Business Model 1: Recommendations for Innovative Energy Contracts with Pay for Performance Guarantee

BEA & OFFIS (Germany)

This business case focuses on sector coupling in the energy sector, using a building complex in Berlin equipped with solar panels on the roof. The solar power generated is used in the underground garage to charge electric cars or in the residential units themselves, but currently, only 60-70% of the electricity produced is directly consumed, with the remainder fed into the grid. The goal is to maximise the utilization of solar energy, with an app that records and visualizes key data for residents, encouraging behavior changes to optimize solar power use. The app will provide information on when the solar power is at peak production and should be used. The results will be used to develop recommendations for flexible electricity tariffs, that financially reward the use of solar power in the future.

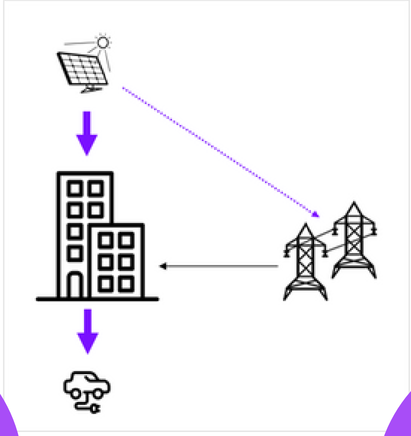
Context

35% of the energy consumption in Germany corresponds to the building sector. The German government has establishedfeed-in tariffs for solar power fed into the grid, tax concessions and subsidies for the construction of solar systems.

Local Partner

Housing cooperative Charlottenburger Baugenossenschaft (Charlotte), which manages the building complex from which the data is collected.

5
buildings equipped with solar panels on the rooftop (approx. 10-20 modules each)



8
charging stations for electric vehicles in the underground garage

79 MWh
produced by the solar panels in 2023, making up a share of almost 25%

313 MWh
of total energy consumption of the complex in the year 2023

Barriers for flexible electricity tariffs

Absence of Smart Metering Systems.

BEA procures its electricity on a quota basis, unlike with a market-oriented dynamic electricity tariff, electricity quantities are purchased one year in advance for each delivery point.

Lack of intelligent PV production meters hinders the development of a dynamic electricity tariff from BEA, which would always be tied to the production of the PV system.

BEA relies on service providers for the billing process and does not have access to market communication data (MSCONS or EDIFACT). Discussions are already underway.

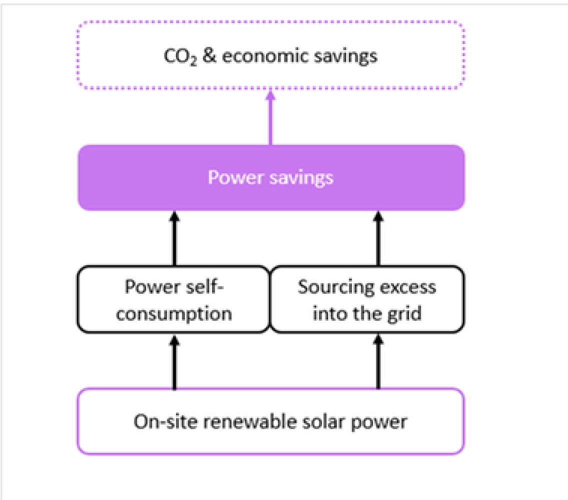
Target group

- The buildings have 159 residential units and around 350 tenants.
- The tenants of the buildings are free to choose their electricity provider, so not all residents are BEA electricity customers.
- 20 of BEA´s customers participate in the InEExS-project. They currently pay a basic tariff and a basic amount per kilowatt hour, which means they currently have no financial advantage. There is currently no real incentive because they are not economically rewarded for using solar power.

Impacts	2022-2024	2022-2042
Renewable energy production	79 MWh/y (2023) 82 MWh/y (2024 estimated)	82 MWh/y
Avoided CO2 emissions (in comparison fossil fuels with ratio of 0,9 tCO2 /kWh)	71 tCO2 eq/y (2023) 74 tCO2 eq/y (2024)	74 tCO2 eq/y
Total investment planned	348,600€	80,000€

Regulations

- **German Digitization Act** - Promotes smart buildings, energy-efficient construction & renovation.
- **Solar obligation in parts of Germany** - Every roof renovation or new build must include a solar installation.
- **Smart Meter Law** - Provides a roadmap for the implementation of a mass rollout of smart meters. From 2025 the law requires smart meters with communication units for consumers with >6,000 kWh/year or plants >7 kW.
- Proposal for the reform to improve the **Union of the Electricity Market Design** - Proposal for multiple suppliers & metering points at a single connection point.
- BEA is consulting on **data protection** for electricity customer data in the app (anonymized before feeding into blockchain via EnergyWeb).



MRV (Measurement, Reporting, and Verification)

BEA measures certain data in the building complex using digital meters. The Zählerfreunde app will make the data accessible via a user interface to the tenants. This meter data is intended for use in the MRV framework.

