



PROSEU

Prosumers for the Energy Union:
mainstreaming active participation of citizens
in the energy transition

Co-learning and co-creation experiences
with renewable energy prosumer Living
Labs
across Europe

(Deliverable N°7.1)

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Summary of PROSEU

PROSEU aims at enabling the mainstreaming of the renewable energy Prosumer phenomenon into the European Energy Union. Prosumers are active energy users who both consume and produce energy from renewable sources (RES). The growth of RES Prosumerism all over Europe challenges current energy market structures and institutions. PROSEU's research focuses on collectives of RES Prosumers and investigates new business models, market regulations, infrastructural integration, technology scenarios and energy policies across Europe. The team works together with RES Prosumer Initiatives (Living Labs), policymakers and other stakeholders from nine countries, following a quasi-experimental approach to learn how RES Prosumer communities, start-ups and businesses are dealing with their own challenges, and to determine what incentive structures enable the mainstreaming of RES Prosumerism, while safeguarding citizen participation, inclusiveness and transparency. Moving beyond a case by case and fragmented body of research on RES Prosumers, PROSEU built an integrated knowledge framework for a socio-political, socioeconomic, business and financial, technological, socio-technical and socio-cultural understanding of RES Prosumerism and coalesce in a comprehensive identification and assessment of incentive structures to enable the process of mainstreaming RES Prosumers in the context of the energy transition.

Summary of PROSEU's Objectives

The eight key objectives at the foundation of the project's vision and work plan are:

- **Objective 1:** Document and analyse the current state of the art with respect to (150-200) RES Prosumer initiatives in Europe.
- **Objective 2:** Identify and analyse the regulatory frameworks and policy instruments relevant for RES Prosumer initiatives in nine participating Member States.
- **Objective 3:** Identify innovative financing schemes throughout the nine participating Member States and the barriers and opportunities for RES Prosumer business models.
- **Objective 4:** Develop scenarios for 2030 and 2050 based on in-depth analysis of technological solutions for RES Prosumers under different geographical, climatic and socio-political conditions.
- **Objective 5:** Discuss the research findings with 30 relevant stakeholders in a Participatory Integrated Assessment and produce a roadmap (until 2030 and 2050) for mainstreaming RE Prosumerism.
- **Objective 6:** Synthesise the lessons learned through experimentation and co-learning within and across Living Labs.
- **Objective 7:** Develop new methodological tools and draw lessons on how the PROSEU methodology, aimed at co-creation and learning, can itself serve as an experiment with institutional innovation.
- **Objective 8:** Create a RES Prosumer Community of Interest.

PROSEU Consortium Partners

Logo	Organisation	Type	Country
	FCIENCIAS.ID	Private non-profit association	Portugal
	U.PORTO	University	Portugal
	ICLEI EURO	Small and medium-sized enterprise	Germany
	CLIENTEARTH	Non-governmental organisation	United Kingdom
	UNIVLEEDS	University	United Kingdom
	DRIFT	University	the Netherlands
	UNIZAG FSB	University	Croatia
	LEUPHANA	University	Germany
	ECO-UNION	Non-governmental organisation	Spain
	IÖW	Private non-profit limited company	Germany
	CE Delft	Small and medium-sized enterprise	the Netherlands

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List of abbreviations used

- CEC Citizen Energy Community
- CMB Community Municipal Bond
- DSO Distribution System Operator
- EU European Union
- ESCO Energy Service Company
- FiT Feed-in-Tariff
- kW Kilowatt
- LL Living Lab
- MW Megawatt
- PIA The Participatory Integrated Assessment
- PtH Power-to-Heat
- PV Photovoltaic
- REC Renewable Energy Community
- RED II Renewable Energy Directive (Recast) from 2018
- RES Renewable Energy Sources
- TSO Transport System Operator

Executive Summary

Collective prosumer projects rely on the participation of a number of diverse stakeholders to be effective and empowering citizens to become active contributors to the energy transition is a process subject to many different kinds of enabling and constraining conditions. Going beyond just the generation of decentralised renewable energy, collective prosumerism contributes to community building by bringing together many people from local communities and beyond.

This character of prosumerism as a collective endeavour has been reflected through the PROSEU RES Living Labs as spaces where innovative solutions for supporting new, or existing project were sought after and co-created with all those involved. To facilitate such co-creation and co-learning experiences, PROSEU facilitated 15 Living Labs across 9 European countries by bringing together stakeholders and to “fuelling” the Living Labs with insights from the project’s different Work Packages. To facilitate this, a common methodology was created ensuring that all Living Labs shared the same analytical framework, but were nonetheless able to freely focus on overcoming their context-specific barriers choosing formats and tools most suitable to them.

The work in the Living Labs has triggered tangible momentum with many up-and-coming prosumer initiatives planning on continuing their journey even beyond PROSEU’s lifetime.

- The **Sub-Urban Heat Transition Living Lab (Germany)** has been initiated to engage citizens with the development of a local district heating network and to evaluate the extent to which residents, but particularly a local school would be willing to engage with the project.
- Also, in Germany, the **Northeast Lower Saxony Living Lab (Germany)** has brought together stakeholders involved in energy cooperatives, renewable energy associations and experts to evaluate the possibilities to market a regional electricity product and to widen the citizen-led projects outreach.
- The **Island of Silba (Croatia)** has become a Living Lab to assess the feasibility of a clean water supply through desalinisation through PV involving the local community.
- A **One-Stop-Shop Living Lab (Croatia)** has been created to develop a tool, particularly in cooperation with stakeholders from banks, which will serve prosumers in the future. It can easily show the bankability of individual PV installations on household’s roofs.
- Connecting football with renewables, the **KDN United Living Lab (Belgium)** has discussed the potential to create a community building integrated with RES with local community involvement.
- The **Getesnippers Living Lab (Belgium)** has evaluated the feasibility of a valorisation chain for sustainable heat using residue biomass from landscape conversion and maintenance work (LCMW).
- The aim of **Santorso Living Lab (Italy)** is to provide citizens with support to enlarge the scope of their area of action (biomasses, sustainable electric mobility).
- As a Living Lab, **Bristol Energy Cooperative (UK)** has explored new potential business models to guarantee further exploitation of larger-scale renewable energy plants even without a fixed remuneration guaranteed under the previous FiT system.
- **Bristol Energy Company (UK)**, working very closely with the city’s energy stakeholders investigated how emerging business models, such as “heat as a service” could contribute to the UK’s net-zero ambitions for the built environment

- The **Buurtwarmte Living Lab (Netherlands)** supported the development of neighbourhood energy cooperatives aimed at providing sustainable heating to their members.
- The **Aardehuis Living Lab (Netherlands)** are to find the institutional barriers around prosumerism in the eco-village, and to co-create solutions together with relevant stakeholders to overcome these obstacles
- The **Wines of Alentejo Living Lab (Portugal)** focused on mainstream the adoption of RES amongst Alentejo's viticulture industry by accelerating a wider adoption of RES and promote the setting up of collective self-consumption schemes among Alentejo's wineries.
- The **Sao Luís Energy Community Living Lab (Portugal)** aimed at encouraging and facilitating the setup of energy communities in Odemira, Alentejo.
- The **Living Lab on Self-Consumption (Spain)** aimed at exploring the best possible business models for energy cooperatives and their members which would also incentivise the maximum uptake of prosumerism in Spain over the next years.
- The **Living Lab on Promoting Prosumerism (France)** has been started to better understand the economic (and legal) models used by members of *Energie Partagée* (EPA) to start a self-production scheme through third-party investment and/or external management schemes. EPA is a French national association created in 2010 by several civil society actors to collect investment from citizens in order to finance renewable energy facilities.

The diversity of Living Labs is reflected in the needs identified at the beginning of the co-creation process and can be broadly divided into finding new business and financial models, elaborating on new organisational forms as well as overcoming technical challenges. The narrative of Living Labs, as portrayed in this deliverable, has shown that collective prosumerism is a cross-cutting undertaking in which good collaboration between involved stakeholders as well as the overall enabling framework are key and have a clear impact on the extent to which Living Labs have been able to co-create innovative solutions to their jointly identified barriers. This deliverable also shows that the extent to which Living Labs were able to co-create and overcome their barriers activities was hugely impacted by regulatory contexts. This has also resulted in the “narrative” of Living Labs to differ in dimension and vastly different outcomes.

1. Introduction

The PROSEU project has a very hands-on research approach. In order to answer the questions of what incentivises citizens to become (collective) prosumers, what barriers exist and what technical, business and financial frameworks allow for the most optimal mainstreaming of prosumerism, a strong focus lies on making research findings available to existing prosumer initiatives and to achieve real added value for prosumer initiatives engaging directly with the PROSEU project.

This is done through PROSEU RES Living Labs in which researchers co-created with prosumer initiatives and stakeholders' solutions to particular challenges, also facilitating co-learning. As networks of prosumer stakeholders, Living Labs allow the researcher to acquire knowledge from an ongoing real-life context while, at the same time, supporting stakeholders in overcoming specific problems¹.

The underlying idea is that, rather than creating something from the ground up, PROSEU researchers collaborate with existing prosumer initiatives and co-create with them solutions for overcoming specific barriers which they might encounter. At the heart of the Living Labs work is a quasi-experimental research approach in which the order of activities followed a set structure.

- The Living Lab (LLs) meet at least four times during the duration of their collaboration with the PROSEU Team. During a first meeting the barriers to action are co-identified. On this basis the needs of the Living Lab stakeholders vis-à-vis the PROSEU researchers are established. Due to obvious differences in the context of Living Labs, the exact needs differed, and analysis is made how these needs can best be met using the combined expertise of the PROSEU consortium.
- This is then followed by at least two “interventions” in which solutions to the established barriers are co-created together with a broad range of Living Lab stakeholders.
- The last intervention serves as a joint evaluation on whether the needs of the Living Labs have been met. This also allows the researcher to draw lessons learned from working with Living Labs in the prosumer field and to evaluate to what extent Living Lab stakeholders have managed to co-create an innovative solution (or have otherwise advanced) regarding their collective prosumer initiative.

This report intends to portray all the 15 PROSEU RES Living Labs showcasing why they have been formed, what barriers have been jointly identified and how the Living Labs worked on overcoming these. The deliverable D7.1 aims to portray the scope of experiences during the different interventions, but particularly all interventions prior to the joint evaluation. It also lays out the methodological and operation backbone for the Living Lab research. There are two subsequent deliverables in WP7. The “Renewable Energy Prosumers Inspiration Book” (D7.2) will draw on the Living Lab experiences highlighted here and will serve as an inspirational publication for enabling prosumerism. While the deliverable “Integrated lessons learned for renewable energy prosumers across Europe” (D.7.3) will take a more reflective approach drawing on lessons based on the joint evaluation process (i.e. drawing on the results of the last intervention) and will cross-reference with results of WP 6 (Participatory Integrative Assessment of Incentive Structures).

¹ Schäpke, N., Bergmann, M., Stelzer, F., & Lang, D. J. (2018). Labs in the real world: Advancing Transdisciplinary research and sustainability transformation: Mapping the field and emerging lines of inquiry. *GAIA-Ecological Perspectives for Science and Society*, 27(1), 8-11.

2. Combining Research and Practice – Living Labs Operational Plan

PROSEU Living Labs are networks of renewable energy prosumer stakeholders. These are understood mostly as entities, but can encompass individual citizens if they are directly involved in a collective prosumer initiative. It is anticipated that the Living Labs act as the framework to co-creation which will continue even beyond PROSEU's lifetime. Throughout the course of the Living Lab process, additional participants were invited to take part in the different interventions. This had the added positive effect that more people were enabled to share their input while a “core team”, of stakeholders, consisting of at least the focal point and the research team, stayed the same throughout all interventions. Across the 15 Living Labs, 60 interventions have been carried out involving more than 660 participants.

2.1 What do we mean by ‘interventions’ and how do we connect practical added-value with research?

Researchers were flexible in their methods on how they chose to ‘intervene’ in the Living Lab process as long as the overall PROSEU Living Lab approach was followed. Throughout the duration of the project (2018-2021), research partners carried out at least a minimum of four interventions with their LLs. The basic premise was that, following the intervention with the Living Lab, positive change will have to be generated in short, but most importantly in the medium to long-term while, at the same time, valuable research insights on prosumer activities are acquired. It is important to stress that an intervention did not serve the purpose of “steering” the Living Lab, but rather to facilitate the co-creation of innovations in an already ongoing network of stakeholders.

The Living Labs therefore aimed at discussing common challenges and to co-create solutions to address these challenges. Interventions took place in various forms, including workshops and meetings, always with a focus on participant interaction rather than one-sided lectures by the research team. After all, the Living Labs were supposed to allow stakeholders, including the participating researchers, to co-create a solution rather than have it “top-down” imposed on them. Collectively, all Living Lab stakeholders asked what they want to achieve in the long and short term and what concrete support they would require from the PROSEU research team to overcome identified barriers. At the same time, researchers were interested in the dynamics of each LL and how Living Lab stakeholders were progressing throughout the course of the interventions, their organisational form as well as how the LLs are addressing a pressing societal issue, what kind of values stakeholders associate with prosumerism. Researchers were also looking at what inherent drivers are present which might support the LL in overcoming jointly identified barriers to collective prosumer activities.

While it was up to each individual partner to shape the content of the interventions, it was important to place the research outputs within a harmonized methodology and operational plan that was shared by all the partners. This ensured that answers to the research questions captured during the interventions, allowed for the highest possible comparability and transparency and provided enough basis for WP7 deliverables (see annex 1 for more details on research questions as well as the reporting template used to record the co-creation activities). The information from the templates was also used to feed in the discussions of WP6 participatory integrative assessment (PiA)² workshops.

With the exception of the evaluation, these answers were gathered through a combination of methods (i.e. workshops, participant observation, interviews, and surveys). Research partners were asked to submit

² Three participatory workshops took place between March and June 2020 (online). Results will be delivered through WP6 final roadmaps for the mainstreaming of prosumerism

regular reports to WP7 lead on how the interventions contributed to addressing the needs of the Living Lab and how barriers are being overcome by means of innovative solutions. This means that the reporting templates captured answers to both “operational” questions (regarding the content of individual interventions) and “research” questions which reflect on the entire Living Lab process. The reporting templates can be found in Annex 1.

Different tools were used to collect and analyse data, thereby answering the PROSEU research questions. The Living Labs’ activities followed a three-stage methodology, comprising an exploration, experimentation, and evaluation stage³. Within each stage, the Living Labs looked into:

- **Carrying out the needs-assessment (Exploration)**
 - Overview of the problem: identification of the challenges and institutional barriers to be addressed through the Living Lab process
 - Establish whether the Living Lab needs to be expanded and by whom; understand the needs of all stakeholders involved in the Living Lab
 - Establish a shared understanding of the envisioned future for the Living Lab
- **Co-creating and implementing 2 interventions (Experimentation)**
 - While each Living Lab focused on tackling specific issues, all of them addressed their barriers from a variety of perspectives combining technological aspects with socio-cultural, economic and environmental considerations. The way in which solutions were developed reflects the nature of prosumerism as a multi-dimensional issue.
- **Evaluating and understanding how the interventions helped address the need/problem (Evaluation)**
 - Evaluate the Living Lab process and its outcomes: Did the interventions solve the problem? Or could the intervention be the beginning of a solution (in the cases when innovations are developed)? Did the innovation lead to a new need/problem?
 - Establish next steps (which could also just be the dissolution of the Living Lab)

Due to the constraints posed by COVID-19, some interventions (namely the final ones) were converted into online meetings. The research team has found that, in principle, this was no problem and that knowledge transfer and exchange, was still very much possible. However, Living Lab interventions also had an important social dimension contributing to overall community building within these networks of stakeholders and, considering the focus of the project on mainstreaming and enabling *collective* prosumerism, more physical meetings towards the end would have been more beneficial to the overall purpose.

³ Schuurman, D. (2015). Bridging the gap between Open and User Innovation?: exploring the value of Living Labs as a means to structure user contribution and manage distributed innovation (Doctoral dissertation, Ghent University).
Schuurman, D., De Marez, L., & Ballon, P. (2013). Open innovation processes in living lab innovation systems: insights from the LeYLab. *Technology Innovation Management Review*, 3(11), 28.

3. Roles and Responsibilities within a RES Living Lab

To guarantee a fruitful, resource-efficient interaction between the RES Living Lab and the PROSEU project team, responsibilities and roles in carrying out the Living Lab activities were divided within each Living Lab as follows:

The PROSEU Focal Point:

- nominated within the research group, is the contact person for both the LL and the fellow researchers for the duration of the project. In case of changes a new contact person has to be provided within two weeks
- this person is responsible for engaging with the Living Lab Focal Point in co-creating four relevant activities
- S/he also facilitates the identification of the appropriate Living Lab participants/organisations to take part in specific activities

The PROSEU Living Lab Research Team:

- consists of representatives of the consortium partners
- will share a joint approach on how research will be carried out throughout the different interactions happening between the Living Lab and PROSEU
- will collate and analyse the results to identify appropriate recommendations and solutions

The Living Lab Focal Point:

- belonging to the Living Lab, s/he acts as main reference and contact person for the duration of the project
- will be responsible for engaging with the PROSEU Focal Point and Research Team in co-designing the activities to be carried out and the different events taking place within the context of the Living Lab
- will facilitate the identification of the appropriate Living Lab participants to take part in specific activities
- will be involved in capacity building activities as well as at least one international knowledge-exchange event as well as the PROSEU final conference and to become a member of the [PROSEU Community of Interest](#). All travel expenses are covered by the PROSEU project

The Living Lab Stakeholders:

- are organisations/individual taking part in the Living Lab including the Living Lab and PROSEU Focal Points
- will be invited to directly shape, and take part in the Living Lab activities
- can participate in a short video-interview about the Living Lab to be posted on social media
- can be mentioned in an article about the PROSEU project/ Living Labs in the media
- can participate in one or several webinars or events organised by PROSEU
- can become part of the PROSEU Community of Interest and engage with RES prosumer initiatives across Europe

4. Who are the 15 RES Living Labs?

This report primarily focuses on interactions between Living Lab stakeholders. For this reason, great attention has been given on highlighting the experiences with co-creation rather than explaining the role of PROSEU project partners in setting up and facilitating individual interventions. Each Living Lab, therefore, explains its co-creation process as a narrative rather than structured according to every intervention separately. This was also done as interventions differed in scope depending on the context, timing as well as stakeholder availability.

