



PROSEU

PROSUMER INSPIRATION BOOK

**Powerful examples for
your community**

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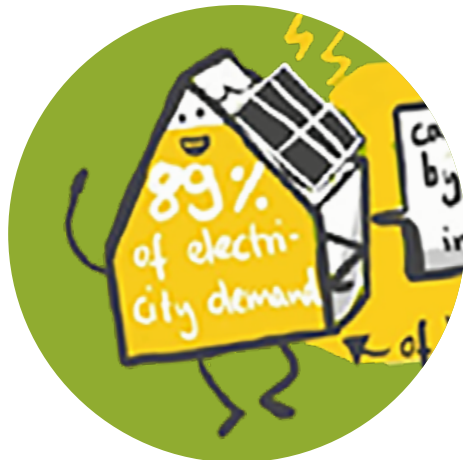


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PROSUMERS are active energy users who both produce and consume energy from renewable sources (RES).

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COLLECTIVE PROSUMERISM ON THE RISE!

Europe is on its way to implement a large-scale transition to a more sustainable energy system: this transition is a key ingredient for a climate neutral, more suitable and inclusive European Union. All over the EU, citizens are placed increasingly at the core of energy markets and are playing their part for more sustainability at the local level. This change has been acknowledged in the European Green Deal and a continuation and strengthening of this development is deemed central to ensuring a more sustainable and inclusive energy sector now and in the future. Citizens are no longer just passive consumers of energy, but are turning to producing and self-consuming renewable energy; they are becoming **Prosumers**.

Admittedly, the concept of prosumerism is not new, but the potential contribution by prosumers is expected to increase drastically over the coming years, fuelled by recent European legislation (the Clean Energy Package) which has the potential to be a game changer for how we produce our renewable energy with rights for (collective) production and self-consumption now being enshrined in law. Europe's citizens now have more opportunities to become active in the energy transition than ever before. **In fact**, by 2050 a full half of European citizens could be producing their own electricity, meeting

45% of the energy demand in the EU, if citizens are properly supported in taking up this role.

An increasing number of communities are coming together to take matters into their own hands driven by their wish for a more sustainable energy supply, fight climate change and to contribute to local sustainability. This involvement is about more than just electricity. Increasingly, citizens are having a stake in community energy projects which bring benefits beyond the supply of energy and enable



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Our four dimensions of co-creating RES Living Labs

citizens to contribute the community's overall sustainability, social cohesion as well as more favourable attitudes towards renewable energy plans in general. Such projects rely heavily on participation and engagement. Mirroring this emphasis on collective engagement the EU-funded project 'PROSEU – Prosumers for the Energy Union' worked together with either emerging or already established prosumer initiatives to better understand what drives and what hinders the mainstreaming of collective prosumerism in Europe. PROSEU did this by **co-creating** solutions which might support these stakeholders in taking their collective project to the next level and to overcome the barriers they are facing at the local, national and European level. Reflecting the collaborative multi-stakeholder spirit, at the heart of so many prosumer projects, PROSEU created spaces for co-creation and co-learning in the form of so-called Renewable Energy Sources (RES) Living Labs.

Working on collective prosumer projects requires insights from several different disciplines and issues surrounding the technical potential are just as important as addressing motivational and acceptance-related factors. New prosumer projects have to find their way through an often complicated and changing regulatory framework and have to ask themselves whether their business model is sustainable and economically viable. Thanks to its multi-disciplinary expertise, the PROSEU consortium has explored challenges and solutions and the many possible directions prosumerism can develop. This handbook therefore invites you to experience the incredibly diverse nature of collective prosumerism and to be inspired by the practical experiences of our Living Labs on how we have been able to work on jointly unlocking the potential of engaging local communities in the energy transition.

The PROSEU Team



The PROSEU team in Leeds, 2018



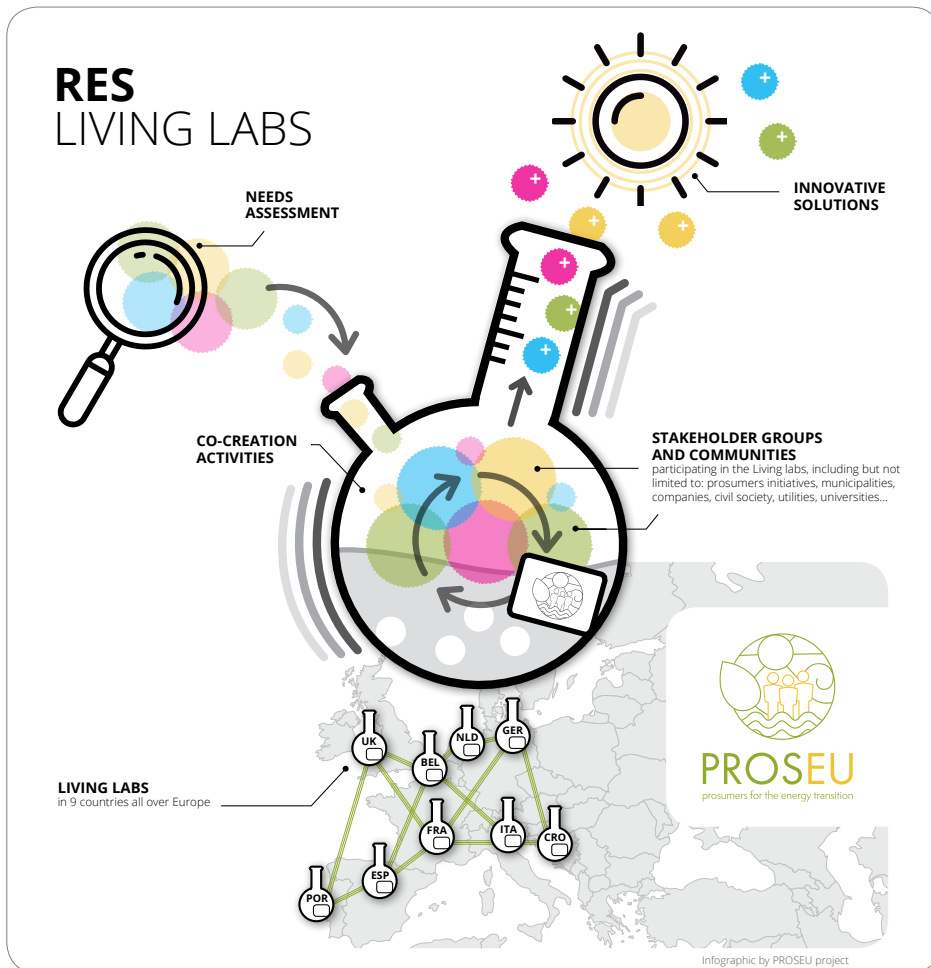
CO-CREATING SOLUTIONS IN PRACTICE

Collective action and engagement on the local level can have a truly transformative effect on how we produce and consume our energy.

To fully explore this potential, PROSEU facilitated and activated 15 RES Living Labs in nine countries as spaces for innovation and experimentation through co-creation. They provided opportunity for collaboration between many different stakeholders such as municipalities, companies, civil society, utilities, universities, but also individual citizens and even between different prosumer initiatives looking to join forces going forward. All of the (potential) prosumers are united in their goal of achieving a prosumer project, but perhaps not all with the same idea regarding the outcome. While the collective ambition of the individual Living Lab might not be reflected in any kind of structured organizational form at first, the Living Labs management framework enabled discussions to take place according to a jointly agreed structure and timeline. For PROSEU's Living Labs, co-creation is not a methodology, but rather an intrinsic approach to problem-solving which can involve the application of many different methods and formats of discussions as long as the outcome is a result of an open dialogue among all stakeholders collectively, where no stakeholder

comes out as overly assertive. This is reflected in the principles of many collective prosumer projects in which fair governance plays a very important part.