A technical use case is created based on a baseline scenario. Then the solar power consumption as well as the EV usage will be evaluated after a specific time period.

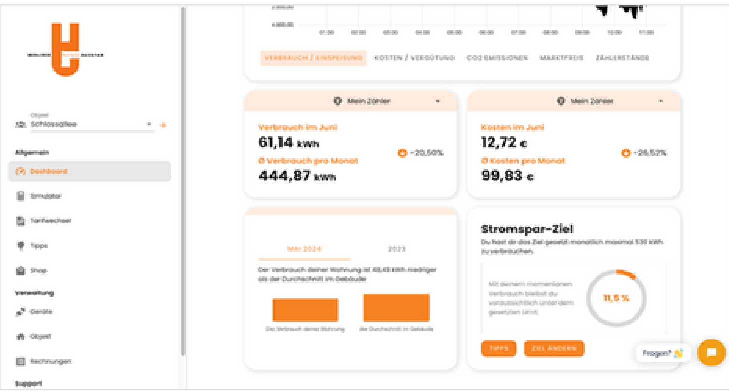
This information will be considered as the basis for the general MRV concept, encouraging behavior changes in the use of solar power.

Zählerfreunde app

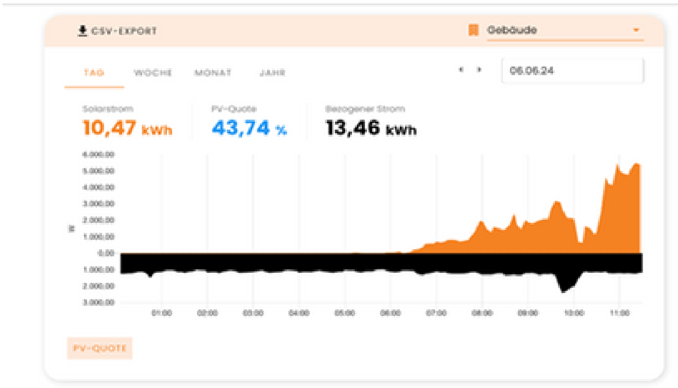
Digital energy management platform that offers individual solutions for managing energy efficiency. Collects and visualizes the selected energy data and makes it possible to calculate the building's CO2 emissions and key performance indicators. Other functions can be attached to the tool to enable the development of a baseline.

Objectives: create transparency of energy consumption, increase efficiency and reduce CO2 emissions.

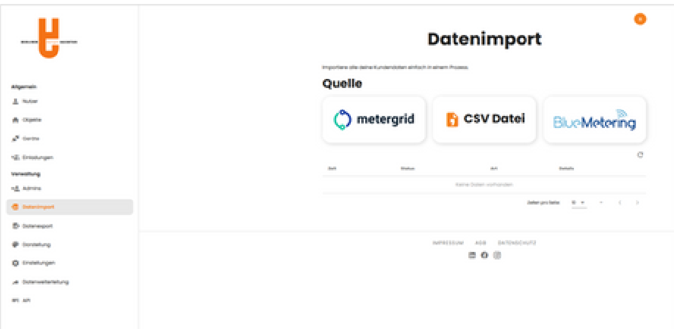
Once the digital meters have been purchased and installed, they take measurements of consumption, which can be forwarded manually to the app and EnergyWeb in CSV or CLS format (Json). If the data is collected in CLS, it must be sent to the Zählerfreunde app every 15 minutes. E-mobility charging stations, on the other hand, send their data in real time.
The tool saves the consumption data. Other open-source data can be integrated into the tool via the REST/GET-CSV interface, e.g. weather data. The counterfactual consumption can be calculated as well as the proposed specific KPIs. Finally, the evaluation can be closely linked to the future scenario of smart contracts. The calculation of mathematical rewards is also possible. This process can be carried out effectively using blockchain technology.



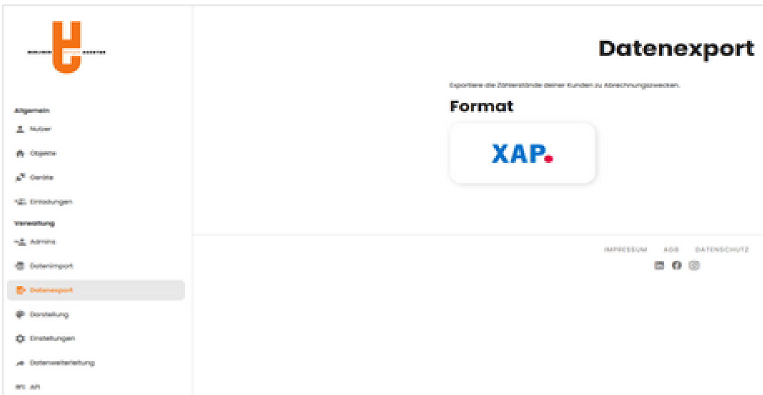
Overview of energy demand and costs



Overview of energy production and consumption



Import of Data



Export of Data

DLT (Distributed Ledger Technology)

Enables the creation of smart contracts that automate processes and eliminate intermediaries, reducing costs, fraud, and errors. Each building (and possibly each asset within the building) requires a unique identifier for the assignment of measured values and automatic processing.

