



## Infrastructure demand and energy logistics for RE-methane in Germany

### Advanced System Technology AST

Am Vogelherd 50  
98693 Ilmenau, Germany

#### Contact

Dr.-Ing. Björn Illing  
Phone +49 3677 461-116  
bjoern.illing@iosb-ast.fraunhofer.de

Dipl.-Wirtsch.-Inf. Oliver Warweg  
Phone +49 3677 461-111  
oliver.warweg@iosb-ast.fraunhofer.de

[www.iosb-ast.fraunhofer.de](http://www.iosb-ast.fraunhofer.de)

### Lead project and joint project

Methane-based fuels in compressed or liquefied form produced from renewable energy (RE) sources offer an alternative to fossil fuels.

Within the Meth-Quest lead project - „Production and use of methane from renewables in mobile and stationary applications“ Fraunhofer is bundling various projects relating to the introduction and market ramp-up of RE-methane for use in car, truck and ship traffic and in flexible stationary power generation units.

In the associated joint project MethSys - „System Analysis“, four work packages are used to carry out cost- and market-side studies as well as ecological considerations. In particular, the approach of the project aims at developing and linking quantitative models which simulate the potential

development of RE-methane in the energy system and evaluate the techniques used in it from a macroeconomic point of view. This includes, among other things, a market start-up simulation of alternative fuels, an estimation of the power-to-gas (P2G) generation potential using supraregional energy system models, an analysis of the regional infrastructure requirements for electricity and gas grids and an ecobalance analysis of methane-based renewable fuels for use in car, truck and ship traffic as well as in stationary power generation units in Germany.

Supported by:



on the basis of a decision  
by the German Bundestag

---

## Targets subproject MethSysLog

---

As part of MethSys, the sub-project MethSysLog - "Infrastructure requirements and energy logistics for RE-methane in Germany - effects on the regional supply infrastructure in the electricity sector" is of particular importance. The targets of this project comprise the following projects:

- Analysis of the effects (synergies and divergences) of the developed P2G technologies for conversion and sector coupling on the supply infrastructure in the electricity sector, taking into account the expansion targets of renewable energies in the electrical distribution network. The effects on the parameters voltage, current, load on resources, necessary grid expansion and local redispatch requirements for selected distribution grids are evaluated on the basis of the reference grid model (RefNetz).
- Development and testing of methods of energy management from the point of view of an operator of P2G plants, taking into account the provision of renewable methane for transport, heat supply or re-electricity generation. The renewable energy expansion targets and the liberalized energy market define the boundary conditions. The operator's target functions are profit maximization and CO<sub>2</sub> minimization. The uncertainties regarding the local availability of RE power are to be taken into account and this local use is to be maximized by coupling with the transport sector. In addition, the necessary reactive interven-

tions of the network operator to ensure the security of supply or the necessary network expansion will be determined.

- Further development and evaluation of energy logistics approaches for coordinated market/network management with the aim of significantly reducing the reactive intervention of the carrier grid operator in the management of the operators by making use of the flexibility potential of P2G facilities and the associated sector coupling.

---

## Tasks

---

Within the project, the models RefNetz and NRGSim are to be integrated into the energy model system of MethSys. Furthermore, the German distribution grid structure will be mapped using reference grids in different type regions. Special attention is paid to the determination of the effects of the integration of P2G plants on the distribution grid and the determination of the excess current as input parameters for downstream models.

Another focus is on the mapping of market processes from the perspective of the balancing group manager (BGM) using P2G systems. The following tasks should be taken into account:

- Determination of the impact on BGM processes

- Analysis of the potential to reduce interventions by the grid operator to ensure grid stability
- Determination of plant schedules of P2G plants for downstream models

---

## Partner

---

- Fraunhofer ISI
- Fraunhofer IBP
- Fraunhofer IOSB-AST
- DVGW Research Centre at Engler-Bunte-Institute (EBI)
- Energy System Analysis Associates (ESA<sup>2</sup>)
- DBI - Gastechnologisches Institut Freiberg