The Living Labs not only allowed for multi-stakeholder engagement, but provided an opportunity for researchers to organize a series of interventions at certain moments to impact the co-creation process and to identify changes in the Living Lab's development. At first the Living Labs convened to conduct a needs assessment and to rally behind a set of commonly identified barriers. This was then followed by at least two specific activities selected prioritized by each Living Lab, and engaging all the stakeholders (through so called "interventions") in which the research team fed ongoing discussions with input, suggestions and findings from the PROSEU project. All stakeholders jointly evaluated whether the Living Lab process was successful in triggering change and contributed towards overcoming the identified barriers.



PROSEU-infographic living labs



OVERCOMING REGULATORY BARRIERS

Energy markets are complicated constructs designed to facilitate the cost-effective production and consumption of energy while balancing fluctuating supply and demand.

This has resulted in a system with regulation that, in general, promotes those stakeholders producing electricity at the lowest cost rather than those producing renewable energy with the highest social benefit. The regulatory and legal environment for prosumerism provides the basis for whether collective prosumer projects can and will be successful. Effectively, the mainstreaming of prosumerism depends heavily on the right regulatory frameworks being put in place, and across Europe huge differences exist on how prosumers are being supported. Additionally, an increased shift away from traditional and “secure” feed-in based payments for surplus energy leaves upcoming prosumer projects searching for new solutions in highly cost-dependent energy markets.

In recent years, an increased return to lowest-price schemes for renewables through tendering is putting additional pressure on smaller prosumer actors to compete. This is coupled with significant limitations on the degree to which the produced electricity can be self-consumed.

However, recent changes brought by the EU legislation - the Clean Energy Package, the recast Renewable Energy Directive (RED II) and Electricity Directive in particular- have the potential to be a games changer for prosumer initiatives requiring EU Member States to ensure that consumers can become renewable self-consumers, who may generate and store RE and sell excess RE production. All of this needs to transpose into national law by 30 June 2021.

Prosumer collectives can take many different forms depending on their purpose and the extent to which governance considerations (e.g. regarding decision making and accountability) are addressed. Different policy and legal conditions do indeed have an influence on the kind of activities prosumer collectives and how effectively they can engage in producing energy, in trading and selling as well as storing it.

Regulators and policy makers need to constantly balance economic and environmental concerns with grid stability and other technological challenges without forgetting the social inclusion policies. The newly granted rights for renewable energy communities under EU law are promising and will, hopefully, promote more progressive energy policies, highlighting the important role prosumer initiatives can play. Until now, the absence of specific legislation enabling collective prosumerism was a challenge many ambitious projects have to face. Whilst there is still a long way ahead for the majority of countries to translate EU-definitions such as “renewable energy communities”, or “jointly acting renewable self-consumers” into their national legislation, several PROSEU Living Labs, in anticipation of these regulatory changes, discussed what is possible now and how the (new) regulation might impact their collective prosumer initiative.





RENEWABLE ENERGY SOURCES (RES) PROSUMER INITIATIVE

The PROSEU project considers such initiatives to be collective energy actors producing energy from renewable sources with the primary objective of providing their own energy and/or that of its members, and in some cases selling excess energy to clients, thereby actively participating in energy markets. Examples of such collective energy actors are: cooperatives, informal collectives; not-for-profit organisations (socio-cultural or sports associations and NGOs); companies in different sectors; public institutions (whether municipalities or schools and retirement homes) and public-private or other forms of partnerships).

RENEWABLES SELF-CONSUMERS

Fall under the prosumer category and are defined as final costumers generating renewable electricity for their own consumption and who may store or sell self-generated electricity provided that those activities do not constitute primary commercial or professional activity.

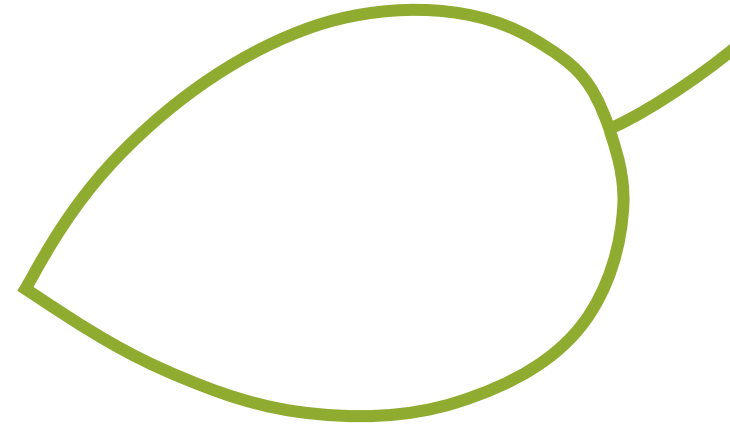
These definitions were elaborated before the adoption of the recast **Renewable Energy Directive** and the **Internal Electricity Market Directive**. The former, while not mentioning the term "prosumers", lays down concrete rights for "Renewables self-consumers" and "renewable energy communities", while the latter defines "citizen energy communities". These elaborations and rights are the legal basis for transposition and implementation in EU Member States.



The stakeholders of the Energie Partage Living Lab in France had mixed feelings about the possibilities available to prosumers. Arranged within an informal safe space during the REVE citizen energy conference, stakeholders pinpointed key issues for the uptake of prosumerism in France.

These include periods of return on investments that remain too long, an unfavourable taxation, with particularly high charges for the network and a very uncertain legal regulation around prosumers. Although there are quite a few collective prosumer initiatives in France, they are usually supported and promoted by public entities covering the potential risks and (directly or indirectly) subsidizing it. The stakeholders in the Living Labs explored the potential to replicate, disseminate or upscale such initiatives, coming to the conclusion that these will only be possible in presence of a more favourable energy market enabling