Constraint of DLT

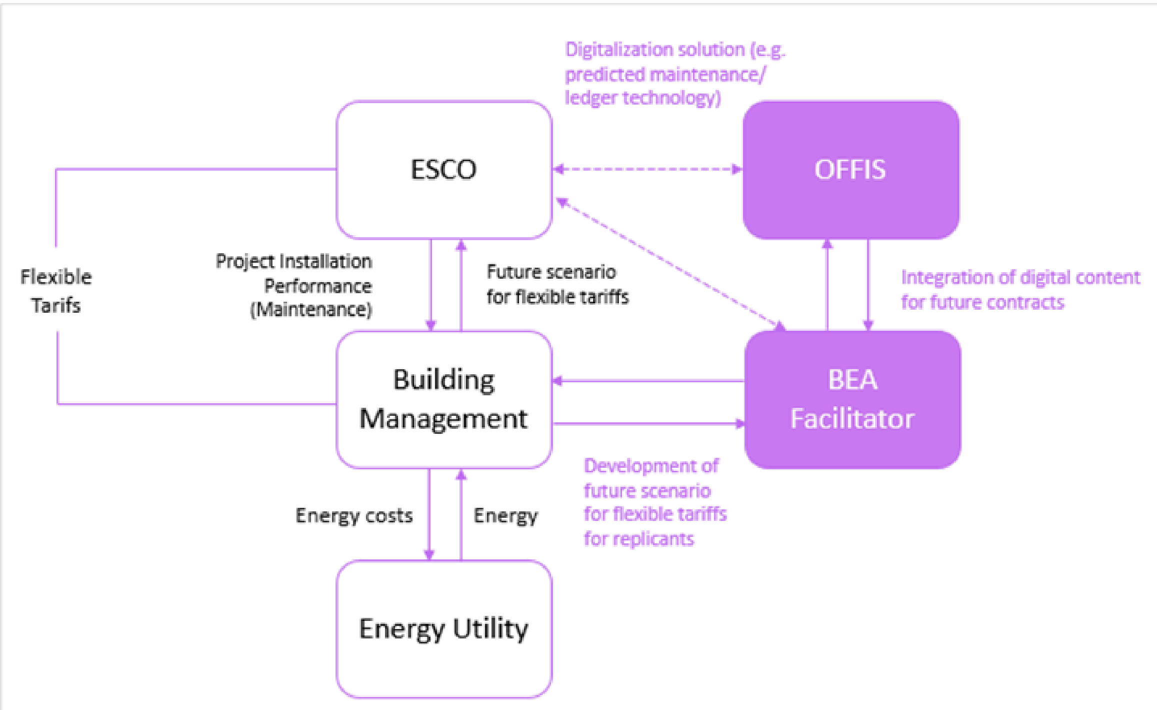
Transaction Costs: Must be economically justifiable for all participants and not counteract energy-saving goals.
Lack of Experience: The German building sector is slow to adopt blockchain technologies, impacting the availability of data and smart meters.
Data Privacy: Strict regulations (e.g. GDPR) complicate the handling of personal data on a blockchain, hindering smart contracting. Plus, aggregating and anonymizing data is necessary due to the immutable nature of blockchain, which complicates incentivizing individual tenants for energy savings.

Benefits of DLT

Data Integrity and Security: storage of building data in a decentralized network protected from tampering and unauthorized access.
Collaboration: better coordination among stakeholders through automated smart contracts.
Transparency: Provides a verifiable record of building ownership and usage rights.
New Business Models: Enables peer-to-peer transactions and tokenization and fractional ownership of real estate.

Future scenarios may involve the tokenizing of increased PV-consumption, which allows the ESCO to reward tenants with better tariffs, if they use PV-electricity directly. After a year of data collection there will be given a special reward for the three participants who changed their consumption behaviour the most.

Key partners and stakeholders



Revenue streams

BEA provides the information and the app and will provide digital meters for all participants. BEA is not yet able to offer flexible tariffs itself, so documenting the hoped-for behavioural change of its electricity customers is an important step for future flexible tariffs.

BEA profits from better utilization of the solar power it produces if it hardly has to feed into the grid.

Benefits of the Business Case

Increased energy efficiency due to better utilization of the solar power (so less energy from the grid is needed)

Replacing fossil fuels (MWh/y) with **RES**

Mitigated CO2 emissions (tCO2/y)

Tenants can **save money** (only in future scenario with flexible tariffs)

Cultural and capacity building: deployment of smart meters which can lead to better understanding of energy consumption and increase of environmental awareness.

Increase in the **self-consumption of renewable energy** (MWh/y) through the enhancement of the sector coupling and better information for tenants.

Watch the related video!

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