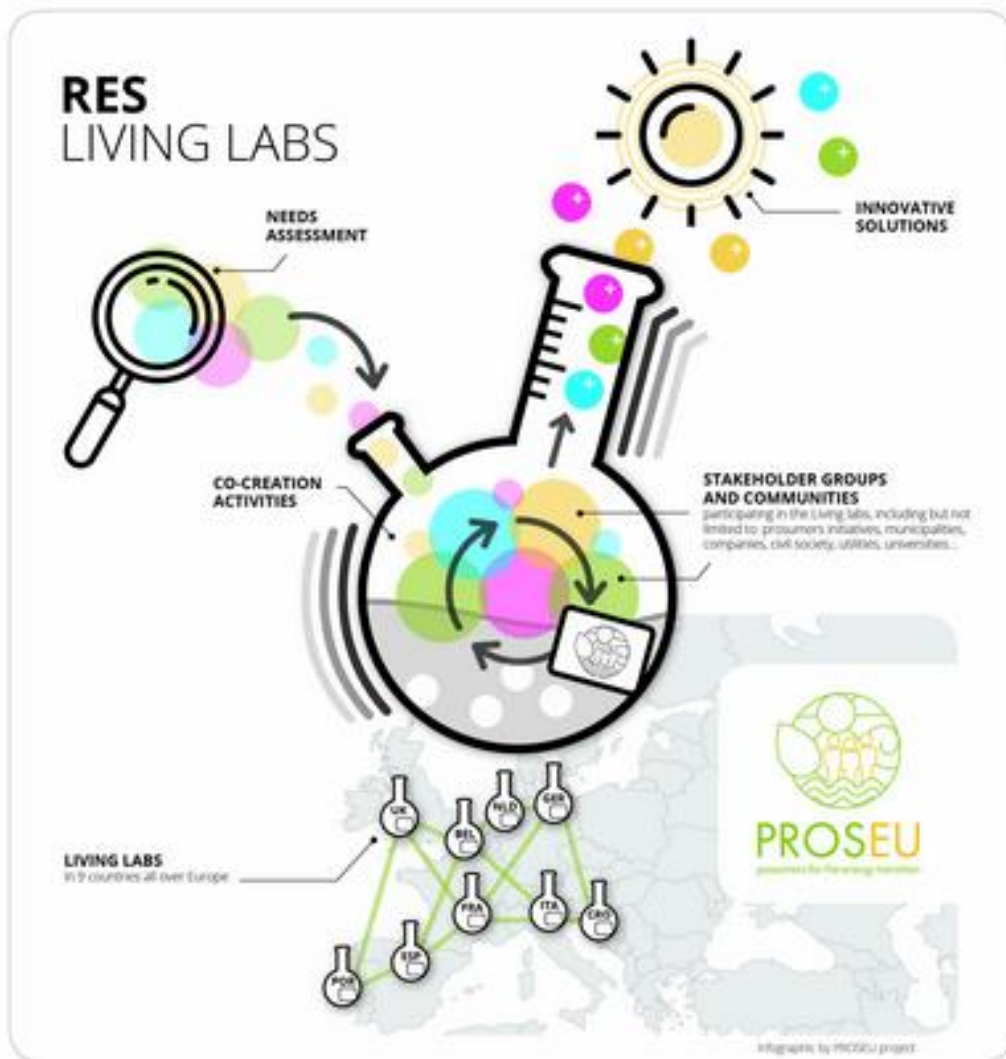


Figure 1: Living Lab Methodology Infographic

4.1 SubWW (Sub-Urban Heat Transition Living Lab) – Germany (PROSEU Focal Point: IÖW)

Where does the Living Lab want to go?

In the German town of Weyhe (district Leeste), a low-temperature local heating network with decentralized renewable energy production is to be developed. The goal is to combine the refurbishment in Leeste with an innovative heat supply, thus combining decentralized feed-in and local heat supply in order to achieve an efficient and resource-saving heat supply. Since by 2030 much of the area in Leeste will have been redeveloped, the choice of heat supply must be decided and implemented by then.

The Living Lab was started with the goal of implementing an innovative district heating grid that gives the possibility for prosumers to feed their heat overcapacities into the grid (e.g. via heat pumps) so that technologies can be used more efficiently and new buildings don't need their own heat production system. This entailed providing the Living Lab with ways to reach out and include citizens in the planning of the heating grid, a process which was facilitated by the PROSEU research team, specifically IÖW. The municipality of Weyhe is engaged in this project and there is already a high awareness for renewable energies and co-ownership in the district. Citizen-owned solar power plants and biogas plants have already been widely discussed and established in the area. There are active ambitions to enable financial and procedural participation of local citizens in the project.

While the overall project is still in an early stage, some constraining factors have become apparent. It is mostly stakeholders already interested in renewable energies and innovation who are participating in the discussions around the project with low involvement of new stakeholders and a wider public overall. Moreover, the long timeline of the project makes it difficult to motivate people to participate and even more to invest money, due to delayed benefits. Renting homeowners might be reluctant to join the grid, if they are not able to allocate investments to rents paid by tenants. Also, the degree of say and participation will depend on the chosen planning process and final organisational structure. Due to the size of the project, connected investments (including public and private funding), a basic-democratic decision-making is going to be difficult and ownership conflicts (such as wayleave and use of public space) may become an issue for building permits. In the case of a pure cooperative organisational structure (without a professional energy supplier), concerns of lacking expertise have been voiced.

Initiated by the Technical University of Berlin and carried by the municipality

The Technical University Berlin was responsible for the calculation of the technical details of the innovative district heating grid and they have recently started cooperation with the town of Weyhe. The project is one of the few where the university is so close to a real implementation. The institute also gave the impulse for the project to happen in Weyhe even before it was established as a PROSEU Living Lab.

The municipality Weyhe is the key driver. With the redevelopment of the district Leeste already decided, a lot will happen in the next 10 years and the municipality wants to use this opportunity to renew the energy supply. The municipality is also in the process of re-buying its electricity grid adding to these strong ambitions for enabling collective prosumer projects. The municipality wants to involve residents of the district financially but also keep them informed in order to achieve acceptance and consensus in the decision-making process. To this end, the council and all relevant stakeholders are regularly informed of the project and involved in the discussion of the progress. The municipality of Weyhe is open to set up a cooperative for the district heating system, but is leaning towards a public utility. The reason for this being that a municipal utility would combine multiple energy aspects in the town of Weyhe. The overarching goal was to engage people in the district heating by involving prosumers to feed into the grid, but also reflect this in the organisational structure.

A democratic approach involving local citizens

The residents of the district Leeste are important stakeholders. They can take part in several roles in the project: discussion of the energy supply in their district, drawing heat from the grid in the future, producing heat for the grid or financial participation in the grid through e.g. a cooperative. Similar to the residents of the district, the homeowners (independent of their living situation) can take part in the project, as they are the ones deciding on the investment of energy production in the buildings. They can produce heat for the grid and they can be financially involved in the district heating grid. There are already a few citizen solar energy plants, which would be a good starting point. The residents and homeowners are favourable of an organizational structure which would include local actors and to have a say in the process of the heating and energy supply is considered to be particularly important. This should also include citizens with little investment capacities. Additionally, it was found important for the people to have a contact person if something goes wrong and an efficient operation of the grid. The new heating supply should be economically beneficial; otherwise, many people lose interest. Another important aspect was the comfort of the heating system. The decentralised provision of heat at the moment is mostly cheap and works well but is not very ecological. Most of the participants showed interest in a cooperative model and seemed to be interested in being a part of the project. Additionally, mixed forms with local and bigger energy utilities were possible for the participants.

Two schools convinced of the district heating solution

There are two public schools in the district (next to each other). One primary school and one comprehensive school. At the moment, both schools have a common energy production via gas and a Combined-Heat-and-Power (CHP) plant. While the CHP is new, the gas boiler and the grid connecting the schools are quite old and inefficient. The municipality already checked whether it is economical to install a PV plant on the big rooftop of the school. However, since supply and demand would not match sufficiently, and there is not enough self-consumption, it has been deemed not feasible under the present conditions. With a district heating grid however, heat from solar thermal or PV combined with a Power to Heat (PtH) unit could be fed into the grid. While more than half of the students, teachers and parents of the school are willing to participate in the discussion of the future energy concept in the school, it turned out that only a minor part can imagine to finance a RES or be part of an energy cooperative. A new supermarket will be in the heart of the district soon. As all other buildings in the district, the goal is to include the building in the district heating grid and maybe utilize its waste heat or overcapacities for the heating grid. While the supermarket is interested, they have already planned their heating, and therefore will be engaged when the project has reached higher maturity.

All coordinated by the local environment center

The Umweltzentrum (UWZ) is an eco-center for the region/city, responsible for keeping in touch with the residents and preparing information for them. Additionally, they are responsible for gathering data necessary to identify suitable areas for the implementation of a local heat grid. They work very close with the municipality and their office in the center of the district is open for all residents.

Evaluating attitudes and interest to engage

In the long-run, the project wants to integrate at least one school, the comprehensive secondary school, into the heating grid. This school would therefore become a prosumer community. The Living Lab therefore also included a survey among teachers, students and their parents to assess the interest of citizens in prosumer solutions.

Issues around environmental and climate protection are raised as most important (40 %), followed by societal and political challenges (36 %). Climate change is the most mentioned challenge (30 %). In regards

to their school, the most mentioned subject areas are teaching (42 %), the school building (27 %) and social issues (19 %). Overreaching issues, like COVID-19 and climate change, are raised in 13 % of the recorded responses. The individual topics of most concern to citizens are the current renovation activities (16 %) and the technical equipment/digital teaching methods (13 %). The heating or energy supply was only raised a handful of times. Overall, the participants have positive attitudes towards climate and environmental protection. 58 % of the participants even indicate to be actively involved in the subject. Some isolated critical voices are coming out of the student body. Around one quarter of the participants are bothered by restrictions imposed by others to “force” a more environmentally friendly life-style. 76 % of the participants are favourable of initiatives for a more sustainable life and some integrate sustainable behaviour in their own. 75 % of the students and all of the parents and teachers pay attention to resource efficiency when purchasing a new electronic device. 71 % of the students, 89 % of the parents and 67 % of the teachers indicated to ensure their everyday life has the least impact on climate and environment.

68 % of the students have been active for Fridays for Future and have participated in at least one climate protest. 35 % of all the participants have participated in at least one signature campaign for renewable energies. Only one student indicated actions against the construction of a wind power plant or over-land power line. Less than half of the teachers and parents indicated some form of financial participation in renewable energies. 13 % of the parents and teachers own a power plant.

A climate-friendly energy production for the school is important to the majority of the participants (91 %). All surveyed topics (expansion of RE; increasing energy efficiency; reduction of energy consumption; exiting fossil energy sources) were found (very) important by at least 89 % of the participants. Most important factors regarding the new heat supply in Leeste are environmental sustainability, comfort, and efficiency and reliability of the heating system. Less important (still over 50 %) are the use of local resources and participation of local businesses. Costs are least important, since they do not have to be carried individually. Additional important factors are to ensure adjustable heating in the individual rooms and to consider options for cooling in summer. More than half of the participants could imagine taking part in the conceptual work for the heating supply of their school. 31 % indicated an interest to be part of an energy cooperative.

Outcome

It was the motivation of the Living Lab to support the project SubWW in the participation of citizens in the planning of the heating grid, also via insights into citizen’s attitudes towards climate protection and the local sustainability in particular. This intention was fulfilled. While the forward-looking target to deliver concepts and processes that are usable for future events was reached, it is not clear whether the local actors will be able to implement them without external support. The participants of the Living Lab were informed and sensitized for the possibility of a heating grid and given the opportunity to voice their wishes for the framework of such an implementation (e.g. organisational structure).

The difficulties in the acquisition of participants and feedback in the RTG showed that the public awareness of the project is still too low. UWZ will take this opportunity to overthink and adjust their public relations activities to generate more awareness of the project. Findings from the Living Lab also serve as impulses for the further research and planning of the proposed heating grid. It is now crucial to utilize these findings for the further course of the project.

While the Living Lab offered some new inputs on the preferences of the citizens and the pupils, there are still some unknowns. The citizens were really hard to engage in Living Lab and the school postponed the workshop several times due to other priorities. The Living Lab gave the stakeholders a more structured and innovative way of involving potential participants of the prosumer community. They learned about the preferences and priorities but also “no go’s” of the participants.

4.2 Living Lab Northeast Lower-Saxony – Germany (PROSEU Focal Point: Leuphana University)

Where does the Living Lab want to go?

This Living Lab encompasses the combined efforts of several energy cooperatives in Northeast Lower-Saxony in Germany as well as a renewable energy association. The activities develop into two strands: (1) increasing the outreach of citizen-led projects, organized around the non-profit association REEW, and (2) developing a regional electricity product, organized around the cooperative BEB. The overall purpose is to strengthen the cooperatives in being a prosumer and empowering them to make other people in their region prosumers as well. Following this aim, the initiatives want to have a high share of regional produced energy in their region and strengthen the regional value chain. Further, they have the aim of lowering the energy need in the region, e.g. by energy efficiency measures. The aim of the Living Lab is therefore to reflect the different projects ideas of the cooperatives on a scientific background, connect their results with knowledge and experiences of different experts in the fields and in this way provide the cooperatives and other stakeholders in the Living Lab with the needed knowledge and confidence to start the projects.

Increasing the outreach of citizen-led projects

RegionalEnergie Elbe-Weser gGmbH (REEW) is an association for the dissemination of renewable energies with citizen participation and for educational and public relations work. It serves as a network for energy communities at regional level. They carry out education programs for renewable energy and have the strong urge to further push the development of RES in their region as well as matters of energy efficiency in buildings. The association collaborates with many active energy communities in the area and beyond and the following initiatives have been stakeholders in the LL: *Energie Oldendorf*, *BürgerEnergie Osteland eG* and *Klimabündnis Halstenbeck*. Further participants are representatives of surrounding municipalities and churches as well as interested citizens. REEW envisions that all suitable municipal buildings will have PV installed allowing citizens to have a financial share. Furthermore, private households should have the opportunity to easily order and install PV panels for their own buildings. To reach this vision, relevant policy makers from different levels, technical professionals as well as motivated citizens must be included.

Within the framework of the Living Lab, REEW wants to explore which kind of regulations need to be considered for upscaling the use of PV in the region, how this could be financed and which stakeholders can and should be involved. Furthermore, the LL was seen as an option to bring potential stakeholder together, kind of like a kick-off- event.

With regard to energy efficiency, REEW envisions that flagship buildings are created and made open to the public to inform citizens about the benefits of energy efficient building. To realise this, it is necessary not only to tackle financial barriers for retrofitting buildings, but also to find buildings whoms owner are willing to open them to the public for a limited amount of time.

Besides these project ideas, REEW has the motivation to further disseminate renewable energies with citizen participation and through educational and public relations work. They are particularly interested in gaining and exchanging knowledge about opportunities to further promote the energy transition in the region and Germany in general. They hope to gain additional ideas for potential projects through the Living Labs.

Working with stakeholders well established in the region and with even clearer visions

BürgerEnergie Buxtehude eG (BEB) is a cooperative of around 250 members which owns a wind turbine as well as several PV installations. It wants to offer the produced energy with its own brand successfully to

regional consumers and of their own members. Further they want to strengthen solar production in their region and possibilities for locals to participate in energy production. BEB envisions that, in the short term, they will minimise electricity sales to the grid and maximise local consumption. However, current regulations and requirements for becoming an energy supplier, to engage in energy trading and to establish a regional electricity product are very complex and cumbersome. The needed knowhow and the financial and human resources are usually not given in citizen cooperatives and to analyse the available options in this regard is part of the Living Lab activities. BEB already has a registered name for an electricity product, but they still need to develop an exact business model including partners, features of the product (e.g. electricity mix) and a marketing strategy. The Living Lab looks at how the tasks and responsibilities of being an energy supplier could be managed and whether a cooperative could take this on. If not, what would be the alternatives and what possible constructs with other partners could be considered? BEB also wants to know what kind of features such a regional energy product should have from a consumer perspective and how it can be marketed successfully.

Developing a regional electricity product

The cooperative's overarching goal is to make its own contribution to the energy transition by expanding renewable energies. Thereby, people should be enabled to become part of this project. The aim is to build and operate their own regional plants and thus strengthen local value creation. In order to create further opportunities for participation in the transformation of energy systems and to strengthen local value creation even more, the cooperative wants to develop its own electricity product and market it locally. This requires providing knowledge and experiences useful and needed for successful regional electricity marketing. The cooperative should be empowered to develop and successfully market electricity produced in the wind farm owned by the cooperative to local customers. The cooperative is not yet a licensed supplier, so legal challenges for marketing are also to be addressed.

As part of Living Lab activities several joint discussions were facilitated by the PROSEU research team to reflect on the challenges posed by the marketing of electricity. People are often not easily convinced to switch their supplier. Therefore, a solid marketing strategy must be developed. This should address the right values and use diverse channels. Further, the obligations of an electricity provider must be handled. Expertise in both of these fields are needed as well as sufficient human resources to do so. To get both, all of the consulted cooperatives have a partnership with a service provider. The cooperatives mainly just do the regional communication and distribution of the product. The partnerships mainly differ in how the regionality of the product is established, in the influence of the cooperative on the marketing and the product attributes as well as obligations for the partnership (e.g. the service provider has to become the direct marketer for the produced electricity of the cooperative).

The BEB was given a good overview about their possibilities to market a regional electricity product and can now further develop their implementation strategy for their own product. Nevertheless, the main barriers/challenges still exist for the marketing of regional electricity products through citizen cooperatives: people do not switch their electricity provider easily as the attribute of "regionality" does not pull customers as some expected (the attributes of price and 100% RE are more important). In general, the value proposition of a regional electricity product is difficult to communicate and a lot of personal (time and knowledge) and financial resources are needed for its successful marketing. The special knowledge for marketing is often rare in citizen cooperatives and marketing a product without a partner is for most citizen cooperatives very difficult.

The Living Lab also resulted in the church in Oldendorf considering to construct a parsonage as a passive house or similar. Reflections on the church's capacity to do so, show that the church needs support in

technical and financial matters going forward. Further they would like to install PV on the church roof. In the future this will require not only thinking about ways for citizens to be involved, but also tackling challenges concerning the protection of historical monuments in Germany which restrict the placement of solar panels on such buildings until particular criteria are met.

