Compile

INTEGRATING COMMUNITY POWER IN ENERGY ISLANDS

Best Practice Guide

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Contents

1 SECTION I - INTRODUCTION

This best practice guide is meant to inspire. The goal of this report is to provide examples and best practices on how to create energy communities in various markets of the energy sector. This report was researched and written for the H2020 COMPILE project.

COMPILE is a H2020 project looking to build citizen and renewable energy communities in closed or poorly connected systems. The goal of our project is to provide solutions for communities to grow and structure to transform the European energy system. COMPILE has produced this toolkit to support European citizens to create energy communities.

While the list of examples featured in this report is not exhaustive, it provides a wide overview of models around which citizens can gather and set-up collective schemes to jointly engage in energy-related activities.

1.1 A FEW WORDS ON COMMUNITY ENERGY AND COOPERATIVES

A REScoop is a citizen energy cooperative. It refers to a business model where citizens jointly own and participate in renewable energy or energy efficiency projects. Energy communities do not necessarily have the legal statute of a cooperative, but rather distinguish themselves by the way they do business. They implement principles that have been duly outlined by the International Cooperative Alliance. All citizens are eligible to join a REScoop. After purchasing a cooperative share and becoming a member or co-owner of local energy projects, members share in the profits and often are given the opportunity to buy the electricity at a fair price. In addition, members can actively participate in the cooperative: they can decide in what the energy cooperative should invest in, and they are consulted when setting the energy price.

The cooperative model relies on 7 principles described by the ICA [1] (International Cooperative Alliance). The cooperative principles, also called the Rochdale principles, are describing and tried governance system. This is the reason why a large number of energy communities across Europe tend to adopt those principles to build their governance [2]. A way to adapt those principles is proposed in the Stakeholder Engagement Guide of the COMPILE Toolkit.

This is why we chose to present mostly cooperative examples in this report.

1.2 THE ENERGY COMMUNITY DEFINITIONS

The final Clean Energy Package [3] contains two definitions of energy communities: Citizen Energy Community (CEC) which is contained in the recast Electricity Directive, and Renewable Energy Community (REC) which is contained in the recast Renewable Energy Directive. Both definitions describe a way for citizens, SMEs or local authorities to organise collective cooperation of an energy related activity around specific ownership, governance and a non-commercial purpose as opposed to traditional market actors. For REScoop.eu, an energy community is a way to 'organise' citizens that want to cooperate in an energy-related activity based on open and democratic participation and governance, so that the activity can provide services or other benefits to the members or the local community. In that sense, energy communities represent an alternative type of market actor, and a different way and philosophy to do business which is now acknowledged by European legislations. The primary purpose of energy communities is to create social innovation and to engage in an economic activity with non-commercial aims. The transposition of those definitions in European member states is covers by a COMPILE working paper of December 2020 [4].

1.3 HOW TO USE THIS GUIDE?

In this report, we will identify and describe the most interesting cases and stories that we came across since the founding of REScoop.eu in 2013. After reading this report, existing energy communities may use our stories to broaden their scopes and consider new activities and innovative collective schemes to engage in energy transition projects. Citizens and starting energy communities may get inspired

and can use the examples to choose direction. National policy makers – looking into the transposition of the Clean Energy Package and the provisions for Energy Communities – may equally get inspired and use the examples to put in place a national policy framework that fosters the emergence of energy communities. Local authorities – including cities and municipalities – may find our examples useful and relevant to consider when making and implementing their sustainable energy and climate actions plans.

This report is organised by activity. Our goal was to provide an easy-to-use way to find models for energy communities. You will find at the end of the report the references and contacts of all the cooperatives cited in the report.

1.4 HOW TO BUILD A COOPERATIVE?

When creating a cooperative project, the first thing that you should be taking into consideration is the service to your community. Most of the examples that you will find in this report started across a kitchen table, at the counter of a local café or in a parent school board discussion. Most of those projects continued because they received the support of other cooperatives and local actors around them. Most initiatives transformed their market by taking it slow and starting small.

A piece of advice from Dirk Vansintjan, President of REScoop.eu: "Start with a small but profitable investment project. Try to find a project that will bring money to the cooperative, in order to finance staff time and therefore the development of future projects."

1.4.1 Geographical scope and potential

Today, there are an estimated 3.500 energy cooperatives in Europe, representing over one million EU citizens. About half of these energy communities are represented in the REScoop.eu network. REScoops typically emerge in countries with supportive legislative frameworks for community owned RES generation like Denmark, Germany or the Netherlands. Cooperative networks, such as DGRV [5] and Hier Opgewekt [6], monitor the yearly progress of energy cooperatives in Germany [7] and the Netherlands [8]. Energy cooperatives are much harder to find in Central and Eastern Europe. Factors that might stand in the way of citizen engagement in the energy transition in Central and Eastern Europe are financial constraints, unsupportive legal frameworks and non-liberalised energy markets. Luckily, we now see things changing for the better and recently welcomed new members from Romania, Slovenia and Croatia. But many challenges remain.

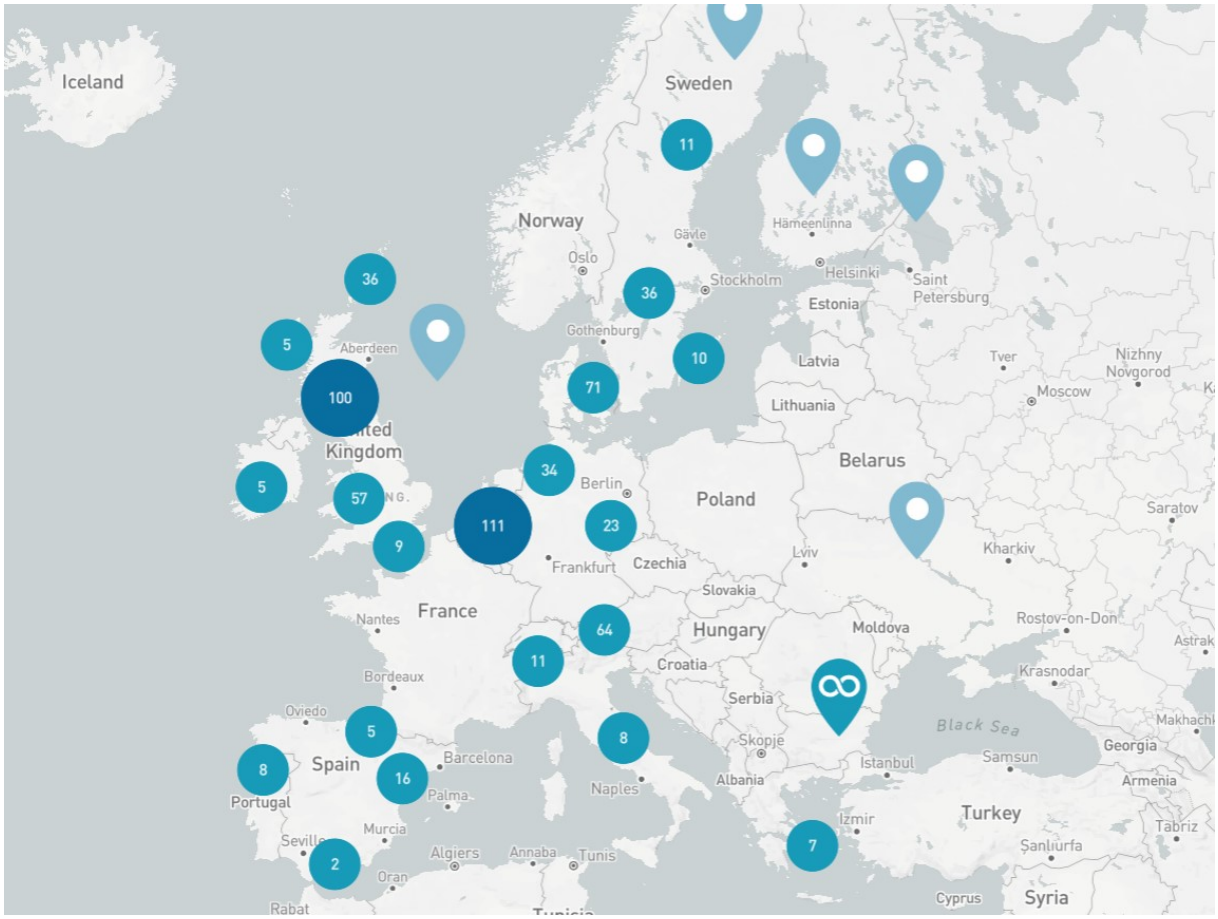

Figure 1 Community Energy Map (Source: REScoop.eu)

The Energy community map is a community energy initiatives registry supported by the REScoop.eu federation based on self-registration.

Research conducted by CE Delft in 2016 [9] revealed that over 264 million European citizens (which amounts to half of the European population) could be producing their own energy by 2050 at home or together in energy communities. These energy citizens could be producing 611 TWh of electricity by 2030 and 1,557 TWh by 2050. This means that by 2030, energy citizens could be delivering 19% of Europe's electricity demand, and 45% by 2050. This is a significant contribution to achieving the EU's 2030 renewable energy target and moving towards a 100% renewable future. The report also shows the potential of different types of energy citizens. In 2050, collective projects (such as cooperatives) could contribute 37% of the electricity produced by energy citizens, while micro- and small businesses could contribute 39%, households 23%, and public entities 1%. Together, these groups could make up as much as 45% of investor types.

