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## **FUTURE SCENARIOS WITH POWER-TO-GAS INTEGRATION OF THE GAS SECTOR INTO ELECTRICITY NETWORK PLANNING**

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In the context of sector coupling, the proportion of new power applications which are characterized by adaptive and flexible load behavior is continuously increasing. The characterization and prognosis of the development of these, such as power-to-gas (PtG) plants, play an important role with regard to the integration of renewable energies into the energy supply grids.

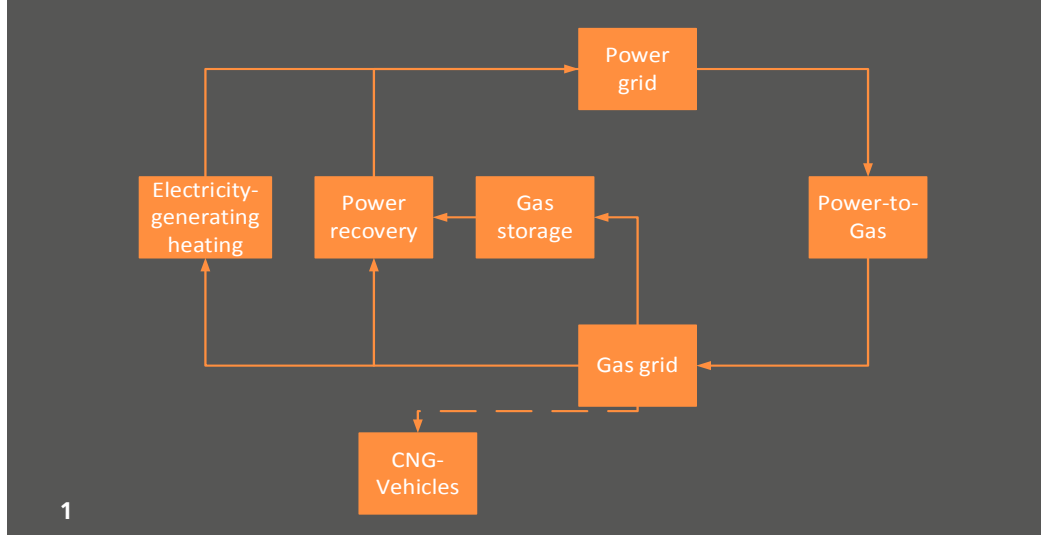
The further expansion of renewable energy systems leads to a further increase in fluctuating power feed-in. To integrate this energy into the grid and thus be able to use it, possibilities are needed to adapt the load to the volatile supply at short notice. The ie<sup>3</sup> determines the potential for the integration of renewable energy plants into the German electricity grid by coupling the electricity and gas sectors, in particular the PtG plants as a flexible load.

### **Keywords**

- Sectoral coupling
- Market and network simulation
- Future scenarios for the electricity sector

### **Industrial sectors**

- Power supply
- Distribution grid operators
- Operators of virtual power plants
- Gas grid operators



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**1 Sector coupling of electricity and gas grid.**

**Technological specification**

The modeling of the gas sector into the existing market and grid model for the electricity sector (MILES) first and foremost requires an expanded data basis. On this data basis, the most important parameters must be developed and used in order to be able to best map the application of PtG systems.

The analysis is based on the market and network simulation environment MILES developed at ie3, which has already been used in numerous case studies and is constantly being further developed.

**Our service**

- Future regional allocation of PtG plants
- Identification of possible business cases for PtG
- Modelling and forecasting the regional expansion of renewable energies offshore and onshore in the light of continuously changing political conditions
- Development of solutions to meet the increased need for flexibility, taking into account the increasing coupling of the following sectors: electricity, heat and transport
- Estimation of possible avoidance potential of feed-in management by PtG plants
- Technical and economic evaluation and prioritisation of grid requirements

**Your benefit**

By extending an existing market and grid model, forecasts for regionalization, deployment, possible business cases and the effects of PtG plants on the electricity sector can be made. Furthermore, possible scenarios for PtG plants are examined with regard to their grid effects in the electricity sector.

The future influence of PtG systems on the grid or on the market can be demonstrated on the basis of given scenarios. This could be of interest for

- Network operators
- Investors of PtG plants
- Institutes for scientific research