Outcome

Although the barriers/challenges still exist, the Living Lab provided the BEB and REEW and other participating cooperatives with a wide overview of different opportunities and ideas to tackle these and therefore helps to push the regional electricity marketing through citizen cooperatives. This especially applies for the BEB for the implementation of their new regional product. Though most other cooperatives choose their partner due to already existing contacts, the BEB now has the overview and can continue discussing different options and their possible results.

4.3 Desalination on the Island of Silba using PV – Croatia (PROSEU Focal Point: University of Zagreb)

Where does the Living Lab want to go?

The island of Silba is located in northern Dalmatia, Zadar County. It is a Mediterranean island with 2,570 hours of sunshine a year. The island faces severe water supply issues, especially during the dry period of the year. It has no water supply and it is dependent on the water transported to the island by ship. Since the island's main income is the summer tourism, water supply issues became extremely important for Silba's residents. Within the Living Lab the focus was on making the island of Silba water-neutral by implementing a combination of desalination and small-scale PV installations. Through scenario analysis it was shown what the advantages and disadvantages of implementing the prosumer concept in a remote island community are. PV driven desalination is assumed to operate for a longer period (at least 30 years), since the payback period of such projects is relatively long, due to high capital investments. The Living Lab aimed at developing a prefeasibility study envisioning the supply of drinking water to every household for one entire year using desalination combined with PV. Next to a lack of reliable data on water usage, communication between the involved stakeholders is also key.

The Local Council and the community...

Silba is an island with an area of 15 km² and an official population of ca. 300. Population varies seasonally, from a few hundred in the winter up to several thousand during the summer period. Intensive seasonal fluctuations in population result in lacking water and energy supplies to the island, especially during July and August. The island of Silba does not support an infrastructure for road vehicles and it is known as the Island of Pedestrians. Its local board council has a majority of politically independent members (four out of a total of five) who work on the island's issues like waste collection, water supply, bike ridings, etc. Silba is officially a part of the broader *Croatian Island Movement* inside which it strongly participates in many projects related to environmental protection and preservation of cultural heritage.

The main contributors responsible for the development of the Living Lab are members of the Local Board Council on Silba, some of them also being members of the Island Movement. Permanent residents are affected by the water supply issue throughout the whole year, while temporary residents, e.g. house owners living outside the island, tourists, and other visitors are affected only during the summer season. However, the main income of the island comes from tourist services, e.g. restaurants, apartment rentals, etc. Therefore, the lack of water on the island directly impacts the island's income and financial capacity for the development.

...leading the way to a more sustainable island society

Island Movement (cro. *Pokret Otoka*) is a self-sustained network of islanders with the main purpose of connecting people or organisations through the idea of a sustainable and responsible society. It was established in 2015 as the result of a desire for establishing connections between active citizens, local stakeholders and experts, young and less young people and professionals in Croatia and beyond. The goal of the Island Movement is to accelerate the transition to a more meaningful and more responsible island society through networking, learning, mentoring, development of projects and sharing of information, knowledge and skills. Although Island Movement currently gathers the young, it wants to make it an example of a successful intergenerational cooperation and become a meeting point for different age groups.

High water prices

Vodovod ltd Zadar is a water utility company and a relevant stakeholder in the Living Lab. It delivers drinking water to the island of Silba by ship. The price of water delivered to an island is structured as the price of water on land plus the price of water transport. By the current business model, a price of water for permanent residents and their households on Silba is ca 1 €/m³ (subsidised price), while the price of water for other households (without permanent residence status) is ca. 12 €/m³, out of which almost 80% is charged by the ship transport. The Living Lab's analysis of the current water supply system on Silba with the help of local citizens, council and *Island Movement* concluded that installing a desalination unit would be the most acceptable alternative to the water carrier ship, due to the island's remote position. As the desalination unit consumes a relatively large amount of electricity and the electricity network on the island is not always stable, the Living Lab activities suggested that an installation of photovoltaics producing electricity to cover the energy demand for the operation of the desalination while electricity excess would be fed to the grid. The analysis of a current water supply network showed that citizens of an island lose about 30% of the total water delivered to the island due to flaws and failures in the infrastructure (leaking pipes, inefficient storages, etc.). In addition to the techno-economic analysis of PV-driven water production, the pre-feasibility study includes the installation of new water storage capacities on the island and a renovation of the water supply infrastructure. In the end, a SWOT analysis was done to detect what are strengths, weaknesses, opportunities and threats of the proposed water supply system in Silba.

The results of the complex analysis shows that meeting the water demand for Silba Island with a reference to the peak consumption in summer months would require an installation of a desalination unit of 100 m³/day capacity of produced water. Such a unit would be driven by a 100 kWp installation of PV panels and 300 kWh battery storage capacity acting as a backup. The capacity of required additional water storage on the island is targeted to 500 m³, which added to existing storage capacities results in the total water storage capacity of 1,500 m³. Regarding the water supply infrastructure, a renovation of the existing 15 km of water supply network was analysed and building new 2.5 km of water pipelines was suggested which would be used to transport water from the production site to island households. The techno-economic analysis showed that the water produced in the proposed system would have a price between 4.8 and 5.7 €/m³ which includes not only the cost of desalination unit and PV system, but also the installation of additional storage capacities, infrastructure renovation and building of new infrastructure, making the pre-feasibility study more convenient and representative to all stakeholders included in the Living Lab.

Outcome

The prefeasibility study shows that the desalinisation of sea water using PV and its delivery to households on the island is more economical than shipping the water from the mainland. This Living Lab demonstrates, thanks to particularly the contribution of island residents, that a PV plant backed by the local community can greatly contribute to ensuring clean water supply for island residents as well as overall island prosperity.

The Silba Living Lab has received a high amount of media attention in Croatia. Despite the interest of the island's population some concern is also being raised that the construction of a PV-drive desalination unit will facilitate construction works on the island increasing the number of apartments and private accommodations resulting in more tourists on the island and disturbed peace. This will need to be taken into account going forward. Overall, the Living Lab provides the island's residents with the understanding that they don't have to be only passive consumers, but can prosume their own water supply using PV. The approach of Silba can serve as an example to other island communities facing similar issues.

4.4 Establishing a one stop shop for integrated solar PV projects - Croatia LL (PROSEU Focal Point: University of Zagreb)

Where does the Living Lab want to go?

This Living Lab entailed the creation of a one-stop shop for households which want to invest in building-integrated solar power plants. Combined effort from academia, industry and civil society is employed to develop tools for demonstration of bankability for such projects, which would be easy to use for private users and investors, while also in acceptable form for financing institutions (primarily commercial banks) in order to foster new financial products, such as green loans. By 2030, the Living Lab stakeholders aim for such procedures to be everyday practice. This tool also responds to barriers faced such as that, in general, low value of investment from end-users does not facilitate production of new financial products.

The tool consists of input sheets where users define their household size, available rooftop area, type of solar PV modules and their location. According to the chosen inputs (location in particular), production is calculated and energy balance is provided per month and for the whole year. The user is then provided with outputs, such as graphs of energy balances and energy covered by solar PV per month, as well as the simple rate of return for the users' investment. This Living Lab was carried out on the background of legislative changes in Croatia in 2018 which give particular rights to prosumers. Commercial banks are not yet very familiar with the prosumer concept since such projects are still few in number. This Living Lab fostered easier financing of PV prosumers through commercial banks.

The ambition was to make the green loans for prosumers the usual state of the art procedure in future, as it is the case with any consumer loan. The main goal of the Living Lab was therefore to investigate the opportunities for private persons to acquire information and funding needed to become prosumers in Croatia.

Using the tool developed in the Living Lab, the energy provision for prosumers would become more transparent in terms of better control of supply for households, as they would achieve self-supply and control the injection of energy from their production unit to the grid. In the course of building up this Living Lab, participation from the civil society, academy and private financial institutions (commercial banks) was the most important element in order to build the results on solid expert and scientific bases as well as to connect the proposed solution to existing financial products (or propose new products as a result of the LL activities). Once the final users (private persons, households) get to use the results of the Living Lab, they will be presented with the opportunity for acquisition of their own means of electricity generation in an affordable and clean way, making it safer and more efficient for them to get closer to energy independence based on renewable energy source.

Building on expertise in ethical financing

The Croatian Cooperative for Ethical Financing (CEF) takes a key role in this Living Lab due to their expertise with the implementation of projects with high social value for local communities and their previous collaboration with local banks. CEF is a non-profit organization with over 12.000 members, organisations

and individuals working together to develop a democratic, transparent, just and socially and environmentally responsible economy. They are also setting up the first ethical bank in Croatia as well as the first green electricity supply.

Enabling private users interested in integrated PV

As the end-users of the PV panels are expected to be primarily private households, several citizens took part in Living Lab activities to be informed about ongoing activities. The Living Lab also investigated opportunities for private persons to acquire information and funding needed in order to become prosumers in Croatia. Citizens are expected to use them in order to prepare their applications for green loans for integrated PV prosumer projects. Also, the energy provision for prosumers will become more transparent as households will be able to better control their supply and to achieve self-supply and to control the feed-in of energy from their PV unit into the grid.

Getting the support from commercial banks

Once the first version of the tools was completed, commercial banks were consulted to receive their feedback on the tools, mainly on the accounting and procedures side. Banks involved were *Société Générale*, *UniCredit* and *Erste&Steiermarkische Bank* as well as *Unicredit group Zagrebačka banka*. The participation of commercial banks in the Living Lab was highly useful as the Living Lab was able to generate information about already existing opportunities for private end-users to get appropriate financial products for funding their investment in equipment and projects. As already existing tools are not explicitly geared towards prosumerism, this new tool builds on what is existing and provides a tailored solution for individual prosumers. Although there are some products available at commercial banks, those could be considered as “back-up” options or easily modifiable general products. In these terms, actions including commercial banks representatives were fruitful for all participating members of LL, through knowledge gain and exchange of ideas. Commercial bank representatives provided their feedback on the tool, and proposed several additions to the draft such as the average interest rate to be used as well as that monthly payments should be expressed as output (for information towards the end-users, but also for banks) – such amounts are compared with electricity bills as useful comparison parameter. Also, in discussion with commercial bank representatives, new information was obtained about real estate loans and “eco”-loans currently available at the bank.

Such information is interesting, since it signals the various ways of thinking towards infrastructure and equipment as goods that are integral to the household and also connected to various financial schemes previously developed for energy efficiency measures. In Croatia, yearly tenders for co-financing of energy efficiency measures and measures designed to proliferate the use of renewable energy in households were implemented with significant success between 2015 and 2018. For such reasons, acquisition and installation of solar thermal, heat pumps and boilers was treated by appropriate funding lines. Similar lines, only slightly adapted, could be used for prosumers.

Outcome

This Living Lab created a tool showing to (private) investors the bankability of their particular PV plant. Based on the expertise from both commercial and non-governmental partners, the tool adds something truly new to the Croatian prosumer financing landscape and has a lot of potential end-use in the future.

Figure 1 shows the input sheet of the tool based on contributions from CEF and following feedback from commercial banks. It includes consumption, overall household size, as well as input for payback plans (interest rates, number of periods and equity share).

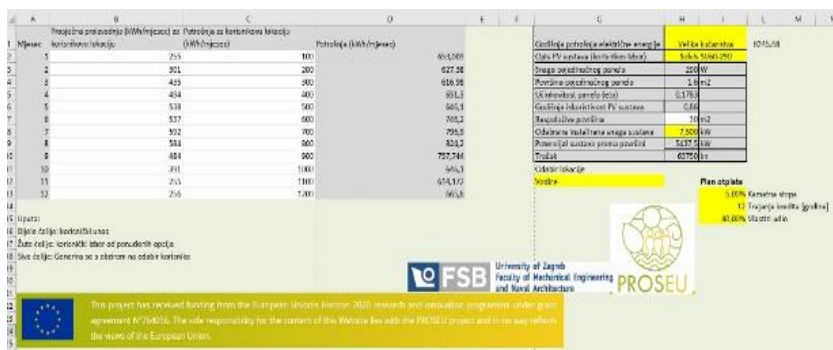


Figure 2: The tool's input area

In Figure 2, data provided to the user is presented, including energy balances on the monthly level and costs/savings curve for the whole year, also on the monthly level. Users are provided with the overall cost of becoming a prosumer, yearly savings on account of having self-production units installed and income for the prosumer under the actual prosumer scheme in Croatia. Also, a simple payback period for such investment is provided.



Figure 3: Outputs provided by the tool to the users

4.5 The Santorso Living Lab – Italy (PROSEU Focal Point: ICLEI Europe)

Where does the Living Lab want to go?

The project was born on a voluntary basis to raise awareness and give advice on access to RES and to group purchase solar thermal and PV panels. Along time their activity stabilised into a monthly help desk and several meetings not only in Santorso but also in the neighbouring municipalities widening also their topics with the aim to continue supporting the citizens with clear information regarding energy market options and renewable energy solutions. The aim of this Living Lab was to enable citizens and the involved municipalities to increase their ambition on local renewables (especially biomass and electric mobility).

At first, the initiative started as an informal group of volunteers with a horizontal organisation and no specific roles but well rooted in the community as well as technically prepared (having experts among the volunteers). The help that they provided to their community in terms of information and support for group purchases of PV, was a success. When the activities became too time-demanding the initiative was taken up by the municipality that, recognising the value of the initiative, made it a public service for the citizens. The helpdesk has been first assigned with a tender to one of the major environmental NGO in Italy, *Legambiente* which run the office and the mobile desk for two years. After that, in 2020, the management of the office returned back to the original group of volunteers, who in the meanwhile have been always continuing their activities keeping the same informal structure.

Now also surrounding municipalities participate in the project sponsored by the Municipality of Santorso. This is both economically speaking as well as in taking part in the decisions making processes on which steps can be taken forward as joint actions that will cover a greater area involving around 80,000 citizens.

The Living Lab would like to expand their activities to other RES. So far, the main focus was on solar panels and building efficiency but a hot topic in the region is mobility and biomass-heating and therefore they would like to gain knowledge and see how the mainstreams solutions can be adapted to their context. Given the area's rural nature, prosumer technologies are seen as a way to promote the surroundings and to take advantage of local resources to have more affordable energy as well as to face climate change. The Living Lab is really interested in the implications of the new legal concepts on renewable energy communities (RECs) and citizen energy communities (CECs) contained in the Revised Renewable Energy Directive (RED II)⁴ and how these new entities can be developed in their territory. Still, there is no clear idea on how this could be applied e.g. through establishing a one stop shop or a concrete initiative led by the municipalities, but this is very much linked with the fact that transposition (and therefore definitions) are still an ongoing process and one of their requests it is to be updated on the latest policy developments and consequences (legal and economic potential). For the group of municipalities to take action, there is the need to translate major policies and policy making processes into a language that can be more understandable. To implement their activities, they would like to have more technical expertise and some advice in regards to financing possibilities for private citizens. This also relates to a need to be better informed about the available technological developments as well as available funding. They also want to get more young people involved. High personal motivation is a definitive enabling factor and, considering the relatively small size of the municipality, it is easier to include additional people and to build a community.

Buona Pratica Santorso leading the way

"*Buona Pratica Santorso*" is a group of people from the municipality of Santorso who wanted to raise awareness on the importance of the energy transition and inform other citizens on the opportunities to invest in RES. The presence of three energy engineers among the volunteers group made the initiative very reliable and strong despite its voluntary base. When the activities became demanding in terms of time and energy, the Municipality decided to support it economically but to be compliant with the law, Santorso has to set up a public tender to assign the management of the Helpdesk and Infopoint. "*Buona Pratica Santorso*" continues its activities of helpdesk promoting the initiative *Salta la corrente* that aims to mainstream the transition to 100% green energy suppliers.

In 2017 and 2018 *Legambiente*, one of the major Italian NGO dealing with environmental advocacy, was awarded via a public tender procedure of the Municipality of Santorso to run the Helpdesk service (called

⁴https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC

Sportello Energia) created by the volunteers of “*Santorso buona pratica*”. The *Sportello* is a free service of the municipality to provide information about RES and beyond. The *Sportello Energia* started with only one meeting per month (every first Thursday in Santorso, 18h-20h) and expanded its coverage also to the neighbouring municipalities of Breganze (every 2nd Thursday) and Thiene (every 3rd Thursday). They are expanding their activities also on other RES, especially biomass in relation with private heating systems. After the success of the Helpdesk, many surrounding municipalities realised the importance of the service provided as well the potential of joined actions. For these reasons the group *Municipality for Sustainability* was created to coordinate actions across municipalities. The 13 participant municipalities are involved in all aspects: a quota of participation is calculated based on the size of the municipality and they share services and ideas trying to find synergies to develop RES projects. The helpdesk is a service provided by the Municipality without any kind of performance tracking. With no data it is not possible to assess the weaknesses of the service and to plan its implementation as well as to detect main needs from the citizens”. Since 2020 the service returned to be responsibility of the group of volunteers who originally created it.

The municipality of Santorso raising awareness and engaging citizens

Santorso remains the leader municipality, coordinating all the activities which currently consist in raising awareness, providing information on collective purchase of PV and available incentives as well as neutrally orient the consumers in the recently liberalised Italian energy market. For the future they are also planning to put in place initiatives i.e. charging columns for electric vehicles. The inhabitants of Santorso are the final users of the initiatives of the *Sportello energia* as well as for the voluntary based group “*Buona Pratica Santorso*”. Although citizens are not directly involved in the planning phase of the activities they are highly taken into account as the target group of all the activities.

The Living Lab considers the implications of the EU Clean Energy Package for the eventual creation of renewable energy communities in the area covered by the group of *Municipalities for sustainability* and options on how to finance these. This was also paired with an input on possible technologies best suited for enabling prosumerism on the local level. Specifically, PROSEU results were showcased to explain how to use and extract data to build scenarios from the PROSEU database of prosumer technologies for electricity and heat⁵. All participating municipalities have just committed to their new Sustainable Energy & Climate Action Plan (SECAP), therefore the PROSEU database and its practical application⁶ in supporting scenarios building both for technicians and for eventually enable citizens participation in the decision-making process was discussed and is considered extremely timely as it can support the implementation the new SECAP action plans, and specifically measures related to community production and use of local energy.