1.4.2 About the size of energy cooperatives

Most energy cooperatives are rather small. They only have a few members and pursue rather small-scale renewable energy projects, typically solar PV panels. Other REScoops have more members but are yet to fully launch their first project. Finally, there are also large energy cooperatives. Ecopower [10] from Belgium and Som Energia [11] from Spain both have nearly 60.000 members. Through the cooperative, these people make joint investments in RES generation installations including large wind turbines, and through the cooperative they use the electricity for their own needs. Co-operative Energy [12], the energy retailer of the Midcounties Co-operative, has over 600.000 clients in the UK. The green energy supplier Greenpeace Energy [13] has over 25.000 members in Germany and 150.000 customers. Our experience is that it gets easier for cooperatives to grow big once they have their first

project up-and-running, or when members are given the opportunity to use the generated clean energy to cover their own needs at home.

1.4.3 Activities that energy communities engage in

Energy communities are often mistaken for and confused with technical smart energy systems innovations or microgrids. Certainly, there are energy communities that run their own microgrids, but they are two very different concepts. The aim of energy communities is to self-organise around energy-related activities, including generation and sale of renewable energy, in order to provide services or other socio-economic benefits to the members and/or the local community. Smart energy systems innovations can be used as one of the tools to achieve these aims – but they are not the aims in and of themselves. Any market actor can develop business models to promote innovative technologies to facilitate consumer participation in the market like collective self-consumption, energy sharing, development of micro-grids and green energy districts or neighbourhoods. That is not restricted to energy communities.

Just like energy communities, cooperatives can and do perform activities across the energy sector. This includes: Renewable energy generation, provision of energy efficiency services (including buildings renovations), retail supply, distribution (of both heat and electricity), storage, flexibility services, aggregation, and electro-mobility services. Although most of the cooperatives in the REScoop network engage in RES generation activities, the falling feed-in-premiums for RES generation have recently forced our coops to extend their scope and look into other energy-related activities. Today, we have cooperatives dealing with RES generation, supply of green electricity and biogas, energy efficiency, energy poverty, electric car sharing, etc.

This guide will give you an overview of the examples of activities energy communities can take part in.

2 SECTION 2: ENERGY PRODUCTION

2.1 ENERGY COOPERATIVES DEALING WITH WIND ENERGY PRODUCTION

Zeeuwind [14] (2700 members) and Deltawind [15] (3000 members) from the **Netherlands** are two local citizen energy cooperatives that successfully developed a 102 MW wind project worth EUR 215 million in 2018. The name of the project is "Krammer" [16], and is still in 2020 the biggest wind park developed by community energy organisations. The two cooperatives were initially forced to sell 50% to the wind turbine manufacturer (Enercon) simply because they could not raise enough equity themselves. Now that the project is actually constructed and the wind turbines are operational, the two cooperatives launched a second financing campaign. In only two days, they managed to raise over €10 million to buy-out the wind turbine manufacturer. This large project also mobilised cooperatives across Europe. The cooperative movement, through the MECISE project [17], offered to participate in bringing this wind park back in the hands of citizens.

Viure del Aire [18] is the first community-owned wind project in **Spain**. The turbine is located in Pujalt, close to Barcelona. The installation did not benefit from any subsidies or a feed-in premium. The development was made possible thanks to the support of another cooperative Som Energia [19]. which pushed through the development. The project is financed by Viure de l'Aire del Cel, a cooperative owned by Eolpop[1]. Som Energia provided the co-op with a EUR 1 million soft loan so that it could get its first project operational. After raising the funds from local citizens, the loan was paid back. The project consists in the installation of a turbine of 2.35 MWpeak. This turbine is to be installed in the municipality of Pujalt in Catalonia. The project brought together 615 members (private and legal

[1] Eolpop is an SME established by the Spanish branch of Eurosolar – the European Association for Renewable Energy. This SME took the responsibility of the development and supported the creation and development of the cooperative Viure de l'Aire del Cel.

persons), that together invest 2.8 million euros by the end of 2018. The entire process of approbation and construction of the wind turbine took 9 years from start to finish. The whole installation and approbation process faced significant administrative and legal challenges, despite a strong support from local citizens and professional organisations. The push back was especially strong from the national Spanish DSO. The whole timeline of the project as well as the description of activities is described in details on the website of the initiative.

In 2009 Hvidovre Wind Cooperative [20] and the utility DONG Energy built three 150-meter-high off-shore wind turbines close to the coast of **Denmark**. The turbines serve as test models for off-shore wind parks. Each turbine has a capacity of 3.6 MW peak (so 7.2MW peak for te whole park). For testing reasons, the wind turbines are placed only 15 m away from the coast line and can be seen from the whole region of Hvidovre. Remarkably enough there was very little opposition against these turbines. On the contrary, the citizens of Hvidovre and the suburban area of Copenhagen raised the required capital (above 100 million Danish crones) in a period of 5 months. The turbines were placed within 18 months. A professionally managed process with good communication, the involvement of local stakeholders and the REScoop participation model makes Hvidovre Wind Cooperative a best practice in the speed of the authorisation process. The work of the three partners: the municipality of Copenhagen, DONG energy and the citizens grouped in a cooperative, allowed for the project to move swiftly. The civil participation process was one of the key focus considering the closeness of the turbines. The role of the cooperative was unique in that sense that it also allowed for the local citizens to participate and express their transition objective for the country.

Ecopower [21] is one of the largest REScoops across Europe in terms of members. It gathers nearly 60.000 citizens from the Flemish region in **Belgium** that jointly take ownership of RES production installations, including 24 large onshore wind turbines (above 3MW). The green electricity that these installations produce is sold to the members at cost price. That is a self-covering service on which Ecopower does not make any profit.

Allons en Vent [22] from **Belgium** built one wind turbine called "*L'éolienne des enfants*" which literally means "the wind turbine of the children". Parents and grandparents from the community were invited to purchase shares in the cooperative and give their (grand)children access to renewable energy. The small wind turbine (800 KW peak) faced little opposition and was built in only 24 months. The turbine is installed in 2006 and inaugurated by a children's orchestra. One cooperative share costs 100 euros. This low share allowed for the 1 200 members (350 tutor and 350 students – i.e. the adults and the children) to collect 200 000 euros for the project in 2005. The rest of the financing (600 000 euros) was lent to the community by the bank Triodos. During the inauguration of the installations, the children used colourful paint to write their names on the turbines as a sign of hope. The parents and grandparents also guide and support the children in running the cooperative. Today the children have grown and are now running the cooperative, developing more local transition projects. This project allowed for a whole territory to be educated on the impact of energy communities, as a school was also built around the project, in order to provide education to more children in the region. The cooperative has since also invested into other similar projects in Belgium and France. It provides a 6% yearly dividend to its members.

De Windvogel [23] from the **Netherlands,** developed and currently operates five wind turbines and 3 solar PV installations (5MW total) that can all together cover the energy needs of about 2.500 families. The cooperative gathers 3.400 citizens from all over the country who all share in the profits. The cooperative continues to grow and invest, taking on more investments in large wind parks and local development projects.

Middelgrunden Wind Cooperative [24] was the first offshore wind cooperative in **Denmark**. The project was initiated by the Copenhagen Environment and Energy Office (CEEO) after Middelgrunden had been listed as a potential site in the Danish Action Plan for Offshore Wind. Together with the CEEO

a group of local people formed the Middelgrunden Wind Turbine Cooperative and established a cooperation with Copenhagen Energy, the local electric utility. In 1997 about 8.600 local citizens jointly invested. The project is one of the most photographed wind farms in the world. Middelgrunden is an offshore wind farm in the Øresund 3.5 km outside Copenhagen, Denmark. When it was built in 2000, it was the world's largest offshore farm, with 20 turbines (2 MWpeak each) for a capacity of 40 MWpeak total. The farm delivers about 4% of the power for Copenhagen. Today, this project is 50% owned by the 10,000 investors in the Middelgrunden Wind Turbine Cooperative, and 50% by the municipal utility company.

2.2 ENERGY COOPERATIVES DEALING WITH HYDRO ENERGY PRODUCTION

The Island of Eigg in **Scotland** is not connected to the mainland for its electricity supply. The islanders changed their energy system from importing fossil fuels to local renewable production, including hydro and wind energy. A key part of this transition process was saving energy to limit the capacity needed. The typical Scottish weather provides enough wind and water for the islanders to benefit from clean energy from local sources. Eigg Electric [25] is community-owned and managed by a company that provides electricity from renewable sources to all residents. In 2008 [26], the Isle of Eigg is home to the world's first standalone energy grid that provides electricity from a combination of three renewable energy sources: 11km of underground high voltage cable connects residents to energy generated from three hydroelectric plants (100kW, 5kW and 6kW), four 6kW wind turbines and 50kW solar photovoltaic capacity which produce approximately 90% of electricity needed locally. A battery bank able to provide electricity for up to 24 hours helps smooth out supply and demand and two 80kW diesel generators are used for back-up. These changes were financed largely by EU funds received by the Eigg Electrics, a company managed by the Eigg Heritage Trust, which was set up and is managed by the Eigg inhabitants. The Eigg citizens also each contributed between 500£ and 1000£ to install the necessary connection to the local grid. Local inhabitant and business also made a commitment to limit their consumption (5 kW for private inhabitant, 10kW for businesses), to keep the system balanced.