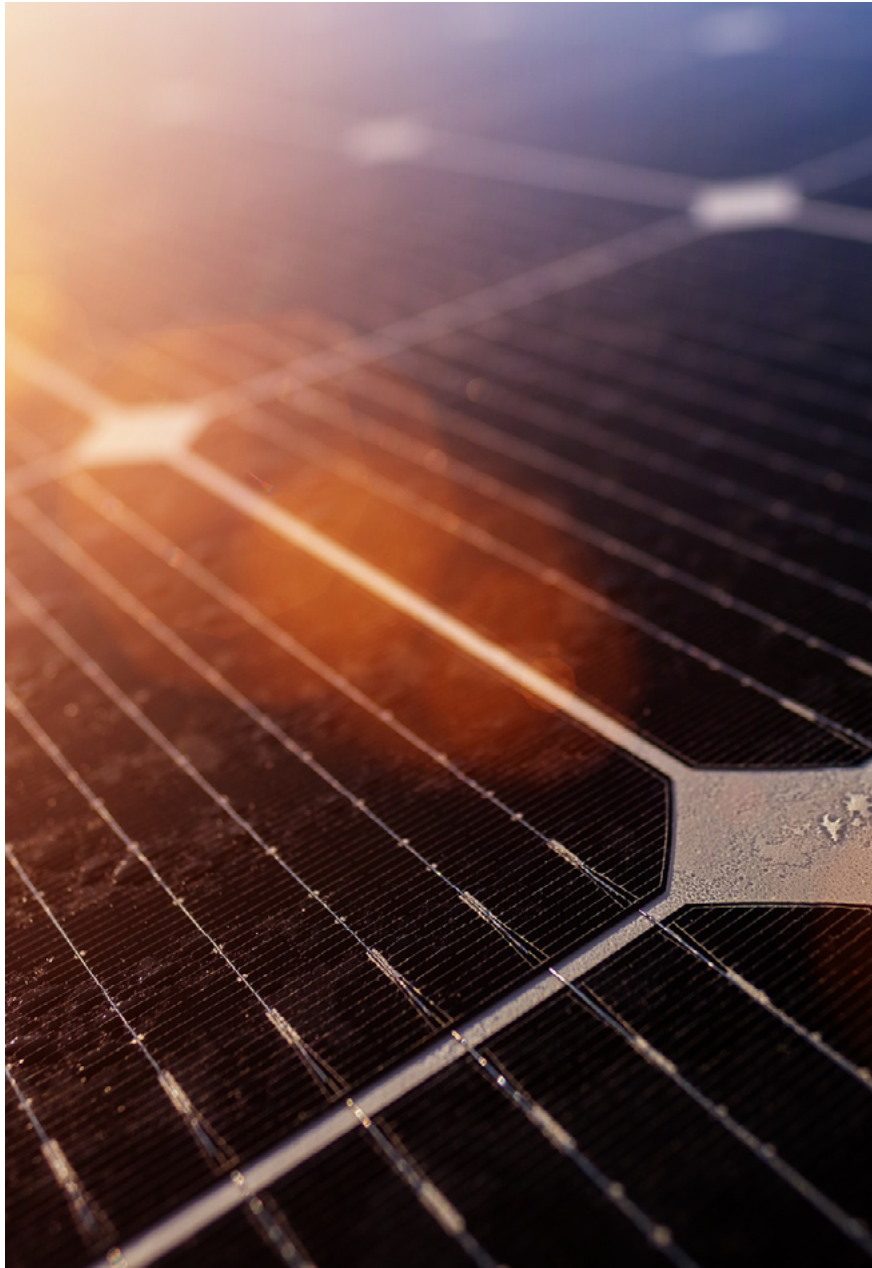
framework. Whilst many planned projects have not materialized due to these challenges, working with local governments is considered to be a more “secure” and a more economically viable way of supporting prosumer initiatives. The fact that in France many small and medium municipalities are partners of EPA/Enercoop is supporting the development of collective prosumer initiatives especially through public-private-partnerships. Local governments are especially behind it given the French national strategy to promote renewable energy initiatives at sub-regional level. The French national strategy to promote (through grants or loans) renewable energy initiatives at sub-regional level has been identified as explaining the interest and commitment of local governments to support and take part in collective prosumer initiatives for experimentation. As such, the example in France shows, that having the right legal enabling framework goes a long way towards supporting collective prosumer initiatives. It is expected that this will be increasingly the case throughout Europe and prosumers will see their position strengthened in many member states energy markets. This is good news since a solid regulatory environment is the basis for allowing new and innovative business and finance models to develop. This was also fed into a study undertaken on EU policies and national best practices for Energie Partage.



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Solar energy

The Living Lab on Self-Consumption in Spain brought together a diverse range of energy stakeholders (utilities, cooperatives, energy agencies, NGOs, etc.) through workshops and identified that local tax exemptions can improve business cases and highlighted some possible business models for collective prosumers in Spain on the background of the new Spanish Royal Decree on self-consumption.

Possible business models included 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 a 500 meter distance). Given the normal self-consumption rates and the current variable tariffs, the pay-back time of such projects can often exceed fifteen years. The participants learned 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 defining what data sets (quarterly hour or half-hourly demand and generation data) need to be exchanged between the metering company and the energy supplier. Living Lab stakeholder Azimut360 is also developing two pilot projects in shared self-consumption, two buildings with 26 and 13 households respectively. As part of the Living Lab, slides for the tenants were developed that explain how self-consumption works. These slides will help other communities that want to establish shared self-consumption. Once the appropriate institutions were identified (in this case the local distribution company Endesa and the Company Portal of the Generalitat de Catalunya), they were contacted to start the process. The results of this experience, as well as the slides for tenants, will help other communities to establish shared self-consumption in the future.



In the wake of new regulatory changes stemming from the EU's Clean Energy Package, Italian municipalities, around the Municipality of Santorso, were empowered in this Living Lab to discover the effects of the new rights allocated to renewable energy communities and self-consumers under revised Renewable Energy Directive (RED II) which has to be transposed into national law by June 2021.

These new rights were presented in a clear manner to Living Lab stakeholders who felt motivated and empowered to act, in particular in line with the commitment from the municipalities to deliver the Sustainable Energy & Climate Action plan in the framework of the EU Covenant of Mayors. The 11 municipalities supporting a joint helpdesk "Sportello Energia", to inform citizens about what they can do themselves regarding renewable energy and sustainability, wanted to get the full picture on what will be possible in the future. To facilitate this process, and gear up for the post-transition period, stakeholders also explored the technical feasibility and options for

an energy community on their territory. Stakeholders were presented with the PROSEU modelling on how the uptake of prosumerism in Europe can be facilitated and it was shown how to use and extract data to build scenarios from the database of prosumerism technologies for electricity and heat. The outcome here was a clear example of the best implementation and facilitation of prosumer technologies given new regulatory environments. They now have a better understanding on how energy communities could look like in their context and how citizens can be involved. Being introduced to these elements contributed to the creation of a narrative how local prosumer projects can be accelerated:

1. **Have the appropriate regulatory framework in place,**
2. **Provide economic support to develop feasibility plans and risk assessments toward bankability,**
3. **Use a technology database (such as PRO-SEU's database) to consider different technology scenarios. Living Lab stakeholders have become more aware of the possibilities within their respective context and can now act accordingly.**



Living Lab: Municipality of Santorso



The Getesnippers Living Lab in Belgium came together at several occasions to discuss how wood material from landscape conversion and maintenance work (LCMW) can be used as biomass feedstock for a local sustainable heat supply.

It was acknowledged that **wood waste is no longer classified only under EU waste legislation**, but now also falls under EU energy law. Since the Living Lab stakeholders envision the use of wood chip boilers in the future, it needs to be acknowledged that European ecodesign criteria for the burning of wood may become stricter. This means that stakeholders from the Getesnippers Living Lab should keep an eye on this when installing boiling and biomass units. This example showed how the European legal framework can be an enabler, but also hinder potential efforts in the future if precautions regarding the environmental sustainability of biomass are not taken at an early stage of the collective prosumer initiative.



BRINGING PEOPLE TOGETHER

Across Europe, citizens' perception of the energy supply as being inherently linked to climate change and sustainability is steadily increasing.

It therefore, comes as no surprise that interest in the way our energy is produced has the potential to spur collective action by bringing people together. Collective prosumer projects are often initiated by a group of stakeholders based on a collective understanding that their engagement will result in tangible benefits for the energy transition, but particularly for the local community. Such projects can have a real community-building effect e.g. by instilling a strong sense of ownership and collective pride, and might result in more activities for the betterment of local communities while helping to reach out to vulnerable groups and to address energy poverty by promoting energy savings. As the money earned/saved can also be re-invested into local social projects, collective prosumer projects are a perfect means to enable citizens to take matters into their own hands and to make a real difference in the process. However, PROSEU research has shown that most local collective initiatives are chronically understaffed. While there exists significant variety in the type of initiatives, some being carried by public actors, or companies, a lot of initiatives are run by volunteers. In such cases, values such as community building as well as ecological concerns are often in the forefront. Taking advantage of subsidy schemes and policy incentives, as well as increasing revenue are generally seen as far less important moti-

vating factors. But since many of such initiatives rely on volunteers to run their activities, they might lack the experience or time to accompany the growth of their activities. Especially when experiencing increasing bureaucratic and administrative requirements, this requires the support of more people and/or an increased professionalization of collective prosumer initiatives. Initiatives begun and supported by public actors, such as local governments, are therefore an effective way of creating the necessary institutional support. These also have an educational dimension since better informed citizens have more reasons to become prosumers and to reach out to other like-minded people. Likewise, established prosumer collectives often take it upon themselves to do outreach work to encourage more people to either become individual prosumers, to join a prosumer collective, or to procure sustainable heat and electricity. PROSEU's Living Labs are a good representation of the community-building and networking character which comes with some many prosumer initiatives.