The participants feel motivated and empowered to act, in particular due to the commitment their municipalities have just signed to deliver the new SECAP. To touch base on the state of art in terms of policy developments responded to their specific request of having a better understanding of what energy communities may look like and which will be next stages and timeline of the transposition of the EU directives. Finally, to be introduced to financing opportunities works well to link the elements in a coherent narrative of movement toward the energy transition (set the regulatory framework – provide economic support to develop feasibility plans and risk assessments toward bankability – introduce to a database that can serve for building scenarios). Via the participation of *Coordinamento agende 21*, an organisation that supports municipalities in the region to localise Sustainable Development Goals (SDGs) and appointed Covenant of

⁵ Novosel, T. North-West Croatia Regional Energy Agency (REGEA); Pukšec, T.; Kampman, B.; Scholten, T.; Naber, N.; Gährs, S.; Knoefel, J. (2019). [Prosumer technology database](#)

⁶ Doračić, B.; Knoefel, J.; Naber, N. (2020). [Report on local, national and EU scenarios](#)

Mayors coordinator, the community has knowledge of some facilities to try to get a part of financing for local community production of actions, has the basics to use a scenario tool for the uptake of local community energy, has the possibility to feed scenario information to participations to plan to 2030 and 2050 their energy transition.

In the last intervention the LL managed to link with relevant actor at local, regional and national level such as *énostra*, a cooperative energy provided that acts at national level and which has been selected by the Italian National government to develop a pilot of Energy Community and ARPA Veneto (ndr *Regional Agency for the prevention and Protection of Environment*), a regional agency that support in the monitoring the environmental status of the region.

Outcome

Although the timeline of normative transposition (of the Clean Energy Package) and of PROSEU's work within the LL unfortunately do not match, this is the perfect moment in which to raise awareness on the potential of the municipalities and to leverage on the motivation of the communities. For this reason, the interventions focused on keeping the Municipalities up to date in terms of available options as well as providing with the knowledge for them to continue on this path. The group of municipalities gained self-confidence on the impact that they can have acting locally. Linking them with other initiatives (case studies) as well as with the European level, makes the LL feel part of a broader movement and increased their motivation; at the same time, a direct link with local actors strengthen the feeling that implementation is possible, resulting in higher motivation in actively pursuing initiatives.

4.6 Connecting Football to Renewables - KDN United Holsbeek – Belgium (PROSEU Focal Point: ICLEI Europe)

Where does the Living want to go?

The idea for this Living Lab was to set up a community-built and owned building, managed by the local football club KDN United Holsbeek. The project is supported by some (but not all) members of the municipal council. The building would serve multiple purposes for gatherings of the football club, but also for other local activities e.g. a coffee place, a co-working space, a space for sport activities other than football (yoga classes). In fact, the aims, additional to the pure construction, are to create a common space that would be used by the local community at large and provide them with a place to gather around common projects. The energy community creation could be a potentially important element for the integration of the local community and strengthen their bounds. The project is considered to potentially consist of different stages: The first stage is to build a wooden passive energy house. The idea of a new building has been on the table for many years, but has not led to a concrete action. It is critical that more stakeholders are brought on board and the local council has to be convinced of the project. The initiative has been launched in the form of a Living Lab in order to stimulate new ideas on how this building can be realized and to create a narrative around why proper integration of a cost-effective (community) prosumer angle to this project would make it more appealing to further stakeholders and especially the major.

Lead by the president of the local football club and placed in the community

KDN United Holsbeek is the local youth football club in the Municipality of Holsbeek. Prosumerism as a concept was not really on their radar before, but they had a general ambition to build the building as energy efficient as possible and use the building construction for enhancing local activities. Their involvement in the Living Lab was expected to provide them with new options on how they can integrate renewable energy technologies into the project. Key enabling condition was the high degree of voluntary commitment from

members of the football club. As the Living Lab is still in early stages, it profits a lot from high motivation of the people involved.

The municipality was represented on the Living Lab through a member of the local council. He is in close contact with the president of KDN United and a strong backer of the project. In order for this project to be successful, it requires the backing of the local council, both from a political perspective, but also in terms of finance as the football club does not have the financial capacity itself.

Interleuven, a cross-municipal organisation in the Leuven area which facilitates cooperation between the municipalities and provides capacity building. They were involved in this Living Lab as Holsbeek is a member municipality and the responsible person works part of the week for the Holsbeek municipality and knows the political situation well. Last stakeholder involved was Cenergy which is a one-man consulting company around IT and energy efficiency solutions. Cenergy involved in the Living Lab because would like to contribute to the project from a technical angle and he is well placed in the politics of the Holsbeek local council.

Involving football supporters

In order to further include citizens and members of the football club in the process, the creation of a renewable energy cooperative was explored. This Living Lab underscores the importance of political backing of the mayor and the council for the success of collective prosumer projects. It is also a question of land management as the local farmer, on whose land the building is to be built, needs to be convinced. A key observation has been that it is challenging to distil the discussions into one clear goal for this Living Lab. Discussions around this building have been ongoing for many years already. As such, many ideas for how the building could be used were already on the table. Creating a narrative of why integrating a prosumer angle to this community building, by e.g. installing solar panels, or facilitating the creation of an energy cooperative with members of the football club, would make it more attractive for the local council and the mayor to support this project.

In preparation of this narrative, and aligned with a citizen's environmental roundtable in the municipality of Holsbeek, several case studies were researched and presented as best practices for how sport clubs can facilitate collective prosumerism. One such example is the case of KV Oostende in Belgium where the (larger) football club has created an energy cooperative allowing supporters and surrounding residents to buy shares and to receive remuneration. It is expected that the cooperative will maintain the plant for a period of 20 years. After that time, the installation will be owned by the owner of the stadium. The football club profits from lower electricity costs and can provide an investment opportunity to supporters. In Amsterdam, a local baseball club has installed solar panels as well as heat pipes on the roof of the club's building. Most notably, the club has invested in storage units which enable the use of surplus heat in the dining area as well as in the sporting facilities. A modern water-water heat pump was also installed. All of this has resulted in significant reductions in electricity consumption as well as gas.

The main motivation, very relevant for the Living Lab, was to keep the price of sports low. If energy consumption and costs are declining, membership fees can be kept low also despite an overall increase in energy costs. In the UK, the football club Maidstone United has started a cooperation with a local already existing energy cooperative called Brighton Energy Coop. Together they have installed solar panels on the roof which provide a third of the required electricity. The same has been done in case of the German football club *FV Nimurg* which, working together with an already established cooperative offers local residents the opportunity to buy shares between 100 and 5.000 euros. These examples demonstrated to the Living Lab that several similar projects have already been very successfully completed with the backing of both

supporters as well as the local community. This provides motivation and insurance that similar projects can be done and are already running successfully.

Outcome

However, it turned out that this Living Lab has demonstrated that collective prosumer projects have a very hard time materializing if the political backing is not there. Unfortunately, despite quite some interest from citizens and Living Lab stakeholders, the local council was not unilaterally in favour of supporting a this communal building and a collective prosumer project. This meant that the football club would have a harder time finding funding and, considering the communicable dimension of the envisioned building, not having the go-ahead from the council would have made it very difficult to advance. In addition to that, due to private reasons, the president of the football club stepped down and with her the carrying force behind this project vanished. Although it is unfortunate that the project did not materialise, it does serve to highlight the importance of local community/council/mayor backing for collective prosumer initiatives. As can be seen in other Living Labs, having the local administration backing a project can be key to success.

4.7 Creating a valorisation chain for sustainable heat from wood chips - Getesnippers – Belgium (PROSEU Focal Point: ICLEI Europe)

Where does the Living Lab want go?

The *Getesnippers* Living Lab is based on a recently started project facilitated by cross-municipal organisation Interleuven, the region of Zuid-Hageland and the province of Vlaams-Brabant. The aim is to explore how the involved municipalities can cooperate to valorise wood materials from general landscape conversion and maintenance work (LCMW) for the production of sustainable heat from local resources. The background is that from 2050 public buildings in Belgium can no longer be heated through fossil fuels. Towards the end of the project, the idea that stands behind this Living Lab is to ensure that the project can be continued without external funding and the coordination can be taken over by a local partner. The discussion on possible business models and organisation plans was discussed. Currently, a lot more biomass is being imported to the EU than what is being produced and consumed locally while at the same time a lot of biomass feedstock is not being valorised and remains unused. Additionally, there are a lot of socio-economic values which are often overlooked such as local employment as well as independence from imported wood chips/pellets. Landscape management is already happening and the challenge is now how to best make use of this previously unused biomass in an economically-beneficial way (while producing sustainable heat).

Living Lab stakeholders shared the vision that they would like to supply all citizens in the region with sustainable heat in the long run, but also clearly emphasized that it is more of a dream at this stage and realistic goals need to be set. As a visionary goal, 3000-4000 households should be supplied. There is also a joint vision to set up short supply chains for local biomass feedstock and to make most effective use of it, but only if this does not have a negative effect on biodiversity. Ideally, biodiversity should be increased rather than decreased as a result of this undertaking. While there is a clear focus on creating a financially viable valorisation chain, it was also mentioned that the real profit comes in terms of performance on the climate mitigation and environmental management side rather than just profit. In fact, profit can even take the backseat.

Guided by inter-municipal cooperation

Interleuven is a cross-municipal organisation in the Leuven area which facilitates cooperation between the municipalities and provides capacity building. Interleuven coordinates the project and manages the involvement of its member municipalities in this Living Lab. Particularly the municipality of Hoegaarden participates actively in the Living Lab with the mayor rallying stakeholders behind the clear vision of providing citizens with heat from sustainable biomass from the region.

A question of landscape management and regional collaboration

ECO2 is a non-profit association aiming to maximise the potential of landscape management in Flanders. They facilitate the creation of zones for landscape management in which different stakeholders cooperate in the interest of better efficiency. They are involved in the LL because they are well placed to facilitate the cooperation of the different stakeholders based on their existing approach. The environmental service of Hoegaarden municipality is also on board.

The Province of Vlaams-Brabant coordinates the *Getesnippers* project together with *Interleuven* and RLZH, which is one of the 16 regional landscape authorities responsible for maintaining nature elements, for nature education and protection as well as the maintaining of walking paths. Living Lab meetings see the participation particularly of the municipality of Hoegaarden, for which the mayor attends as well as the municipality of Landen. They have a strong stake in the *Getesnippers* project as they have landscape management works taking place in their contexts and are looking into options for using wood chips for heating e.g. in a local school. The effective interplay between the LL stakeholders in previous projects provides the basis for cooperation in this Living Lab.

As the focus of this Living Lab was on creating a valorisation chain for biomass feedstock, prosumer business models analysed within PROSEU were mostly of a different character. The purpose is to arrive at a valorisation chain in which the different municipalities and (in the long-run) private citizens are buyers of the sustainable heat. Therefore, the final cost of heat supplied needs to be as low as possible and is subject to many technical conditions incl. the employment of maintenance workers, the collection and drying of the wood chips as well as the process behind creating the heat (gasification vs. burning).

In terms of barriers, it is acknowledged that running and maintaining the valorisation chain is a business which brings with it its own set of challenges. It is possible that a lot of energy will be invested in this endeavour, only to then bump into regulatory barriers which might lead to high frustration, similarly to what is often experienced with wind turbines. It is also true that fairly little money is available for the entire project and, currently, it is all very project-based. Valorising local biomass could lead to a decrease in biomass if not done correctly. The different landscape elements are fairly dispersed requiring a rather complex chain. This means that the business model needs to be clear and the “energy business” needs to be positive. It requires a high degree of commitment and business sense. Going forward, the right kind of legal enabling framework is also required (in terms of getting permits). The administrative cost should not be underestimated and the *Gestsnippers* project needs to prove that the valorisation chain works.

A presentation of different prosumer business models as well as the presentation of the prosumer business model canvas gave Living Lab stakeholders a general overview of business model logic. As a result, the need for concrete case studies on different business models on bio energy (valorisation chains) as well as on (financial) incentives for public buildings to upgrade their boilers has been identified. There is a need for examples on how the use of residue biomass feedstock can be done in a way which facilitates cooperation between many different stakeholders and municipalities and to highlight how citizens/prosumers can profit from such a scheme. Examples are provided also regarding stakeholder engagement on biomass heating

from other contexts. Another need is for information on possible (EU) funding sources to complement since complementing the internal valorisation chain with further funding (e.g. to finance end-use biomass boilers, central or decentral) might be beneficial.

One example which has been presented was “*Energiequelle Wallhecke*” in Steinfurt County, Germany. In that case, 170 km of hedges are being regularly maintained and the collected biomass turned into woodchips for heating. They are using a centralised management system to gather information about all hedges and to make economic analyses for hedges in clusters to increase efficiency. In that particular case, the wood chips are being directly sold to end-users which includes a broad spectrum of buildings. The overall valorisation process is being coordinated by one stakeholder.

Insights were also given into which particular type of wood provides the best wood chips. Biodiversity also needs to be considered in order to prevent planting of just one particular sort of wood. As a basic rule, it was established that 50 households could be supplied with sustainable heat from about 1.1 km of hedge trimmings. It was considered whether in *Getesippers* case the creation of one central point for the collection and valorisation (drying/gasification) is feasible. Some of this work could be outsourced to private parties rather than the regional landscape management authority. This would, however, reduce the appeal of the system as a “closed loop”. Proper communication to citizens as to the need for LCMW of hedges is also highly important to increase acceptance.

Insights into a template for biomass valorisation chains was given by referring to a handbook for LCWM produced by the European *greenGain* project⁷. Another example featured a district heating network in a German municipality fed with local wood chips. The network is connected directly to municipal buildings as well as households. The network is owned by a local energy cooperative in which residents buy shares. In that particular case, the chain is being managed by the regional energy supplier. In the case of the Dutch heating network in Zaanstad, one company is managing a central biomass boiler as well as the district heating network. The wood used is also residue wood from LCWM and a company is providing guarantees of origin. In terms of valorisation, some woodchips are also being exported to Germany.

Regarding the European framework, it was stressed that residue biomass feedstock is no longer being classified as just waste within RED II. In terms of burning the biomass, high environmental criteria is stressed and some examples have been given of how the burning of biomass might lead to restrictions e.g. in Krakow where heating with wood and coal has been banned in the city. The European Ecodesign directive also needs to be considered regarding max. emissions from household boilers/ovens/CHPs. The EU Green Deal and Climate Law are presented as being game changing for how sustainable biomass can contribute to reaching climate neutrality by 2050. However, the overall sustainability of biomass will be reviewed in the near future. This has implications for the *Getesnippers* project as boilers need to be constructed with ambitious goals in mind. An overall overview of the potential funding mechanisms from the EU as well as the just transition mechanism is provided. It is highlighted that the EU is not a big fan of wood pellets since their production is energy intensive and mostly a lot of the production is not really sustainable, but this should be no issue for *Getesnippers* since wood chips are being used from LCWM.

In the long term all households in the regions should receive sustainable heat from LCWM. It is being highlighted that this is a vision and it is clear that implementing this in reality is more difficult, but (particularly the mayor of Hoegaarden) mentioned that it is important to stand behind a joint vision. The valorisation

⁷ https://greengain.eu/wp-content/uploads/2017/12/646443-greenGain_D3.7-Hanbook-for-know-how-on-LCWM_FINAL-with-bullet-points.pdf

should include “short” chains and shall increase biodiversity rather than decrease it. The process should be a solution for public space and well as private space. In terms of gain, it is stressed that the overall gain for the climate and the environment is more important than huge financial profit. The ambition is to maintain the cultural heritage in the Gete region which is particularly the hedges separating fields. Proper maintenance of these hedges coupled with local climate action is therefore very attractive. In the long term 3000-4000 individual households should receive the sustainable heat. This will also require the planting of new hedges.

In order to achieve this, it is important to get the right kind of data of creating an inventory of valuable hedges and other kind of LCWM assets. Digitalisation has a role to play in this regard. Connecting to the issue of energy poverty seems beneficial and this will require properly analysing which residents are experiencing energy poverty. Perhaps creating a district heating network in just a very local specific area could be an idea and installing a biomass boiler in a municipal building is an option. In this regard the options offered by the Clean Energy Package in terms of creating renewable energy communities and the opportunities for municipalities in joining them have been highlighted. It is clear that one entity will be required to facilitate the entire process in the long-run, perhaps the provincial government could support in this regard. It is not fully clear whether a central or decentral approach for burning the wood chips is preferred. It is mentioned that the biomass potential could be expanded to also include e.g. Christmas trees. Going forward, it will be highly important to also include citizens in the process (also in terms of consultation).

Bundling the many different steps in the Getesnippers project, the Living Lab created a four-step process based on a guide created by the greenGain project. The process encompasses a preliminary assessment of the value chain, followed by a detailed feasibility analysis, the implementation works followed by continuous operation monitoring a maintenance optimisation. Living Lab stakeholders discussed how to what extent these steps can be filled in with information already generated by the project to that date. Laying out the potential for useable quality and non-quality biomass feedstock, stakeholders discussed requirements for appropriate machinery for the cutting work, but also weight the environmental cost-benefits of burning the wood chips vis-à-vis using them for other purposes e.g. ground cover and composting. While the economic analysis is something which will be done more extensively in the future, a significant cost savings are envisioned since heating oil could be replaced. These savings could be potentially invested in planting new landscape elements. Several potential locations for the LCMW were identified and their potential put in relation to expected demand for wood chips for sustainable heat, which is likely to increase. It was acknowledged that a the participation of a broad range of stakeholders, in particular also nature protection organisations (as critical voices) will be very important and an inclusive information process towards citizens is essential to ensure acceptance. Implementation of the work will require the acquisition of permits as well as initial subsidies for a biomass boiler. Regarding the latter, the idea came up to reach out to a local school which placed a lot of emphasis on sustainability and already have solar panels installed on its roof. It could be well-suited to act as a potential end-user of for the woodchips.

Outcome

This Living Lab has established a better understanding of the factors which needs to be considered when creating a valorisation chain for biomass feedstock from LCMW. As a result of the activities a step-by-step approach for Getesnippers was created which serves as a template to enable a more stream-lined process going forward. Obviously, the exact order of the steps can change due to local framework conditions, but it was acknowledged that having such a guide is very helpful going forward. In the long-run, it is planned that this guide will also serve to replicate the Getesnippers approach to other regions in Flanders. All involved stakeholders have been united under a common vision for a sustainable heat supply in the Gete region and allowing citizens to profit from that while maintaining the cultural characteristics of the regional landscape. The Living Lab has also shown that while the prospect of using LCMW for sustainable heat is a good one,

a lot of planning resources have to go into setting up the collection, drying and identification of suitable landscape elements as well as the permitting and information aspect surrounding it before consideration can be given to using the woodchips for sustainable heat.

