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

Summary case study report

GEN-I Jesenice

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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 GEN-I Jesenice, an informal energy community between an energy utility and apartment block. The full case study 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 GEN-I Jesenice, 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 GEN-I Jesenice 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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Contact: paula.hansen@ouce.ox.ac.uk

GEN-I Jesenice

GEN-I Jesenice is an informal name given to an energy project between GEN-I (a Slovenian energy supplier) and a group of residents, on an apartment block in the town of Jesenice, Northern Slovenia. The project was developed with the aim of generating energy efficiency improvements and electricity cost savings for residents of the apartment building. Two separate PV systems provide electricity to the building's common areas and a heat pump, as well as the individual apartments. Net metering is used in combination with a cost distribution key based on historic consumption to determine residents' investment repayments and electricity bills. The initiative currently achieves ~50% self-sufficiency in electricity over the year.

Emergence

GEN-I Jesenice is Slovenia's first apartment building with a shared solar PV system. An important driver of this energy sharing model has been one of the building's residents. With extensive professional experience and trained as an engineer, this individual began thinking about ways to improve the building's cost and resource efficiency in 2011.

A particular motivation were residents' complaints about high costs. This was exacerbated by perceived power imbalances and unfair treatment of citizens: for 33 years, a municipal company supplied hot water and space heating to residents through ownership and operation of energy infrastructure within the building's boiler room. Residents were charged for their usage as well as a fee for maintenance. However, when the time came to replace the system, instead of removing, updating or replacing the system the municipal company transferred ownership to the residents, framing it as an act of goodwill. Residents were left to finance a new system themselves. This motivated the pro-active resident to put a stop to plans by using his knowledge and experience to help implement a smarter, more effective system. In a first step, a new heat pump was installed in 2013. Eko Sklad (translation: Eco Fund), an organisation providing subsidies and soft loans for environmentally friendly investments, contributed 25% towards the cost of the heat pump, with residents paying the remainder.

Subsequently, in February 2019, a 37kW solar PV system was installed and connected to grid. Crucially, the development and realisation of this shared solar project was inspired and enabled by a new piece of legislation on the collective self-consumption of electricity from renewable sources that entered into force in 2019. For the first time, apartment buildings were now allowed to become (self-sufficient) energy communities, too. To realise the PV installation, the lead resident worked with a new subsidiary of GEN-I and provider of turnkey solar energy solutions, GEN-I Sonce[1] ('sun').

GEN-I Sonce was approached by the lead resident of the Jesenice building just as the company began researching and assessing different apartment buildings as potential test sites of a collective self-consumption initiative under the new legislation. Because of the good rapport amongst apartment residents, GEN-I Sonce agreed to work with the lead resident over alternative test sites that lacked community support. GEN-I Sonce went on to take a key role in the project, taking on responsibility for conceptual design (including technical design, energy forecasting, security planning, and financial planning) and implementation (including control and safe operation of the system).

Particular attention was given to financing of the PV systems. To avoid apartment residents having to pay upfront investment costs a variety of funding sources were used. Eko Sklad (a Slovenian Eco Fund) contributed €180 per kilowatt of installed power of the solar PV system. GEN-I Sonce secured some funding via crowdfunding through Eko Sklad and GEN-I ESCo issued an innovative green bond (bought by a Slovenian investment bank) to finance the remainder. GEN-I subsequently agreed to act as the supplier to the apartment

[1] *A GEN-I service that allows customers to become self-sufficient and take control of their energy supply costs by investing in a micro solar power plant.' https://gen-i.eu/en/*

building and individual apartments and Elektro Gorenjska, the local electricity distribution company, gave consent to the project.

Operation

The Jesenice community comprises 23 households (apartment owners) who collectively own two rooftop PV arrays and a heat pump. These assets are managed under two sets of arrangements (Figure 1):

1. One PV array (21.6 KWp) supplies individual apartments with electricity and is financed under a modified supply contract with GEN-I ESCo (an established electricity supplier). This contract includes repayment of the upfront capital costs and uses net metering and an allocation key to calculate how much electricity each apartment self-consumes and what additional electricity is supplied from the grid. This is known as a 'self-sufficiency' contract in Slovenian law. To calculate each apartment's share of investment costs and their allocation of electricity generated, historical consumption data is used (the average of previous three years) alongside data on the size of each apartment. The modified contract is set so that apartment residents pay no more for electricity than what they were paying before the PV was installed.
2. A second PV array (15.1 kWp) supplies communal areas and a heat pump, which in turn provides all hot water within the apartment block, financed via contracts with the housing company (which manages the communal areas in the building and hot water system). The company acts as an intermediary between residents and the supplier. Resident contracts with the housing company again combine repayment of the PV systems' upfront capital costs with any additional (grid) electricity required and a bespoke allocation key (based on the number of residents per apartment) to calculate the distribution of costs amongst apartments. In turn, the housing company has a single supply contract with GEN-I which includes capital repayment costs for the PV system and benefits from net metering.

