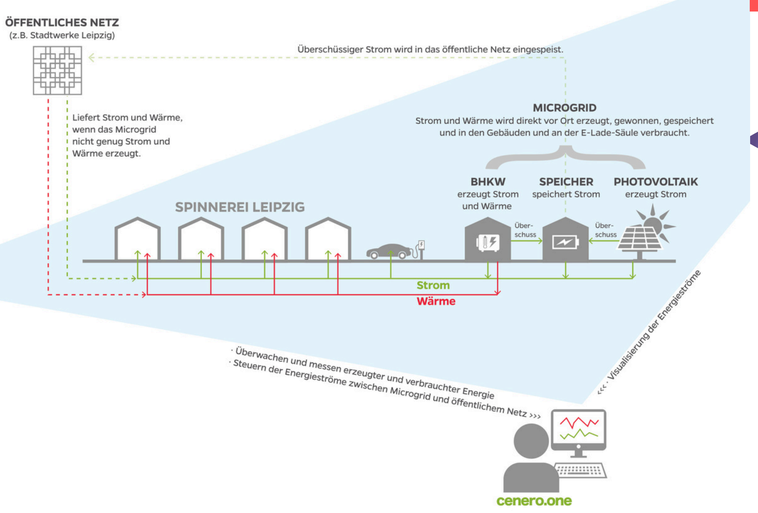
SPARCS

Balancing the microgrid inside the public grid



DEMO DISTRICT

The Baumwollspinnerei

PARTNERS INVOLVED

CENERO

cenero.one

Leipziger Stadtwerke

COMPLETION DATE

November/2023

KEY NUMBERS

70.47 kWp PV
(63,000 kWh/a)
50 kW / 48 kWh
Lithium-Ion Battery
CHP units
(50 kWe / 90 kWth,
99 kWe / 173 kWth)

CO_2 REDUCTION POTENTIAL

High with upscaling

Short description

- A microgrid is a localised and independent energy system that can generate, store, and distribute electricity and heat
- It operates as a small-scale, self-contained energy network within a larger power grid.

Microgrid components at the Baumwollspinnerei:
- 70.47 kWp PV Plant (63,000 kWh/a)
- 50 kW/48 kWh Lithium-Ion Battery
- Combined Heat and Power (CHP) units (50 kWe / 90 kWth, 99 kWe / 173 kWth)
- E-mobility hub with bidirectional charging
- Digital meters and sensors monitoring energy flows
- Energy monitoring with cenero.one and load management software

BENEFITS:
- Increased grid independence and resilience
- Localised Power Distribution - reduces losses
- Efficient renewable energy integration and sector coupling
- Cost savings - flattens consumption peaks and utilises waste energy

Peer-2-Peer energy trading interface together with Stadtwerke Leipzig
BENEFITS:
- Data exchange point mutually transparent to both parties
- Learnings about prosumer approach in energy trading
- Grid Support Services - peak shaving and frequency regulation

Key results during the project lifecycle

- Reaching a regulatory milestone with the grid operator to commission the components. Metering concept agreed upon as a pilot project - potential foundation for future projects
- Increase in share of RES and decentralised energy production (PV and CHPs)
- Increase availability of sustainable E-Mobility
- Using E-Mobility for grid stabilising and peak shaving purposes
- Decrease in consumption through energy monitoring and heat demand control within the microgrid
- Development and continuous advancement of the energy monitoring tool cenero.one
- Advancements and implementation of load management software to allow sector coupling
- Sector coupling to increase efficiency between various consumers and generating plants
- Reducing the site's carbon footprint and increasing the degree of self-sufficiency
- Peer-2-Peer trading with Stadtwerk Leipzig

Insights and learnings

- Gaining valuable insight into the sites energy system and consumption/generation patterns through in-depth energy monitoring - the importance of monitoring was highlighted
- Interconnection of variable generators and consumers in the context of sector coupling
- Load management for grid stabilisation, peak shaving and frequency regulation
- Scalable transformation concept for historical buildings and former industrial sites
- Consumer sensibilisation and transparency with energy monitoring
- Transformation from single tenant/use to multiple diverse tenancy - many important findings regarding complexity of consumers and generators in one system
- Energy services - uncovering many potential business model typologies for microgrids (Peak shaving, Load managment, etc.)
- Increased understanding of the current state of microgrid legislations and regulations in Germany

Challenges

- Regulatory reguirements and lack of standards
- Complications agreeing on suitable meter concepts
- Current subsidy guidelines in Germany require energy amounts to be specified according to generation type, which increases the complexity for system and grid operators when there are a variety of different generation systems. The mixing of CHP and renewable energy systems posed major challenges for the Distribution Network Operator responsible for paying out the subsidies
- Monumental protection laws
- Increasing complexity of consumers and generating plants
- Structural building statics challenges and existing historical network
- Communication of bidirectional vehicle with charging station/ Implementation of the bidirectional prototype of car and charging station
- Communication and coordination with partners
- Contractual challenges
- Billing concepts for bidirectional charging
- Bidirectional charging technology only in prototype stage in Germany
- Workforce shortages of the grid operator
- Delivery delays

Plans for replication

Baumwollspinnerei:
- PV - Hall 17 - 80 kWp; 72,000 kWh/a
- PV - Hall 3 - 270 kWp; 243,000 kWh/a
- PV - Hall 9 - 310 kWp; 280,000 kWh/a
- Geothermal heating with seasonal storage
- Further expansion of digital LoRa Network

Neighbourhood project with Saarländerstraße 25
- Mix of renewable energies
- Sector coupling - PV, e-mobility, geothermal heating, waste heat, seasonal storage, electrical storage
- Load management and peak shaving
- Grid services: load management and grid frequency balancing
- Efficient heating with thermal precision profiling of buildings

Questions and comments from partners

Comments to be added during poster session at Consortium meeting in Leipzig

CONTACT PERSON AND LINKS

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