Whalley Hydro [27] is an energy co-operative based in Whalley (**UK**) that has successfully developed a 100-kW micro hydro-power generating plant beside the River Calder. Considering the potential ecological impact on fish movements, flood patterns and noise, the co-operative went through an extensive environmental impact assessment procedure to ensure environmental harm was avoided. Rivers in the United Kingdom are protected by the Environment Agency. To build a hydro plant in a river, one needs to comply with stringent and comprehensive environmental regulations. Whalley Hydro's way of dealing with this regulation, using the expertise of the government agencies, makes this an example of best practice in the environmental integration of RES technology.

The Rumbling Bridge Hydro Coop [28] in **Scotland** was set-up with support from the government-funded CARES development loan [29] and the cooperative Energy4All [30]. The cooperative owns a 500-kW run-of-river hydro power station. So far, the output from the turbine has exceeded the projected output, so the local community stands to earn a considerable community benefit from the scheme over the projected 40 years of operation.

2.3 ENERGY COOPERATIVES DEALING WITH SOLAR ENERGY PRODUCTION

Klimaatscholen 2050 [31], is a project for the council of Flemish catholic schools, carried out by consortium of six REScoops from Flanders (**Belgium**). This consortium is constituted of BeauVent [32] (Oostende), Ecopower [21] (Antwerp), Energent [33] (Ghent), Pajopower [34] (Halle), Stroomvloed [35] (Leie) and ZuidrAnt [36] (Antwerp). Those cooperative were awarded a contract to help catholic secondary schools to save significant amounts of energy in their school buildings by initiating energy efficiency measures and by putting solar PV-panels on their roofs. The funds that are needed to make

these investments are raised from families and neighbouring citizens of the schools. The cooperatives will be responsible for the project exploitation, so that the participating schools get a reduction on their energy bills. Using the energy monitoring tool EnergieID [37], the cooperatives have supported 16 schools in the region to install PV panels (for a total of 341.5 kW peak) and save energy (both electricity and heat).

Gent Zonnestad [38], a project put forward by the local energy cooperative EnerGent [33], is resolutely promoting more solar panels in Ghent (**Belgium**) and its surrounding area. The cooperative offers independent advice to homeowners, tenants and local businesses and successfully developed a map indicating how well buildings in the city are oriented for solar energy production. The cooperative also organises citizens through a group purchasing scheme. The panels bought in bulk are selected and assessed by the cooperative to be socio-environmentally responsible panels, and purchased at a competitive, predetermined prices. The cooperative also offers support to the interested families to find financing support and to realise the maintenance of the installation. The Gent Zonnestad project resulted in 665 installations for more than 1500 families (in 2020).

Alcolea del Rio [39] is the first community-owned solar PV project in **Spain**. The project is close to Sevilla and one of the first projects put forward by Generation kWh, an innovative financing scheme developed by Som Energia [11]. The members of the cooperative provide zero-interest loans, and in return they get access to clean electricity at cost price. Each member of the collective scheme can buy shares corresponding to its household consumption. The cooperative then supplies KWh to the members at cost prices, following the model of collective auto-consumption. Generation KWh reached members across the whole of Spain, providing them access to truly green electricity for the first time. Despite the lack of subsidies or feed-in premiums for RES generation in Spain at the time, the cooperative decided to proceed because of the project's environmental and societal value. The project has been operational since 2016 and generates electricity to cover the needs of about 1.300 families. This project is one of the three projects financed by the scheme up to 2020. The installation has the capacity of 2 160 kW peak, and represents an investment of 2 041 025 euros. The Generation kWh has brought together 4 479 members for a total investment of more than 4,5 million euros.

Energy4All [30] from the **United Kingdom** supported the start-up of Edinburgh Community Solar Cooperative [40], a local cooperative that successfully raised 2 million euros (1.4 million £) to install 24 solar PV arrays on public buildings in Edinburgh (Scotland) for a total of 1.38 MW peak capacity. This project was realised in partnership of the municipality of Edinburg and with the express objective to contribute to the low carbon transition of the city. It is paired with a strong public education campaign specifically targeting children. Residents who join the co-operative and purchase a share also get a fixed return on their capital (5% per year).

In addition, Energy4All [30] has been helping schools and communities in the **UK** start community renewable energy projects. After the success of the Wey Valley Solar Schools Energy Co-operative [41] in 2011, schools across the country contacted Energy4All to join the financial model the cooperative had set up. Due to changing feed-in-tariffs in England in 2013, Energy4All adapted the Wey Valley model and founded the Schools' Energy Cooperative to support more English schools in creating renewable and energy efficiency projects. Profits and energy savings are paid back to the schools, reducing their monthly bills. The Schools' Energy Cooperative now owns and operates 1,76MW of solar PV on 44 schools. Overall, Energy4All helped the Schools' Energy Cooperative raise EUR 2 million, and continues to support the schools with monitoring of the systems and administrative tasks.

Enercoop [42] from **France** successfully enabled the creation of "Lum del Larzac" [43], a solar PV project in the Midi-Pyrénées region in France. The project consists of 18 roof-top solar PV installations with a total capacity of 162 kWp. Enercoop is a network of local cooperatives generating clean energy from renewable sources. The cooperative buys the electricity from local project and supplies it to its

members. Enercoop brings together 11 cooperatives from each French region, and supplies in total to 70 000 French citizens.

The cooperative Jurascic [44] operates a 108 kWp photovoltaic installation worth EUR 153 000 on the roof of a riding arena in Courlans in **France**. The panels were originally installed in 2011, but the plant was taken over by Jurascic in June 2017 and now belongs to 650 local citizens, contributing to a local and solidarity-based economy.

The cooperative ZEZ [45] (Green Energy Cooperative) from Croatia is a workers solar cooperative that brings together 18 members. The cooperative has developed and funded several solar projects, including a 60 KWpeak project in the city of Krizevci. This installation, included in a collective self-consumption scheme also involves a blockchain trading platform to allow for businesses occupying the buildings to purchase the electricity directly from ZEZ. The cooperative also has helped develop an open licence crowdfunding platform to help cooperatives and municipalities of Croatia to fund renewable projects: Nasuncanojstrani.hr [46]. The cooperative has the goal to finance projects to equip 1000 solar roof in Croatia.

2.4 ENERGY COOPERATIVES DEALING WITH BIOMASS ENERGY PRODUCTION

Ecopower [10] from **Belgium** operates a wood pellet factory in Ham with an overall production capacity of 40 000 tonnes of wood pellets per year. The wood pellets are used by citizens to heat their private homes. The cooperative provides pellets and briquettes. Ecopower offers a complete solution to its members, using waste heat to dry recycled wood, and delivering it to the members of the cooperatives as well as electricity and efficiency consulting.

Bürgerenergie Genossenschaft West [47] gathers 900 citizens from Neustadt an der Waldnaab in **Germany** and aims to shift their local energy system to renewables. By issuing EUR 500 shares, the cooperative raised more than EUR 7.4 million to do RES projects and operate a local district heating network using biomass. Throughout the winter, the members from the region of Trabitz get access to heat produced from manure. The region of Trabitz covers an area of 26.67 km² and is home to approximately 1 300 inhabitants. The district heating system spans the entire region. The cooperative also provides advisory services for solar installation and renewable supply.

2.5 ENERGY COOPERATIVES DEALING WITH GEOTHERMAL ENERGY

Thermo Bello [48] is a district heating cooperative owned by residents of a district in Culemborg, **Netherlands**. Since 2009, the cooperative is running a district heating system that heats the water with a geothermal heat pump on the drinking water reservoir. In addition to the energy supply, the residents are also closely involved in the development and layout of the district, the landscape and maintenance of public green spaces, traffic safety, water management and the production of local food. The cooperative produces 9000 Gigajoules per year to serve 192 homes and 8 business premises via an underground distribution network located in the district. In 2019, the Dutch government has launched a plan to support the deployment of district heating across the Netherlands. This program aims to reduce the country's dependence on natural gas. Cooperatives in the Netherlands have been at the forefront of this implementation.

3 SECTION 3: ENERGY COOPERATIVES PROVIDING ENERGY EFFICIENCY SERVICES

As expressed by the "Energy Efficiency First" principle[2] adopted by the European Commission (2018), reducing our energy consumption is crucial to mitigating climate change. Many of the transition scenarios, both national and European, require a strong focus on energy efficiency. The H2020 REScoop PLUS project [49] showed a correlation between membership in a cooperative and a reduction in personal energy consumption by up to 20%, based on the study of 5 large cooperative suppliers. REScoops and energy communities have a strong role to play in supporting their members to tackle energy efficiency and energy poverty. There are many types of efficiency services that are provided by cooperatives to their members, some of which are outlined below.