4.8 Bristol Energy Cooperative – United Kingdom (PROSEU Focal Point: University of Leeds)

Where does the Living Lab want to go?

Bristol Energy Cooperative (BEC) is a community-owned energy cooperative, growing Greater Bristol's local green energy supply and making the benefits available to all. They develop renewable energy and energy efficiency projects and help others to do the same. They started in 2011. BEC projects are funded by members, who receive interest on their investment from the money they receive for the energy BEC produces. Decisions are made on a one-member one-vote basis at their general assembly meetings. BEC aims to support the creation of a resilient, robust and organised community, and respond equitably to current and future energy challenges, in particular to enable meaningful cuts in carbon emissions, and reduce dependence on unsustainable sources of energy and to fund and implement renewable energy and energy efficiency measures, in collaboration with people, communities and businesses. Working cooperatively with people and communities to make carbon reduction technologies available to all, regardless of financial resources, and supporting them in mutual action to respond to the challenges of climate change is also at the core of this Living Lab. In the UK, community energy projects have long enjoyed a considerable success and Bristol Energy Cooperative is one of these well-established cooperatives which got started in 2011 and can now be considered a people-owned power station for Greater Bristol. They have been very active and successful in pushing community energy projects forward. The scrapping of Feed-in-Tariffs (FiTs) in the UK in 2019, is presenting a major challenge to the business model of community energy groups. In response, community energy actors such as BEC are exploring new business models, which allow for greater self-consumption, but they are having a more difficult time developing sustainable business models despite the fact that the cost of renewables has decreased in recent years. BEC is cooperating very closely with the City of Bristol and plays an important role in increasing Bristol's nascent decentralized energy scene.

Rooted in the local community and environmental consciousness

Much of the cooperative's work revolves around the engagement of the local community, but also the city council. Since the primary focus of BEC is to mitigate the city's climate impact as well as to specifically provide value to the local community, the cooperative employs a diversity of staff with strong backgrounds in environmental policy making and with experience working for local governments.

Exploring new business models

Within its frame of a Living Lab, *Bristol Energy Cooperative* is exploring new potential business models to guarantee further exploitation of larger-scale renewable energy plants even without a fixed remuneration guaranteed under the previous FiT system. The Living Lab provides a space for exploring the challenges and opportunities facing the Bristol Energy Landscape to explore how Bristol can continue to be a frontrunner in the UK's energy transition. It is therefore important to bring together a diversity of actors including local government, community energy organisations, businesses, citizens, academia and the third sector. The Living Lab brings to the table Bristol's municipal and community energy and finance actors to discuss the opportunity and barriers of launching a *Community Municipal Bond* (CMB) in the City. The Living Lab focused on the practical opportunities and challenges of launching this innovative Public/Community

finance mechanism in the city. The aim is to chart a path forward for realizing the goal of delivering low cost finance for emerging community and public energy projects in the Bristol.

It is identified that the financial barriers for BEC are largely due to the cost of capital (interest rate) rather than raising volumes of finance. The typical cost of capital for traditional community crowdfunding has been in the 4-5% range, whereas the CMB can achieve rates <2%. However, a key outcome is that securing financing is always secondary to having a functional business model. The UK's withdrawal of the FiT makes this very difficult even with a low cost of finance. There are some concerns relating to the governance and control of such a mechanism. Given that the CMBs are issued by councils, the council may wish to have significant control and oversight of the projects that are funded. Community energy groups like BEC may therefore prefer the traditional more expensive financing routes, due to the greater agency they may have over this process. This further suggests that the interests of local authorities and policymakers in achieving maximum scale for lowest cost – as with a CMB – may not always be aligned with civil society/community prosumer groups who may value local value and shareholder profits above scale.

The Living Labs explored a diverse set of business models based on extending the definition of self-consumption to neighbourhoods or multi occupancy buildings. Here, more contributions are needed to system charges, and these models enrol a more diverse set of actors into prosumerism and the energy transition. As they seek broader revenues, these business models need to solve problems for other system stakeholders. The more a business model expands into capturing flexibility revenues and decarbonising other energy vectors, the more complex it tends to be. This complexity increases the need to invite other stakeholders into partnership, such as peer to peer platform providers, aggregators or larger energy service companies (ESCOs).

Where this is the case there may be a tension between the community value logic of some renewable energy communities (RECs) and citizen energy communities (CECs) and the commercial logic of partners. For regulators, managing this tension between pure market actors and RECs and CECs means drafting regulation that explicitly shows where simple 'barriers to entry' are being removed, and where RECs and CECs/collective prosumer are being specifically empowered to do something a commercial entity is unable to do. In the models presented, the only explicit example of this is the Postcoderoos model in the Netherlands whereby predominantly co-operatives and Residents Associations can access the tax incentive of collective self-consumption. In other models, the need for close local engagement and small-scale organisational forms may lead to mutual and not for profit governance structures being preferred.

In particular the potential for a UK version of the German *Mieterstrom* model or variants of the Spanish Auto consumption (*Autoconsumo*) model are seen as potential models for social housing in the city. Even though a digital format was chosen once, there was much agreement on the importance of the UK's regulator *Ofgem* in enabling these business models, pointing to the already successful small supplier derogations.

Outcome

This Living Lab has focused particularly on strengthening the position of Bristol Energy Coop as an enabler of socially-inclusive prosumerism in Bristol, particularly in cooperation with the City of Bristol. Having discussed a variety of different possible business models (which have also been in detail collected as part of D4.2 "Policies for Prosumer Business Models in the EU"⁸) the Living Lab considered especially the

possibility of supporting a *Community Municipal Bond* and how this could fit with the values and overall goals of *Bristol Energy Coop*. The Living Lab helped shed new light on the position of cooperative actors in a post-subsidy landscape and provided good networking opportunities. However, it was clear that it did not alter the fundamental issues facing the sector. The global pandemic has made Bristol Energy Coop's activities more challenging and it's long-term, future less certain. The economic downturn that has followed the lockdown has led to fewer proposed projects, and issues with existing ones due to social distancing requirements.

4.9 Bristol Energy Company – United Kingdom (PROSEU Focal Point: University of Leeds)

Where does the Living Lab want to go?

Bristol Energy (BE) are one of the UK's emerging municipally owned energy companies, alongside *Robin Hood energy* in Nottingham, Cheshire East council and several niche municipal ESCO. *Bristol Energy* seeks to challenge the UK's big six energy companies, although with an explicit focus on the city as its core customer base. Indeed, as of August 2019 they have 100,000 customers - with the majority based in a city of only 463,000 - a significant market share. Although localism has been core to the organisation's brand, their stated aim is to address issues of fuel poverty and deprivation through a focus on affordability, home insulation programs and vulnerable consumers. Although operating a for-profit model, Bristol Energy will recycle any profits into the wider council's budget and must also repay their initial £27 million start-up funding. Bristol Energy aims to make a meaningful difference to the energy sector and give everyone access to fair, transparent tariffs and great customer care.

Offering electricity purchasing services to local renewable generators and supporting the city's vision

Bristol Energy have also been heavily involved in the cities' low carbon transition: offering favourable power purchase agreements (PPAs) to small renewable generators alongside a route for the council's investment in low carbon infrastructure through Bristol's £1bn 'City Leap' programme. Bristol Energy have been involved in an innovative trial with the UK's Energy Systems Catapult to develop an 'energy-as-a-service' business model. It is hoped that in time this business model will develop into a full prosumer offering, with low carbon heating systems and solar panels offered to customers on long term energy performance contracts. However, the current energy system regulation and wider institutional norms are presenting challenges in moving beyond the trial stage.

Key issues related to the capacity of an organisation like BE to deliver significant scale in this agenda, despite being relied upon by government for the delivery of insulation programs like the ECO. One important area of focus is the role of municipalities in this story and how municipally owned energy suppliers such as BE could be leaders in this agenda. The view was that current electricity market regulations – especially in relation to supplier switching – effectively prevent them from forming municipal ESCOs. Indeed, the general view was that the wider retrofit agenda – including uptake of rooftop PV – would struggle without increased government policy support. However, it was acknowledged that the COVID-19 outbreak is presenting a new 'opportunity space' for government policy action and the potential devolution of energy planning powers to local authorities, especially considering the UK's heavily centralised system.

This Living Lab, also particularly involving *Energiesprong*, *UK SmartKlub*, *Bristol City Council*, *Centre for Sustainable Energy*, *Bristol Energy Network* as well as *REGEN*, therefore investigates how these emerging business models could contribute to the UK's net-zero ambitions for the built environment. The focus is on

five key elements of these business models and the challenges faced by organisations, such as Bristol Energy in adopting them:

- **Value Proposition** - the value or utility from goods and services that is provided to the customer
- **Customer Interface** - all downstream, customer-related interactions including the relationship the customer has with the supplier organisations in terms of marketing, sales and distribution channels and the ongoing relationship with the product or service.
- **Supply Chain** – the upstream relationships between an organization and its suppliers comprising the logistical and technical elements that enable delivery of the value proposition
- **Financial Model** - the combination of an organisation's capital and operational expenditures with its means of revenue generation - in terms of what products and services customers pay for and how revenues are collected and distributed.
- **Governance** - the co-ordination and management of the other components and the organisational form of the business model – involving a single organisation or a network firms that interact to provide a service or product, including a range of legal forms, with varying levels of public, private and civil society governance.

Energy as a service

Energy as a service models have the potential to deliver real performance outcomes, offer a simple and compelling customer offer and provide secure returns for finance providers. These models will also help to integrate low cost but intermittent renewable electricity with other energy vectors such as heat, as well as demand side flexibility although require interoperable systems, aggregators and new regulation. Deeper and broader service models have higher transaction costs and face a number of barriers to adoption. New homes can be an easier first market for these business models. These longer-term models require trust with the role of government, local authorities and community groups essential in building it. The UK's supply chain, especially SMEs, are not well adapted to this market and there is currently a major skills and knowledge gap. Regulation also lags behind and there are also significant regulatory overlaps between, energy building and financial regulation that need addressing coherently for this market to flourish. Government needs to intervene to offer low cost, long term patient finance, if the existing housing stock is to be upgraded in line with 2050 targets.

Energy used in buildings and especially homes are a major source of carbon emissions - remaining stubbornly high in Bristol in recent years. Overcoming this issue will require the retrofit of energy efficiency measures and the installation of PV panels and low carbon heat systems. It is increasingly clear that to address these issues integrated 'one-stop-shop' and energy as a service business models may provide a solution. The Living Lab further explored the potential of new retrofit business models to understand how different stakeholders present might facilitate their adoption.

Low carbon, energy efficient housing creates multiple benefits beyond climate change. Warm, well insulated homes are proven to improve occupant health and wellbeing, have a higher market value, and require less maintenance. Further, by drastically reducing the energy bills of lower income households, whole house retrofit can be used as a core tool in addressing economic deprivation and inequality. Current policy is failing to deliver. The current suite of government policies is woefully inadequate for addressing these challenges. Successive cutbacks and failed policies during both the Conservative and Coalition governments now mean Bristol is far off track for meeting its climate and social policy objectives from new and existing homes.

The scale of challenge for existing homes necessitates a step change in how retrofit is undertaken, funded and regulated. This will require a multi-measure whole house approach involving the adoption of deeper measures, low carbon heat and renewable microgeneration. Delivering this will require a joined up systematic approach covering multiple sectors and policy domains. Most of all this must be based around

creating demand for warm and comfortable homes, rather than a narrow focus on cost savings. Regulations will be required to meet this challenge. The cornerstone of this strategy must include stringent minimum energy performance standards for existing homes. These should start in social housing before being introduced for the private rented and owner-occupied sectors. These efficiency standards will need to be accompanied by a moratorium on new fossil fuel heat. This should be introduced immediately for new homes, and towards the end of the 2020s for existing homes. However, this regulatory 'stick' approach might only deliver part of the goal, with the rest requiring voluntary uptake based on the positive vision outlined above. A strategic approach across multiple levels of government will be required. A national level taskforce could coordinate and support the action of local authority led, area based retrofit programs. These bodies will require significant funding and support and will act as the key delivery agent and interface with communities. Crucial to this will be both the development of high-quality property level data and strategies, through building renovation passports and the integration with key community stakeholders and agencies. This will require a radical rethink of the business model through which retrofit is delivered. The traditional business model for the delivery of retrofit measures has been a fragmented patchwork of subcontractors, who provide few guaranteed-on performances. Best practice examples of 'one-stop-shops' providing a whole house retrofit through a single point of contact will need to become commonplace.

The Living Lab shows that Bristol currently has a massive skills gap that must be urgently addressed. The scale of the new build and retrofit challenge will require 100,000s of new highly skilled tradespeople in a short period. This will require a significant overhaul of, and investment in training the construction industry. This should be managed to ensure that these new jobs provide long term security and avoid a 'boom and bust' effect. Building regulations, construction standards and product certification require urgent review. Although new standards for retrofit are currently being introduced this process should be ongoing and seek to broaden its focus to issues surrounding moisture, air quality, fire safety and environmental impact of materials.

New funding and financing mechanisms are needed. The UK's current funding mechanism for fuel poverty - ECO is too small and poorly suited for its purpose. New policies should instead increase the grant funding for fuel poverty, bring it back into general taxation and focus on multi-measure, whole house retrofits. A range of low/zero interest loan schemes could be adopted with different funding models. These mechanisms will need to address split incentives between landlords and tenants, have a low or zero interest rate and also provide funding work and wider renovation work beyond energy savings. Fiscal incentives can be a key driver to uptake, especially at key trigger points. Whole house retrofits are likely to be far easier and cheaper, when integrated into wider renovation or building works. A range of incentives could be designed for this purpose, although our modelling focused on both reduced VAT for renovation work and variable stamp duty. These policies were shown to have a significant impact. The majority can be met at these natural trigger points. Living Lab discussions are fed with modelling which has shown that in conjunction with the regulatory policies outlined above, these fiscal incentive programs could allow the majority retrofit targets to be met through existing junctures - such as undertaking major renovations, boiler replacements or when moving home. This programme costs would be very significant, although would deliver a huge range of benefits: from savings tens of billions in energy bills, to reduction emissions from homes by over half by 2030 and significant improvements in public health. Moreover, the rate of deployment would be unprecedented, creating hundreds of thousands of jobs by doubling of the current renovation market in terms of people employed. This would also create a comparable number of indirect jobs in the wider economy. Government should therefore ensure that this employment is sustained through new programs of investment in the housing stock in the 2030s and beyond. We must act now as delaying will only make meeting this challenge harder.

Outcome

This Living Lab shows that deep retrofitting and “energy as a service” through effective ESCO schemes has a lot of potential, particularly for Bristol Energy. Given current regulatory framework conditions in the UK, much attention has been given to develop policy recommendations on how the enabling framework needs to change in order for actors, such as Bristol Energy, to be able to significantly step up their game when it comes to energy retrofitting. Bristol Energy have been involved in an innovative trial with the UK’s Energy Systems Catapult to develop an ‘energy-as-a-service’ business model. It is hoped that in time this business model will develop into a full prosumer offering, with low carbon heating systems and solar panels offered to customers on long term energy performance contracts. However, the current energy system regulation and wider institutional norms are presenting challenges in moving beyond the trial stage.

Actors such as Bristol Energy are forced to emulate the practices of conventional energy suppliers, despite their social value objectives. In time it is hoped that concepts such as energy service models can begin to challenge the dominance of the market paradigm. However, UK municipalities face significant structural challenges in developing prosumer business models against an ongoing backdrop of austerity and privatisation. Due to the COVID:19 outbreak, all of the main contacts in the organisation were placed on the governments job retention scheme. Subsequently, Bristol City Council plan to sell the company into the private sector. Although Bristol Energy’s Heat as a service model is viewed as a successful and innovative pilot, the company were not been able to commercialise the offering.

4.10 Supporting sustainable heat through cooperatives – Buurtwarmte – The Netherlands

Where does the Living Lab want to?

The Buurtwarmte Living Lab supports the development of neighbourhood energy cooperatives aimed at providing sustainable heating to its members. This can use a variety of technological options depending on the specifics of the area (district heating, heat pumps, etc.). In the long run, Buurtwarmte wants to support as many neighbourhoods as possible. The Living Lab stakeholders envision that in 10 years all the financial streams from the government aimed at increasing sustainability, will no longer predominantly go to businesses, but to citizens. The initiative has been started by four citizens with a background in energy cooperatives in different cities. They want to compile the knowledge and experience they gathered through the initiatives in their own neighbourhoods and make this available to other neighbourhoods in the Netherlands. The Netherlands is facing the daunting task of switching heating in the urban environment away from natural gas and towards renewable sources. They felt this transformation was not going to succeed without the involvement of citizens.

They do not (yet) have clear long-term goals, apart from supporting as many neighbourhoods as possible. The ‘neighbourhood approach’, as Buurtwarmte calls its service, will be developed further in the coming three years, with an aim to create a complete support structure for the uptake of sustainable heating systems at the neighbourhood level. The initiative will be a service offered by the umbrella organisation for energy cooperative ‘Energie Samen’ (the REScoop.eu of the Netherlands). It is not yet clear what legal form the initiative will take. To offer the service Buurtwarmte will work together with another Energie Samen service: ‘HOOM’. Buurtwarmte will focus on the collective social process within the neighbourhood, while HOOM will focus on individual support and advice to households regarding insulation, energy efficiency, and RES technology. In addition, the living lab members are involved in fact finding, training, lobbying, and community activities regarding sustainable heat.

They want to function as a 'layered network organisation' meaning that their central focus is local initiatives, but they try to connect different initiatives in the same regions to provide support, and develop a national service that provide support throughout the country, but using people coming from 'local' initiatives. More insights into how local sustainable heating systems are governed is therefore required.

Promoting citizen-led heat as an alternative to natural gas...and earthquakes

The public debate in the Netherlands around the use of natural gas, has taken a sharp turn since the increasing strength and prevalence of earthquakes related to the production of natural gas between 2012 and 2014. This has opened up the debate about the use of natural gas for heating in the built environment, and has switched the discourse from 'natural gas as safe, clean, and affordable', to 'getting rid of natural gas'. This has enabled new initiatives to emerge due to increased awareness among (frontrunner) residents and the national government.

