BIOgas membrane reformer for decentralized hydrogen production

Fact Sheet

Project Information

BIONICO
Grant agreement ID: 671459

Funded under H2020-EU.3.3.8.2.

Project website

Overall budget € 3 396 640

Start date 1 September 2015
End date 31 December 2019

EU contribution € 3 147 640

Coordinated by POLITECNICO DI MILANO Italy

Objective

BIONICO will develop, build and demonstrate at a real biogas plant (TRL6) a novel reactor concept integrating H2 production and separation in a single vessel. The hydrogen production capacity will be of 100 kg/day. By using the novel intensified reactor, direct conversion of biogas to pure hydrogen is achieved in a single step, which results in an increase of the overall efficiency and strong decrease of volumes and auxiliary heat management units. The BIONICO process will demonstrate to achieve an overall efficiency up to 72% thanks to the process intensification.

In particular, by integrating the separation of hydrogen in situ during the reforming reaction, the methane in the biogas will be converted to hydrogen at a much lower temperature compared with a conventional system, due to the shifting effect on the equilibrium conversion.

The fluidization of the catalyst makes also possible to (i) overcome problems with temperature control (formation of hotspots or too low temperature), (ii) to operate with smaller particles while still maintaining very low pressure drops and (iii) to
overcome any concentration polarization issue associated with more conventional fixed bed membrane reactors. Dedicated tests with different biogas composition will be carried out to show the flexibility of the process with respect to the feedstock type. Compared with any other membrane reactor project in the past, BIONICO will demonstrate the membrane reactor at a much larger scale, so that more than 100 membranes will be implemented in a single fluidized bed membrane reactor, making BIONICO’s

In this way a more easy operation can be carried out so that a stable pure hydrogen production can be achieved. BIONICO project is based upon knowledge and experience directly gained in three granted projects: ReforCELL, FERRET and FluidCELL.

Field of science
/natural sciences/physical sciences/theoretical physics/particles

Programme(s)

Topic(s)

Call for proposal

H2020-JTI-FCH-2014-1

Funding Scheme

FCH2-RIA - Research and Innovation action

Coordinator

POLITECNICO DI MILANO

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Piazza Leonardo Da Vinci 32
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Activity type
Higher or Secondary Education Establishments

EU contribution
€ 387 172,79

Website

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Participants (8)
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EU contribution
€ 497 000

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Higher or Secondary Education Establishments

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Private for-profit entities (excluding Higher or Secondary Education Establishments)

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EU contribution
€ 879 547,68