The project entails multiple meter points within a single apartment building. It sits *in front of the meter* but under new legislative rules acts as though it were behind the meter. To facilitate this the project is reliant upon GEN-I ESCo, as a supplier, for balancing each meter point, interacting with, and consequently benefiting from a connection with the distribution network. Heat, electricity, and finance flows are set out in Figure 2.

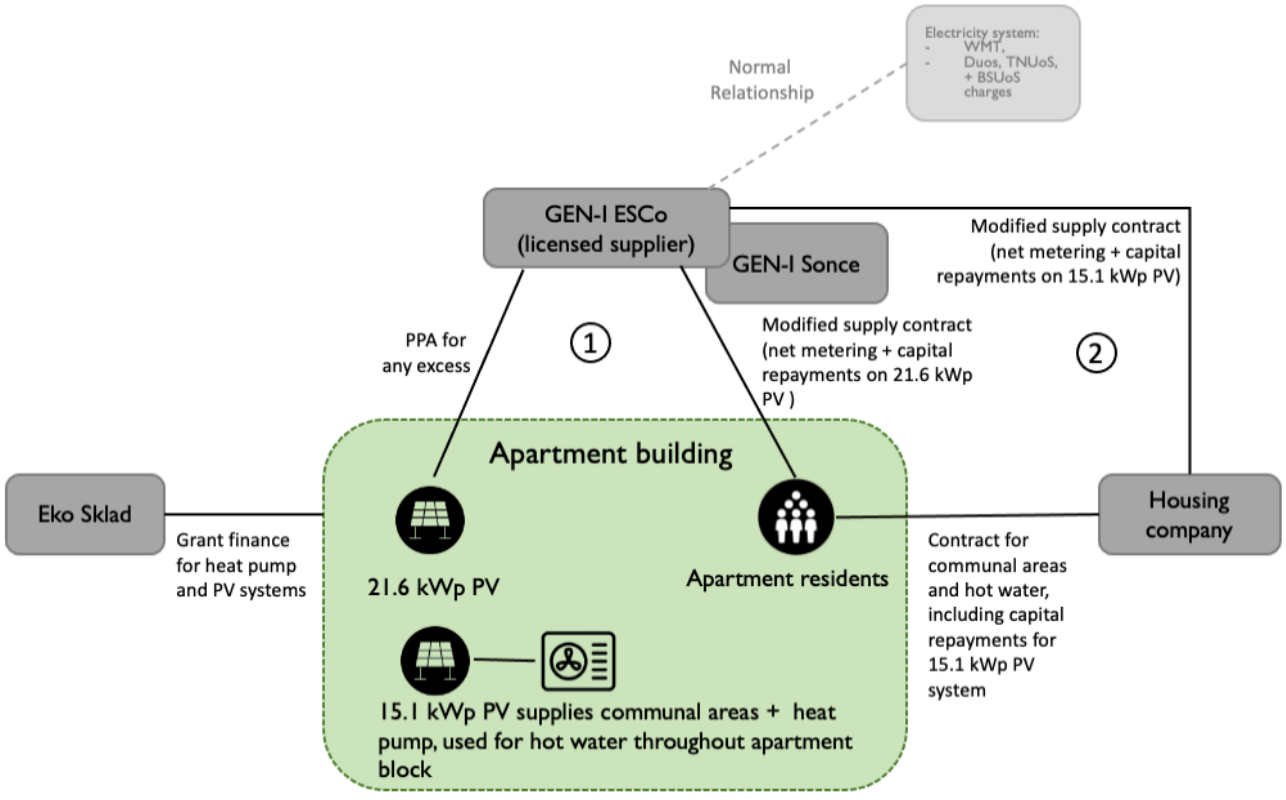

Figure 1: Key actors and relationships within GEN-I Jesenice community

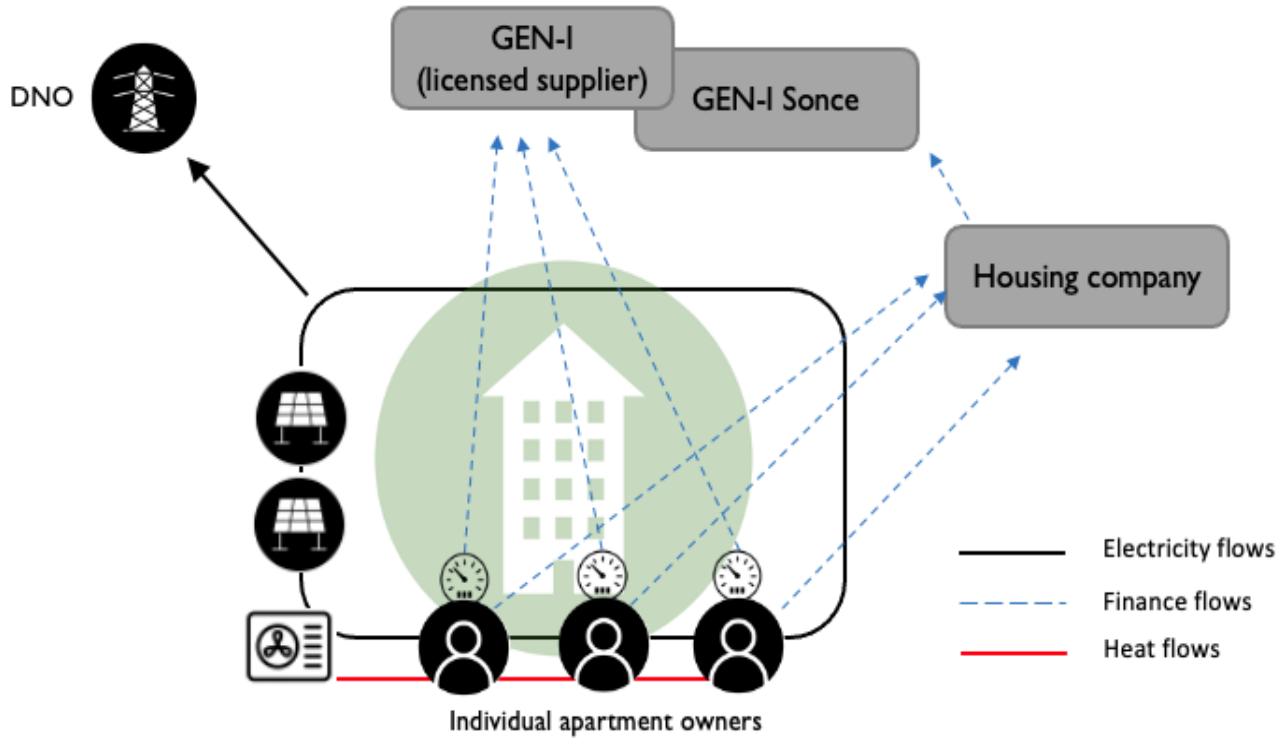

Figure 2: Electricity, heat, and finance flows within GEN-I Jesenice

Business model

The GEN-I Jesenice initiative's business activities take on a networked or collaborative structure. The initiative has involved multiple independent actors, four of which have ongoing concerns in the business model (GENI ESCo, GENI Sonce, the housing company and apartment residents). Each actor undertakes activities that are integral to creating a functioning initiative, without which it would not work.

For community members the project offers a reduction in energy bills, the opportunity to install and use onsite renewable generation (solar PV) and efficiency measures (a heat pump) to reduce the environmental impact and associated carbon emissions of the apartment building. Through working with others, the project has empowered residents, fostered knowledge about energy use and created an opportunity to act without any upfront costs.

