

CH2P Research Project for the Advancements of Technological Solutions for Decentralized Hydrogen CHP Systems

Hydrogen is among the most important energy sources of the energy transition. As part of a research project, a consortium under the leadership of 2G is working on the development of next-generation combined heat and power (CHP) systems capable of using hydrogen for the efficient and inexpensive production of heat and electricity. As part of the 7th Energy Research Program of the German federal government, the project receives subsidies of approximately 2.36 million Euros. The kick-off meeting having taken place in Heek, the work of all project parties now begins.

Heek, 02/06/2023 – With the adoption of the “National Hydrogen Strategy” in June of 2020 if not earlier, hydrogen became a dominant topic of the energy transition in Germany alongside the expansion of renewable energies. Besides heavy industries and mobility, energy production will be one of the most significant consumers of hydrogen which will replace natural gas in the medium term. Following the increasing focus on supply security as of February 2022, the demand for efficient hydrogen solutions is rising across the energy sector. By means of application-oriented research and development, the research project “Technological solutions for highly efficient zero-emission hydrogen engines for CHP applications” (CH2P) with a total of nine project partners was conceived to make a significant step towards the required technology.

Project built on the multitude of hydrogen CHP systems installed by 2G

As a significant pillar of the energy generation sector, CHP systems can already support industrial consumers and heating networks by efficiently generating heat while also contributing to grid stability as a counterpart and partner to volatile renewable energy generation systems by filling the gaps in their energy production. If CHP systems are operated on hydrogen, their contributions can become emission-free and climate-neutral. As the leading contributor to this project, 2G Energy AG is already supplying a growing number of customers with purely hydrogen-fueled CHP whose development is constantly progressing. Over the course of the project, the output spectrum of these units is supposed to grow, increasing the efficiency, and reducing costs in turn. In the eyes of Frank Grewe, CTO of 2G Energy AG, the project is a direct continuation of the company's research and development over the past decade: “The highly efficient exploitation of renewable gases has always been the core of our company's philosophy – a fact that, among other things, is reflected in our many hydrogen projects across the globe. Through this joint-project with partners from business and science, we intend to confirm and sustainably reinforce our technological leadership in terms of hydrogen-based cogeneration.”

Increased specific output through innovative engine systems and new composite materials

Three out of five development focal points of the joint-project are dedicated to the development of technological solutions enabling an increase in specific output. One of the approaches is to modify the hardware of a 2G engine. Additionally, a subcontracted company is working on the development of a smart ignition system configured entirely for the operation on hydrogen and intended to lead to an elevated combustion efficiency. Furthermore, there is a joint-effort between 2G and the Technical University of Applied Sciences "OTH Amberg-Weiden" (Competence Center for Combined Heat and Power) to assess the potential of improved mixture homogenization and, consequently, improved combustion efficiency.

Another focal point of research is the development of innovative piston rings for combustion engines. The Institute of Structures and Design at the German Aerospace Center (DLR) and the CVT GmbH & Co. KG, a technical ceramics manufacturer, cooperate with the piston manufacturer KS Large bore Pistons Germany GmbH on this focal point. By the end of the project, the first prototypes are to be tested in a running engine.

Finally: further reduction of emissions

The final focal point is dedicated to developing a system, a new type of SCR catalyst working on H₂ instead of urea as the reducing agent, to eradicate the only pollutant present in the exhaust gas of hydrogen-fueled systems, the air pollutant NO_x. The Institute for Chemical Technology at the University Leipzig and the Institute of Energy and Climate Research at the Jülich Research Center look for appropriate materials and manufacturing methods. They are to cooperate with the thermal-processing specialist IBU-tec advanced materials AG and the catalyst manufacturer Interkat Catalyst GmbH on producing prototypes to be tested on the engine test bench.

The three-year research project started on September 01st, 2022, and is subsidized to the tune of approximately 2.36 million Euros by the Federal Ministry for Economic Affairs and Climate Action (BMWK) as part of its 7th Energy Research Program, amounting to a funding rate of 60%. Projektträger Jülich is functioning as the project executing organization.

Pictures




In the picture: Launch meeting of all project parties

Source: 2G Energy AG


About 2G Energy

The 2G Energy AG is one of the world's leading manufacturers of combined heat and power generation systems (CHP) providing a decentralized supply of heat and electricity using reciprocating piston engines that run on natural gas, biomethane, biogas, sewage gas, landfill gas or hydrogen. The systems in the portfolio range from an electrical output of 20 to 4,500 kW. The customers range from farmers over municipalities, commercial enterprises, medium-scale, and big industrial companies to the energy sector. In addition to the headquarters in Heek, located in the "Münsterland" region in western Germany, 2G is represented by subsidiaries in several European countries as well as North America and has about 800 employees worldwide. Since its foundation in 1995, 2G has commissioned more than 8,000 systems throughout the world.






Funding Bodies

<p>Federal Ministry for Economic Affairs and Climate Action</p>	<p>Gefördert durch:</p>  <p>Bundesministerium für Wirtschaft und Klimaschutz</p> <p>aufgrund eines Beschlusses des Deutschen Bundestages</p>
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Project Executing Organization

<p>PTJ – Projektträger Forschungszentrum Jülich</p>	
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Project Partners

<p>Ostbayerische Technische Hochschule Amberg-Weiden (OTH – Technical University of Applied Sciences)</p>	
<p>Deutsches Zentrum für Luft- und Raumfahrt (German Aerospace Center)</p>	
<p>CVT GmbH & Co. KG (Specialist for Chemical Vapor Deposition, Chemical Vapor Infiltration & Technical Ceramics)</p>	
<p>Forschungszentrum Jülich – Institute of Energy and Climate Research (IEK)</p>	
<p>Universität Leipzig</p>	

Associated Partners

<p>KS Large Bore Pistons Germany GmbH (Piston manufacturer)</p>	
<p>Interkat Catalyst GmbH (Catalyst manufacturer)</p>	

IBU-tec advanced materials AG (Pigment producer)	IBU tec
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