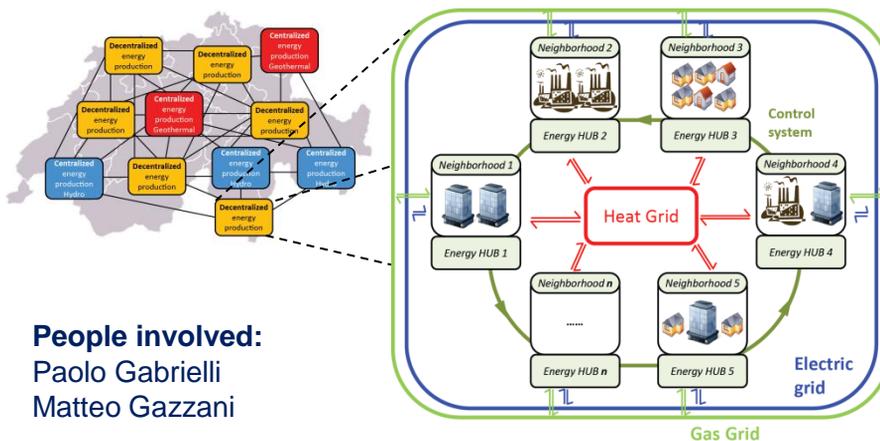


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A holistic approach to rethinking the energy system: decentralized power production with renewables and storage integration

Renewables integration in decentralized multi-energy systems in Switzerland



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Renewables integrated with gas-based decentralized power production and storage are a promising solution:

- Balancing excess power production
- Efficiently co-generating electricity and heat
- Easing the transition toward larger use of biogas
- Limiting the cost increase
- Enhancing social acceptance and awareness

Examples for possible projects:

1. Modeling existing micro-cogeneration technologies

Micro-cogeneration is an emerging technology with the potential to provide energy efficiency and environmental benefits by reducing primary energy consumption and associated greenhouse emissions. Distributed generation has a significant potential to help the renewables integration in the energy portfolio. In particular, the utilization of high temperature fuel cell could lead to the improvement of electrical efficiency in comparison with traditional micro-cogeneration systems. The goal of the project is the analysis, design and optimization of a fuel-cell based system.

2. Hydrogen production with biogas: from well to wheel analysis

Biogas production processes are currently a well developed technology. However, while biogas is often seen as a poor commodity playing a minor role in the energy market, it is actually an abundant primary energy source for the production of hydrogen. A major possible application for hydrogen is represented by the mobility market. The goal of the project will be the study of the various steps of hydrogen production, from production, to storage, transportation and utilization.

3. Techno-economic assessment of power-to-gas systems

Power to gas (P2G) is a technology that converts electrical power to gas fuel. There are currently different methods in use, all implying water electrolysis. Nowadays, power to gas is gaining popularity due to its potential to provide flexibility to the energy systems and hence contribute to the implementation of intermittent energy sources. The role of P2G in the energy transition has insufficiently been considered until now. The goal of the project is a techno-economic analysis of a P2G system in the context of decentralized, integrated multi-energy systems.