

NEMESIS2+

New Method for Superior Integrated Hydrogen Generation System 2+

Duration:

01/2012-12/2014

Application Area:

Hydrogen Production & Distribution

Budget:

Total budget: 3.393.062 €

FCH contribution: 1.614.944 €

Partnership / consortium list:

German Aerospace Center (Coordinator); HyGear B.V. – The Netherlands; Johnson Matthey PLC. – United Kingdom; Abengoa Hidrógeno, S.A. – Spain; Abengoa Bioenergía San Roque, S.A. – Spain; Centre for Research and Technology Hellas – Greece; Instituto Superior Técnico – Portugal

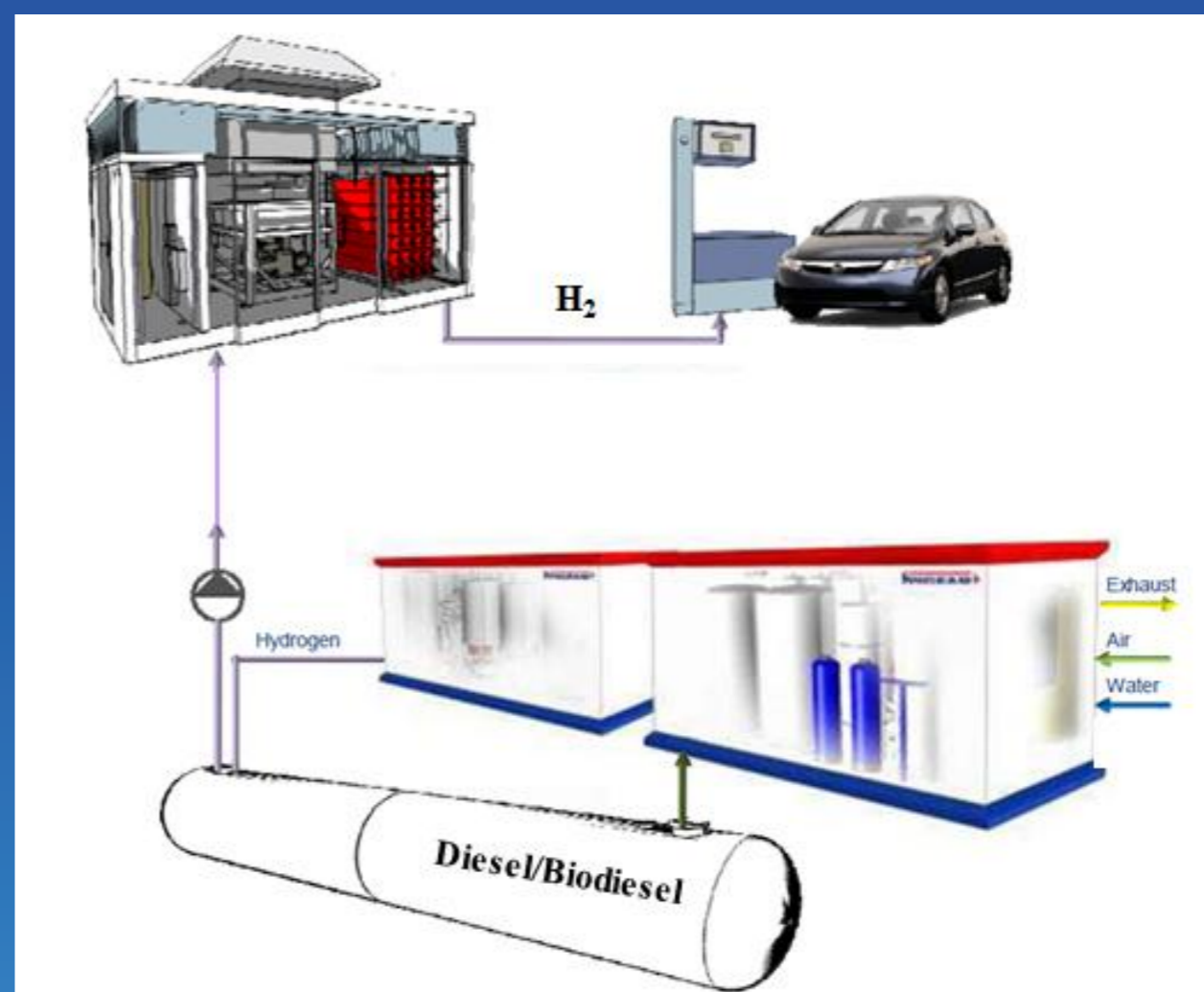
Summary / main objectives of the project:

Within the 3-year project NEMESIS2+ a small-scale hydrogen generator capable of producing 50 Nm³/h of hydrogen from biodiesel and diesel will be developed.

Decentralized hydrogen production from liquid fuels offers a number of advantages like high energy density and infrastructure already being available. Besides, it is economically advantageous in areas where hydrogen cannot be cost-effectively supplied by a central production plant.

Technical accomplishment / progress / result:

- Promising sorbent material for liquid phase desulphurization of diesel identified
- Development of dual fuel burner which is able to run on liquid fuels and on PSA off-gas
- New reformer and WGS catalyst formulations developed
- Successful SR and WGS long-term test (incl. 1 ppm H₂S)



Contribution to the Programme Objectives:

| | OBJECTIVES OF THE CALL | OBJECTIVES OF THE PROJECT | CURRENT STATUS |
|---|----------------------------|---------------------------|--------------------------|
| System efficiency (HHV H ₂ / HHV fuel) | 80 | 70 | 60 |
| Catalyst durability | Stable long-term operation | > 1000 hours | N/A (test not finalized) |
| Scalability (Nm ³ /h) | 2-750 | 2-750 | 5-1000 |
| H ₂ production costs (€/kg) | < 5 | < 4 | N/A |

Conclusions, major findings and perspectives:

The NEMESIS2+ consortium was able to show the feasibility of hydrogen production from biodiesel and diesel by means of steam reforming at elevated pressures. Special emphasis is placed on developing an innovative desulphurization concept based on liquid phase adsorption. Long-term stability of the reforming catalyst is the most critical part of the project. Therefore the effort in the second project period will be increased in order to improve catalyst lifetime.

Future Steps:

A decision on the final prototype setup has been taken at mid-term. Currently the hardware is being adapted to liquid feedstock (diesel and biodiesel). In the last six month of the project, the NEMESIS2+ hydrogen generator will undergo extensive testing (> 1000 hours).