SuperP2G

Synergies Utilising renewable Power Regionally by means of Power to Gas

P2G is a key technology to bridge the major energy grids and consumers. Our project will help stakeholders find and evaluate the beneficial regional applications. Now more than ever, we need alternatives to natural gas! – Prof. Marie Münster

Integration of energy vectors is key to ensure cost-efficient inclusion of renewable energy. P2G contributes to the overall efficiency and balancing of the energy system with energy storage and transfer of green energy to end use sectors. Currently, regional commercial P2G-projects have not yet emerged. SuperP2G ensured that P2G solutions approach commercial implementation by contributing to

1. technical optimisation and system integration
2. market access and uptake, as well as for
3. development of solutions for adoption.

SuperP2G interconnects leading P2G initiatives in five countries, ensuring joint learning. Each national project focuses on different challenges, where researchers team up with local need-owners to co-create solutions. SuperP2G focused on improving existing tools including open access, as well as develop a new web tool-box for P2G modelling. This was supplemented with analysis of regulation and markets, as well as stakeholder involvement.

Main Results

The results include a set of tools and procedures to foster implementation of P2G in the planning as well as in operation of P2G in integrated energy systems. These tools, databases and methodology are improved by the insights of the different case studies as well as the cross-insemination. This resulted in a tool-kit for P2G modelling on regional, national and European level that was combined in the SuperP2G webtool.

Project Duration
01.11.2019 – 31.03.2023

Project Budget
Total Budget: € 2.500.000

Project Coordinator
Prof. Marie Münster (Denmark)

Project Partners
- Technical Univesrity of Denmark (Denmark)
- Greenlab Skive (Denmark)
- National Research Council Italy (Italy)
- University of Bologna (Italy)
- University of Groningen (The Netherlands)
- DBI-GTI (Germany)
- DVGW-EBI (Germany)
- Energieinstitut an der JKU Linz (Austria)

Project Website
www.superp2g.eu

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ERA-Net Smart Energy Systems Joint Call 2020 (MICall20)
This project has been awarded funding within the ERA-Net SES Joint Call 2020 for transnational research, development and demonstration projects. 22 Mio EUR of funding have been granted to 21 projects active in 17 regions and countries.

ERA-Net Smart Energy Systems

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This tool-kit makes it possible

- to improve the technical and economic analysis of P2G processes,
- to optimally plan and operate P2X systems,
- to integrate renewable sources and hydrogen applications in local energy systems,
- to investigate the optimal operation of energy hubs and flexibility through P2X technology,
- to select size and location of P2G systems on regional and national level,
- to analyse future demand of renewable H2 and SNG for the industry,
- to analyse where in Europe, when and under which conditions green hydrogen will be produced.

Results from the application are amongst others insights into CAPEX of methanisation plants which are 450€/kW for a 5MW plant and can be reduced to 160€/kW for 100MW plants. Furthermore, algorithms that apply first-principle models and data driven optimisation were able to define the optimal cost investment and operation taking into account the configuration, sizing and revenue flows of the system.

On the value chain level, tools like DBI-MAT allow techno-economic modelling of sector coupling and simulation of P2G systems with local industrial applications. The EnerHub2X model supported one of our industrial partners in Denmark to identify bottlenecks in the operation of P2X hubs.

For the regional level the SP2G-Italy tool was able to use GIS data and develop scenarios for the hydrogen penetration in the Apulia region. The figure on the right shows the identified cluster centroids as power production points in this area.

This tool could also be applied on the national level to analyse scenarios for the Italian hydrogen penetration in the mobility sector. On the same level, colleagues from Austria used the tools CoLLeCT, PResTiGe and MOVE to analyse the cost developments related to future hydrogen demand of the industry in Austria. It resulted that the electrolyser costs have high potential to decline in future. The key factor for hydrogen prices turned out to be the full load hours of the electrolysers, the efficiency of the plant, the investment costs and the electricity price.

With regard to European level modelling, the Balmorel tool was applied and a great economic potential for regional hydrogen grids and storages was identified with the most competitive green hydrogen production found in South Europe based on PV.

Other results include scientific papers from the different case studies, including models for assessment of power-to-gas systems.

Joint Programming for Flourishing Innovation – from Local and Regional Trials towards a Transnational Knowledge Community

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DTU

ENERGIE INSTITUT an der Johannes Kepler Universität Linz

National Research Council of Italy

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

DBI GTI Gastechnologisches Institut

university of groningen | faculty of economics and business

GreenLab

DVGW Forschungsstelle ebi

ERIG European Research Institute for Gas and Energy Innovation