Microgrid Lab 100% - R&D project for decentralized energy supply with biomass and other Distributed Energy Resources

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Microgrids

BEST – Microgrids and Renewable Energy Small- and Medium-sized Laboratories

Advantages of Microgrids

Microgrids are local energy grids that (partly) cover their own energy demand. Decentralized renewable energy sources reduce energy costs and CO_2 emissions in a microgrid. Various storage systems and strategies like load shift are employed to balance the volatile energy flows. Intelligent controllers improve the energy management of the micro and smart grids (fig. 1).

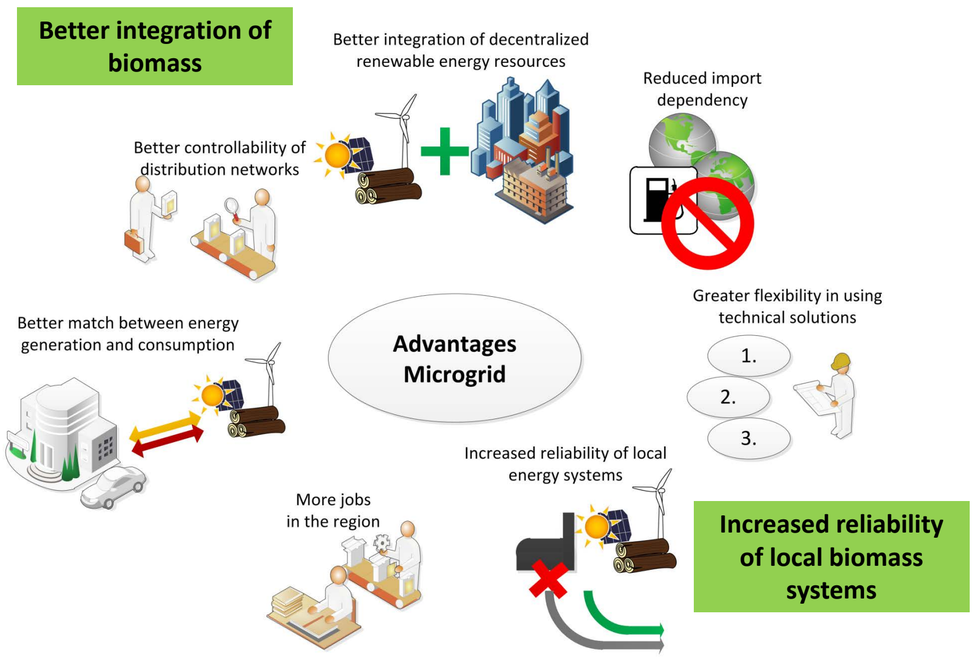


fig. 1) Advantages of Microgrids

BEST GmbH is the industry leader when it comes to biomass control systems in Austria. Thus, BEST GmbH is already combining this knowledge within the "OptEnGrid" (FFG 858815) and "Grundlagenforschung Smart- und Microgrid" (K3-F-755/001-2017) research projects, which are based on the leading microgrid optimization tool DER-CAM from Lawrence Berkeley National Laboratory at the University of California. These two BEST GmbH basic research projects form the basis for new innovative microgrid controller concepts which will be implemented and tested in the presented Microgrid Research Lab in Wieselburg. The Microgrid Research Lab will include the Technology- und Reseach Centre (tfz) Wieselburg-Land and the new firefighting department next to the tfz.

