New Clean Energy Communities in a Changing European Energy System (NEWCOMERS)

Summary case study report

Project Z

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newcomers
EXPLORING NEW ENERGY COMMUNITIES

About NEWCOMERS

NEWCOMERS is an international research project that aims to deliver practical recommendations about how the European Union as well as national and local governments can support the development and growth of energy communities across Europe. The project involves a consortium of eight partners across Six European Countries: Sweden, UK, The Netherlands, Germany, Slovenia and Italy. For more information, please visit our website: https://www.newcomersh2020.eu/

About this document

This case study report provides a short summary of a full case study report on Project Z, a pilot project of an incumbent electricity utility. The full case study report was guided by 14 research questions, across four themes. The themes and questions are presented in the following table.

Theme	Research questions
Actors	Who is involved in the EC and what are their roles? What knowledge and skills are needed to develop and operate ECs?
Technologies	What technologies are employed in ECs? What are the advantages and disadvantages of certain novel technologies, including smart applications? What implications do they have for the viability of different EC BMs? What influences the choice of technologies employed in ECs?
Values	What forms of value do case study communities currently generate and for whom? What values do ECs provide to the energy systems they are connected to?
Business models	How are actors and technologies connected to deliver products or services? How do ECs emerge? How do they operate? How replicable and/or scalable are ECs likely to be? How might scaling/replication occur?

This summary document focuses on the emergence and operation of Project Z, showing how it creates and delivers different types of value to citizens, consumers, and energy systems, as a business model. It concludes with a brief discussion of the potential for Project Z to grow or to be copied in new contexts. It presents – in a highly reduced format – the interpretation of the researchers. It does not necessarily reflect the opinion of those involved in its development and operation. Any factual errors remain the responsibility of the authors.

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Project Z

Project Z[1] is a pilot project of a multinational electric utility company based in Germany. It aims to trial 'local energy trading' in order to retain privately generated renewable electricity within a defined geographical area. To achieve this, blockchain technologies are used to capture and process data on the electricity generated, traded and consumed. As of January 2021, the pilot consisted of approximately 30 households in North Rhine Westphalia in Germany.

Emergence

Project Z was initiated in 2019. The aim was to develop and trial 'peer-to-peer' trading capable of retaining renewable electricity from domestic solar PV installations within two neighbourhoods. At the core of the trial is the idea of enabling those with PV systems to sell their surplus to those without, thereby providing access to 'green, regional' electricity. The trial emerged as a response to increasing numbers of customer inquiries from:

- customers increasingly interested in accessing sustainable - and more regional – electricity and
- customers who owned solar PV systems and were inquiring about what happens to their surplus power – the electricity they are not using themselves.

A central appeal of the solution being trialled is its simplicity from a customer perspective. The project team are striving to make it as easy as possible for customers to become involved. Joining the community simply means signing up to a special neighbourhood electricity tariff. With this tariff comes access to an online platform offering real-time tracking of electricity use (regional vs rest of network). The only prerequisite for joining is to have a functioning meter. This does not have to be a fully smart meter, as this would drastically limit the number of potential participants, but it does need to have some advanced features, e.g. measuring exports as well as imports. To support customers signing up to this initiative, advanced meters are provided where needed. The Project Z pilot is perceived as a digital service that supports collective self-consumption of locally generated renewable electricity in suburban neighbourhoods.

Operation

To create and deliver value, the pilot uses privately owned, domestic solar PV systems, advanced metering, and a range of platform technologies to facilitate the exchange of electricity between households. This set up utilises the public distribution network to trade electricity locally, in what is sometimes called a virtual private network, as depicted in Figure 1. The meters record generation and consumption data. Distributed ledger technologies provide 'the chain of trust' linking individual sensors/smart meters to the platform and to the energy utilities existing billing software.

No direct electricity trading occurs between households. Instead, each household has a bilateral contract with Project Z, which details import and export tariffs that are slightly more favourable than those from licensed suppliers. The licensed supplier (retail) arm of incumbent utility provides all additional electricity required and handles all regulatory and compliance issues. At present, though, participating households have a choice over who acts as their licensed supplier. This is made possible by the pilot being conducted within a large organisation, a multinational energy utility, that owns and operates the local distribution network in addition to selling electricity. These relationships are depicted in Figure 2.