3.1 EFFICIENT CONSUMPTION

The best way to consume less is to understand the energy bill. To simplify the bill for its members, Ecopower [10] from **Belgium** used a single tariff structure, meaning that they charge a single unit price regardless of the electricity consumed. This price includes taxes, transportation costs and energy prices. The transparency of this measure helps citizens to better understand their energy bill and helps members to save a considerable amount of energy. Emphasizing that energy savings also lower your energy bill makes it a best practise. This pricing scheme had to be changed following drastic changes in Belgian grid tariffs.

Through Dr. Watt [50], Enercoop from **France** is training its members to become energy experts and save energy within their communities. This "cocktail of solution" includes an in-person training course, an online platform and a peer-to-peer learning group. The members singing up for this training program are offered three training days to learn how to measure, assess and understand the energy consumption in their homes. The cooperative provides the trainee with Wattmeters in order to carry out the measurements. This training is supported by an online platform where members can track their consumption and progress. The group is then organised in peer-to-peer learning groups called "tupperwatt groups". Those groups allow people to physically meet and exchange ideas on how they can save energy at home and in their communities. Dr Watt allowed members of Enercoop participating in the training to save up to 11% on their energy consumption.

Som Energia [11] **(Spain)** is using interactive invoicing called 'InfoEnergia' [51] to inform its members about their private energy consumption. Som Energia started with InfoEnergia as an extra service for their members. Instead of just sending invoices Som Energia also sends reports on the energy use of their customers. In this report customers are compared with similar household benchmarks, with previous periods. They also get personalized energy saving tips. The service desk of Som Energia is trained to know how the system works and how the reports are created. This way they can handle any questions from customers concerning the report. Through targeted tips and tricks, the cooperative helps its members reduce their average energy consumption.

Courant d'Air [52] **(Belgium)** has successfully developed a programme called Generation Zero Watt [53] through which they train primary school children to become true energy experts and save energy in the classrooms. The children are being taught how to conduct energy audits, about the benefits of renewables and how to save energy. School children get an appealing educational toolkit at their disposal, including a G-book (similar to Facebook) that allows them to exchange ideas and experiences with one 's schools. The Generation Zero Watt programme turned out to be highly effective in Belgium as it helped local schools to save up to 25% of energy.

[2] This objective is described specifically in the early communication of the EC to the EP, putting energy efficiency at the heart of the Clean Energy for All Europeans legislative agenda: https://ec.europa.eu/energy/sites/ener/files/documents/com_860_final.pdf

Energie ID [37] is a social organisation from **Belgium** that provides online energy monitoring services. Users fill out their monthly consumption data and thus gain insights in their monthly energy consumption behaviour. Intelligence triggers energy savings. There's also a feature on their platform to benchmark your energy consumption against other families. The competitive aspect has a positive impact on the savings achieved. The H2020 REScoop PLUS project showed that Energie ID helped its members lower their consumption by up to 11% per year [54]. The platform of Energie ID is also allowing for community coaches to support a group of citizens to share experiences and learn how to manage their consumption better.

Using LED lighting equipment cuts electric consumption dramatically compared to traditional light bulbs. In 2016, Courant d'Air [52], an energy cooperative based in Eupen (**Belgium)**, decided to encourage its 2 000 members to participate in a collective purchase of LED light bulbs. With clear and straightforward communication campaign, the cooperative managed to mobilise over 600 of households. They committed to an investment ranging between EUR 100 and EUR 60 00,0 which resulted in 228 MWh of energy savings per year since then. A similar scheme was set-up by Klimaan [55], a starting cooperative from Mechelen (Belgium).

3.2 BUILDING RENOVATION

Efficient and comfortable homes are a priority for many European citizens. It is also a major policy challenge in Europe as Member States struggle to reach the renovation objectives that they fixed for themselves.

As there are many ways to improve energy efficiency in your home, it can be difficult to choose the best action. The cooperative Ecopower from **Belgium** developed a cost-covering service called Ecotraject [56]. Through this innovative programme, the coop aims to assist its members with deep energy renovations in their private homes. The scheme starts with a quick scan online, which allows members to get an idea of the renovation they could undertake. Upon the member's request, an energy expert from the coop starts with a thorough inspection of the home, to understand what would be the most effective measures. The experts then come up with plan, listing down the possibilities, the expected investment, energy savings and payback time. The cooperative even puts its members in touch with reliable local contractors.

Klimaatpunt (formerly known as Pajopower) **(Belgium)** reaches out to people in socially vulnerable neighbourhoods with their "Klimaatmobiel" [57], a funny looking vehicle that they park in the community. People usually get curious and go and check it out. This is how they gain trust. They talk to these people about the energy transition, the importance of energy savings and renewables and they teach them how to switch energy suppliers, how to take action in their private homes, and how to apply for subsidies.

Carbon Co-op [58] in the **UK** is an energy services and innovation co-operative that helps people and communities to make the radical reductions in home carbon emissions necessary to avoid runaway climate change. The cooperative recently introduced the Carbon Co-op Hub [59], a platform allowing people to keep track of their energy consumption at home. Carbon Co-op also manages several renovation programs in the Greater Manchester area. The cooperative support it members to renovate their homes by providing an end-to-end service. The team of Carbon Co-op realise a diagnostic and provides a plan and budget to renovate the home. Upon approval by the member, the cooperative will find a select contractor based on a proven local network, and carry-out the renovation. The team will then validate the result of the savings. The cooperative also provides advisory services to the member to find financing and subsidies specifically for the renovation project. The service is up and running since 2018 and has already realised more than 100 projects.

Les 7Vents [60] is a cooperative in the North of **France**. In 2012, the team of 7Vents launched the "Hands for Homes" program [61] (extension from the Enerterre program [62] in France). This program

has since been replicated across Europe thanks to the H2020 program. The cooperative created a barter-based market where people in energy poverty and/or with housing in need of deep renovation can find support for renovating their homes. The network promotes SASR (Shared and Accompanied Self-Renovation) which requires the participation of the occupant/owner to the rehabilitation (Self), with the help of volunteers (Shared) and accompanied by a professional (Accompanied). The homeowner participate in the building with volunteers, thus decreasing workforce cost. Everyone can volunteer, without discrimination due to gender, age, culture, resources or competencies, thus fostering social diversity. The building professional on site accompanies volunteers and beneficiaries in learning technical gestures and skills by transferring her/his knowledge and techniques. Wherever possible, occupants renovate their houses with the help of neighbours and volunteers that want to learn how to retrofit a house. In return, other beneficiaries will benefit from the help of those who they have helped for the rehabilitation of their homes. Thus, beneficiaries get involved in a mutually beneficial system. Their involvement for the rehabilitation of their own house is expected for the rehabilitation of other beneficiaries' house in a reciprocation process, for instance through the form of a local time-swap exchange.

Through "Wijkwerf" [63] the cooperative EnerGent wants to encourage and help citizens in the city of Ghent **(Belgium)** to make their homes more energy efficient. The scheme is set-up as a joint purchase, but with high quality standards and tailored guidance for energy retrofits. The moto of the scheme is "Less costs and less worries". A similar model is set-up by Lochem Energie [64] in the **Netherlands**. The "Energie Coach" [65] is an efficiency specialist from the cooperative that is visiting the homes of members at their request. The coach will take thermic images of the homes and realise a 2 hour diagnostic of the home and deliver a report to the member. Based on this report, the member of the cooperative can get consulting services to realise improvements to their homes, or simple advices on how to change their consumption patterns.

Hvidovre Fjernvarme [66] is a district heating cooperative running a network in **Denmark**. This cooperative of 42 345 members, including the Hvidovre municipality, is providing heat from renewable sources to 53 500 inhabitants in the municipality of Hvidovre. Together with three other district heating cooperatives (FDHvidovre, Avedøre and Rebæk Søpark) deployed a program to support members to optimize their heating installations, allowing them to save energy and money. The technical support is a check of the consumers heating installations every second year: The first check is a check of their district heating unit and a thorough energy analysis of their houses, i.e. how the consumer can save energy in their house. After the check, the consumer receives an energy report of their house. In the report, the consumer is informed on whether their heating consumption is below or above the average consumption and it entails guidelines for what the consumer can do to optimize the energy efficiency of their house. This type of check is repeated every six years. Two years after the first check, a maintenance check of the district heating unit is performed to adjust the unit in the most energy efficient and energy saving way. This type of check happens every two years. The checks are free for the members of the cooperative and allows homeowners to take actions to improve their homes.

