

# iHEM Research Project (intelligentes HeimEnergieManagement [intelligent Home Energy Management])

GEFÖRDERT VOM



Bundesministerium  
für Bildung  
und Forschung

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Partners:

1. meteoControl GmbH (Augsburg), Coordinator
2. Ceramic Fuel Cells GmbH (Heinsberg), since 7/1/2015 SOLID POWER GmbH
3. Sailer GmbH (Ehingen)
4. Steca Elektronik GmbH (Memmingen)
5. Ulm University of Applied Sciences (Ulm)
6. Technical University of Munich (Munich)
7. EWE Forschungszentrum für Energietechnologie e. V. Next Energy (Oldenburg)
8. Carl von Ossietzky University of Oldenburg (Oldenburg)
9. Office (Oldenburg)
10. ProCom GmbH (Aachen)

Title: iHEM—intelligent Home Energy Management

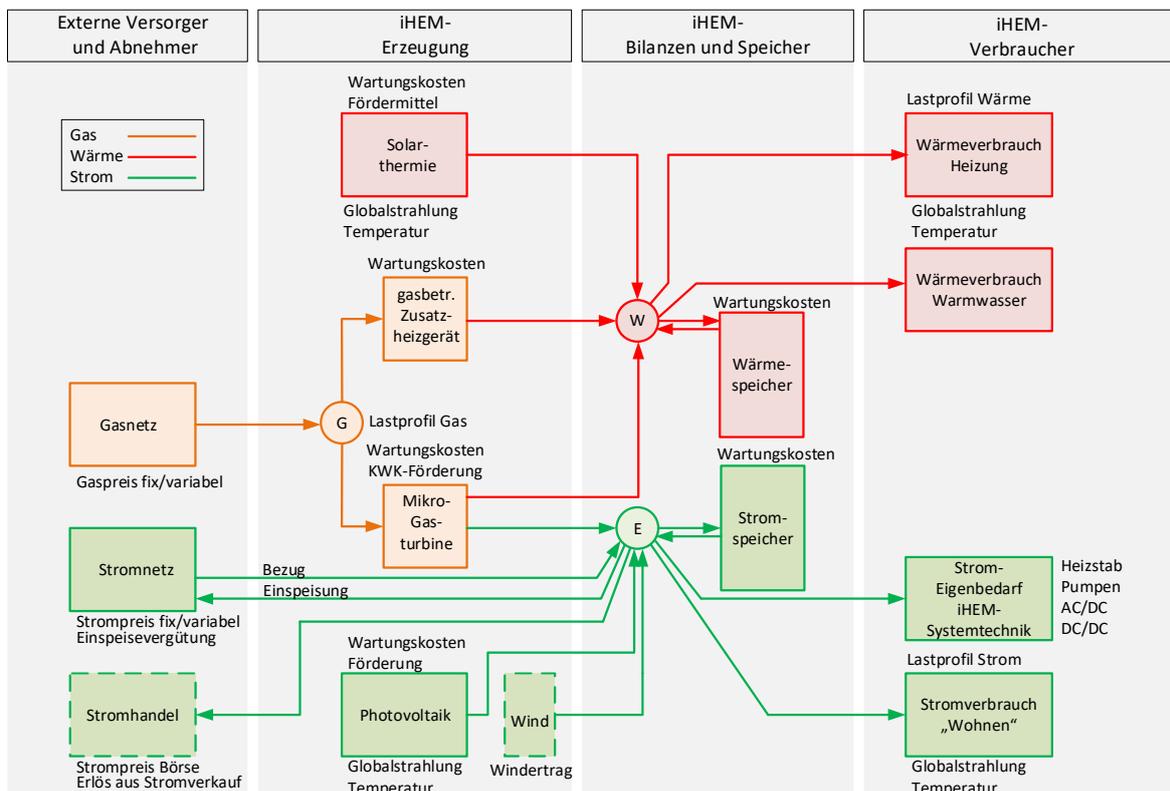


Figure: Context of iHEM energy flows with their physical and economic attributes

## Project objectives:

The aim of this collaborative project is to research, develop and evaluate an intelligent home-energy-management system that makes it possible to exploit the potential synergies in heat and electrical supplies to properties through predictive operational-management strategies.

The overall system outlined in the figure takes into account the distributed generators and consumers for a single-family home, such as photovoltaic (PV) systems, solar-heating systems, electricity and heat storage, auxiliary heaters, CHP units and master control units. The aim is to operate the system in question efficiently, using the greatest possible proportion of renewable energy taking into account economic operational-management strategies. By adapting the design of the generating units to be modular, location-specific constraints, such as existing building areas and PV yield potentials, can be considered. In addition to the optimization of efficiency within the building and coverage of internal requirements, consideration is given to technical and economic network-specific restrictions and degrees of freedom, such as cut-off conditions and tariff models.

Given this background, all individual components are systemically optimized and modified specifically to requirements. In the process, the increase and improvement in the understanding of electrical and material storage, as well as laboratory and demonstrator runs that closely reflect practice, will accumulate experience whereby it will be possible to validate, optimize and further develop system designs for supplying domestic energy. Improved forecasting tools should also increase efficiency in the operational management of the overall system.

## Objectives of ProCom GmbH

In order to achieve the above project objectives, ProCom GmbH can build on its expertise in the energy industry as well as the subfunctions of its IT tools. The main research objective of ProCom GmbH consists of developing and validating operating and business models in the field of home-energy management. To this end, the focus of the work of ProCom GmbH will be on the following aspects:

- Analysis of the heat requirements of various building types
- Analysis of the electrical load profiles of energy sinks and the influence of user behavior on them
- Analysis of the generating profiles of electricity sources (CHP, PV, fuel cells)
- Analysis of the generating profiles of heat sources (solar heating, CHP, auxiliary heaters)
- Analysis of future energy and economic constraints and derivation of the corresponding system requirements
- Derivation of energy and economic optimization criteria
- Draft dimensioning of the system and plant technology
- Evaluation and development of future operational-management concepts and various business and operational models
- Development of service and maintenance concepts
- Construction and commissioning of the laboratory system
- Demonstration of the implementation of optimization
- Demonstrator test run and evaluation of the system components