The German Sub-WW (sub-urban heat transition) Living Lab is developing a low-temperature local heating network with decentralized renewable energy production on the background of a greater district renovation project.

This process relies heavily on the interest and motivation of local residents to take part and to potentially acquire shares of a possible energy cooperative which would own and govern the district heating grid. Transparency and participation are very important to the project's stakeholders including a regional environment center (UWZ) and the municipality of Weyhe. A combination of roundtable discussions and surveys has shown that climate change and an environmentally friendly heating supply seemed to be very important to the participants, but also linked to the estimated economic viability of the project.

Originally, it was planned to hold a dedicated roundtable at the public school of Leeste, but the format was changed to an online survey due to limitations imposed by COVID-19. Disseminated via internal mailing lists, participation was higher than expected for the face-to-face format, but it restricted somewhat the open discussion of the heat production of the school. With the help of open questions, getting the needed individual input was possible and some conclusions could be drawn.

The new heating supply should be economically beneficial; otherwise, many people lose interest especially considering that the current provision of heat is mostly cheap and works well despite not being very ecological. Most of the participants showed interest in a cooperative model and seemed to be interested in being a part of the project. School students have voiced particular interest in being part of a possible energy cooperative governing the districts

heating supply since the topic of renewable energy has gained a lot of traction among pupils recently. Living Lab stakeholders will continue using these results to reiterate swift implementation of the project and to engage more stakeholders in the discussion going forward. It is particularly crucial to engage strongly with the municipality to increase overall political discourse as well as public participation to prevent resistance caused by weak acceptance.





Living Lab: KDN United Holsbeek

Sports brings people together. Not only to stay fit, but also to collectively engage in renewable energy production. This was the focus of the KDN United Holsbeek Living Lab in Belgium in which a local football club brainstormed together with energy actors from the region on how a new community building could be integrated with renewable energies.

Plans for a new communal multi-purpose building were already in the making and, next to issues related to land-ownership and financing, it was also discussed how members of the football club could contribute to and profit from the plans. The goal was to create a common space that would be used by the local community for a diverse range of activities beyond football such as a co-working space, a cantina, yoga classes etc.

It was decided that **creating a convincing narrative** around the building (as a complete wooden passive energy house) with a community energy angle could help to convince the municipal council of the necessity for this building. One idea was to install solar panels on the new building's roof and to set up an energy cooperative to allow the club's members (mostly parents whose children

are playing football) to join the cooperative, to invest in it and to receive a return on investment over time. This possibility seemed promising and several examples from elsewhere in Europe were presented where sport clubs have done something similar by either installing collective PV installations on their club building's roof or to install heat collectors to significantly save on heating costs. Unfortunately, the co-creation process was halted due to several complications which would make it difficult for any collective prosumer project to advance.

Having the (administrative and financial) backing of the local municipality for such community-led prosumer projects is essential, but there was no clear consensus in the local council on whether having such a community building is a good idea or even feasible. Part of this was due to an unresolved land expropriation procedure as well as a lack of (political) willingness to engage residents as active energy citizens. All of this goes to show how essential local government backing is for such community-oriented activities in general and collective prosumer initiatives in particular.





Living Lab: Wind of Alentejo

Having many people participate in a collective prosumer project means that the joint motivating factors need to be identified. The Wines of Alentejo Living Lab in Portugal arrived at such a joint view using a building blocks method which aimed at collecting the shared views of all stakeholders and to get participants to develop their own individual and group visions for their 'ideal and sustainable wineries'.

This exercise showed sustainability and climate change are the most pressing problems for wine producers. Climate change impacts are already affecting the quality of wine production and therefore wineries feel an urgent need to act and to work together. Wine growing uses a huge amount of energy, representing a high cost for producers, which they hope to reduce using renewable energies. As companies, they feel the pressing need to have a good social image by adopting a more sustainable strategy as part of their business.

In the Aardehuizen Living Lab, an eco-village in the Netherlands, many organisations came together to find institutional barriers around prosumers. Attending organisations were the national government, the grid operator, intermediaries, regional organisations as well as local energy prosumer initiatives of the neighbourhood.

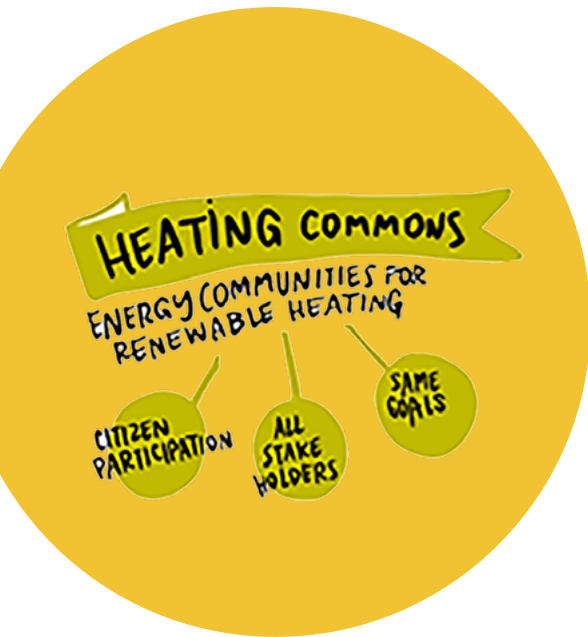
The main co-creation workshop was held at the beautiful location of the Aardehuizen which served as an inspiration and created a good atmosphere for participants to be actively engaged. The purpose of was to **find institutional barriers and drivers for peakshaving, to support stakeholders to become “action-minded” and to establish a better relation between prosumers and the grid operator**, so that forthcoming peakshaving projects would be able to rely on the grid-operator’s support. A main outcome of the workshop was a growing network: a stakeholder of Aardehuizen presented their plan at another meeting where the right people were present. Moreover, the workshop created momentum for a subsidy application between Saxxion University and the Aardehuizen association.

Another workshop on prosumer business models created inspiration amongst its participants. Having participated in a meeting on prosumer business models, a staff member of the City of Rotterdam mentioned that she was already looking for ways on how the city would be able to engage citizen participation with sustainability initiatives. After the workshop, she is taking these insights on the diversity of different models into internal knowledge sessions in her work in Rotterdam.

Lastly, the Living Lab produced a report, poster and factsheet on the net energy consumption and CO2 emissions of houses in the eco-village in comparison to typical new-build houses and to determine best practices on energy consumption within the community. The publication of the report generated quite some media attention putting the Aardehuizen in the spotlight. The eco-village was featured in a major national newspaper with about half-a-million readers as well in an item in a major national TV programme.



Living Lab: Aardehuizen



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The co-creation workshop was very successful and made us think collectively on how smaller scale and citizen-owned and operated heating systems can be implemented.

BUURTWARMTE LIVING LAB STAKEHOLDER

Collective prosumer projects are increasing in number, which is also the case for calls and ambitions for energy autonomy and do-it-yourself lifestyles. The Dutch Living Lab and collective of energy cooperatives “Buurtwarmte”, alongside a diverse group of stakeholders, looked at what a commons approach to sustainable local heating systems can look like.

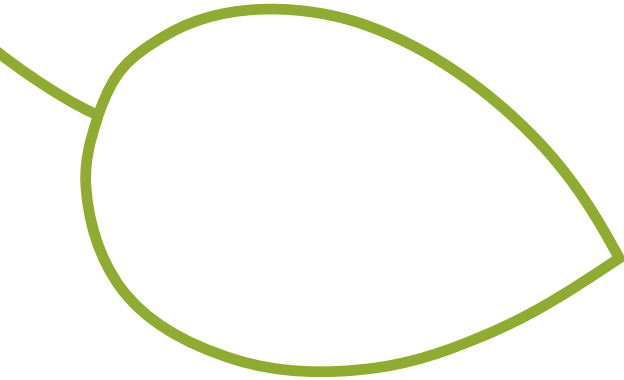
This was done on the basis of the assumption that in 10 years all the financial streams from the government aimed at increasing sustainability are no longer predominantly going to businesses, but to citizens. If a common heat supply is being set up, e.g. through an energy cooperative adhering to the values of the International Co-operative Alliance, this can enable people from the same neighbourhood to participate even if they do not have a technical background. For this to happen, proper communication is essential.