Energy Community Tipperary Cooperative [67] (**IR**)represents 8 Community Energy Teams (coming from 8 communities) consisting of volunteers living in the area with an interest in working for local benefit. Representing between 1000 and 1600 residents, or 300-500 households, per community. Started as a pilot scheme in the Drombane/Upperchurch community (1000 inhabitants) in rural Tipperary as a way to halt economic and social decline. The Drombane/Upperchurch project began in 2011 when a local group (Drombane Village Group) as part of a community initiative was looking to stimulate the local economy through developing jobs and 'keeping money in the area'. The cooperative is launched in 2015. The team of the cooperative performs a preliminary technical assessment of the home. The experts of the cooperative then bundle local projects to a bid for a grant of the Sustainable Energy Authority Ireland. If the bid is successful, the cooperative tenders and

manage the renovation projects for individual residents. The residents only have to pay for the remainder not financed through the grant scheme. ECTC works primarily with local contractors.

4 SECTION4: ENERGY COOPERATIVES DEALING WITH ENERGY POVERTY

In a number of EU Member States, REScoops explicitly pursue social aims, such as fighting energy poverty. They do this by developing solidarity schemes to help vulnerable members with their energy bills, by providing services and education to their members on reducing their consumption, and using revenue from renewable energy generation to improve the living standards of vulnerable and low-income households.

Repowering London [68] is a cooperative in the **UK.** The cooperative is running a scheme in social housing in the London region. The cooperative volunteers are recruiting and training volunteers from the social housing tenants. Those local champions are then facilitating the creation of a cooperative with their neighbours in the building. The constituted cooperative is investing in solar panels on the roof of the social housing. The share offer is support by Repowering London. Champions are then trained to install the solar installation. The production is shared amongst the members of the cooperative. Repowering has developed Youth Training Programme, a paid scheme covering sustainable energy, social enterprise and community development. The programme is offered to young people (16-25-year olds), who are lacking opportunities and role models and who may feel alienated from greater society, disengaged with education and uncertain of the future. The programme is carried out in parallel to development of community energy projects in the local area, and includes presentations from industry specialists and knowledge sharing. Upon completion, trainees are awarded UK certified educational certificates and receive careers advice, to boost their employability and confidence. The training serves as one of the front lines to inspire and influence action at the home and beyond to combat fuel poverty, a major concern in these communities. One of such projects supported by the cooperative is Brixton Energy [69] in London (**UK**). This local cooperative trains young people in Brixton and turns them into energy experts. After being trained for several weeks, the young professionals can give high quality energy advice, or develop RES projects. The cooperative then takes additional steps to support the communities in social housing building to create a cooperative, and carry out a photovoltaic production project. The young energy experts are then participating in the construction of the installation.

Enercoop is a cooperative electricity supplier based in **France** whose members called for the creation of energy poverty mitigation actions. The program Energie Solidaire [70] is a microdonation fund that allows suppliers clients to add micro-donations to their energy bills which will then directly support grassroots energy poverty solutions in France. This program is now implemented for the members of Enercoop. Energie Solidaire can now also be added to any supplier's billing system, allowing for the action to be expanded across Europe. The fund then selects energy poverty tackling NGOs which are implementing local programs to suppress energy poverty. The fund was launched in 2018 and has already gathered and donate back 30 000 EUR (in 2019). The fund is supported by many NGOs involved in poverty alleviation and renovation in France.

An increasing number of energy communities share part of their profits with a community benefit society which provides value to the entire community, not only to those who decided to join the cooperative. This way, everyone can benefit from the projects in the community not only those who can afford putting in money. Community benefit societies can set-up campaigns, workshops or help mitigate energy poverty in all sorts of ways.

In Eeklo **(Belgium)** the cooperative Ecopower [10] shares ownership of a wind turbine with the local authority. This will give local citizens that already have problems paying their energy bills and where a budget meter was installed access to clean and more affordable electricity of Ecopower – without

having to buy a cooperative share of 250 EUR. This scheme allows for citizens in poverty to benefit from the lower kWh price in the region of Flanders, which is provided by Ecopower to its members. This price is “electricity at cost price”.

5 SECTION 5: ENERGY COOPERATIVES DEALING WITH STORAGE

Tenants mainly live in apartments and older terraced houses, which makes it difficult to install private solar panels. A collective solar project, led by the energy cooperative EnerGent [33] (BE), aims to offer a solution. By 2022, Buurzame Stroom intends to install 5 000 square metres of solar PV panels spread across a district in Gent accounting for 750 kWp. Buurzame Stroom [71] aims to increase the renewable energy production in that district and wants to set up innovative business model for collective self-consumption. In addition, the project wants to test whether the district can be turned into an integrated local energy system powered by renewables. Electric vehicles operated by Partago and battery systems are put in place to buffer excess solar energy. Buurzame Stroom benefits from the expertise of various cooperatives including Ecopower and EnergieID and the WiseGRID project [72].

The cooperative EWS Schönau [73] from **Germany** provides its members with a grant to purchase and install private batterie systems in their homes [74]. EWS is a distribution system operator and supplier for the area of Schönau im Schwarzwald in Germany. This 30-year-old cooperative is looking to provide only renewable energy to the families connected to its grid and installation, and for this they decided to promote the development of decentralised electricity storage units. The cooperative provides a grant of 200 EUR to households looking to install a sustainable storage system, and to manage it to benefit local grid stability.

6 SECTION 6: COOPERATIVES DEALING WITH ELECTRICITY SUPPLY

Coopérnico [75] is the first cooperative energy producer and supplier in **Portugal**. Citizens from all over the country were invited to become a member and purchase a share. These revenues are then used to finance RES investments including solar PV panels. The energy that is supplied is sustainable energy from their RES projects. So far, the cooperative has nearly 800 clients. Similar business models have been put forward by many other energy cooperatives. Enostra [76] from **Italy** has 4 000 clients, Goiener [77] from the Basque region in **Spain** supplies energy from local and renewable sources to over 13 000 clients. The largest energy retailers within our network are Ecopower from **Belgium/Flanders** with nearly 55 000 clients, Enercoop from **France** with nearly 90 000 clients, Som Energia from **Spain** with nearly 115 000 clients, Greenpeace Energy (**Germany**) with over 180.000 clients and EWS [73] (Germany) with over 200 000 clients.

German cooperative Bürgerwerke [78] is aggregating RES generation capacity from citizen- and community-owned RES installations so that citizens can supply themselves with clean energy from local sources independently of energy companies with citizen power.

A few years ago, the energy cooperatives from the French speaking region of **Belgium** decided to join forces and set-up Cociter [79], their own cooperative energy supplier. The energy that the coops jointly produce covers the needs of 15 000 families. With over 3 000 members, Cociter still has space for 12 000 new families to join in.

7 SECTION 7: COOPERATIVES DEALING WITH HEAT SUPPLY

The best examples from within our network come from **Denmark**. The Danes have about 340 local district heating cooperatives. Hvidovre, a district of Copenhagen, is a typical example. The cooperative Hvidovre Fjernvarme [66] is a district heating cooperative that brings together a majority of the of the

citizen of the area (42 345 members). The cooperative has been deploying a renewable powered heating grid since the 1980s. The production is based on woodchips and pellets, coupled with solar thermal and heat pumps. The renewable production covers 100% of the consumption of the area. In the next 10 years, the cooperative expects to continue their investment to reach 98 million EUR. Today the cooperative delivers 340 000 MWh per year to it's the connected households. The water that runs through their cooperative network gets heated with the waste heat from a local CHP plant.

In **Belgium,** we often refer to BeauVent [32] who are operating a cooperative district heating network in Oostende [80]. This project, started in 2017, is operational since 2019. It provides 7 GWh/year to connected households. BeauVent is continuing the network's development to provide residual heat captured from industrial sites to the citizen of Oostende. Today, the network is 7km long.

Also in **Belgium**, Ecopower [10] is currently installing a district heating network in Eeklo. Eeklo – a small city in Flanders of about 30 000 inhabitants – is a signatory of the Covenant of Mayors. The city is looking to become carbon neutral by 2050. One key element in realizing this ambition is putting to good use the 15 MW of condenser heat that is lost at the waste incineration plant on the territory of Eeklo. To turn its plans into action, the city tendered the right of using the public underground for a district heating system. The requirements in the tender were rather innovative: Partners needed to allow at least 30% financial participation of citizens, partner had to turn to 100% green heat in the system by 2036, and they had to supply heat at a cost comparable to heat from fossil fuels. Belgian cooperative Ecopower teamed up with waste and energy industrial giant Veolia and won the tender. The municipality being keen to involve all kind of local stakeholders, any party connecting to the DH system, individual citizens, but also SMEs, schools, elderly homes and the hospital are allowed to co-invest and have a say in the entity that is being set up to own and operate the project. Thanks to this district heating project, Eeklo will reduce it greenhouse gas emissions by over 40% by 2030.

E-Werk Prad Genossenschaft [81] **(Italy)** is a cooperative in the municipality Prato allo Stelvio in Bolzano-Bozen. The electric cooperative was founded in 1926 and started off with a hydropower plant. Today, they produce electricity from different energy sources and they also supply heat to their members.

Greenpeace Energy [13] from **Germany** does not only supply electricity to its members. Excess wind energy is converted into hydrogen and can be fed into the natural gas grid. This way, members can benefit from biogas to heat their private homes.