Project viability also depends on the provision of value to the partners involved. For GEN-I, it offers an experimental site to trial a new service offer: the provision of turn-key solar PV and heat pump solutions for apartment blocks embodied with its subsidiary GEN-I Sonce. Whilst the project challenges and reduces the profitability of GEN-I's traditional energy supply model – the delivery of volume electricity to passive customers by reducing the amount of power supplied to apartments – it also provides experience of a new service offering, that of balancing collective consumption initiatives. The project allows GEN-I to learn about onsite generation and consumption profiles and reduces risk of incurring imbalance penalties or high spot prices for power in settlement.

To the energy system in which the project is embedded within it offers increased distributed generation and self-consumption, thereby lowering demand on the grid. It provides optimised generator operation and reduced electricity losses. Nonetheless, net metering arrangements enabled under Slovenian law, mean the grid acts as free storage.

Prospects

The project has a variety of potential development paths. For example, it could be extended to provide collective space heating through a secondary heat pump. Having worked out the contractual arrangements,

the project could be replicated by GEN-I Sonce/ GEN-I ESCo in other apartment buildings facing similar situations and with similar levels of social cohesion and cooperation amongst residents.

To refine the project installation of smart meters capable of recording half-hourly consumption would facilitate a move away from net metering (and reliance on the public grid as a battery) but would require new contractual arrangements to allocate generation and consumption. This could increase resident's energy literacy (through closer awareness of generation and use) and contribute further system benefits.