Cooperatively-owned systems are also more transparent because members have more insight into the system and its management. On a macro level, it can help overcome monopoly issues and in-transparent pricing of district heating networks. During a pressure-

cooker workshop, stakeholders were inspired by different perspectives on how a heat-commons can look like. The most basic definition would be that a heat-commons consist of a heating grid, a sustainable heat source, a community which owns it, e.g. through an energy cooperative. Allowing citizens to have a say in a project's development has been put forward as one of the most important elements of the commons. The same applies to the creation of a shared identity as well as the feeling of belonging to a community.

Living Lab stakeholders were also inspired by the example of 'MienskipEnergie', a foundation that established a label for local energy communities and standardizes and communicates a certain set of values in relation to energy production. It is used to communicate to municipalities that the initiative holding the certificate is operating in a transparent and inclusive manner. It appeared that such a certificate could also be beneficial for other stakeholders in the Living Lab as a means to institutionalise the idea of the 'heat commons' with rules and structures to achieve a better position of such approaches with existing and new structures of the heat system. Living Lab stakeholders learned about how to govern the new energy commons and ended up with more confidence and an improved 'sales pitch' on why their approach works and is attractive.

Increasing visibility/acceptance among (and cooperation with) government and market parties has been an additional added value of the workshops since such cooperation is essential for getting collective heat projects of the ground.



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Having co-created a step-by-step guideline was very useful as it enabled us to approach our work in a even more structured manner.

It provides a good basis for further action while still allowing for enough flexibility in how we valorise waste wood from the region for sustainable heat.

GETESNIPPERS STAKEHODLER

ASSESSING BUSINESS AND FINANCIAL SOLUTIONS

Depending on the overall legal and regulatory framework, collective prosumers have an easier or more difficult time employing a business model enabling them to maintain a profitable means of operation over a longer time frame.

From a technological perspective, the price of installing renewables is falling allowing more homes and businesses to afford the up-front costs of installing prosumer technologies. Advances in digital technology and the increased roll-out of smart meters also makes it possible for regulators and aggregators to look at consumption and prosumption habits on an individual level, setting the scene for more demand-response and ability to integrate individual prosumers into wholesale markets. Energy systems are thus getting smarter, making it easier to trade smaller amounts of energy and to trade them between smaller players in the energy market, even down to trading between households. However, regulatory changes can have a significant impact on existing business models. Feed-in subsidies are fading, requiring new, but also established prosumer collectives, to search for new ways to operate in an economically viable manner. It is important not to see prosumer business models in isolation, but to shape them in accordance with the wider ecosystem within which they are situated. It is therefore a question of finding the right business models and

financing for prosumers to respond to specific regulatory environments, but also technological conditions and to acknowledge that certain “enabling environments” might prohibit a specific business model that works well in one context, but not in another due to differences in e.g. retail prices, subsidy support, export prices, the availability of net metering, tax incentives and grant schemes. This also means that any new type of prosumer business model might have to allow prosumers to become competitive in today’s energy markets while simultaneously safeguarding core values such as community building and citizen participation. In some cases, caution will need to be taken to ensure the pressure on collective prosumers to compete in energy markets on a “level-playing-field” with established market actors does not come at the expense of these original core values of many initiatives. Collective prosumer initiatives are the result of multiple enabling factors and it is clear that a business model can be good on paper, but in some cases tricky to properly bring to market.

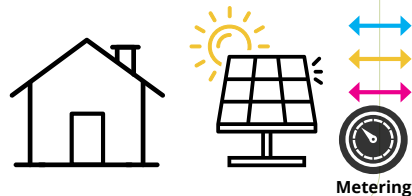
PROSUMER BUSINESS MODELS



PROSEU
prosumers for the energy transition

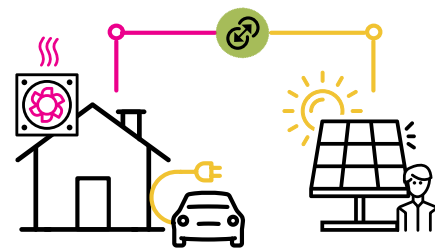
BASIC PROSUMER

Basic self consumption: Household produces electricity and consumes it. Potentially sells some but also buys. Benefit: Save money, use renewables.



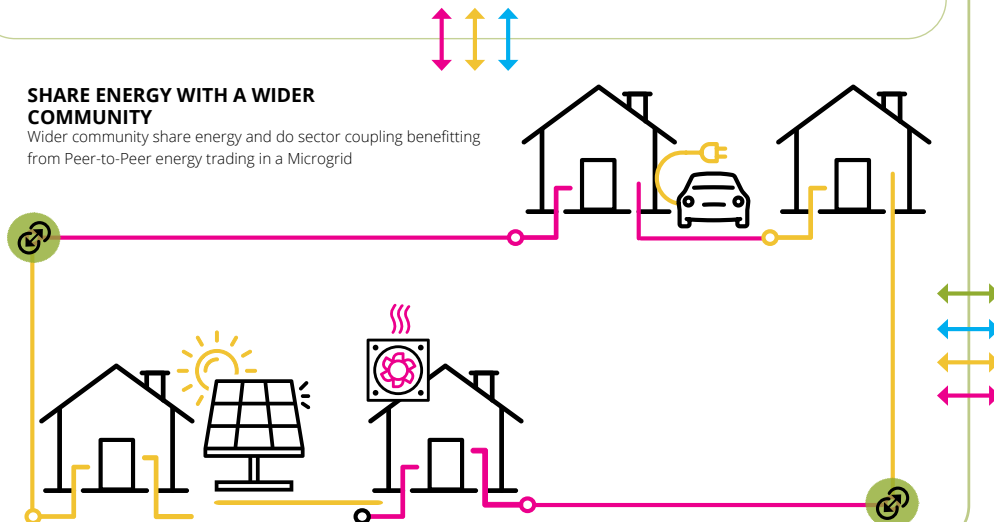
SECTOR COUPLING IN THE HOME

Self consumption with the ability to do sector coupling internally.



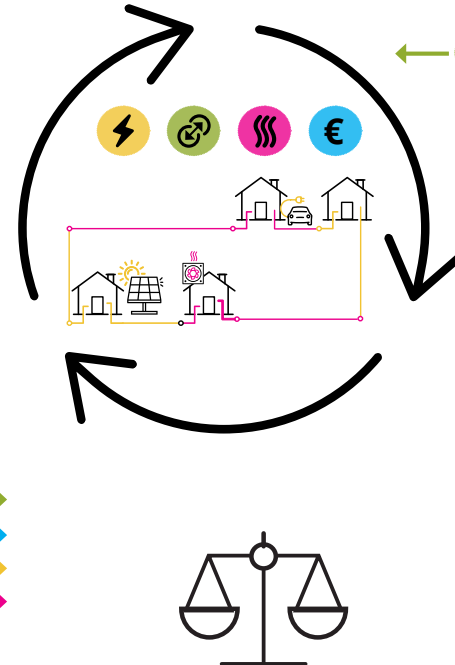
SHARE ENERGY WITH A WIDER COMMUNITY

Wider community share energy and do sector coupling benefitting from Peer-to-Peer energy trading in a Microgrid

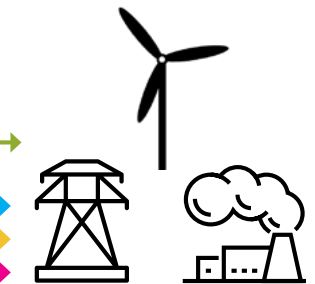





BALANCING OF THE WIDER ENERGY SYSTEM

The combination of production and sector coupling in a wider community allows for providing flexibility to the entire grid. This provides added value for the green transition.




