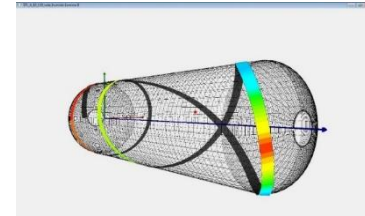
LPG
CNG
CHG



OPTIMUM CPV



Audi A3 Sportback g-tron
Fuel and Gasoline
Structure of the gas tank
06/12



- **Feasibility study “SUNSHINE” project running:**
SUN -based Solid State battery and Hydrogen Integrated Novel Energy-concept

Project partners:

Lampiris (Total)
Terranova Solar
Havenbedrijf Gent
U-Gent
WaterstofNet

Demonstration/Testing
Call for demonstrations tbc
2018

Consortium to be elaborated for demonstration project



- **Knowledge project “BRIGHTFIELDS” submitted to VLAIO (intercluster call) on October 1**

Project partners (Flux50 – IBN Flux50):

U-Gent
Hydrogenics
Deme / Aertssen / Jan Denul
Xant
Actility

Conclusions from search for H2 consumers (Ghent – port of Ghent):

Transport

- Several parties interested in trucks on hydrogen (e.g. BPost > sort centre close to TNS)
Clear roadmap for availability truck needed
- City of Ghent prepared to invest in a few vehicles (schoolbus; van)
but HRS should be close to the city
- Connect TNS to pipeline of Air Liquide?

Industry

- Only industrial user of H2 identified (closeby) is Arcelor Mittal

- **Knowledge project “GREENPORTS” submitted to VLAIO (Transition priorities) on October 1**
(Gas from Renewable ENERGY in ports)

Project partners:

U-Gent - Flamac

Engie - Colruyt/EOLY - Hydrogenics – MBZ - WaterstofNet

Fluxys – ELIA - Air Liquide (supporting role)



- **Investment project (2MW demonstration plant) NOT submitted to EFRO (deadline Sept 27)**

Reason : two partners have decided to go for an industrial scale project (> 10MW)

More time is required for preparation of budget/consortium

MARINE APPLICATION OF H2 (1)



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- Two concepts :
 - ❑ Ship “ZULU”: [Shipit](#) / Blue Line Logistics => technology Revolve (UK)
 - ❑ Ship “Poolster”: Patrick Borms => technology [Van Wings](#)



Hybrid Diesel/H2 combustion engine



Hybrid H2 generator/electric engine

- Bunkering ([Air Liquide](#)):
 - Option 1:
Filling of fixed tanks on board similar to buses in Antwerp (fixed filling point in port filled by A.L. tube trailers)
 - Option 2:
Exchangeable container on board that is filled off-site (e.g. at current filling point for the buses) .

Follow-up?

- Main issue: Cost of H₂ to be competitive with Diesel should be < 2€/kg
- Higher operational cost not acceptable in chosen application (inland container transport)
- This could be solved in the future by
 - Volume increase H₂ consumption in the port
 - Use of contaminated H₂ (byproduct) in combustion
- Short term:
 - Focus on applications with more public visibility (Waterbus?)
- In the meantime: CMB launches “Hydroville” on H₂
<http://www.hydroville.be/cmb-technologies/>
Passenger transport from Kruibeke to Antwerp
To be launched November, 29



- **Literature review made (WN)** (Available on PtG website)
Conclusions:
 - Necessary systems to cover the complete H₂ (or derivative) demand for zero-emission transport (part of private cars, light and heavy duty, ships..) is so immense that turning to installations on sea might be necessary.
 - The avoidance of costly export cables and electricity losses provide arguments for producing the hydrogen offshore rather than onshore (but dependent on specific conditions, e.g. combination with existing offshore infrastructure)
 - The Netherlands are active in this field => large study project started “offshore energy system integration project” and a “North Sea Energy Community” is established, coordinated by TNO
- **Follow-up:**
 - **Start specific study for Flanders/Belgium? Who?**

Green gas-hydrogen

- Follow-up project of **CertifHY** (European certification scheme for green H₂) to be started
- Installation of Colruyt will be one of the test sites for this project
- Stakeholdersforum on Nov 20 in Brussels

EU projects concerning H₂ legislation

- FCH-JU project Hylaw running until end of 2018

Hydrogen Europe: joint initiatives for identification of barriers in current legislation



HE guidance note
for CEP and MP



Joint statement
on REDII

Local legislative issues: e.g. grid fees , to be discussed in specific projects.

