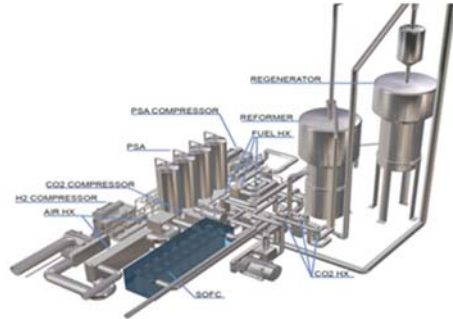


## ZEG<sub>400</sub>

### *Realisation of a 400 kW pilot based on the patented ZEG-technology*

A 400kW ZEG-plant (ZEG<sub>400</sub>) will be the reference plant of the ZEG-technology, at close to industrial scale. Full integration of a 200kW Solid Oxide Fuel Cell (SOFC) module and a 200kW Sorption Enhanced Reforming (SER) reactor system will prove the high total system efficiency of the ZEG-technology.

The ZEG<sub>400</sub>-pilot plant will provide necessary experience and knowledge of system and thermal integration, process control and safety aspects for realisation of commercial ZEG-plants.



The BioZEG-project (completed in 2013) represented a significant up scaling from 2kW to 50kW and introduced heat integration between SOFC and the fluidized bed regenerator in the SER reactor system. The ZEG<sub>400</sub> project will also include a dedicated heat-transfer loop and recycling of hydrogen for further efficiency optimization. Main issues addressed in a test program of a 400kW scale pilot will be:

- Heat integration between SOFC and SER with heat transfer loop
- H<sub>2</sub> – cycling for efficiency optimisation
- SOFC-technology options
- Operation for improved lifetime

The ZEG<sub>400</sub> project is Phase 1 of realising a 400 kW plant and the main objective is to establish a detailed technical and economic basis for up scaling of the ZEG-technology in order to minimize the risks for the realisation of a close to industrial scale ZEG plant.

Already completed is a third party assessment of the up scaling of the ZEG-technology from 50kW to 400kW, performed by the German research institute ZSW (Centre for Solar Energy and Hydrogen Research Baden-Württemberg, [www.zsw-bw.de](http://www.zsw-bw.de)).

The R&D challenges addressed are related to the inclusion of all technology elements required for a fully integrated ZEG-plant:

- Development of a detailed system design and cost estimate of a 400kW pilot plant
- Development of a 3D thermal model for high temperature heat exchange in the SER regenerator
- Establishment of design basis and preliminary design for a heat transfer loop
- Establishment of design basis for different technological SOFC options and solutions

The ZEG<sub>400</sub> project will also include test and demonstration of all critical technological parts.

A next necessary step for up scaling will be to a MW scale (1 – 15MW) focused on optimization of the process and technological solutions as well as cost reductions

The project is scheduled as a 2 year program from April 2013. The project has a total budget of 6.1 MNOK of which 4.27 MNOK is granted by the national CLIMIT/Gassnova demonstration program.

The ZEG<sub>400</sub> project is open for additional industrial participation.

#### **For more information:**

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