Microgrid Lab 100% - Supports development of new microgrid controller strategies

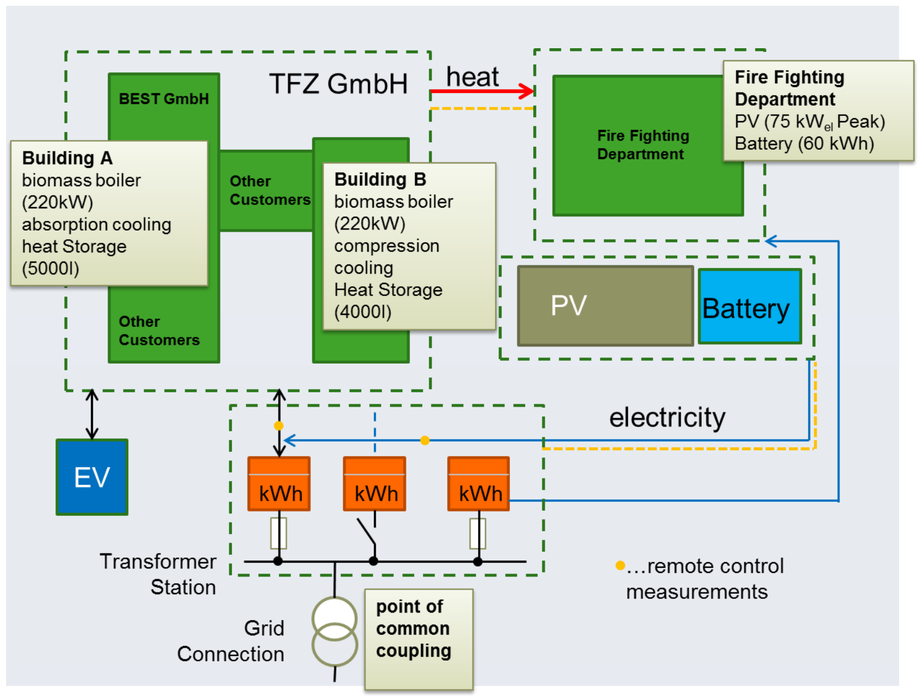


fig. 2) Concept of Microgrid Lab Wieselburg

The major objective of the Microgrid Research Lab at Wieselburg is to integrate the existing Distributed Energy Resources (DER) as biomass boilers, absorption and compression cooling and heat storages at tfz as well as the new technologies as Photovoltaics (PV), electric vehicle (EV) charging stations and a battery in one testbed. This concept (fig. 2) is used for analyzing the interactions of all these technologies to increase the system efficiency. Furthermore the final Microgrid Lab will support the development of new microgrid controller strategies. For example the installed wood chip boiler has enough capacity to supply the new firefighting station completely with heat. In return, a new installed PV and battery system at the firefighting station can be used for the testbed.

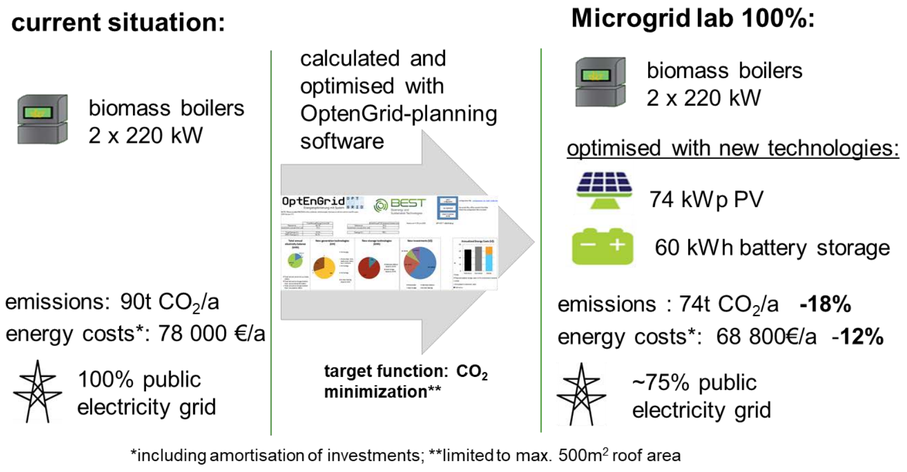
fig. 3) Technology and Reseach Centre (tfz)

High potential for cost and CO_2 reduction

The future firefighting department and the tfz Wieselburg (fig. 3) will be designed as a microgrid. The aim is to reduce the energy demand of both buildings after following tasks:

- scientific planning and commissioning
- monitoring and evaluation of electricity, heating and cooling demands as well as energy sources like PV, e-storage, absorption chiller and biomass heating system
- creating test cycles and developing of control and optimization algorithms

Within the project Microgrid Lab 100%, a mathematical analysis of the future microgrid has been performed. In comparison to the reference case, the microgrid solution show a 12% cost reduction and a 18% decrease of CO_2 emissions (fig. 4). This will be achieved by installing additional technologies and implementing a microgrid controller.



*including amortisation of investments; **limited to max. 500m² roof area

fig. 4) new technologies for cost and CO_2 reduction

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