[1] Due to reasons of commercial sensitivity and at risk of revealing the business strategy of those involved both the name of the project and of the central actors involved have been removed. The project will simply be refereed as Project Z.

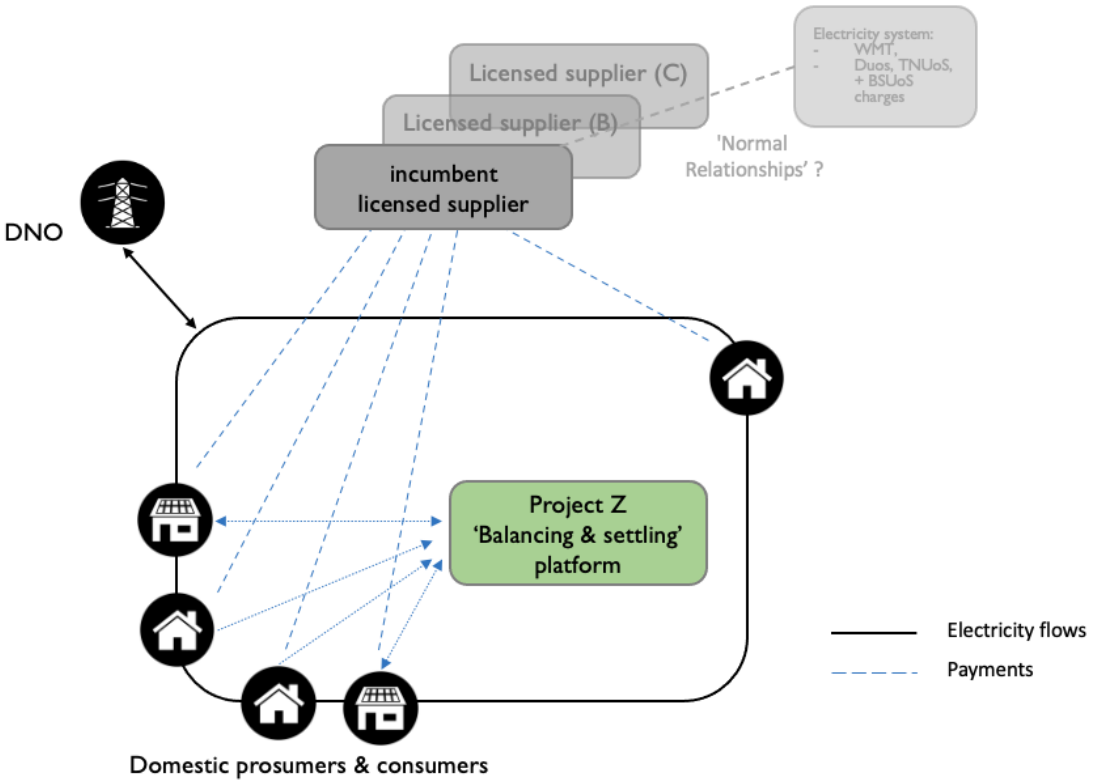

Figure 1: Primary electricity and financial flows in Project Z

To incentivise participation, a customer reward scheme has been designed in which 'community coins' are paid for use of electricity generated within the pilot. These coins can be spent on goods and services at local affiliated businesses.

Business model

Project Z does not operate as a separate legal entity. It is one project within the incumbent energy utility's innovation portfolio. Nonetheless, it is set up to develop a new business model.

Project Z's primary value proposition (the tangible or intangible value associated with the product or service a business offers its customers) is summarised by those involved as 'regional, sustainable energy autarky'. This proposition encompasses the potential (for all members) to buy locally generated renewable energy from within the community and the possibility (for PV owners) to sell excess generation to the community. It offers members an easy means of participating in the energy transition with minimal hassle whilst maintaining electricity bills at their current rate. The service offer therefore concentrates on local independence and self-sufficiency. It offers the potential to foster good community relations and a sense of local identity.