CURRENT MARKET



-  Electricity
-  Payments
-  Heat
-  Grid Flexibility

This infographic is a simplification.
Find 15 detailed business models
on proseu.eu/business

Infographic by PROSEU project

 This project has received funding from the EU's Horizon 2020 research and innovation programme under grant agreement N°764056. Opinions are those of PROSEU and do not necessarily those of the EU.

Stakeholders from the Living Lab in Northeast Lower-Saxony in Germany such as the energy cooperative “BürgerEnergie Buxtehude eG” and “RegionalEnergie Elbe-Weser gGmbH”, an association for the promotion of prosumerism, have , among other topics, analysed factors that enable or constrain the marketing of regional electricity products and whether citizens would switch their energy supplier based on the concept of “regionality”.

It was shown that the marketing of electricity has different challenges and convincing citizens to switch their energy supplier can be a real challenge especially considering low switch rates and a lack of understanding regarding the complexity of the electricity market.

At the same time, should collective prosumers, for example energy cooperatives, choose to supply energy directly to their members, this would require them to become a licensed supplier and to do so would demand a significant increase in their knowledge and administrative capacity. In

practice, it is mostly easier for energy cooperatives to focus their efforts on the regional communication and distribution while the marketing is left to larger licensed suppliers with whom the energy cooperatives cooperate and with whom they have a direct marketing contract.

At the same time, prosumer collectives need to consider whether another “regional” electricity provider, such as a utility is already present in the area. It also appeared that the attributes of “regionality” alone might not entice customers to switch, and the attributes of price and 100% renewables are generally seen as more important. However, striving for a regional electricity product is not done purely from an economic point of view. Instead, the regional product can be considered more of an image factor for the cooperatives and for the local energy transition contributing to a raised acceptance of renewables. This can also be done by first focusing on the members of the prosumer collective as potential customers, also to increase the sense of ownership among members. The general framing of the product is also highly important since costumers should be made aware that they can actually make a difference through switching to an energy supplier which offers a regional energy product.



Wind energy



UK-based Bristol Energy Cooperative (BEC), as a Living Lab, explored how a recently launched Community Municipal Investment (CMI) product could be rolled out in cooperation with the City of Bristol.

The CMI is a system in which the city issues bonds specifically for community-based energy projects and can strongly engage with citizens as investors. The community bond allows residents to invest in green infrastructure projects and in return for supporting the city's RES ambitions, citizens investors will receive a long term, low risk return.

The bond is issued directly by the city and administered by an established crowdfunding platform: Abundance. A combination of roundtables and "lunch and learn" workshops have shown that the largest hurdles for stakeholders such as BEC are largely about the cost of capital rather than raising volumes of finance. Securing **financing is always secondary to having a functional business model** (ensuring that the

produced electricity can actually be sold for an appropriate price, or that savings outweigh the costs). Considering the UK's withdrawal from FIT schemes, having a functional business model is more important and more difficult than acquiring volumes of finance. The lack of a lucrative business model for community energy groups in light of the removal of subsidies continues to be an issue further exuberated by the outbreak of COVID-19.

There might also be a discrepancy between the interest of local authorities and policy makers in achieving maximum scale for lowest cost and the ambitions of civil society/community prosumer groups who may emphasize more local value and shareholder profits above scale. It was suggested that BEC could continue focusing particularly on large solar sites with Power Purchasing Agreements (PPAs) coupled with a community share offer as the core business model. More partnerships could be built on new business models including microgrids and local energy markets.

Further work with the Bristol City Council to investigate the Community Municipal Investment (CMI) product to reduce the cost of capital on projects is planned.



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The largest hurdles for stakeholders such as BEC are largely about the cost of capital rather than raising volumes of finance.





Living Lab: Bristol Energy Company

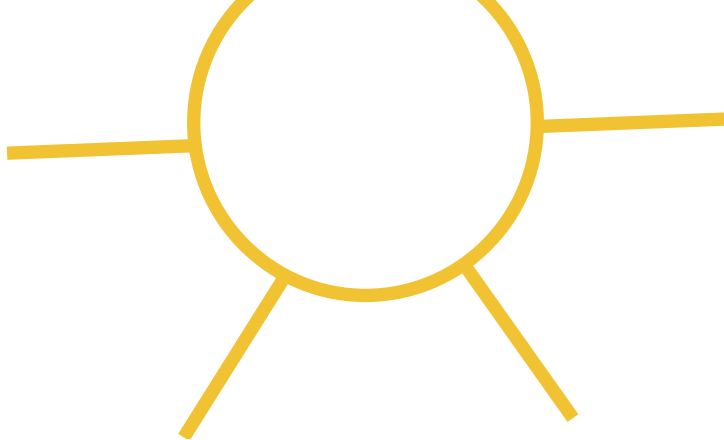
The Living Lab surrounding Bristol Energy Company in the UK has seen workshops and focus groups and highlighted the inadequateness of current building retrofit policies. It also explored the benefit of heat-as-a service model with domestic costumers, with the aim of developing the model into a zero-carbon heat offering.

It was shown that 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. By drastically reducing the energy bills of lower-income households, whole house retrofit can be used as a tool in addressing economic deprivation and inequality.

Municipality-owned energy suppliers like Bristol Energy could be leaders in this regard, but current electricity market regulations – especially in relation to supplier switching – effectively prevent them from forming municipal Energy Service Companies (ESCOs). These provide good solutions for the fact that current business models

of housebuilding, energy supply and domestic retrofit are poorly suited to this challenge of meeting the UK's 2050 climate targets. **'Energy as a Service' models have the potential to deliver real performance**, offer a simple and compelling costumer offer and provide secure returns for finance providers. The 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.

The Living Lab has shown that new homes can be an easier first market for these business models. As these models require trust, local governments and community groups have a key role to play in this regard. 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. Modelling undertaken by Retrofitworks, and discussed as part of the Living Lab, suggests that such a large retrofit programme would be amongst the largest programs of capital investment in Bristol's history. However, current regulation in the UK still lags behind and there are significant regulatory overlaps between energy building and financial regulation that need addressing to enable such a market to flourish.



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The financing tool we developed together has a real potential to make an impact on the market. It has the potential to enable projects which would otherwise lack initiative and high-risk capital.

ONE-STOP-SHOP LIVING LAB STAKEHOLDER

EXAMPLES FROM LIVING LABS



To a large extent, making procurement and/or investment by private citizens into renewable energies more attractive also relies on making the right tools available for doing so. In the Living Lab One-stop shop for integrated PV projects in Croatia, the combined efforts from academia, industry, banks and civil society have been employed to develop a tool for demonstration of bankability of private renewable energy installations when applying for a loan at commercial banks.

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 reason, acquisition and installation of solar thermal, heat pumps and boilers were already treated by appropriate funding lines. Similar lines, only slightly adapted, could be used for prosumers when acquiring PV panels for rooftop installation. Frequent exchanges with commercial banks helped to better understand the viewpoint

of the commercial sectors, when dealing with projects and upscaling equipment needed by prosumers. The tool to be used by households consists of an input sheet where users define their household size, location, the available rooftop area as well as the type of preferred PV modules.

According to the chosen inputs, the estimated production is calculated and the energy balance is provided for the whole year. The user is then provided with several outputs such as the graphs for the overall energy balance, the energy covered by PV each month and well as a simple rate of return for the user's initial investment. Following several review meetings with selected banks, the input sheet was updated to also include estimated consumption for the household as well as space to insert information needed to establish a payback plan (interest rate, number of periods, as well as inputs needed for payback plans. The outputs include the payback plan for the duration chosen by the user, interest paid during that period as well as monthly overall payments which can be compared with the user's electricity bill. Although the tool was primarily developed for individual households, Living Lab stakeholders agreed that it is well suited to be expanded in the future e.g. by creating a template of to be used by SMEs to simplify and speed-up the financing of such prosumer projects.