For projects, exemptions can exist via “regelvrije zones”, valid from mid 2018
or “gesloten distributienetwerk” <http://www.vreg.be/nl/gesloten-distributienetten>

- Possible joint booth from PtG cluster at Hannover Messe 2018?
 - Suggestion from Bart B. (FCH-JU)
 - Other regions are represented as region/country (NRW, BW, Aberdeen, Norway)

Standard Package

Stand space (without setup), including services

- ✓ Stand space
- ✓ Basic services

TELL ME MORE

From **2.716,00 €**

Full Service Package

Booth size (m ²)	Booth size (ft ²)	Price incl. registration fee
4	43	5.340 €
5	54	6.590 €
6	65	7.840 €
7	75	9.090 €
8	86	10.340 €
9	97	11.590 €
10	108	12.440 €
11	118	13.650 €
12	129	14.860 €
13	140	16.070 €
14	151	17.280 €
15	161	17.590 €

Basic Service Package

Booth size (m ²)	Booth size (ft ²)	Price incl. registration fee
20	215	20.340 €
25	269	25.340 €
30	323	28.540 €
35	377	33.240 €
40	431	35.540 €
45	484	39.940 €
50	538	42.340 €
55	592	46.540 €
60	646	47.740 €
65	700	51.690 €
70	753	55.640 €
75	807	59.590 €



- Who is interested ?

- Suggestions? List of demo-projects
- Other suggestion:
 - organise seminar with a few speakers from representatives from projects

DEMO-PROJECTS POWER TO GAS

Project	Location	Description	Scale	Main Partners	Status
→ Audi e-gas project	Werlte (D)	<ul style="list-style-type: none"> Electrolysis and methanation CO₂ from Biomethane plant exhaust Methane injected in natural gas grid Audi customers can fuel e-gas at 650 locations D. 	6,3MW Electrolysis (3 Alkaline electrol.) 1,000 metric tons of e-gas per year	Audi ETOGAS	Operational since 2013
Wind-gas project	Hamburg (D)	<ul style="list-style-type: none"> Electrolysis; injection of H₂ in gas grid 	1MW Electrol. (PEM) 290Nm ³ /h H ₂	Hydrogenics E.ON SE	Operational since 2015
→ Biocat project	Kopenhagen (DK)	<ul style="list-style-type: none"> Electrolysis and biological methanation Methane injected in gas grid Ancillary services by varying power intake 	1 MW Electrol.(Alkaline) Produces from grid when prices are low	Hydrogenics Energinet Electrochaea	Operational since mid 2016
Thüga power to gas plant	Frankfurt am Main (D)	<ul style="list-style-type: none"> Electrolysis H₂ injected through mixing station, then injected in natural gas grid No compressor used=>high efficiency (77%) 	315kW PEM	ITM power (electrol.) Thüga Energienetze GmbH (cfr Eandis) Various TSO/DSO-gas	Operational
Falkenhagen PtG project	Falkenhagen (D)	<ul style="list-style-type: none"> Electrolysis, from wind energy H₂ injected in gas grid 	2MW Electrol. (Alkaline) 360Nm ³ /h H ₂	Hydrogenics E.ON Gas Storage Swissgas	Operational since 2013
GHRVD	Dunkerque (FR)	<ul style="list-style-type: none"> H₂ injection in natural gas grid Test of CH₄/H₂ mix in transport (50 buses); from 6% to 20% ("Hythane" fuel) Test of CH₄/H₂ mix in heating of a residential neighbourhood of 200 houses; to 20% H₂ 	?	Engie McPhy Energy, INERIS, CETIAT and CETH2 <i>etc..</i>	Operational since?