To create and deliver value, Project Z also relies upon and, therefore must provide value to, the incumbent energy supplier and the local distribution network operator, both of which are divisions of the multinational energy utility. For the licensed supplier arm of the utility, the pilot holds value as a trial of a new service offering, at time when its traditional utility business model of supplying electricity at volume is being increasingly challenged. It is therefore testing a new business model. As a new business model, the pilot has the potential to attract and retain new customers who value choosing how and where the energy they consume is generated. It also makes it possible to reduce the costs associated with electricity supply by reducing the risk of supply imbalances (the difference between what a supplier thinks a customer will use and what they actually use in a set period of time, normally 30 minutes). As a DNO, Project Z encourages more efficient use of local PV generation capacity by incentivising the use of local power at the moment when it is generated. This eases the strain on substation equipment.

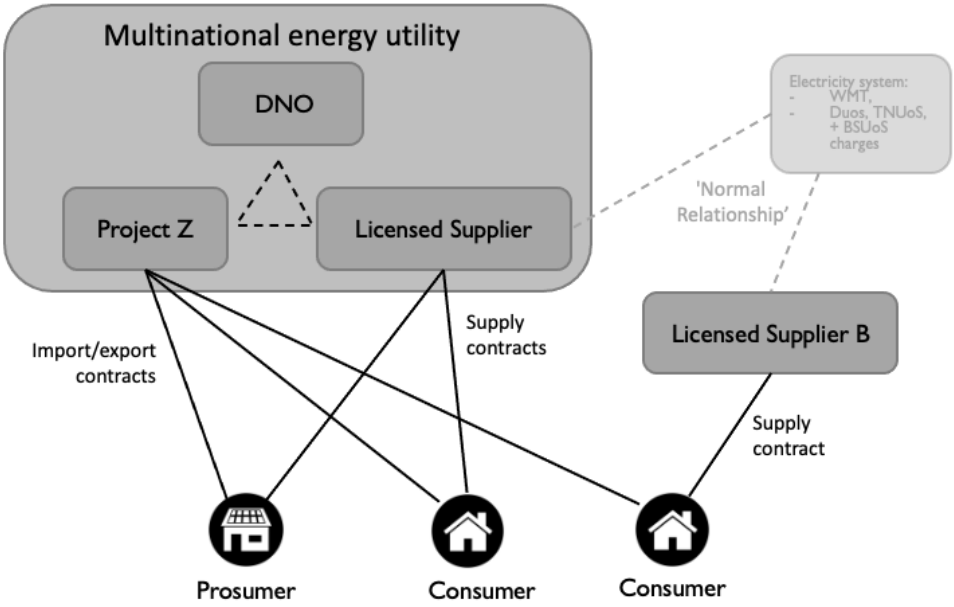

Figure 2: Central actors and relationships within Project Z

Prospects

At present the pilot relies on fostering regional, sustainable energy independence as its primary value proposition. It is expected to generate limited financial benefits to members (approximately two Euro cents per kWh, divided between producer and customer). To make the pilot more financially attractive, the team are exploring alternative financial means to incentivise participation, including the development of a community reward scheme. At present, it is unclear how attractive this is for current or potential future members; more could be needed to attract householders, beyond the pioneers already involved.

From an energy system point of view, Project Z holds potential to offer more benefits to the network operator, through the connection and engagement of local people on a single platform. Through this platform, Project Z could be used to incentivise members to shift the times at which they use electricity to match times of local generation (a form of demand side management). This might include reducing

- the need for costly and disruptive local network reinforcement (to deal with increased two-way flows of electricity on low-voltage networks),
- local curtailment (the 'dumping' of excess renewable generation where there is insufficient demand), and
- the need for increased renewable generation capacity elsewhere in the system.

Achieving these additional benefits is likely to require further advanced metering infrastructure and the development of tools to engage, motivate, and reward members. Decisions as to whether to proceed with supplier-led initiatives such as Project Z will therefore depend substantially on how DNOs and suppliers estimate the costs and benefits of investing in this more locally focussed method of network management.