In **Germany**, the cooperative of Oberrosphe [82] created a district heating grid extract from biomass. The grid benefits both from a collective biomass digestor owned by the cooperative, but also private smaller biomass based electricity production from local farmers. In February 2007, the people of Oberrosphe founded a cooperative called " Bioenergiedorf Oberrosphe", with the aim of supplying the village with climate-neutral electricity and heating. The cooperative has invested in a biomass heating installation and a local heating network. These have been in operation since 2008 and currently supply local heat to 135 houses through approximately 7 Km of pipes. In addition to heat supply, Bioenergiedorf Oberrosphe eG also operates several solar PV installations scattered around the village. The biomass heating installation also has a photovoltaic roof that generates green electricity. In 2015, Bioenergiedorf Oberrosphe joined up with 7 other community-based biomass producers from neighbouring villages. Collectively, the citizens and farmers of these villages now buy wood materials, operate machines, remove waste and exchange experiences.

8 SECTION 8: COOPERATIVES OPERATING DISTRIBUTION GRIDS

Historically, the development of energy infrastructure has been a key battle ground for modernisation and access to electricity. In some Member States, this deployment has been unbalanced, and has left certain regions behind. In those regions, cooperatives have been created by local citizens to get access

to these services. Energy democracy in its purest form is based on local ownership and control by citizens. In some Member States, the needs of the citizens were not taken into account. To meet those needs (local control, renewable only sources, decentralised production, etc.), citizens had to take over grid infrastructure.

E-Werk Prad Genossenschaft, a cooperative of the Südtiroler Energie Verband [83] in **Italy**, recently started an innovative smart grid project to obtain a better balance in their energy production and consumption. This Italian cooperative network was started in 1897 to develop a production in the Alto Adgani region of Italy. A group of cooperatives from the region got together to take over the regional grid. The fact that most consumers are also members of the cooperative makes it easier to organize the demand side response. This gives an extra and improved dimension to the project.

When citizens of the small city of Schönau in the Black Forest in **Germany**, organised in ElektrizitätsWerke Schonau (EWS) [73], decided to buy the local distribution grid in 1991, the energy market was not yet liberalised and financial support systems were absent. By buying the grid, the cooperative aimed to reorganise it in an ecological manner. In order to transform the grid and the energy production, EWS encouraged citizens to install renewable energy production units by facilitating their connection to the grid and by paying special feed-in tariffs. At the moment, the produced energy of citizens is exported to the grid and they are compensated through the EEG (renewable contribution tax). EWS proves that by taking the grid and the sale of energy in your own hands, you can change the business model to meet the needs of your members. EWS supports other communities in Germany to do the same.

Today, this need for local control and development is standing top of mind for many citizens. New examples of cooperatives and citizen-led initiatives taking over the grid infrastructure are emerging. In **Berlin** and **Hamburg**, the municipalities cooperate with cooperatives of local citizens to take the grid over from large, carbon-based, international companies. In **Flanders**, local citizens rose up to stop the sale of a majority share of their regional DSO (currently in the hands of municipalities) to an international company. Across Europe, citizens are organising to participate in the management, maintenance and development of those priority infrastructures.

9 SECTION 9: COOPERATIVES WORKING ON BLOCKCHAIN TECHNOLOGY

Consumption or production data is often registered by meters that are owned by distribution grid operators, giving end-users little control over what is actually private and sensitive information. The Pylon Network [84] from **Spain** has been working on a solution and successfully developed an independent and neutral database based on blockchain technology. Through their technology, production and consumption data can be stored and shared safely. End-users or prosumers can thus keep control over their data and decide with whom they want to share information with.

FairCoop [85] based in **Austria**, developed FairCoin [86], an innovative blockchain technology that requires less energy and enables fast and secure transactions. The cryptocurrency has been built with a clear set of values in mind, so as to bridge economic gaps on a regional and global level. It is by far the most ecological and resilient cryptocurrency in the world.

10 SECTION 10: ENERGY COOPERATIVES DEALING WITH ELECTRO-MOBILITY SERVICES

When thinking about the future energy market, we have to consider electricity, heat and transportation. A few years ago, REScoop.eu facilitated an international collaboration between three e-car sharing cooperatives through a dedicated working group. These cooperatives eventually set up a new cooperative called The Mobility Factory (TMF) [87]. TMF features a jointly owned **European**

platform that enables energy communities from across Europe to share e-cars within their communities.

Partago [88] is an e-car sharing cooperative operating in the city of Ghent **(Belgium**). With support from 500 local citizens, the cooperative invests in and operates a fleet of nearly 50 electric cars. These cars are shared within the community through the TMF Platform. Similar business models have been developed by Som Mobilitat [89] (**Spain**), Coöperatieauto [90] (**Netherlands**), UrStrom [91] (**Germany**), Alterna Coop [92] (**Spain**), Mobicoop [93] (**France**) and Conecta Movel [94] (**Spain**). Altogether mid-2020, this network represents about 190 cars and 71 000 EUR of investments. To join the cooperative MobilityFactory SCE, the minimum investment is 4 shares for an investment of 1 000 EUR. Together this network has produced a software tool estimated at 177 000 EUR in 2020.

In Bruges (**Belgium**), CoopStroom [95] developed an innovative collaboration with the City Council. Throughout the day, the e-cars are used for professional reasons by civil servants of the city, whereas at night and during the weekend these cars can be used by the members. A similar model was put in place in several Belgian municipalities (Elsenborn, Scherpenheuvel-Zichem, Leuven).

11 SECTION 11: ENERGY COOPERATIVES DEALING WITH ENERGY SHARING

Energia Positiva [96] is a citizens energy cooperative from **Italy** taking joint ownership of renewable energy projects. Members get access to the clean energy and can use it to cover their own needs. In that sense, it operates like a "virtual power plant".

OurPower [97] is a cooperative from **Austria** that offers the opportunity to its member to perform share energy. The cooperative is hosting a regional electricity marketplace allowing for its members to buy and sell kWh directly from other members.

In the **Netherlands**, the municipality of Loenen [98] took a bold stance to support the local transition with a goal to make the municipality carbon neutral by 2050. In order to support this initiative, the citizens of Loenen have created the Loenen Cooperative. The municipality established a fund supporting citizens that wish to invest in roof solar production. The cooperative is aggregating those production units, and provides a smart grid system to ensure the matching of consumption and production in the village. The cooperative is running active demand response programs, in addition to renovation actions and heat pumps. This community is also trying to get away from gas, and is therefore looking to get support from the national government to do so.

12 SECTION 12: ENERGY COOPERATIVES TEAMING UP WITH LOCAL AUTHORITIES

Municipalities are often the first allies, primary supporters and often members of energy communities. Municipalities are the first representation of local citizens, but are often faced with little capabilities and limited tools for action to engage with their citizens. Below are some examples of how municipalities and cooperatives have collaborated. More of those great projects can be found in the guide "*How cities can back renewable energy communities*" [99] of Energy Cities.

In the city of Halle in **Belgium**, the cooperative Pajopower [100] recently replaced 445 traditional public street lights by LED. The investment worth EUR 225 000 was financed by the cooperative and helps the city to save both energy and money. This is a typical example of third-party financing through

a collective ESCO model[3]. Citizens were invited to adopt the public street light in front of their doors buy purchasing a collective share and replacing the street light by LED.

The city of Leuven in **Belgium** has been looking to develop an energy community group. For this purpose, the city teamed up with a group headed by the cooperative Ecopower to deploy the "Licht" program. Licht Leuven is a community building program through which the municipality offers the opportunity for citizen to get training from cooperative coaches of Ecopower, and several other expert NGOs. This program allowed the city to create citizen groups looking to become a cooperative themselves. The program was so successful that it was picked up by the provincial government and became "Licht Vlaams Brabant", coaching more than 9 groups across the province. The outcome of the whole program which started in 2017 is the creation of 4 energy cooperatives.

In **Spain**, the city of Barcelona worked to create a participatory tool which involved citizens, called Decidim [101]. This tool is at the heart at the deployment of Barcelona Energia [102], a municipal operator, bringing together 200 GWh/year of local electricity production. This operator is also distributing the electricity to the citizens of Barcelona. It further supports citizens to develop their own production, with the ultimate objective to grow the renewable potential of the city. Decidim is an open-source public participation tool which allows the citizens of Barcelona to vote and communicate directly with the institution of Barcelona Energia. This platform was also provided freely to other municipalities and cooperatives like Som Energia.

Odenwald Energy Cooperative (EGO) [103] in **Germany** created an "Energy House" where the citizen of the region could find training on energy topics, cultural events and communal infrastructure. The cooperative financed the transformation of this old brewery in a passive building to create a renovation service building where citizens can find support to renovate their homes and buildings. The building also serves as office buildings for the public administrations from the Odenwald municipality.

The city of Krizevci in **Croatia** took a bold engagement in 2018 – to be carbon neutral by 2030. Together with the cooperative ZEZ, the municipality supported the creation of a local cooperative: Klick Cooperative [104]. This cooperative brings together an engaged group of citizens looking to invest in renewable production projects. It further supports the work of the municipality in engaging its neighbours.