H2Vlaanderen

in opdracht van VEA

WaterstofNet samen met Hinicio

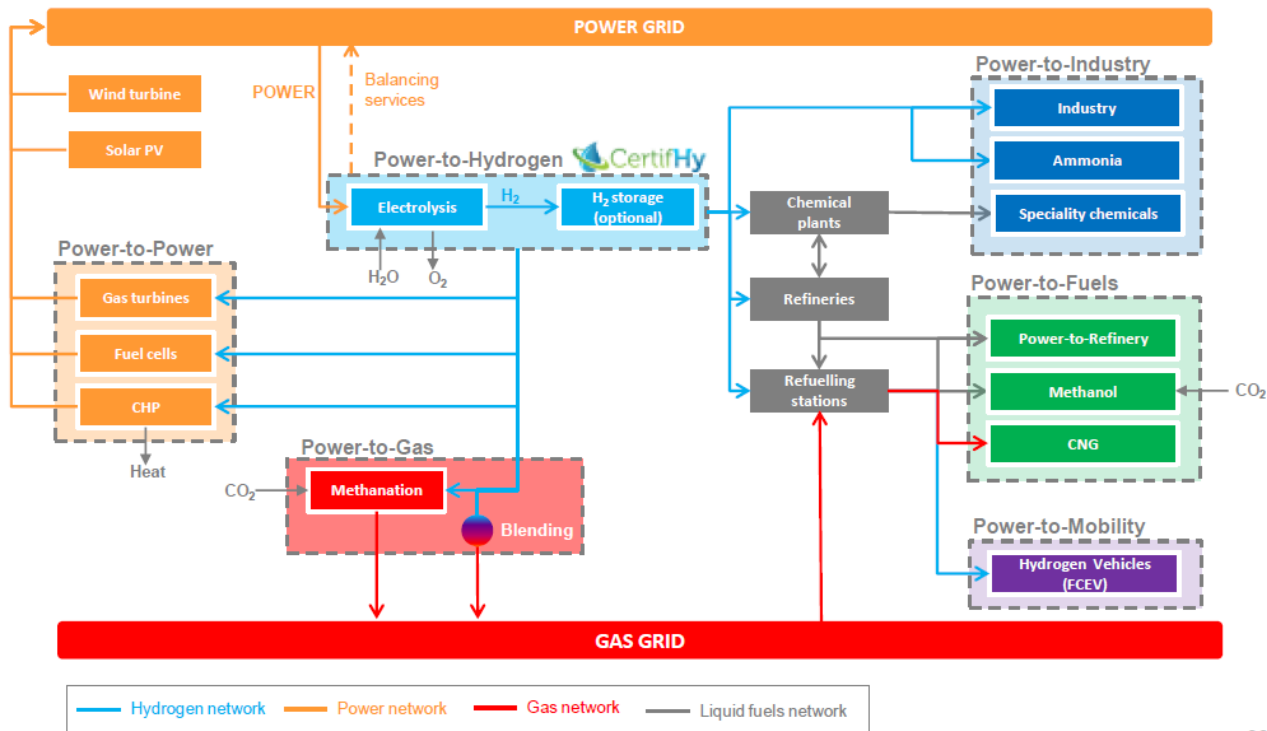
4/10/2017

**Onderzoek naar het potentieel voor
groene waterstof in Vlaanderen en
opmaak van plan van aanpak
op dit potentieel te ontsluiten**

**In opdracht van VEA
(Vlaams Energie Agentschap)**

Energie- en klimaat plan 2030 - 2050

Status



Status



Tijdslijn



- Overview international studies + input Flanders

- November : feedback cluster power to gas

- Technic-economic potential hydrogen Flanders

- December: feedback cluster power to gas

- Eindrapport

- Februari 2018

Status H2Benelux



3/10/2017

Status

- 8 HRS and 80 FCEV
(17,5 M€, 7,2 M€) 2/2017 – 12/2020
- Luxemburg 1 (Shell)
- Wallonia 1 (Colruyt)
- Flanders 2 (Colruyt)
- Netherlands 4 (Shell/PitPoint)
- FCEV: 5 keuro for services
- Grant agreement to be signed in October/November 2017



Flanders
State of the Art



RÉGION DE BRUXELLES-CAPITALE
BRUSSELS HOOFDSTEDELIJK GEWEST
BRUSSELS-CAPITAL REGION



Ministry of Infrastructure and the
Environment



BENEFIC

BRUSSELS NETHERLANDS FLANDERS IMPLEMENTATION OF CLEAN

POWER FOR TRANSPORT

State of play hydrogen stations

Currently there is one publicly accessible hydrogen filling station in Flanders and two in the Netherlands (+one temporary mobile hydrogen filling station of 350 bar). The project aspires hydrogen filling stations for cars and trucks/busses at the most relevant locations on the Flemish and Dutch TEN-T core network and aims at complementing the ongoing developments on hydrogen in both regions.

Project call

In the beginning of 2018 a joint project call will be published. Public and/or private parties will be invited to submit their project proposals. The BENEFIC partners will choose infrastructure projects based on eligibility, selection and technical criteria.

Financing

Approved projects are eligible for co-financing in line with the CEF conditions. The hydrogen priority envisages to co-fund 20% of **9 hydrogen filling stations** along the core network, of which 2 in Flanders and 7 in the Netherlands, with a maximum subsidy of €300.000 per hydrogen filling station.

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