As part of the Dutch climate agreement the cooperative movement has successfully lobbied for an increased share of citizen owned RES. The agreement now includes the aim of achieving 50% local ownership for new RES projects. Although this mainly applies to solar and wind projects, this does increase the general climate for citizen initiatives. Despite scepticism by governments, the cooperative movement is also making a breakthrough. It is growing quickly (from 400 in 2017, to 500 coops in 2018). And some large cooperative wind projects have shown that coops are capable of handling larger projects. Moreover, the lobbying efforts and cooperation between different coops has increased, for example through merging several representative and umbrella organisations under the header of abovementioned Energie Samen. A more confident and organized cooperative movement improves the general climate for new initiatives to start. Also, increasing dissatisfaction with the government when it comes to energy related issues has resulted in groups of frontrunners taking measures in their own hands.

The increased flexibility of the labour market in the Netherlands is also a driving factor for the cooperative movement with more and more people becoming active as freelancers, using the ZZP legal structure (independent contractor without employees). For example, many former government employees are now working as independent contractors for coops. This has allowed coops to make use of professionals without needing to hire fulltime employees (which most cannot yet afford). A large pool of flexible professionals has emerged that can help cooperatives with communication, asset management, project development, etc. Now cooperatives are growing the first cooperatives with full or part time employees are starting to emerge.

A foundation supporting sustainable heat cooperatives

The (non-profit) foundation "050 buurtwarmte" was founded by two energy cooperatives in the Dutch city of Groningen, "Paddepoel Energie" and "Grunneger Power". It is currently managing the initiative "Buurtwarmte Paddepoel to develop a community owned district-heating system for the Paddepoel neighbourhood using a communal heat pump and is also engaged in the overall Living Lab called "Buurtwarmte". The foundation's goal is to use the knowledge acquired during this project to help other neighbourhoods in Groningen develop an alternative (to natural gas) heating system. They did this within the framework of the Living Lab. Through a neighbourhood process in which residents can, together with the foundation, develop a plan for the heating system. Interestingly they are not only partnered with the municipal heating company, but also with Dutch energy giant Shell (who supports with funding and technical knowledge). They became involved in the Living Lab to share and expand their knowledge, and support other citizens in starting heat initiatives. They are still in the planning stage.

Limited visibility/not being known among policy makers is also an issue. As with many starting initiatives 050 buurtwarmte has the problem of not being known enough, nor being able to get a seat at the table in

some (government) coalitions/partnerships. Interestingly municipalities and provinces do not see BW or the cooperative movement as a movement that represents the public interest, but as a stakeholder with a 'private' interest. On the other hand, BW indicates that consultancies are seen as 'neutral', because they do not have an 'interest' in a certain outcome (e.g. a private or a cooperative heating system). For example, 050 buurtwarmte indicated that the municipality found they were commercially driven (even though they are non-profit and will (likely) share knowledge under creative commons licenses). The fact that 050 buurtwarmte is a cooperative is considered as just another type of company which might be acting in the interest of a project developer aiming to build and operate heat pumps. In addition, the cooperative movement is also seen as not professional enough to be able to undertake such ventures. Generally, they feel that they are not being accepted by the major actors/stakeholders in the Dutch energy transition as an important party in this transition, for example by those involved in the national Dutch 'climate accord' (a multi-stakeholder platform that will result in a policy agenda on climate and energy for the coming years). Currently, the role of citizens is not high on the agenda. Even though there will be government money available for housing insulation and switching heating systems, most of this will go to housing corporations and commercial project developers.

Sharing their experience - Thermobello

Thermobello is a local heat company in the EVA-Lanxmeer area of Culemborg. All of the shares of the company are owned by an energy cooperative. The inhabitants of the neighbourhood are members of the cooperative. The system uses heat from waste water with a gas kettle as (emergency) back-up during very cold days. They are looking for other back-up options. They are a frontrunner in the Netherlands when it comes to local sustainable heat provision in a collective manner. They joined the Living Lab to share their knowledge, support other citizens in developing such systems, and accelerate the energy transition.

Supporting other citizens in taking up heat initiatives

Blauwvinger energie is an energy cooperative in the Dutch city of Zwolle. Its main goal and activity is to produce energy from renewable sources, for now only from solar PV, but also has activities around energy saving/efficiency (home insulation) and heating. They became involved in the Living Lab to share and expand their knowledge, and support other citizens in starting heat initiatives.

Warmte-net Oost Wageningen (WOW) is an energy cooperative in the Dutch city of Wageningen which has been set-up by residents of the neighbourhood of "Benedenbuurt", together with the municipality, to develop a local district heating system for around 470 houses. In 2019 it has 113 household members. The current plan is to develop a high temperature district heating system, to prevent having to do costly adaptations to the relatively old houses in the area. This will be done in combination with promoting insulation, induction cooking, and solar PV. They became involved in the living lab to share and expand their knowledge, and support other citizens in starting heat initiatives. They are still in the planning stage.

Providing advice on energy saving, insulation and sustainable energy technologies

Hoom is a national cooperative aimed at helping local energy cooperatives, initiatives, and households implement energy savings activities. They do this through knowledge sharing, training, and tool development. They have partnered with Buurtwarmte and will provide, in tandem with the collective process, individual advice and support to households e.g. regarding energy savings, insulation, and sustainable energy technologies.

All under the umbrella of Energie Samen and in cooperation with Hier Opgewekt

Energie Samen is the trade/umbrella organisation for sustainable energy initiatives from citizens, companies, and farmers. Their activities include lobbying, project and cooperative development (electricity, heating mobility), energy efficiency (through Hoom), IT services for energy cooperatives, and knowledge sharing (through HierOpgewekt).

The Living Lab co-creates with a diverse group of actors on what a commons approach to sustainable local heating systems can look like. One way they did this was through a multi-stakeholder workshop. This included reflections on how a citizen initiative on sustainable heat in the city of The Hague is using the concept of a ‘commons’ as well as a presentation by Living Lab stakeholder “Blauwvinger Energie” on how the overall Buurtwarmte Living Lab could try to implement a commons approach, and what could be the guiding principles and values necessary for such an approach. The best practice example from a local sustainable heating initiative in the village of Heeg, and the Frysian ‘Mienskips energie’ organisation, which provide a type of certification for cooperatively organised energy initiatives, was also presented as a way to institutionalise – standardise and communicate – a certain set of values in relation to energy production. E.g. the Mienskips energie certificate is used to communicate to municipalities that the initiative holding the certificate is operating in a transparent and inclusive manner. Regarding the Buurtwarmte values, it is established that commons is one important value that the initiative associates with the energy transition and prosumerism. They see renewable energy as a commons that belongs to everyone and citizens taking control of what happens in their surroundings. As one participant puts it: “we are building a commons, it is my dream that in 10 years all the financial streams from the government aimed at increasing sustainability are no longer predominantly going to businesses, but to citizens”. They find that cooperatively owned or run systems, that are set up by the neighbourhood itself are more transparent because there is more insight in the system and its management for the members of the coop. On a more macro level it can help overcome monopoly issues and in transparent pricing of district heating networks. They are actively working to increase diversity within energy cooperatives. Stakeholders in the Living Lab know they will not make it only with technically minded men, there is a need a diversity of people to make this happen. Moreover, they need most people in a neighbourhood to partake when they are helping a neighbourhood set up a heating system. This will require ensuring that their communication is accessible to people with non-technical backgrounds.

Outcome

The Living Lab’s needs are met by providing a network opportunity for the living lab with important stakeholders, such as local and national governments; by them being able to test/validate their guiding principles, which helps them improve their service and ‘salespitch’. In addition, it supports the broader discussion among researchers, policymakers, and practitioners on this topic. The experience was very positive, the Living Lab managed to get an interesting group of people together and was able to contribute to Buurtwarmte’s development with a focus on dealing with institutional barriers. At the same time, in hindsight both parties feel they could have put more emphasis on evaluation and reflexivity during the Living Lab process. Especially given the fact that the DRIFT researchers as ‘outsiders’ had a good position to help the living lab participants with this.

4.11 VVe Aardehuis – The Netherlands

Where does the Living Lab want to go?

Aardehuis, an eco-village, wants to find the institutional barriers around prosumerism in the Aardehuis, and to co-create solutions together with relevant stakeholders to overcome these obstacles. Aardehuis wants to reduce peaks on the electricity grid. They want to do this by contributing to ‘peakshaving’ which refers to

reducing grid congestions through batteries, smart meters and local exchange of energy. Another goal is improving the net energy consumption of the prosumers living in the Aardehuis, by learning from each other's best practices. The activities in Aardehuis are motivated by real concerns of this community around the high energy usage in construction and a generally individualistic way of living of the current society. Residents of the Aardehuis communities have realised that things need to change and that they can be an example. Their houses are built sustainably and to tackle the waste problem they have made use of old car tires. The Living Lab is also driven by autonomy on the understanding that at least they can make a difference and do things the right way. This entails building in a smart energy saving way from the beginning. Under the motto 'living and working together in harmony with the environment' and to be an inspiration for others, they want to show that things really can work differently. Being far from secluded, however, they have welcomed 8000 visitors since construction. Aardehuis is organised by means of sociocracy. Decisions are made by consent, meaning that everyone has to agree with decisions. The ecovillage has a board, regular member meetings and work groups.

An ecovillage stepping up its prosuming game

This Living Lab is centred around a single eco-village in Olst: Vereniging Aardehuis. It is an ecovillage, founded 5 years ago, a community of households who generate their own electricity. The goals of the Living Lab are to find the institutional barriers around prosumerism in the Aardehuis, and to co-create solutions together with relevant stakeholders to overcome these obstacles. Vereniging Aardehuis in Olst wishes to become 100% self-sufficient, no longer needing electricity from outside of the ecovillage. They are interested in being an energy-plus neighbourhood. They currently already are, at times - meaning they generate more electricity than they can consume. To become 100% self-sufficient, they want to implement a sea salt battery for energy storage, and are interested in implementing a smart/micro-grid. They also aim to make battery storage and/or smart systems more scalable for other communities, by finding ways to reduce costs of the installation of these systems.

Currently, they have already received subsidisation from the government for the battery, but still have to pay 25,000 EUR themselves for the peripheral appliances of the battery system. Thus, net metering remains the cheaper option, meaning batteries and smart grids are not economically attractive and thus not scalable. In order to install a battery and a smart energy system, they need better ties with the grid operator, so that they can help them in the organization of their plans. Additionally, to achieve scalability, they aim to improve the business model of the peak shaving system. For that, they need better ties with (local/regional/national) governmental organizations, to lobby for more subsidy for peak shaving technology.

The grid operator is not easily approachable. The presumed reason is that the grid operator Enexis has no strategic advantage to respond/change the service for small users such as Vereniging Aardehuis; more charging stations, and decentralization in general, have a higher cost than centralized power stations. However, it could be a capacity problem, more than a motivation problem, in that they have too little time and capacity to answer calls of small users. At this point, Enexis is in fact showing some enthusiasm to work and facilitate Vereniging Aardehuis, but enthusiasm has come from individuals who have limited power within a large organisation. It would be useful if there was more communication at management level, to create more incentive at powerful places within Enexis.

From the residents'side, there might be concerns about their loss of self-sufficiency and autocracy. There are also privacy concerns to consider, but good communication about the technology of peak shaving, and the goal/usage of their data incentivised sceptic inhabitants to share their information.

Learning from each other and inspiring others

As a Living Lab their aim is to increase awareness about grid congestions and establish new and better contacts around the topics of peak-shaving (especially with the grid operator). Vereining Aardehuis aims to spread its knowledge on their prosumer activities and to be an example for other prosumers. Not only do they want to increase awareness in their own community about the energy activities they carry out, they also want to actively influence policy making, particularly around peak shaving for (collective) prosumers.

Bringing together a large number of actors helped to do a broad agenda-setting across various actors. In particular, the grid operator and local/regional/national governments, to aid in overcoming legal/financial issues. As such, an enabling condition was the presence of a large number of actors from a wide range of organizations: government (RVO), grid operator (Enexis), intermediaries (e.g. EnergieSamen), regional organisations (e.g. Oost NL), It would have been nice to inform and/or inspire the local municipality with the Aardehuis approach. The delegate of the municipality was at the time setting up a participatory sustainable housing project in the vicinity of the Aardehuis, and the goal of the intervention was partly to spread the Aardehuis' approach. By their absence, this opportunity was no longer available. However, the employee of the municipality indicated he wants to be kept up to date. Interactions within the Living Lab have the added benefit of increased networking especially when it comes to funding opportunities as well as having generated knowledge on recent policy changes now allowing the grid operator to invest in storage systems. This will be taken up further to explore if the grid operator is available to invest in a storage system in Aardehuis. The TU Delft is currently running a project proposal to install local blockchain systems allowing people to exchange surplus electricity for local services.

The Living Lab also enables networking between the leaders of Aardehuis and other prosumer initiatives. This leads to Aardehuis becoming aware of subsidy opportunities for installing a battery, it has also contributed to better contacts with the grid operator Enexis. Taxation was also addressed and it occurred that if Aardehuis would be to store electricity and delivering it back to itself, it might be double taxed. If peakshaving is going to be properly implemented, it requires that these kinds of details are known.

A delegate of the Aardehuizen participated in the Energy Day: a workshop organized by WP4 of PROSEU, hosted in Amsterdam. The goal of the day was to find new business models of prosumers in the Netherlands. Here, the networking component was also instrumental as well as the option for Living Lab stakeholders to learn about different forms of prosumer business models. A data request (survey) to create more awareness and/or insight into the system impact of the Aardehuis was being carried out. All 24 homeowners in the Aardehuis community were surveyed with a spreadsheet by email covering energy consumption and production as well as building aspects. All 24 homeowners participated and replied. The gathered data was analysed and used to deliver the products for the last identified need: awareness and/or insight into the system impact of the Aardehuis. This consisted of a fact sheet comparing an average Aardehuis dwelling with a typical newbuild dwelling and a qualitative report discussing the best practices within the Aardehuis community.

Outcome

The Living Lab around the Aardehuizen started with the ambition to overcome institutional barriers around peakshaving for prosumers. Essentially, this ambition was a learning goal. Through workshops, interviews, blogs and fact sheets, the Living Lab attempted to answer this question. In particular, social learning (i.e. the exchange of information at events amongst participants) proved to be helpful in increasing the knowledge of the Living Lab. We learned that the main issue is that grid congestion is technically the role of the grid operator. In the perspective of the aardehuizen, this peakshaving has to shift roles from the grid operator, to prosumers. Then, the aardehuizen aspires all citizens to be attracted to peakshave. For this, peakshaving has to be cost-effective. Thus, even though they paid 25,000 euros for their battery, they want

their battery to be cost-effective (otherwise there's no way to mainstream the use of it). We learned that the grid operator is not able to invest in these projects, because of their public role.

4.12 Wines of Alentejo – Portugal (PROSEU Focal Point: FC.ID)

Where does the Living Lab want to go?

The Living Lab has been initiated as a result of the joint work of PROSEU's FC.ID team and the Wines of Alentejo (a private institution dedicated to certifying, controlling and protecting the Alentejo wine production). The main goal was to mainstream the adoption of RES amongst Alentejo's viticulture industry by accelerating a wider adoption of RES and promote the setting up of collective self-consumption schemes among Alentejo's wineries. Climate change has been a key driver for local action. Alentejo faces an increasing concern with the future availability of water resources due to climate change, and wine producers find changes in climate are already affecting grape quality and harvests. Thus, the main motivation for introducing RES has been related to a pursuit for a more sustainable production model. The increasingly high energy costs are also an important motivation for adopting RES, since wineries find that integrating a RES-based energy system in their wineries could help them reduce their energy bills (once initial investments are paid for). Therefore, the key future vision of these companies was to achieve as much as possible energy autonomy, by not only reducing their carbon footprint, but also their energy costs.

Those stakeholders that are likely to help wine producers deal with legal, financial and technology factors in the context of RES production and self-consumption were considered important to reach this future, and as much as possible involved in the LL activities. At the start of the LL process, regulatory barriers were significant, since Portugal did not have a regulatory framework for collective self-consumption. However, by the end of 2019, a new decree-law on collective self-consumption and renewable energy communities was issued (i.e. DL162/2019), opening the possibility to set up several new business models, involving the collaboration of the different stakeholders. For the mainstreaming of RES in viticulture, it is important to be able to directly sell the excess of renewable energy produced to local agents (local villages, companies, institutions), at a price agreed between both parties. It would also be helpful if the wineries could have a seasonal contracted capacity (which would match their also seasonal energy needs), although the current legal framework still does not allow this. The participating wineries also found they needed more knowledge about technological options to maximise the efficiency and effectiveness of their RES production activity. The Living Lab thus looked into the implementation of different business and financing models, including alternative financing mechanisms for the wineries' renewable energy projects and technological solutions for increasing the uptake of renewables in the sector.

Wineries dedicated to a regional renewable energy plan for the viticulture industry

Wines of Alentejo is a private institution dedicated to certifying, controlling and protecting the Alentejo wine production. It is dedicated to developing a regional sustainability plan, which includes a wider adoption of RES in the region's wine industry. They work closely with the following wineries that were also engaged in the Living Lab:

- Herdade das Servas is a pioneer in integrating RES in a sustainable winery. They are very interested in further developing this through digitalisation and robotics, combined with RES.
- Herdade do Esporão are pioneers in developing a sustainable system for their winery. Integrating organic grape production, sustainable water management (they have their own innovative water treatment centre at the winery), solar energy and biomass energy.

- Sogrape is another winery in the region, which is now starting to adopt RES but is still designing its RES-based system.
- Carmim is also a cooperative of wineries with a significant solar photovoltaic installed capacity, located in the same area as Esporão.
- Adega de Borba is cooperative of wineries which also a solar photovoltaic installation
- Adega Mayor and Adega Reynolds are not yet producing RES but aim to. They are working with a company to install solar panels in the winery.

Viticulture uses a huge amount of energy, representing a high cost, which wine producers hope to reduce with RES. On the other hand, Alentejo's wine producers feel the pressing need to improve their 'social image', by adopting a more sustainable strategy as part of their business. It is not certain that wineries could directly contribute to affordable, clean and safe energy for all, but given the importance of Alentejo as a wine producing region in Portugal, the efforts of these companies could contribute to decarbonise a whole sector. By increasing their adoption of RES in this region, this group of wineries could influence other wine producers in the country and in Europe.