13 SECTION 13: ENERGY COOPERATIVES WORKING IN NETWORKS

Energie Samen [105] is a cooperative owned by several energy cooperatives in the **Netherlands**. Unlike REScoop.eu, they are not a federation but a cooperative providing services to Dutch community energy projects with regards to financing, legal issues, communication, technical studies, project development, etc. That means that starting energy cooperatives get support from Energie Samen to conduct wind studies and obtain all the licenses needed to erect a turbine within a community. If the project goes through and the starting co-op gets in the position to make an investment, Energie Samen charges a price for the service delivered. This is how Energie Samen maintains its revolving character.

Electra Coop [106] from **Greece** offers several services on solar and renewable energy, energy efficiency, energy certification of buildings and homes. At the same time, they provide consultancy services to the public sector on community energy investments and innovative PPP collaborations involving the local community. The project Hyperion [107] is one of the new models available to Greek cooperatives. This project relies on citizens and SMEs investing together following the Greek collective

[3] The initial capital investment was made by the cooperative. The municipality benefit from a lower energy bill. The municipality pays the difference between the old and new energy bill, to the cooperative. This "pay back" allows the cooperative to remunerate its investment.

self-consumption scheme available for energy communities in the new Greek legislation. Members invest in solar cells placed in a rural area neighbouring the city of Athens and consume the energy produced by a netting scheme. Through this project citizens in Athens, SMEs in Athens and local farmers providing the grounds are investing together and benefitting from the scheme.

Energiegenossenshaften Schweiz [108] provides support and expertise on planning, construction and maintenance of solar PV projects in **Switzerland**. In the French-speaking part of Switzerland, another federation was created to provide similar services: l'Association Suisse pour l'Energie Citoyenne (ASEC) [109]. ASEC is currently working a map of all citizen-led initiatives in the country. Together, those federations are supporting the development of community project at national level.

14 ENERGY COOPERATIVES WORKING ON COLLECTIVE FINANCING

Energie Partagée [110] (**France**) is a social fund looking to invest in citizen-led projects. The team at Energie Partagée supports citizen groups who are looking to develop local production projects. The network provides technical support, coaching and financing. The fund takes shares of projects looking for early financing, and then gets out of the project once it is stable and more money is raised from the local community.

Energy4All [30] is a federation of cooperatives from the **UK**. This network of cooperatives supports local groups in creating a cooperative, and in developing their share offers. This makes it a lot easier for new community energy projects to raise money for renewable production projects. The cooperatives then become members of Energy4All and help finance the share offers of future community energy groups.

15 SECTION 14: CONCLUSION

15.1 TECHNICAL, ADMINISTRATIVE AND FINANCIAL BARRIERS TO ENERGY COMMUNITIES

The Best Practice Guide is showing the wide scope of the activities and the ingenuity of energy communities. Yet, many energy communities are still faced with high barriers to access many of the activities described above. The COMPILE pilots have faced those barriers head on and tried to identify solutions. Those barriers are coming in four main types:

- **Disproportionate or irrelevant administrative procedure** : Energy Communities are a new concept, so Members States are still experimenting with supports and administrative mechanisms. Some of these mechanisms, as well as existing market imbalances, are creating inequitable situation and damaging the level playing field for Energy Communities.
- **Lack of readiness of the infrastructure and actors** : Many system actors are adapting to the new energy market rules. This creates difficult situations for Energy Communities as they need to support and compensate for the lack of maturity of system actors and municipalities.
- **Lack of transparency and information**: Energy is a complex topic, and many consumers do not understand the possibilities offered to them by the Energy Community definitions. This lack of information and transparency is reinforced by misinformation.
- **Lack of access to financing** : Energy communities, by their value-based investment, have specific needs for financing. Those needs are currently not met, and the traditional financing solutions are out of reach for projects with limited equity and portfolios.

15.1.1 Disproportionate or irrelevant administrative procedure

Many of our pilots have been facing disproportionate administrative procedures in the process of creation of their energy communities. The barriers faced are:

Inappropriate registration procedures : energy communities are facing barriers relating to their identification to regulators through registration platforms. Specifically the issues are the format of the platform, the detailed information requested is making it impossible for non-professionals to perform those registrations. This is especially true in Portugal, where condominium looking to create energy communities have had to hire external consultants for the registration process only.

Punitive regulations for members of energy communities: citizens should be allowed to keep the protections afforded by their employee status while being a members of an energy community. In Croatia, members of our pilot lose the protections linked with employment as they become member of the cooperative.

Absence of procedures and regulations on municipal participation: the participation of municipalities has been highlighted in both the renewable energy community and citizen energy community definitions. However, municipality are operating under strict regulations. In Greece, Any procurement procedure linked to a municipalities above 2000 euros must be performed under the public procurement rules. This is creating an impossible burden for small organisations like energy communities. This makes the opportunity of participating in energy communities void for municipalities.

Disproportionate regulatory barriers for supply activities: in all our pilots, supply activities were crucial to allow for citizens to get access to the energy they are producing and to share it with their neighbors. Our pilots faced high barriers to obtain the right to supply, even in a geographically limited space and to a small group. The licensing model used a the majority of members states is putting the same burdens on large supplier with millions of clients, and an energy community with 5000 to 9000 clients. This makes it impossible for energy communities to supply energy to their members.

The origin of those barriers are mostly coming from the lack of understanding and appropriate structures in the regulators to manage energy communities. Most of our pilots highlight the fact that procedures and requirements are often not made for the specific organizational form and participants (private consumers) acting in energy communities.

15.1.2 Lack of readiness of the infrastructure and actors

The second major barrier is the lack of readiness of infrastructure, which put a stop to many activities or innovative schemes that energy communities are working to implement.

Lack of smart meters deployment: all the partners of the project COMPILE are currently facing issues with the deployment of smart meters. Smart meter deployment is a crucial part in many case of the implementation of local community based schemes (self-consumption, flexibility services, energy efficiency). In some member states, the cost to obtain smart meters on a voluntary basis is higher than when deployed in a centralised way. This is preventing energy communities to obtain this necessary tool.

Limitations by System Operator: the security of infrastructure is important for all actors of the energy system, including consumers. In many of our pilots, energy communities are participating and supporting grid management and security of supply. But they are faced with arbitrary limitation on their activities. In Portugal, the only distribution key allowed for collective self-consumption is static, and therefore not encouraging citizens to improve their self-consumption levels. In Slovenia, the limitation of the sub station is making it impossible for the energy community to act with the entire local community.

Lack of municipality maturity: In Croatia and Greece, our pilots have collaborated intensely with municipalities. But the lack of readiness of municipal services and capacity at the municipal level is a barrier to the development of the energy community. Municipalities are lacking the funds and know-how to participate and collaborate with their citizens to create energy communities.

In our analysis, those barriers are linked to the novelty of energy communities. Local governments and system operators need to be familiarised with the specific needs and capabilities of energy communities. However, in some countries, the lack of effort and flat out refusal to collaborate is making it difficult for citizens to access the rights provided to them by the REC and CEC provisions.

15.1.3 Lack of transparency and information

In the continuation of the two previous barriers, the lack of information is a burden on energy communities. Our pilot had to be pioneers in many cases in their countries. We participated in the creation of national legal frameworks around energy communities. But the challenges are not stopping for the energy communities coming after us.

Lack of continuity in the legislation: the most important part of the scaling of the energy community concepts for citizens is continuity in the legislative framework. The fear of a changing legal framework can destroy any initial motivation of local actor to create an energy community. Especially in our pilot in Slovenia, the lack of stable and continuous regulation has been a major barrier to engage citizens and municipalities in that path.

Lack of support and information to citizens and municipalities: in all our pilots, the lack of information, knowledge and capacity at the municipal level has been the most difficult challenge to face. We also faced the spread of disinformation on the definitions and the purpose of energy communities. It is crucial that Member States make a specific effort to communicate on the nature and benefits of energy communities to citizens. This is the only way to put this concept at the service of consumers throughout Europe.

Member States are requested by the Renewable Energy Directive to create enabling frameworks for Renewable Energy Communities. This enabling framework is key to the development and scaling of the energy communities concepts. Without efforts from European and national authorities, the concept of Energy Communities will become a missed opportunity.

15.1.4 Lack of access to financing

Energy communities are facing specific barriers to access financing for their projects. Those barriers are often due to their size, the shared ownership model and the lack of understanding of financial institutions. Energy communities often have no difficulties raising capital from citizens once a project is defined and moving forward, however there is often a gap between financing from founders and financing from the boarder community. This financing gap is usually addressed by banking institution in traditional businesses, but in many Member States, energy communities are poorly understood and often discriminated against by traditional banking actors.

For instance in our pilot in Greece, no bank would support the loan necessary to kick start a collective self-consumption project. The projects was shown to be profitable, but the organization had no track record and a limited portfolio. The innovative activity was considered as more risky by the banking institutions. In Portugal, a similar issue was met as the size of the loan request by small condominium was not producing enough return to support banking conditions (even through the cooperative could raise the financing later on).

