Microgrid Lab 100%
Testbed for the development of control algorithms for microgrids
Graz, 22.01.2020
Stefan Aigenbauer
Objective: Real-life microgrid testbed

- Technology- und Research Centre (tfz) Wieselburg and the new firefighting department
- Existing technologies: two wood chip boilers, thermal storage devices, absorption chiller,…
- Newly installed technologies: photovoltaic system, battery, electrical vehicle - charging

- Technology- and Research Center (tfz)
  - direct use of PV-electricity
  - enough capacity for district heat
  - New fire fighting department next to tfz
Why Microgrid Lab?

The project “Microgrid Lab 100%” enables a real application for the developments of following two ongoing basic research projects:

“OptEnGrid” (FFG 858815):

- **planning and optimization software tool for microgrids**

“Grundlagenforschung Smart- und Microgrid“ microgrid controller concepts:

- development of control algorithms, technologies and services for microgrids
Project facts:

Title: MICROGRID LAB 100%

Costs: € 640,000.-

Start: 1.1.2019

Duration: 3 years

funded by the government of Lower Austria
Project Partners:

Microgrid Lab 100%

Involved COMET - partners:

Supported by:

CEBC 2020 - Stefan Aigenbauer
New technologies for the Microgrid Lab

**current situation:**

- Biomass boilers: 2 x 220 kW
- 100% public electricity grid
- Emissions: 90t CO₂/a
- Energy costs*: 78,000 €/a

**Microgrid lab 100%:**

- Biomass boilers: 2 x 220 kW
- Optimised with new technologies:
  - 74 kWp PV
  - 60 kWh battery storage
- Emissions: 74t CO₂/a
- Energy costs*: 68,800 €/a

*Target function: CO₂ minimization*

*including amortisation of investments

**limited to max. 500 m² roof area
Planning the Microgrid Lab
Implementation of Microgrid Lab

Installation of PV | Battery | Microgrid connection point | District heating installations

New firefighting department | Point of common coupling
Next steps and Outlook

- Monitoring of electricity, heating and cooling demands; evaluation of user behaviors
- Verification and improvement of optimization software tool
- Implementation of developed microgrid controller algorithms
- Creating test cycles to evaluate the used technologies and for further development of microgrid controller strategies
- Workshop with interested companies and stakeholders to create concepts for business plans and product development of microgrid components or services

In future the Microgrid Lab will act as testbed for technology providers and manufactures as well as different energy suppliers and new emerging sectors.
Outlook: development of advanced controller

1) standard load controller

2) example: advanced microgrid controller

- On peak: 6:00-22:00: 13,9 ct/kWh
- Off peak: 22:00-06:00: 9 ct/kWh

- Yellow: Electricity from PV
- Dark red: Electricity from Utility
- Orange: Electricity from Battery
- Black: Total Original Electricity Load
- Dotted line: Battery SOC
Outlook: development of advanced controller

1) standard load controller €672.-/week

2) example: advanced micro-grid controller €592.-/week

-12% cost reduction

Electricity from Utility

On peak: 6:00-22:00; energy costs: 13,9 ct/kwh

Off peak: 22:00-06:00; energy costs: 9 ct/kwh