The Getesnippers Living Lab explored how to set up a valorisation chain for waste biomass from landscape conversion and maintenance work (LCMW) in the Leuven area in Belgium.

While the economic analysis is something which will be done more extensively in the future, significant cost savings are envisioned since heating oil could be replaced. These savings could be potentially re-invested in the landscape. Stakeholders brainstormed together focusing the discussion around three clear goals: drawing a vision, assessing measures and identify and overcome challenges, following an approach known as the Disney method. This enabled all participants to approach the topic in a more structured manner, taking care that these three parts were clearly separated in order to not be held back by critical thought from the very beginning and to “dream” about the greater vision first.

In the long-term, all households in the region should receive sustainable heat and LCMW in general should contribute to this. From the very beginning, the Living Lab set itself the objective of supporting biodiversity rather than generating a negative impact by making use of wood chips (e.g. in trimmed hedges) and rather foster better management of the landscape. The ambition is also to maintain the typical hedges separating fields as cultural heritage of the region. Maintaining their cultural ‘character’ through regular maintenance is thus being combined with local climate action. The Living Lab concluded that installing a boiler e.g. in a municipal building would only make sense if the value chain for collecting wood from these very dispersed landscape elements could be made economically viable, thus if the wood could be

collected at a reasonable price.

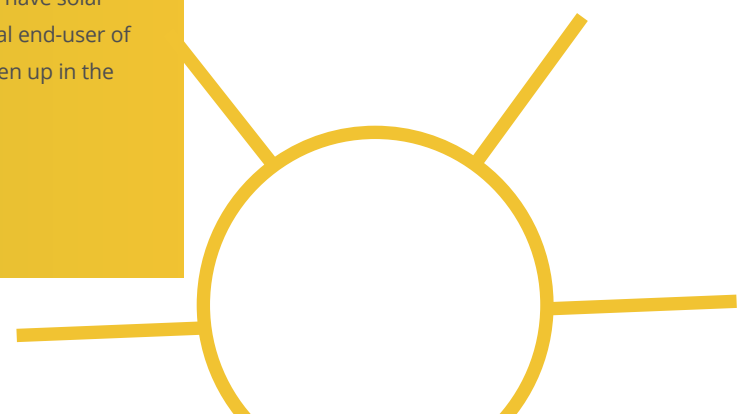
The Living Lab followed a **four-step process** based on a guide created by the **greenGain** project. The process encompasses a preliminary assessment of the value chain, a detailed feasibility analysis, and an implementation phase followed by continuous operation monitoring and maintenance optimisation. Through this approach, Living Lab stakeholders collected relevant information, laying out the potential for useable quality and non-quality biomass feedstock, discussing the required machinery for the cutting work, but also spent time assessing and weighting the environmental cost-benefits of burning the wood chips vis-à-vis using them for other purposes e.g. ground cover and composting.

The Living Lab mapped several options for potential locations for the LCMW accounting for expected increase in demand for wood chips for sustainable heat. Key stakeholders not yet engaged, but essential for the success of this project, were also mapped. The importance of bringing on board nature protection organisations (as critical voices) to secure an inclusive information process towards citizens, and fostering social acceptance of these measures, was highlighted in particular.

Implementation of the work will require the acquisition of permits as well as initial subsidies for a biomass boiler: a local school which placed a lot of emphasis on sustainability, and already have solar panels installed on its roof, was identified as a potential end-user of the woodchips. A possible cooperation that will be taken up in the future.



Living Lab: Getesnippers



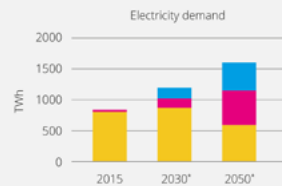


THE POTENTIAL OF ELECTRICITY GENERATION BY PROSUMERS IN THE EU IN 2050



PROSEU
prosumers for the energy transition

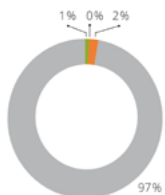
The electricity demand by households doubles by 2050 due to more use of heat pumps and electric vehicles.



● Heating and cooling
● Electric cars
● Lighting and Devices



CURRENT TECHNOLOGIES for generating electricity of households

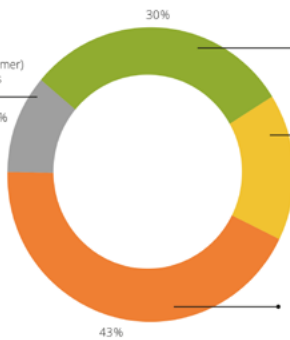


● Solar PV rooftops
● Solar PV ground-based (collective)
● Wind (collective)
● Other

POSSIBLE FUTURE TECHNOLOGIES for generating electricity of households

OTHER (non-prosumer) renewables

11%



89% of electricity demand of households in 2050 can be generated by households themselves

* All figures on this infographic that present future years are results of the maximum renewable scenario as explained in ... (add link)

Infographic by PROSEU project

PROSEU-infographic the potential of electricity generation

IDENTIFYING TECHNOLOGICAL SOLUTIONS

The technical potential of renewable energy prosumers in Europe is very high. The share of generated electricity provided to the residential sector by prosumer technologies can be up to 89% in 2050.

In fact, PROSEU's research has shown that prosumers can mostly produce more energy than they need and add the surplus into the grid. All suitable technologies have their advantages and disadvantages depending on the situation and conditions where the prosumer community is based. Solar energy is one of the most common technologies, especially because it can be used to produce electricity through photovoltaics as well as heat through solar thermal. However, suitable rooftops or bare land and solar irradiation must be available for implementation. Wind energy can be an efficient way to produce renewable energies, but taking the size of turbines and the required distance from buildings into account, it is only suitable for energy communities. For heating and cooling production, heat pumps are on the rise as a very efficient prosumer technology. More established technologies are boilers or combined heat and power plants that use biomass. The technologies can also be combined with thermal or battery storage on a small or large scale to raise the self-sufficiency. The most

suitable technology is therefore always context-dependent and the potential for an individual household to reach complete self-sufficiency is rather limited. This can be due to a lack of roof space as well as due to an imbalance of supply and demand. PROSEU research has shown that the highest shares of self-sufficiency can be reached if prosumers are grouped in a community. Having a more digitalized energy system is also essential in order to streamline processes. This must come with continued effort on the energy efficiency front and attention should be paid to overcoming technical barriers by simplifying and clarifying requirements and conditions.



The Croatian Island of Silba has become a Living Lab since it faces severe water supply issues, especially in the dry periods of the year when tourists visiting the island also increase the demand.

Without its own water supply, residents are completely dependent on water transported from the mainland by ship. As a Living Lab, the island community has co-created a **prefeasibility study on how the island can be made water-neutral by implementing a combination of desalination and small-scale PV installations**. The produced electricity would cover the energy demand for the operation of the desalination unit, while excess electricity would be fed to the grid. Residents provided insights into water consumption patterns which were then analysed by the PROSEU research team. The analysis showed that citizens currently lose about 30% of the total water delivered to the island due to flaws and failures of the infrastructure.