An example of this lack of understanding is coming from Spain, were equity capital from cooperative members (which is the bulk of the balance sheet of cooperatives) is deemed volatile by financing institutions. This is blocking cooperatives from accessing loans necessary for the development of their projects.

Finally, the fact that energy community must stay autonomous has been stopping the influx of private capital. Traditional investors are often refusing the democratic governing principles of energy communities and requesting exponential returns for their investments. This is perverting the roles of energy communities and is rejected by most citizen-led organisations. Some private investors have sometimes successfully perverted the energy community model in their favor, in order to benefit from specific enabling frameworks. We touch on those examples in the Financing Guide of COMPILE, in the debate FINcoops vs REScoops.

15.1.5 Proposed solutions

The Clean Energy Package requires Member States to develop an enabling framework for Renewable Energy Communities. In order to tackle the barriers listed above, the COMPILE project proposes the following solutions to support alleviate those issue:

Simplified administrative procedures : It is crucial that national energy regulators recognise and support the different types of actors that make up energy communities. Simplified administrative procedures and one-stop-shops are uniquely relevant to solve those issues. This support is better provided at the municipal or regional level because of their close contact and capacity to dialogue with citizens.

Capacity building and technical support for municipalities : Municipality will play a crucial role in the development of energy communities. But for many municipalities it is hard to engage because of the complexity of public procurement rules and the lack of understanding around new market actors like energy communities. Capacity building and technical support must be available to help municipalities better understand the ways they can support energy communities. Clear governance models and stable regulations allowing for specific municipal tendering rules in favor of energy communities can also help the development of those community based organisations.

Appropriate financing tools that recognise citizen-centered ownership models: Since the start of the transposition process, misinformation and misunderstanding have been spreading across Europe. It is crucial for Member States to develop financing tools specifically for energy communities that will reward citizen involvement and ownership. Some best practice in this regard are national and regional grant-to-loan funds like the CARES fund in Scotland.

Supportive framework for energy communities that tackle social issues : Energy communities are usually created as territory transition project (local projects to promote a local energy transition). Therefore energy communities tackle several activities benefiting the system, including energy efficiency, energy poverty alleviation and flexibility. However, those activities are often difficult to develop and require heavy investments. In order to promote the development of such activities, Member States should create additional support schemes for communities looking to tackle broader societal challenges.

15.2 RESOURCES

This guide should help you get inspired for your path to energy democracy. You are not alone on this road, and we hope that you will reach out to one or more of the cooperatives presented here. If you are ready to take the next step to explore how to finance your project, how to mobilize your community, we invite you to open the other guides of this toolbox.

If you wish to get to know more about the projects and organisation cited above, as well as receive support to develop a similar activity, we recommend to contact the relevant organisations directly. You can also contact network organisations bringing together all those organisations under one umbrella. More information and support can be found at www.rescoop.eu and www.compile-project.eu

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17 ANNEX I COOPERATIVE DIRECTORY

ORGANISATION	COUNTRY	FEDERATION	FOUNDATION	MEMBERS / PARTNERS	Production Electricity	Production Gas	Supply Electricity	Supply Heat	Energy Efficiency	Network Electricity	Network Gas	Energy Povert y	Financing	Transport	Flexibility	WEBSITE
Zeeuwind	NL		1987	2700	X											www.zeeuwind.nl
Deltawind	NL		1989	300	X											www.deltawind.nl
Viure de l'Aire del Cel	ES		2009	615	X											www.viuredelaire.cat
Som Energia	ES		2010	71472	X		X		X			X	X			www.somenergia.coop
Hvidovre Wind Cooperative	DK		1992	2268	X											www.hvidovrevindmollelaug.dk
Ecopower	BE		1991	60000	X		X	X	X			X	X			www.ecopower.be
Allons en Vent	BE		2001	1200	X											allonsenvent.be
De Windvogel	NL		1991	3400	X	X										windvogel.nl
Middelgrunden Wind Cooperative	DK		1999	8650	X											www.middelgrunden.dk
Eigg Heritage Trust	UK		1997	87	X		X	X	X	X		X	X			http://isleofeigg.org/eigg-electric
Whalley Hydro	UK		2010	310	X											www.whalleyhydro.co.uk
Rumbling Bridge Hydro Coop	UK		2015	664	X											rumblingbridgehydro.coop
Klimaatscholen 2050	BE		2018	6	X											www.klimaatscholen2050.be

BeauVent	BE		2000	5500	X			X	X							www.beauvent.be
Energent	BE		2013	1212	X				X			X	X			energent.be
Pajopower	BE		2014	374	X				X			X	X			www.pajopower.be
Stroomvloed	BE		2017	360	X											www.stroomvloed.be
ZuidrAnt	BE		2016	600	X											www.zuidtrant.be
Edinburgh Community Solar Cooperative	UK		2013	540	X							X				www.edinburghsolar.coop
Energy4All	UK	YES	2002	13250	X											www.energy4all.co.uk
Wey Valley Solar Schools Energy Co-operative	UK		2011	117	X				X							www.weyvalleysolar.co.uk
Enercoop	FR	YES	2005	50000	X		X		X			X	X			www.enercoop.fr
Jurascic	FR		2016	650	X											www.jurascic.com
ZEZ	HR		2015	18	X				X			X	X			www.zez.coop
Burgerenergie Genossenschaft West	DE		2009	900	X			X	X							www.neue-energien-west.de
Thermo Bello	NL		2009	192				X								www.thermobello.nl
Courant d'Air	BE		2009	2500	X				X			X				www.courantdair.be
Energie ID	BE		2011	22					X							www.energieid.be
Klimaan	BE		2019	835	X											www.coop.klimaan.be

Carbon Co-op	UK		2005	270					X							www.carbon.coop
Les 7Vents	FR		1998	18	X				X			X				www.7vents.fr
Lochem Energie	NL		2010	900	X		X	X	X					X		www.lochemenergie.net
Hvidovre Fjernvarme	DK		1984	42345				X			X	X				www.hvidovrefjernvarme.dk
Energy Community Tipperary Cooperative	IR		2015	1600					X			X	X			www.energycommunitiestipp.ie
Brixton Energy	UK		2016	250												www.brixtonenergy.co.uk
Energie Solidaire	FR		2018	8								X				www.energie-solidaire.org
EWS Schönau	DE		1994	9000	X		X	X	X	X		X	X	X		www.ews-schoenau.de
Coopérnico	PT		2013	2091	X				X			X				www.coopernico.org
Enostra	IT		2014	5790	X		X		X				X			www.enostra.it
Goiener	ES		2012	13706	X	X	X	X	X			X				www.goiener.com
Greenpeace Energy	DE		1999	26000	X	X	X	X	X			X		X		www.greenpeace-energy.de
Cociter	BE	YES	2015	7500	X											www.cociter.be
E-Werk Prad Genossenschaft	DE		1923	1443	X		X	X	X	X		X		X		www.e-werk-prad.it
Bürgerwerke	DE	YES	2013	40000	X		X	X	X					X		buergerwerke.de
Bioenergiedorf Oberrosphe	DE		2008	250				X			X					www.bioenergiedorf-oberrosphe.de

Südtiroler Energie Verband	IT	YES	1998	284	X	X	X	X	X	X	X	X	X	X		www.sev.bz.it
FairCoop	AU	YES	2014	N/A									X			www.fair.coop
Partago	BE		2015	500										X		www.partago.be
Som Mobilitat	ES		2016	2260										X		www.sommobilitat.coop
Coöperatieauto	BE		2018	20										X		www.cooperatieauto.nl
UrStrom	DE		2011	400										X		www.urstrom.de
Alterna Coop	ES		2017	439										X		www.alternacoop.com
Mobicoop	BE		2018	20000										X		www.mobicoop.fr
Conecta Movel	ES		2017	45										X		www.conectamovelcoop.es
CoopStroom	NL		2017	600										X		www.coopstroom.be
Energia Positiva	IT		2016	413	X		X								X	www.energia-positiva.it
OurPower	AU		2020	20	X		X								X	www.ourpower.coop
Loenen Cooperative	NL		2020	275	X		X		X	X					X	N/A
Klick Cooperative	HR		2020	11	X											N/A
Energie Samen	NL	YES	2018	100000	X	X	X	X	X	X	X	X	X	X	X	www.energiesamen.nu
Electra Coop	GR		2019	6	X											www.electraenergy.coop
Energiegenossenshaften Schweiz	SW	YES	2011	309	X		X		X						X	www.energiegenossenschaft.ch
Association Suisse pour l'Energie Citoyenne	SW	YES	2020	7	X				X							www.energie-citoyenne.ch

Energie Partagée	FR	YES	2010	270	X				X			X	X	X	X	www.energie-partagee.org
DGRV	DE	YES	1972	200000	X	X	X	X	X	X	X	X	X	X		www.dgrv.de
Hier Opgewekt	NL		2012	6												www.hieropgewekt.nl
Midcounties Co-operative	UK	YES	1844	700000	X	X	X		X			X	X	X		www.midcounties.coop
Odenval	DE		2009	3000	X		X		X							https://eg-odenwald.de/
Repowering London	UK	X	N/A						X			X				https://www.repowering.org.uk/