

BEST / BE2020_2.0
BEST – Bioenergy and Sustainable Technologies GmbH
/ BIOENERGY 2020+

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: COMET-Centre (K1)

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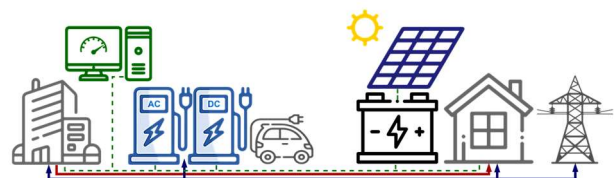
SMART CHARGING MANAGEMENT IN MICROGRIDS

SMART CONTROL OF CHARGING INFRASTRUCTURE FOR ELECTRIC VEHICLES IN MICROGRIDS BY UTILIZING RENEWABLE ENERGY TECHNOLOGIES

At the Technology and Research Center Wieselburg-Land, the first charging stations for electric vehicles were put into operation as part of a research project, drawing energy from the research laboratory “[Microgrid Lab 100 % decentralized and renewable energy supply](#)” and the local energy grid.

As early as 2019, one of the first Austrian energy communities was established based on demand as part of the "Microgrid Lab" research project funded by the state of Lower Austria. The COMET partner Netz NÖ supported the project with know-how and in-kind services. Since 2020, the nearby fire station has been supplied with biogenic local heat from the TFZ, which in return receives renewable electricity via a photovoltaic system and battery storage. Other technologies such as heat pumps, absorption chillers and thermal storage are also integrated in the testbed.

In order to research the optimal operation of charging infrastructure in combination with photovoltaic systems and battery storage systems in local energy grids, the COMET competence center BEST - Bioenergy and Sustainable Technologies GmbH and the company Wien Energie GmbH have jointly integrated three charging stations at the Microgrid Research Laboratory and tested and developed the supervisory control system in the COMET projects "OptControl" and "OptInvest".



© BEST, Microgrid research laboratory schematic.

As a result, electricity as well as heat or cold from

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renewable energies can be optimally used on site, which reduces costs, avoids CO₂ emissions and supports the power grid.

After the integration of the charging infrastructure, the monitoring and control of the charging stations was implemented in real-time operation. On this basis, strategies for load management could be tested and developed in terms of avoiding peak loads and optimal energy management strategies to maximize the share of renewable energy when charging the e-cars.

For the 600 recorded charging cycles in the course of the project, the charging efficiency was also determined for charging with direct or alternating current, eight different electric vehicle models, and the related effect of ambient conditions such as solar radiation and outside temperature (-5 to 35°C).



© BEST, Charging infrastructure at the Microgrid Lab.

Impact and effects

The expansion of the microgrid research laboratory with charging infrastructure enabled research on the optimal interaction of the charging points with the PV system as well as the battery storage, and thus the coupling of the energy generation sector with the mobility sector. In future research projects, the developed control strategies and findings can be further upscaled and verified in order to contribute to the energy transition. Research on other innovative technologies and energy carriers, such as hydrogen storage and utilization, will be pursued in the next step.

Project coordination (Story)

DI(FH) Stefan Aigenbauer
Area Manager
BEST

T +43 (0) 50 2378 – 9447
stefan.aigenbauer@best-research.eu

BEST – Bioenergy and Sustainable Technologies GmbH

Organisation/ Consortium Leader

Inffeldgasse 21b
8010 Graz
T +43 (0) 50 2378 - 9201
office@best-research.eu
www.best-research.eu

Project partner

- Wien Energie GmbH, Austria
- Netz Niederösterreich, Austria

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