Among the Living Lab participants, there were two participants who represented cooperatives of wineries (i.e. Carmim and Adega de Borba). These cooperatives could further raise awareness within their members on the relevance of adopting renewables in the context of viticulture. The Living Lab also involved RES specialists from the Faculty of Sciences of Lisbon University and from the UPORTO Consortium Partner, as well as economic specialists from the UNIVLEEDS Consortium Partner, who provided assistance in the activities related to the development of new business and financial models for adopting renewables in wine production activities.

Thus, throughout the interventions, the Living Lab brought together energy experts to show innovative studies, techniques and prototypes which could help wineries adopt RES. The main constraining and enabling factors addressed were regulatory aspects (the legal framework changed in Portugal half way through the LL work, and participants received regular updates on these changes, which were thoroughly discussed); business and financial aspects, as well as technological aspects.

Following the initial needs assessment, the living labs' activities first focussed on technological and regulatory aspects, and then on new business and financial models. Thus, to support wineries in exploring different RES-based technologies, a prototype was presented using a water pump powered by solar energy to irrigate the vines. This 'nature-based' solution also requires changing the behaviours and routines of producers (for instance, irrigating during the day, when solar power is at its peak). Knowledge was also shared on the possibility for using surplus energy during off-peak seasons (considering that the use of energy in wineries fluctuates considerably between different seasons) to charge electric vehicles. Living Lab stakeholders equally learned from experts about technology solutions which are being used in wineries across the world (i.e. with examples from wineries in California and Italy, that were presented by invited speakers in the LL workshops).

Moving from technology to business, participants used an adapted Business Model Canvas to brainstorm about possible business models that could be set up. The main actors involved in the discussion were CEO's and managers of Wine Companies, two solar energy companies and a FIN Tech Company (i.e. GOParity), which finances sustainable projects through crowdlending. The market actors' role was to provide contributions to the discussion regarding financing schemes for renewables, but also to understand what business models could be developed once wine producers agreed on possible self-consumption models. Financial constraints were taken into account, since the core business of wineries is not renewables,

and it is important for these agents to set up business models that allow a quick return on investments. One of the things that was clearly stated by the wineries who participated is that they were not willing to ask for bank loans for RES, they would however consider investing themselves in RES if they were sure future benefits would pay off the costs.

Two business models were analysed: one involving a synergy between a local tourism Wine Route and the charging of electric cars; and one focussed on setting up an energy community, with the participation of two local wineries (i.e. Esporão and Carmim) and the local village. The first solution would allow wineries to use surplus energy for charging electric cars and could provide an additional feature to the already existing Wine Route. The business model would imply offering the charging services, while customers could be participating in tours of the wineries. This solution has been very much focussed on combining the production of renewables with wine tourism.

Another business model explored consists on setting up an energy community between local wineries and nearby villages, using solar energy (produced by both village residents and the wineries). To support the implementation of this model, the FC.ID PROSEU team used energy systems modelling to simulate a new energy community involving the Herdade do Esporão, the Carmim Cooperative and the Reguengos de Monsaraz village, using the CALLIOPE software⁹. The computer simulations showed different options for different levels of installed capacity, with and without storage, as well as the costs and possibilities for exchanging locally with other key stakeholders. The energy systems modelling of a new energy community in Reguengos de Monsaraz, which we refer to as a 'solar wine village', provided also an example that could be used for setting up other similar communities in rural and wine producing regions in Portugal. The resulting simulations showed the different options for increasing local energy production from renewables, the costs (with and without the use of batteries), and the best locations for the installations. The modelling only considered solar photovoltaic installations. The option without using batteries foresaw an investment in total of 2.95Million Euros, including a large-scale photovoltaic station (i.e. 690kW) and solar panels distributed throughout the villages' rooftops, (comprising a total installed capacity of 1410kW). Such installations would provide the village year-round with about 17% of their required local energy needs. Using batteries would increase the village energy autonomy (by almost a factor of 3), as it enables a larger presence for the photovoltaic technology but requires a considerably larger investment of 23.48Millions.

⁹ CALLIOPE is a free open source (Apache 2.0 licensed) tool to build energy systems models at different scales - <https://www.callio.pe/>

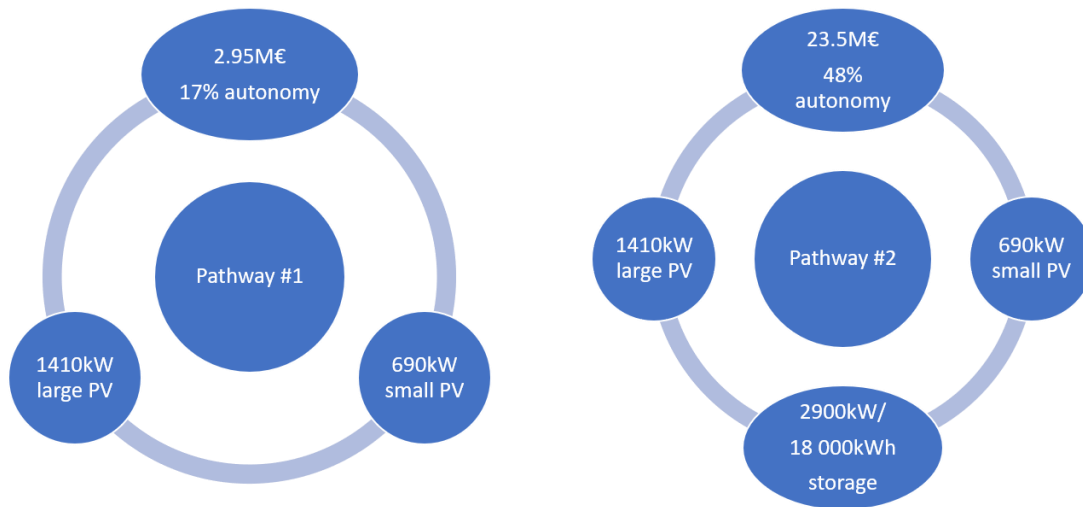


Figure 4. Illustrations of the Modelled pathways with and without storage for the 'Wine Solar Village community'.

Outcome

The results of the modelling were presented to the Wines of Alentejo and the local representatives of the Reguengos de Monsaraz village, as well as the wine producers who have been involved throughout the Living Lab. The results were well received by the LL members and stakeholders involved in the final session. The presentation was very interactive, including many questions regarding the potential and feasibility of the model. Participants provided input to the researchers to modify some parameters of the model (e.g. questioning the affordability of using batteries). A key output and conclusion of this process was the realisation that wine producers need to work in a more collaborative way to reach the goal of introducing and expanding their RES potential. Future steps will therefore imply working together to implement collective self-consumption projects and apply to existing financing mechanisms of sustainable energy production in rural regions.

4.13 Sao Luís Energy Community – Portugal (PROSEU Focal Point: FC.ID)

Where does the Living Lab want to go?

The Living Lab has been initiated as a result of the joint work of PROSEU FC.ID team, the *Coopernico* Energy Cooperative and the *São Luís Transition Town* initiative (an informal community that is leading the project of transforming São Luís into a renewable energy community). The process evolved to include also *Tamera EcoVillage*. Together, the São Luís Transition Town initiative, other residents and local Parish administrators created an informal group – i.e. *Energia com Alegria*.

The Living Lab is the result of the various activities of this multi-stakeholder group. The aim of this group could be described broadly as encouraging and facilitating the setup of energy communities in Odemira, Alentejo. Yet, the different stakeholders have specific goals which have become increasingly clearer as the living lab work progressed. São Luís aims to become the first energy community in Portugal; Tamera wants to see solar villages proliferate in the region in order to mainstream prosumerism in Odemira as part of its hopes for a more sustainable Alentejo. Finally, *Coopernico* aims to support the development of energy communities which meet the cooperative's ethos and goal of promoting energy democracy. Altogether these different goals come together in a key future vision of the Living Lab, which is for São Luís to become a sustainable and autonomous energy village (by 2030 the whole village would be powered by RES locally

owned and managed), and in the process create new jobs and a local techno lab that specialises in RES and supports the development of the local energy system, while also providing assistance to other villages in the region.

Part of the global Transition Town Community

By being part of the *Energia com Alegria* (Energy with Joy) group, the São Luís Transition Town community, the *Coopernico* Energy Cooperative and *Tamera Ecovillage* all played important roles and helped drive forward the living lab process. São Luís became involved because they have been planning to become an energy community since 2012, where the first solar installations were put in local public buildings (around 100kW is already installed) as a result of a participatory budget grant. PROSEUs Living Lab was an opportunity to continue developing this process. The *Energia com Alegria* community, which has acted as a key focal point in the Living Lab, is mainly led by the local *Transition Towns* initiative, which is part of a global network of towns and local communities working at a grassroots level towards a sustainable socio-technical and socio-ecological transition. The initiative has a horizontal and consensus-based decision-making structure. The local Parish administration is integrated in this decision-making structure and included in all meetings.

Building on experience of the Coopernico energy cooperative

Since all work is based on volunteer work, the process of developing a local energy community has advanced very slowly. *Coopérnico* has been a key stakeholder in this process, together with residents, the *Junta de Freguesia* (local Parish) de São Luís, and the Odemira municipality played an important role in facilitating the development of the community. *Coopérnico* is the first Portuguese Energy cooperative, who finances and produces RES energy to both sell directly to the grid and in a self-consumption model. *Coopérnico* works mainly with public not-for-profit entities and organisations by using crowdfunding to finance its solar installations. Through their involvement in the living lab *Coopérnico* aimed to support the development of the first renewable energy community in Portugal (possibly helping raise funding for a collective solar installation). The presence of *Coopérnico* was crucial since the cooperative is open to fund local installations and/or help the local community develop its own business model to fund the installations. Also, *Coopérnico* suggested that a local hub of the cooperative was created in São Luís. Although this suggestion was well taken, the 'Energia com Alegria' informal and volunteer-based group had a problem with internal management and organisation. São Luís Transition members feared that there would not be enough commitment to lead forward such local hub of the cooperative. This discussion continued towards the end of the living lab work, and there were no final decisions on this matter.

Buying solar panels and teaching how to install and manage them

The project for a solar village included the installation of private self-consumption units for a few residents of São Luís. *Minga* (another Living Lab stakeholder) is a cooperative working in the Alentejo region, with an activity in different sectors, from food production, to art and energy. One of *Minga's* activities is to sell solar panels and help/teach its clients to install and manage their panels. They became involved in the Living Lab to facilitate the bulk buying of a set of solar panel installation kits for the residents of São Luís. *Minga* has equally volunteered to assess the possibility of some houses installing hybrid systems (that will allow a house to be almost off-grid). Since the beginning of the Living Lab process 8 houses installed their small self-consumption units.

Exchanging with a neighbouring villages, administrations and entrepreneurs

Tamera is an ecovillage located close to São Luís. The involvement of Tamera in the São Luís process has been quite significant and allowed for an ongoing knowledge sharing between the two communities. Tamera is also an energy community, aiming for energy autonomy over the medium term. Among the living lab participants there were equally some entrepreneurs who own local sustainable and rural tourism sites, as an example is the *Quinta da Figueirinha*, already using RES but wanting to expand their installed capacity and interested in learning from this experience. Residents from villages nearby, namely from Relíquias and from São Martinho das Amoreiras, also took part in Living Lab discussions. The Junta de Freguesia of São Luís was also very interested in supporting the project, by helping the community apply for funding and by providing a meeting space for the living lab. Representatives of the Odemira municipality also participated. RES energy specialists, mainly PhD students from the Faculty of Science of Lisbon University were invited to take part in the discussions and help clear out doubts regarding different RES types.

The collective discussions and engagement of this multi-stakeholder group resulted in the following options for developing the São Luís energy community:

- a) have a local production unit/solar installation of up to 250KW which would be co-owned by a local cooperative or association.
- b) several small/household self-consumption units, which could set up peer-to-peer schemes, possibly creating a local energy pool.
- c) multiple solutions, combining off-grid systems, micro-grids and hybrid systems: these would include self-consumption system and a small production system where all energy is injected in the grid. installation of a small local production unit (not for self-consumption), which would be financed by *Coopernico* cooperative (through its crowdfunding system).

Given the changes in the Portuguese RES self-consumption legislation, Living Lab stakeholders were presented with information on both older and new regulatory frameworks, and legal aspects were thoroughly discussed, so that all stakeholders were aware of the legal feasibility of different ideas that existed for São Luís. It was also possible to reach a common understanding of what an energy community is (which was not really clear for all participants at the start of the living lab process), and about the different options which would allow São Luís to become one. On the other hand, and following the request of local stakeholders, the Living Lab equally enabled building local capacity building, by providing practical knowledge about solar PV, as well as thermal and biogas energy, through two practical workshops, where participants discussed these options and their practical technicalities with invited experts from the Lisbon Faculty of Sciences.

Throughout the interventions implemented, the living lab offered the opportunity to explore in depth specific aspects relevant for the implementation of an energy community in São Luís, using GIS maps, marking the different places where RES installations could be placed (and visiting in-person these locations), discussing different funding possibilities (mainly through crowdfunding and/or public funding granted through the local participatory budget), clarifying doubts about the specific legal regime of existing and foreseen installations, as well as the socioeconomic impacts (including reducing energy poverty) and environmental impacts of the installations. These aspects were discussed in-depth throughout the different Living Lab interventions.

At the final stages of the Living Lab, the FC.ID team used the knowledge resulting from the previous discussions and collected data on local consumption to enable modelling the different possibilities for continuing to build up the São Luís future energy community. The energy systems models used the CALLIOPE software (as in the case of the Wines of Alentejo Living Lab). The resulting simulations showed the different options for increasing local energy production from renewables, the costs (with and without the

use of batteries), and the best locations for the installations. The modelling considered solar photovoltaic installations, as well as wind energy. The option without using batteries, foresaw an investment in total of 4.8 Million Euros, including a large scale photovoltaic station (i.e. 270kW), solar panels distributed throughout the villages' rooftops, (comprising a total installed capacity of 540kW) and a small wind turbine (750 kW). Such installations would provide the village year-round with about 70% of their required local energy needs. Using batteries would increase the villages' energy autonomy but increase the investment to 6.8 Millions. Considering financing, it was considered that the small-scale individual installations (which could then be connected through a collective self-consumption/peer-to-peer scheme), could be implemented gradually. As for financing the larger installations, two options were put forward: a) Coopérnico cooperative could finance larger installations through crowdfunding, and b) larger installations could also be funded through a participatory budget application for funding. The next steps for the *Energia com Alegria* group will be therefore to start implementing some of these installations, and for that effect, two participatory budget funding applications have already been submitted.

Outcome

The final Living Lab intervention consisted in presenting to all stakeholders the results of the energy systems modelling. All participants found the study very helpful and agreed the next step will be to, on one hand continue procuring funding opportunities to finance their energy community project, and on the other, pay closer attention to energy efficiency and the need to introduce robust measures in the village that enable households to reduce energy consumption, including acquiring funding for refurbishing older houses. Thus, the Living Lab resulted in a clear path ahead for the continuous development of São Luís' energy community (i.e. in terms of the additional installed capacity to be implemented, the costs, and benefits for the community), but also in a realisation that local transition efforts need to focus also on reducing local consumption, increasing energy efficiency and ensuring the widest possible participation of São Luís families.

4.14 Living Lab on Self-Consumption – Spain (PROSEU Focal Point: ecounion)

Where does the Living Lab want to go?

The LL has been started because to identify appropriate business models for prosumers and energy companies within the context of the recently adopted Spanish legislation regulating self-consumption (Royal Decree Law 15/2018 and Royal Decree 244/2019). The living lab aimed at exploring the best possible business models for an energy cooperative and its members that would incentivise the maximum uptake of prosumerism in Spain over the next years. The Living Lab vision is to achieve a wide-spread deployment of prosumerism in Spain by 2030 and contribute to a 100% renewable Spanish energy sector by 2040.

Members, partners and stakeholders of the Living Lab

Several entities have been involved in the development of the Living Lab. Our main focal point was *Som Energia*, a Catalan Renewable Energy Cooperative based in Girona. Som Energia aims to mainstream local prosumerism under new Spanish legislation by launching a collective PV purchase & installation campaign and developing a sound business model for neighbour communities and SMEs. This initiative was supported by *Amigos de la Tierra* (FOE Spain), an environmental non-profit organisation with the mission of promoting local and global social change towards a just society which respects the environment. *Amigos de la Tierra* actively promotes renewable energy empowerment of citizens. The technical partner was *Azimut360*, a renewable energy project developer and engineering cooperative that carries out PV

installations in Spain and abroad. *Azimuth360* was responsible to implement two pilot projects on shared self-consumption in multi-family buildings.

Establishing new business models in Spain

The Living Lab explored possible business models for collective prosumers in Spain on the background of the Spanish Royal Decree on self-consumption. These include self-consumption within the same multi-family building, as well as shared self-consumption through the grid (which is now possible in Spain up to 500 m distance). It was discussed that given the normal self-consumption rates and the current variable tariffs, the pay-back times of such projects are rather long, above 15 years. Local tax exemptions can improve business cases. The general perception was that Spain is still in an early stage to know to what degree self-consumption is and will be viable. Living Lab stakeholders learn the key variables to take into consideration (apart from price per kWh also the variable tariffs, taxes, grid fees, and other administrative costs) and the importance of having clear procedures in place which define which data sets (quarterly hour or half-hourly demand and generation data) need to be exchanged between the metering company and the energy supplier.

Prosumers projects in Catalunya

The standard contracts between participants and the calculation of the shares were first discussed. Appropriate institutions to approve the projects were identified and subsequently contacted (distribution company *Endesa* and the regional energy agency ICAEN). The Living Lab supported *Azimuth360* advancing through the new legislation by finding jointly solutions despite the lack of information given by the administration. Guidance from the Spanish Energy agency IDAE was also needed to clarify prosumers management options. However, it required numerous attempts through telephone and email over the course of three months to receive an appropriate response from the distribution company: it is obvious that the administrative processes to approve self-consumption facilities are not yet working smoothly, with unclear competencies and complicated procedures. For instance, it is mandatory to send the list with the signatures of all participants in a self-consumption project to each energy provider individually, instead of sending it only once to the (common) distribution company. It is also not possible to first use the generated electricity for the common load (like elevators and staircase lighting), instead all this energy is assigned through fixed coefficients without exception. These findings have been communicated to the National Energy Agency IDAE in order to trigger improvements of the regulation.

