



Fraunhofer IFAM

FRAUNHOFER INSTITUTE FOR MANUFACTURING TECHNOLOGY AND ADVANCED MATERIALS IFAM



POWER STORAGE FOR THE ENERGY REVOLUTION

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The challenge

Municipalities, regions and power grid operators are important players in the energy revolution. In particular, municipalities and regions influence the planning and construction of systems for utilizing renewable energies. They often strive to utilize the produced energy locally. The grid operator's job is to maintain a secure and efficient power supply, even when energy generation fluctuates significantly.

Accumulators are important components for achieving these goals. The answer to the question of which storage technology is best suitable in individual cases is dependent upon the user's perspective. While municipalities and regions focus on utilizing energy locally, the use of accumulators represents an alternative for grid operators to expand

or reinforce the mains system.

Accumulators can perform a variety of tasks:

- Storing excess production and avoiding plant shut-downs
- Utilization of renewable power even when the plants are delivering very little power
- Largely local utilization of power
- Improved base load capacity of renewable energies
- Provision of balancing energy
- Provision of renewable power for electrical vehicles



Our services

We offer analyses of the following:

- Determination of the storage potential in your region
- Selection of suitable accumulators with special attention to new storage technologies
- System analysis of the effects of using accumulators on the local/regional energy supply system
- Analysis of the economic efficiency of using accumulators in energy supply companies, the industrial sector and commercial enterprises
- Role of energy accumulators in municipal and regional energy concepts
- Effect of the energy policy framework conditions on the use of energy accumulators

In addition to technical and economical questions, we also discuss regulatory planning aspects for accumulators.

Example project Multi-Grid Storage

The "Multi-Grid Storage" research project will investigate how to efficiently link electricity, gas and heat supplies with the integration of renewable energies. The focus of the project is the question as to how excess power can be stored temporarily in the form of heat, gas or

electricity. This involves comparing different storage concepts with regard to costs and efficiency.

Our "MuGriFlex" model allows the simulation of a variety of system combinations, e. g. electric boilers, heat pumps, heat accumulators, CHP plants, electrolyzers and methanizers under different economic framework conditions in the energy industry, in particular with regard to funding, taxes and prices. Thus, we can determine the conditions, under which the individual storage concepts can be operated. The project also demonstrates the significance of different storage or equalization measures with regard to the energy system of the future and how the current market mechanisms have to be further developed.

Example project Flexibility options

This study examines the options for Germany to compensate for insufficient and excess power coverage from fluctuating renewable energies being fed into the grid. The assumption is that the renewable energies contribute a very large share, namely 80 percent, of power generation.

The objective of the study was to use model simulations to identify future options that should be taken into account now when making decisions on the power/heat supply. The focus is to examine the flexible

use of combined heat and power plants in combination with heat storages, electrical heaters and electrical heat pumps for district heating systems and the use of local heat supply solutions.

The study was carried out with the involvement of the German District Heating Association (AGFW) and the German Renewable Energy Federation (BEE).