

▣ District Power: citizens as energy prosumers

📍 → WALENSTADT, SWITZERLAND

KEYWORDS: COMMUNITY ENERGY;
BLOCKCHAIN

DURATION: Since 2018

WHO: Federal State, Universities,
companies, citizens

BUDGET: Unknown

SUMMARY

“Quartierstrom” (district power in English) project aims to promote the production and consumption of solar energy locally. The project is led by ETH Zurich and the University of St. Gallen and involves multiple partners from universities and industry. Additionally, the project partners also collaborate with the local utility company, the Water and Electricity Works, and with local residents. The project has been supported by the Swiss Federal Office of Energy. “Quartierstrom” enables the set-up of exchange and remuneration of electricity between consumers, prosumers and the local electric grid provider. More specifically, it developed a prototype of a microgrid in which solar power is traded within a local community in Walenstadt. Thanks to the blockchain technology, the electricity produced from local rooftop panels can be sold directly from household to household on the lowest grid level, without the utility company as an intermediary. Owners of photovoltaic systems can sell surplus electricity to their neighbours, giving households without solar panels the opportunity to purchase clean and locally produced energy.

GOALS

- Promote the production and consumption of solar energy locally;
- Investigate if local energy markets with bottom-up grid tariffs are a viable approach in the local electricity supply systems and if blockchain is a suitable method for processing transactions in a local electricity market;
- Integrate a technological solution with active engagement of citizens as energy prosumers.



HOW IT WORKS

37 households participate in the project and form a local electricity market. Among these households, 28 participants owned solar power systems and 9 were consumers, including a retirement/nursing home. The systems combined have an output of approximately 290 kW and supply around 300,000 kWh of electricity annually. The electricity demand of the entire community is around 250,000 kWh per year.

“Communities made up of prosumers and consumers are economically and environmentally more efficient than individual households. Building such a community is an interdisciplinary task that we are implementing together with the utility of Walenstadt for the first time”

→ Sandro Schopfer, ETH Zurich

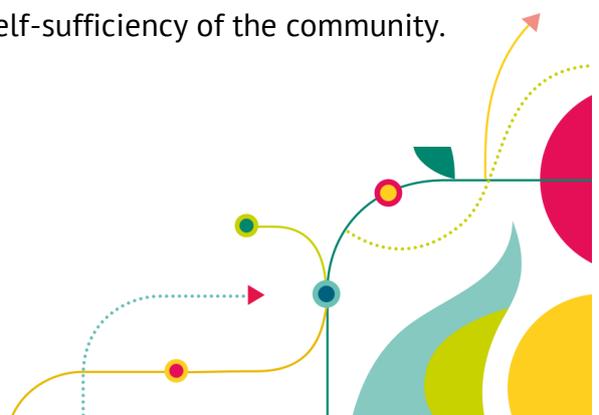
The project investigates:

- **The technical feasibility** of a blockchain-managed community energy system and its impact in terms of local utilization of solar energy, grid quality and energy efficiency;
- **Suitable market mechanisms** and resulting market prices for local electricity;
- **The design of an appropriate user interface**, user engagement over time and the overall acceptance of the system by the users.

As part of the implementation of the project, each household has been supplied with **prototypical smart meters** measuring currents, voltages and frequencies. These meters are integrated into a single board computer that connects the system to the blockchain.

The local grid operator and electricity supplier, the Water and Electricity Works Walenstadt, provided access to the distribution grid for the implementation of the project. Grid costs (i.e. bottom-up grid tariffs) for local transactions are lower than if the electricity would be purchased outside of the community. Bottom-up grid tariffs differentiate when solar energy is traded within the community network or if energy is purchased from outside the community network. Unfortunately, the Swiss legislation does not support these bottom up grid pricing schemes yet. In order to test the bottom-up tariff model, the project covered the grid costs from higher grid levels.

The local electricity market started operating from January 2019 and it will stop in January 2020. On the project's website it is possible to [check the amount of solar power](#) that is produced and self-consumed in the community and to analyse the level of self-sufficiency of the community.



The households participating in the project can use **a web app to define their choices for buying and selling energy** within the community. The solar power system operators determine the conditions under which they would like to market their surplus solar power to the neighbourhood, while electricity consumers can determine the maximum price of the electricity that they can buy within the neighbourhood.

TRANSFORMATIVE POTENTIAL

Generating and distributing electricity within the neighbourhood contribute to reduce the energy that needs to be transported from outside the community. The project represents an energy innovation promoting **active engagement of citizens as energy prosumers** and fostering local renewable energy production. The further analysis and dissemination of the results of the project will be very important for a better understanding of the feasibility of this innovative pilot and for determining its potential replication in other cities and countries.

MORE INFORMATION

[District Power's website](#)

[Quartierstrom - Implementation of a real world prosumer centric local energy](#)

[market in Walenstadt, Switzerland](#)

[ETH Zurich's blog](#)