Pilote project in Puente La Reine (Navarra)

The Living Lab also supported a shared self-consumption project in Navarra involving several members of *Som Energia*, coordinated by *GARES Energia*, aiming to use a PV plant installed on a municipal sports building in the city of Puente la Reina. We were invited to participate in the 1st *Congress on self-consumption and distribution of generated energy organized near-by in Pamplona in October 2019 to present PROSEU and share our Business Models scenarios*.

However, it was difficult to find common ground over the distance. Additionally, the Corona virus outbreak further complicated the collaboration and led to the postponement of the project activities that were planned by *GARES Energia* in-situ. We thought of holding an online event with all stakeholders to discuss the necessary project steps. To that end, we prepared a slide set to support the presentation of the project idea and the regulatory framework for self-consumption. However, as the project aims to have a very inclusive, participatory, bottom-up approach to the joint self-consumption project, this idea was discarded as being too much “top down”. As the project will thus only start once the COVID-19 crisis has been overcome (i.e.

by end of 2020 or beginning of 2021), this does not correlate anymore with the PROSEU timelines. It was thus decided to keep communication channels open but to not plan any concrete joint steps anymore.

Outcome

This Living Lab provides Partners and stakeholders with insights into possible business models to facilitate self-consumption in Spain, particularly from a tenant-perspective. Despite difficulties in getting the Living Lab together, due to other priorities and COVID-19, valuable information has been communicated and connections to some enabling actors are made.

Overall, our conclusion is that while the LL initial objectives and ideas did not materialise in the way it was foreseen (also because the LL stakeholders are not really part of the PROSEU project which makes it complicated to define each party's role in the LL), it was very beneficial for PROSEU that eco-union had the possibility through the national LL to dive deep into some of the crucial aspects in shared self-consumption and community prosumerism. The insights gained in the LL, with the pilot projects, the conversations with the Alliance for Self-consumption, IDAE, the French distribution grid operator and others were extremely helpful to better understand the requirements of prosumerism, the barriers, solutions and impacts.

4.15 Living Lab on promoting prosumerism – France (PROSEU Focal Point: ecounion)

This Living Lab centres around several networks active in promoting a citizen-led energy transition in France. Energie Partagée (EPA), the focal point, is a French national association created in 2010 by several civil society actors (Enercoop, etc) to collect investment from citizens in order to finance renewable energy facilities. It has around 150 members (energy cooperatives, NGOs, local authorities, etc.). Promoters of the Living Labs wanted to better understand the economic and legal models used by members to start a self-production scheme through third-party investment and/or external management schemes. As the regulatory framework is not clear in France, there are several uncertainties regarding legal or tax aspects that are impeding the development of collective prosumers initiatives.

Joining forces to accelerate citizen energy

Several partners working on the field of Prosumers joined the Living Lab. Enercoop, created in 2005 by several French NGOs (Greenpeace, Biocoop, Hespul, CLER, Amis de la Terre, La Nef), is the first citizen energy cooperative. It is selling green energy to more than 25.000 members (citizens, SMEs, local authorities, etc.). CIRENA is a regional network to promote renewable Energy in the region of Nouvelle Aquitaine (South-West France) created in 2018 with around 40 members (local authorities, energy cooperatives, etc.). Hespul is a non-profit association created in 1991; initially focused on grid-connected PV through EC research projects, it now embraces all activities in the field of renewable energies and the rational use of energy. EnerCit'IFis an association and energy cooperative launched in 2019 to promote production of renewable energy in Paris and Île de France region.

Facing legal and economic hurdles

This Living Lab tries to identify and solve the main barriers to viable business models for prosumers in France. Hence, it focuses on business models for all type of prosumers (e.g., personal prosumer in residential building; community prosumers in residential building; municipal prosumer projects, SME prosumer project). Furthermore, it identifies and aims at addressing the potential impacts that business models can have on the existing energy actors (distributors, grid operators...). The main opponents to attractive business models for prosumers are considered to be the major utility operators. The Living Lab

pursues the values of an inclusive energy democracy and clean energy transition. Hence, they are interested in solving the different hindrances of achieving this goal that come with class, by which community projects and support is considered essential; and gender, by which energy education is also considered essential.

The main tension relies on achieving a transition to a clean, inclusive, affordable, and efficient energy democracy by having the regulators and current major players truly pursuing the same goal. The Living Lab envisions a society in which everyone can access to 100% renewable energy in a sober local energy model organized through a shared, transparent and democratic governance. In this vision, prosumers would be a way to decentralise and democratise energy production through local or regional initiatives promoted by EPA members (usually a network of individuals, local governments, SMEs and citizens associations).

Different positions from different actors

EPA and Enercoop highlight the need to understand better the economic and legal models used by their members to develop (collective or individual) self-production projects through third-party investment and/or external management schemes. As the regulatory framework is not clear yet, there are several uncertainties regarding regulatory or tax aspects. In particular, the regulator (CRE), DSO (Enedis) and legislator (Energy and Finance Ministries) have sometimes different interpretation of the legal and tax requirements, which complicates the development of such initiatives by creating a high risk for promoters. Also, the administrative, technical or legal processes to set-up such initiatives are very different according to the geographic location and actors involved. There is therefore a need to understand better the barriers and opportunities related to (collective) prosumers initiatives in France to address them.

Unfavourable tax schemes

The network tax scheme (TURPE, TICFE) is currently very unfavourable to prosumers initiatives, as it increases the return on investment to unsustainable level. So, energy citizens stakeholders show little appetite today for such initiatives. Additionally, the legal framework to develop collective prosumers initiatives is very unclear which adds economic risk for promoters. Finally, EPA members are today more focused on medium-size facilities installed on local public infrastructures (schools, etc.) that are usually easier to finance, build and operate.

Setting a working group on Collective Prosumers

EPA aims to create an on-line working group on Prosumers with their members (between 10-20 entities) based on the discussions they had during their 2019 general assembly (14-17th of June 2019), that was attended by PROSEU partner eco-union. EPA planned to organise virtual meetings to advance in the issue in 2019-20. However, it remains unclear how the working group will be created and facilitated, as prosumers issue doesn't seem to be a priority during the current pandemic situation. The aim of this (planned) working group is to connect prosumers initiatives promoted by EPA members, exchange knowledge and collectively identify the main barriers and opportunities related to collective prosumers in France in order to facilitate its development and (economic & legal) sustainability.

Regulatory and political environment

The main opponents are today the French energy regulator (CRE), the Finance ministry (tax department) and some Members of the French Parliament as they (mainly) see prosumers as a threat to the (economic and social) sustainability of the current energy system (in particular the network cost), based in France on the tariff equalisation principle (*péréquation tarifaire*) which means that any citizens in the French territory should pay the same price to access to basic services such energy, independently of the real cost to bring

it to the households. Also, the French energy regulator (CRE) is concerned by the potential loss of consumers rights if the prosumers developers have not the same duties than incumbent actors.

Today the perceptions from EPA members is that the benefits of promoting prosumerism are outweighed by the economic, social and legal difficulties. Sometimes they actually support the regulator vision that prosumers might create a “niche” for “happy few” and might also be a threat for solidarity between citizens. Therefore, they don’t always support prosumers as a realistic future in the short term.

European Conference of Citizen Energy

Part of the Living Lab discussions took place in the [European Conference of Citizen Energy](#) that took place in June 2019 in France (Redon). It was an informal and safe space to exchange impressions, experiences and motivations around self-consumption in France. The participants have mixed feelings about prosumers. When the new energy French law was passed in 2017, it created a lot of expectations and interest to start citizen energy initiatives, including prosumers. However, most of the planned projects did not happen because the economic return on investment was too long, as the current tax schemes are very unfavourable (network taxes very high) and the legal regulation around prosumers is very uncertain (not clear duties and responsibilities). Therefore, most of the participants recognised that currently there were no economic case for the development of prosumers initiatives and are not convinced it will change in the short term, due to the lack of interest and support from national authorities.

Following that, oral and written PROSEU feedback on a study undertaken by a consultant on behalf of EPA was carried out. The study undertaken by EPA is a review of EU policies and national good practices about the sharing of renewable energy (Citizen/ Renewable Energy Community), in particular the opportunities and challenges related to the implementation of RED directive.

Outcome

This Living Lab has initiated a working group on facilitating citizen-led prosumer projects in France and has distilled concerns and barriers for prosumerism in France. The situation caused by COVID-19 made it more difficult to already carry out this working group, but several considerations and contributions to, particularly EPA’s work, were possible.

The working group initiative is still at an early stage as it is still trying to set-up the communication platform, build a critical mass and create a positive momentum, overcoming the initial frustrations due to lack of prosumers initiatives. However, it is clear that among EPA members and Living Lab participants there are some divergences about the feasibility and benefits to promote collective prosumers in the current regulatory framework, which impede to develop a more strategic and systemic reflections to overcome the existing barriers. Also it appears that outside the Living Lab are emerging very relevant advocacy initiatives from the private sector to influence and improve current energy policies, as the one promoted by the Energy for All platform or Enerplan (French solar business association).

Despite the current unfavourable situation, Living Lab stakeholders recognize that over the long-term prosumers development is critical for a real and rapid energy transition in France. Hence, they are interested to have a deeper understanding of the current prosumers initiatives and the position of LL members to identify barriers and develop a common strategy, in particular related to regulatory and legal framework. However, as explained earlier, Prosumerism is not currently a priority due to lack of economic viability and weak demand by field members.

5. Outlook

Looking at the nature and stakeholders of the different Living Labs, it becomes clear that they provide a space for the co-creation of a broad range of innovations in the prosumer field. As Living Labs are networks of stakeholders, particular attention was given to the collective motivation to engage in prosumer-related activities, rather than the motivations of individual stakeholders. The diversity of Living Labs is reflected in the needs identified at the beginning of the co-creation process and can be broadly divided into finding new business and financial models, elaborating on new organisational forms as well as overcoming technical challenges. Although, as mentioned at the beginning, all Living Labs had to cover a variety of cross-cutting issues in order to address their barriers reflecting the general nature of prosumerism as a multi-dimensional issue.

It has also appeared that a Living Lab's collective motivation strongly correlates with the collective vision for the future as well as inherent socio-cultural values. An initial insight from the Living Lab process is that the socio-cultural values themselves were not the primary means for action, but motivation for action appears to be mostly generated by particular key enabling factors unique to that context in which Living Lab activities are ongoing. It is these factors which then correlate with inherent values and overall attitudes towards the future to result in the overall motivation of stakeholders to co-create.

Overall, experiences with the co-creation processes were positive and have showcased that enabling collective prosumerism is best facilitated in a collective manner requiring the participation from many stakeholders with whom some initiatives might not automatically be in touch with already. Reflecting on the co-creation process, we find that it strongly relies on the motivation and initiative of Living Lab stakeholders. This was now always a smooth process, which reflects the general position that many prosumer initiatives are faced with, such as conflicting priorities, lack of political backing as well as not enough funding. The added value from the PROSEU project, however, has definitely generated positive change in the Living Labs and contributes to strengthening prosumer's stance in an increasingly competitive energy system. For more in-depth reflections on the co-creation process and lessons learned on working with Living Labs in the prosumer field, please consult the publication "Integrated lessons for renewable energy prosumer futures across Europe" (D7.3). Experiences from selected Living Lab interventions will also be highlighted as part of the "Renewable Energy Prosumer Inspiration Book" (D7.2).

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Annex 1: Living Labs Reporting Template

This is the Living Labs reporting template which will result in one Living Lab Report (LLR) per Living Lab – thus every partner is required to write such a report for each of their LLs. Information gathered throughout the template will be fed into all WP7 deliverables and outputs, but also as input to all other work packages, specifically for WP6 (input on incentive structures), and to complement the research of WP3, WP4 and WP5 tasks. Finally, it also provides some data that relates to the project’s societal impact (WP8). Each partner, working with a Living Labs, needs submit to the filled-out reporting template to the WP7 lead.

This template is divided into separate tables and makes a distinction between operational and research questions. The first tables are for capturing the more operational aspects of the interventions, such as the needs and how the Living Lab progressed based on your input. A separate table is dedicated to the research questions which require more in-depth information on the stakeholders and the context of the Living Lab as a whole.

Answers to research questions are given in relation to the specific interventions meaning that not all questions need to be answered every time an intervention is being carried out. **Please make sure to respond to the research questions as extensively and as detailed as possible throughout the entire Living Lab process.**

The **research questions** should be answered already following the 1st intervention (needs assessment) and should then be complemented with further information after subsequent interventions. **You will find the research questions as a separate table further below.**

Following the last joint evaluation, please make sure to share your three main lessons learned from working with the Living Labs.

KEY INFORMATION – ABOUT THE LIVING LAB	
Name of Living Lab (The collective name chosen by all LL stakeholders)	
Location (Where is the LL located?)	
Motivation and Vision (Why has the LL been started? Where does the LL want to go by 2030 and 2050?)	
Stakeholders Living Lab Stakeholders are those entities – i.e. RES initiatives, policy makers, private companies, financial sector, utilities, technology experts, etc. - who participate in the Living Lab.	Summary (150 words) for each stakeholders, indicating the type of actor (in case of initiatives refer the stage of development - i.e. planning, implementation, <1year, 1 to 5 years, >5 years), what they do in relation to Prosumerism and why they became involved in the Living Lab.
1 LL Focal Point	
2 PROSEU Focal Point	

3 Other

4 ...

Exploration Stage:

1st Intervention: Needs Assessment

Date	
Method used	
Type and Number of Participants	
Venue	
Duration of Event	
Needs: What are the concrete needs to be addressed through the Living Lab interventions? How do these needs relate to barriers and drivers as perceived by LL focal point and other stakeholders?	
Check: Have you answered the research questions in the table further below?	

Implementation Stage:

2nd and 3rd (and potentially 4th) Intervention:

Please answer for all interventions in the implementation stage, in separate (numbered) versions of this table

Objective & its relation with need identified in needs-assessment	
Date	
Method used	
Type and number of Participants	

Venue	
Duration of Event	
Actors and conditions: Which actors and organizations are involved with the intervention, and what is their role? Which constraining/ enabling conditions are particularly relevant to the intervention?	
Results and experiences: How did the intervention contribute to overcome the identified barriers and how have the assessed needs been met? What have been the results of the intervention? How has the LL progressed? What have been the experiences with the intervention? What have the PROSEU focal point and other stakeholders learned? How and to what extent have PROSEU focal point and other stakeholders reconsidered their needs (as established in in needs assessment)?	
Check: Have you answered the research questions in the table further below?	

Evaluation Stage:

4th Intervention: Joint Evaluation	
Method used	
Date	
Number of Participants	
Venue	
Duration of Event	

<p>Internal Evaluation (Was the objective reached? How did it help to solve the need/challenge identified in the pre-assessment?)</p> <p>How and to what extent have focal point and stakeholders reconsidered their objectives and ambitions?</p>	
<p>Motivation and Vision (Why has the LL been started? Where does the LL want to go by 2030 and 2050?)</p> <p>Reflect on whether this has changed from when the LL started.</p>	
<p>Check: Have you answered the research questions in the table below?</p>	

Research Questions

<p>To be answered after the 1st intervention and complemented with further information from later interventions). In your explanation, please keep in mind that “initiative” can refer both the individual stakeholders, but also to the LL as a whole. Should you encounter diverging views among stakeholders, please include these as well.</p>	
<p>Motivation:</p> <p>Why has the initiative been started?</p>	
<p>Organisational model:</p> <p>How is the initiative organized?</p>	
<p>Future vision:</p> <p>What future does the initiative aspire to (in relation to energy and more broadly)?</p> <p>How can this future be reached and who are the relevant actors?</p>	
<p>Socio-cultural aspects:</p>	

<p>What are the pressing societal problems and which of these does the initiative address?</p> <p>Which groups are considered to resist?</p> <p>Which values does the initiative associate with 'energy transition' and 'prosumerism'?</p> <p>More specifically, what importance does the initiative accord to energy production/ provision being.</p> <ul style="list-style-type: none"> ● transparent ● inclusive (e.g. gender, race, class) ● participatory ● affordable ● clean ● safe ● efficient <p>To what extent does the initiative identify and address tensions and trade-offs between those values?</p>	
<p>Critical turning points:</p> <p>What were the moments or events at which the initiative underwent or decided for changes of course?</p>	
<p>Constraining Conditions (Barriers):</p> <p>What factors hindered the development of the initiative? Consider i.e. regulatory, institutional, technological, knowledge, financial capacity, practices and routines...)</p>	
<p>Enabling Conditions (Drivers):</p> <p>What factors enabled the development of the initiative? Consider i.e. regulatory, institutional, technological, knowledge, financial capacity, practices and routines...)</p>	

Interactions

Information submitted in the above tables can be complemented by knowledge and information gained through the course of other interactions you might have had with the Living Lab outside of the “official” intervention. Interactions could be merely participating in an event organized by the RES initiative or stakeholder of your Living Lab, a field trip, could be sitting in a meeting and taking notes, or a formal interview with one or two people who are representing one or more initiative participating in the living lab.

	What?	Who	When (date)	Where (Location)
#1 [example]	<i>Internal board meeting of Cooperative X</i>	<i>Cooperative X</i>	<i>Day/Month/Year</i>	<i>Rotterdam, NL</i>
# 2				
#...				

Interviews

Who was interviewed?	Where?	When?	Interview Record
[example] <i>Jan Jansen, director of Cooperative X</i>	<i>Rotterdam, NL</i>	<i>Day/Month/Year</i>	<i>Please upload transcript to WP7 folder.</i>

Lessons Learned and Recommendations

Please share your three key lessons regarding the Living Lab Process and for working with Living Lab Stakeholders.

By Lessons Learned we mean key things that you thought worked or did not work (consider any *AHA* moments you’ve had). For instance, in the LL process, what can you say works well and what would you *not* do if you were repeating the four interventions again? Regarding what you learned Living Lab Stakeholders that you’ve worked with, what are the key things that you find are not working for them, and what is working?

Possibly involve your stakeholders in a systematisation of their experiences, by including a discussion on lessons learned in your last intervention.

Impact Evaluation

To evaluate the impact of the overall activities carried out by PROSEU in WP7 and in combination with relevant WPs, a set of generally applicable KPIs has been developed.

KPI's for impact evaluation	Number
Number of interventions carried out	
Number of newly persons trained/engaged LL stakeholders	
Number of LLs agreeing to engage with PROSEU after project closure	
Number of participants involved in Living Lab interventions and interactions	
Number of innovations co-created or implemented	
Number of jobs created	
Number of organizations outside of Living Labs engaged	



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