SYMBIO APPROACH TO HYDROGEN MOBILITY: HYDROGEN RANGE-EXTENDED ELECTRIC VEHICLE

ZERO conference – OSLO - 4th of Mai 2017

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SYMBIO FCELL owns its own Fuel Cell technology

SYMBIO FCELL offers to the market:

a) Its own Fuel Cell technology
b) The KANGOO ZE H2
SYMBIO FCELL is a French privately owned company.
KANGOO ZE H2 is a dual energy vehicle (Electric and H2).
The Hydrogen kits from SYMBIO FCELL are manufactured in respect of automotive industry standards by a subsidiary of MICHELIN group.

The Hydrogen kits are then integrated in the original KANGOO ZE in respect of the automotive industry standards by RENAULT TECH, a subsidiary of RENAULT.
Somewhere in Asia?
WELCOME IN PARIS!
The Entry of Freight Vehicles in the cities centers is more and more restricted

A real Headache for delivery and other services companies
MAJOR CITIES IN EUROPE CANNOT IGNORE CITIZEN’S NEED FOR BETTER AIR QUALITY

Fines particulates\(^1\) are only one item among many others like: Ozone, Nox, Sox, CO…

Those pollutants increase the cancers risks\(^2\), asthma, emphysema, heart deseases, stroke…

(1) PM: Particulate Matter
(2) IARC: Diesel Engine Exhaust is Carcinogenic (June 12, 2012)
52 kWh Electricity, 24 kWh Heat

- 30 kWh of power provided by the Fuel Cell + 22 kWh provided by the batteries
- In cold weather, heat produced in the Fuel Cell is diverted to vehicle cockpit: no impact of cold conditions on comfort or range

No climate effect on Hydrogen Electric Vehicle, as shown with real life “Mail delivery” cycles in urban areas (Poste office)

Kangoo ZE

Kangoo ZE + Kit H2

5 °C

Kangoo ZE

Kangoo ZE + Kit H2

-5 °C

Kangoo ZE

Kangoo ZE + Kit H2

<80 km 120 km 300 km
THE 3 AVANTAGES OF THE KANGOO ZE H2

3 Avantages

- Range: 100 km → 300 km
- Heating without hurting th erange
- Refuelling within about 4 mn
TECHNICAL SUPPORT OF OUR PARTNERS LED TO A ROBUST AND COMPETITIVE SOLUTION

Fuel Cell Stack

Hydrogen kit assembly

Vehicle integration

Kangoo ZE

Symbio FCeCell H₂ Range Ext. Kit

Special Accessories Ex: “La Poste”

Vehicle Integration

Fuel Cell Stack

Fuel Cell System

Vehicle Tech
CURRENT SITUATION

• City of 100,000 inhabitants → 100 LCV = 1,500 kg CO2 /day

PROPOSED ACTION

• 20 ICE (Internal Combustion Engine) Vehicles → 20 clean vehicles

• Makes 20 x 261 days* x 15 kg = 78 Tons CO2 spared each year

(*) 1 year = 261 working days
25 Zero Emission vehicles operating daily
KANGOO ZE H2 remains a dual energy vehicle
KANGOO ZE H2 is a connected device \( \rightarrow \) Diagnosis

* Non Hydrogen problem \( \rightarrow \) Renault takes in charge

* Hydrogen problem \( \rightarrow \) Symbio takes in charge

The SymbioFCell Hydrogen kit has a warranty of 2 years. Warranty extension possible
TECHNICAL FEATURES OF OUR VEHICLES ARE THE SAME AS THOSE OF KANGOO ZE, HYDROGEN FUNCTIONALITIES ON TOP OF IT

Kangoo H2 Datasheet

Delivery features
- Payload = 650 kg – 105 kg
- Volume capacity = 4,6 m³ – 0,1 m³
- Driver interface type Kangoo ZE + Fuel Cell & H₂ activity Display

Energy onboard
- « plug-in hybrid H₂ » vehicle
- Original electric battery = 22 kWh
- H₂ tank = 26 kWh (1.78 kg) [350 bar]
- H₂ tank = 30 kWh (2.03 kg) [700 bar]
- « Bonus »: Heat provided by the Fuel Cell: 26 to 30 kWh

Legend
XXX = Features of the original electric vehicle
XXX = Impact of the H₂ Kit
Security of passengers as well as the one of the vehicle are the same one find in a regular vehicle

Firemen are now using « Kangoos ZE H2 » for service
HERE ARE SOME OF OUR CUSTOMERS
THEY ARE INVOLVED IN THE ZERO EMISSION MODEL AND ARE ACTING TODAY.
LAST BUT NOT LEAST!

SKEDSMO KOMMUNE
THANKS FOR YOUR ATTENTION…