Consequently, a collective SWOT (strengths, weaknesses, opportunities, threats) analysis was carried out to prepare for the installation of a PV plant producing electricity for the operation of the desalination unit while excess electricity would be fed into the grid. Additional water storage capacities as well as the renovation of the water

supply infrastructure were also recommended. The results of the complex analysis showed that meeting the island's water demand, considering the peak consumption in the summer months would require an installation of desalination unit of 100 m³/day capacity of produced water. Such a desalination unit would be driven by a 100 kWp installation of PV panels and a 300 kWh battery storage capacity acting as a backup. The capacity of additional water storage to be installed on the island is targeted to be 500 m³, which, added to existing storage capacities, results in a 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 considered as well as the construction of 2.5 km of new water pipelines that would be used to transport the water from the production site to the island's households. It also appeared that the water under this newly proposed system would have a price between 4.8 and 5.7 €/m³. Residents were included actively in the review process of this analysis. The slightly increased price was explained by the fact that it does not include only the cost of the desalination unit and PV system, but also the installation of additional storage capacities as well as the required infrastructure renovation and construction costs for the new infrastructure. Including all of these factors into one final end-price has made the prefeasibility study more convenient and representative for stakeholders involved in the Living Lab.



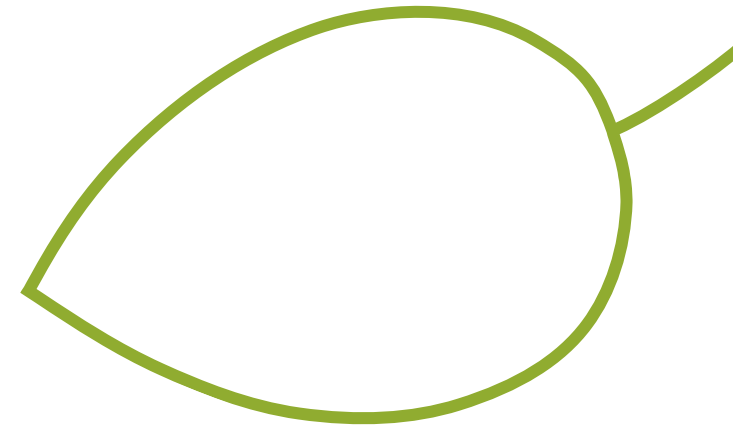
Living Lab: Croatia Island of Silba



Discussions on the basis of modelling software also took place as part of the Living Lab activities at the Sao Luis Energy Community in Portugal.

Throughout the process, stakeholders explored in depth specific aspects relevant to the **implementation of an energy community using GIS maps**, marking the different places where RES could be placed. Using the knowledge generated through previous discussions CALLIOPE, an energy system modelling software, was used to show 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 photovoltaic installations as well as wind energy. The option without using batteries, foresaw an investment in total of 4.8 million EUR, including a large-scale photovoltaic station (i.e. 270kW), solar panels distributed throughout the rooftops in the village, (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 energy autonomy but increase the investment to 6.8 million EUR.



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Just by bringing different people together with different interest and visions, we can build new alliances, new synergies which help advance the transition.

SAO LUIS ENERGY COMMUNITY STAKEHOLDER





Living Lab: Wind of Alentejo

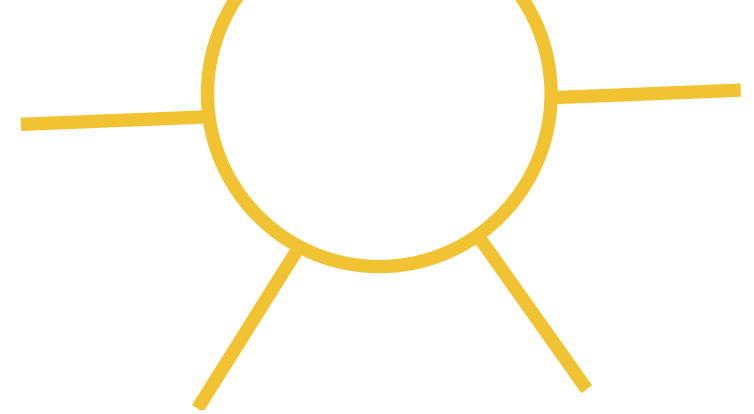
The Wines of Alentejo Living Lab in Portugal looked at combining business model and technical analysis. A solution was therefore presented using a water pump powered by solar energy to irrigate the vines.

Presented as a 'nature-based' solution, it requires changing the behavior and routines producers (for example, irrigating during the day, when solar power is at its peak). 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 that future benefits would pay off the costs. One particular business model explored was 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, **energy systems modelling** was used to simulate a new energy community involving the Herdade do Esporão, the Carmim Cooperative and the Reguengos de

Monsaraz village, using the CALLIOPE software. 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, that we refer to as a 'solar wine village', provided an example that could be used for setting up other similar communities in rural and wine producing regions of 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 totalling 2.95 million EUR, 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 need. Using batteries would increase the village energy autonomy (by almost a factor of 3), as it enables a larger presence of the photovoltaic technology but requires a considerably larger investment of 23.48 million EUR.



FEELING INSPIRED YET?

Working directly with citizens and communities is essential to guarantee the success of the energy transition for Europe. The scale and size of the challenges posed by climate change and the EU's objective of becoming climate-natural by 2050 require direct participation and contribution across all levels, and all sectors.

Working with the 15 RES Living Labs has reiterated prosumerism as a multi-dimensional issue. Looking at the four topics addressed in the handbook, it becomes clear that no single issue can be dealt with in isolation – environmental, social and economic aspects are strongly interlinked, and should be reflected as such into policy development, and implementation of all measures. The best and most sustainable innovation is always co-created from the bottom-up, and successfully designed with stakeholders able to bring to the table particular set of experiences and lessons learned from their very own context.

These experiences and the tremendous transformative power of these communities is a crucial ingredient for scaling-up a sustainable energy transition in the EU. It is also why peer-exchanges among the PROSEU's Living Labs have been continuously facilitated: to engage in international discussion, share knowledge and learn from each other's ideas. That is the beauty of collective prosumer initiatives. They can bring out the best in terms of community building all the while allowing citizens to take a stand and really make a difference.

Although there are still many challenges to be overcome, such as storage, flexibility, digitalization, grid capacity and data governance, technology is no longer the main barrier to entry, and communities are ready to tap existing technologies and solutions to empower their local energy transition.

Policy makers and practitioners have the task to leverage the potential lying in these communities, to properly enable their commitments and their actions through putting in place stable, certain and favourable framework conditions. Regulation clearly has a strong influence on the kind of business models and technologies that collective prosumers have at their disposal and it will continue to have an influence on the development of the many different initiatives out there.

It is promising and truly inspiring to see the many ways in that collective prosumers are able to adapt to changing framework conditions and to come up with solutions.

Through the necessary support and definition of rights and roles, collective prosumer initiatives can reach an economy of scale allowing prosumerism to be fully mainstreamed in the Energy Union, and to reach its full estimated potential share of Europe's energy market.

As the Living Labs show, socially-inclusive prosumerism can only happen if local stakeholders / residents are engaged and motivated to play their part in setting up an initiative from the outset and across all steps of its development. This buy-in is a staple of a fair and inclusive energy transition, in particular for a phenomenon like prosumerism, where voluntary engagement is often at the core and revolves around the vision and motivation of these communities.

The engagement from prosumers is even more needed now, as communities across Europe feel the impact and stress of the COVID-19 pandemic, which has made in-person gatherings more difficult, but also impacted on available funding streams. With their focus on retaining and upscaling local value, collective prosumer



Solar energy

CONCLUSIONS



projects therefore have a very important role to play in contributing to a sense of community as well as to post-crisis recovery. The PROSEU Living Labs have demonstrated the importance of maintaining the link to community-building and energy democracy - rather than a primary focus on increasing capital revenues. They have also shown how instrumental local governments are to facilitating this and for nurturing such initiatives, by providing the space for innovation and implementation, by creating trust and by offering a sense of guidance and direction going forward.

The PROSEU's Living Labs are only a few of the many inspiring communities that decided to implement their energy transition from the bottom-up in Europe – and their journeys have just begun! We invite you to learn more about their past actions and future plans and vision at www.proseu.eu.

We hope that this practical insight into PROSEU's Living Labs has inspired you to potentially get the ball rolling and to energise your very own local community and to contribute to a more sustainable future for all.

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