



cVPP: community-based Virtual Power Plant

Newsletter N°9

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cVPP - A NEW MODEL FOR ENERGY SYSTEM ORGANISATION

Message from Lead Partner | TU Eindhoven

Due to growing concerns about CO2 emissions, the use of renewables has increased substantially in the recent years. However, their growing deployment, intermittent nature and the lack of storage facilities cause problems to the grid, urging the need for smart grid solutions. Next to this, the current energy system is organized in a centralized way, preventing citizens to participate in energy markets and change how energy is generated, distributed and consumed within their own community. In this Interreg NWE- funded project we took on developing and testing a Community-based Virtual Power Plant (cVPP) concept that empowers citizens to participate collectively in energy management and that helps to decentralise and democratise the energy system.

Being organised by the community and driven by their needs, a cVPP can offer financial, social, environmental, institutional and technical value to citizens. Moreover, through a collective ICT platform that models price' changes, energy flows and weather conditions, cVPP facilitates community-driven energy initiatives to aggregate distributed generation and flexibility and thereby contribute to a stable and reliable electricity grid. The viability of the cVPP business model that is necessary for communities is limited in the current regulatory framework.

Recent updates of the EU's energy policy framework however are expected to improve the level-playing-field for citizen energy and give space for cVPP initiatives to spread its operational scope.

Why cVPP?

There are a number of aspects which distinguish the cVPP project from many other projects. It takes communities and their needs as a starting point for cVPPs. Current Virtual Power Plant (VPP) applications aim to solve congestion and help balance the grid, serving the technical needs of the large incumbent actors.

By defining the community aspect of a cVPP, it contributes to the empowerment of citizens and communities.

- It helps them realise the critical mass and gain market presence on equal terms with large energy players. It develops tools with and for communities and tests them in the real-life environments and not in controlled conditions of a lab.
- It engages a variety of actors in a co-creative process.
- It combines practitioner experience and intuition with trans-disciplinary academic excellence to provide a workable, scientifically sound solution with very high societal relevance.
- It presents a novelty for grid operators of how to organise new energy system with high participation of prosumers and citizens and provides a test bed for legal aspects, which will serve as input for the national transposition of the Winter Package into national regulations.



cVPP project wins EU Sustainable Energy Citizens' Award!

We are proud to announce that the cVPP project won the prestigious EUSEW Citizens' Award 2020 during the European Sustainable Energy Week this June! The cVPP partnership is very appreciative of the hard work done by all partners and the implementing and replicating energy communities. A big thank you goes to all European citizens who voted for us. It seems clear that the message of this project resonates with you. This award came as a welcome addition to an already successful webinar during the EUSEW conference.

UPDATES FROM PROJECT PARTNERS

Loenen NL | DPL

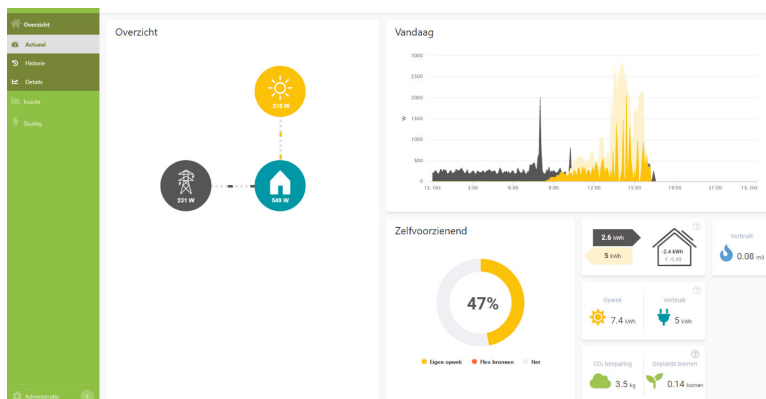
On Monday 2nd November 2020, the Loenen DE-centrale officially went live. Sustainable Loenen Projects (DPL), Translyse, Qirion and ICT Group have worked hard on the development of the first version of this community-based Virtual Power Plant (cVPP), called DE-centrale Loenen. The Virtual Power Plant has been implemented on the basis of energyNXT, ICT Group's Energy Management System (EMS). By means of a virtual meeting, the platform was formally taken into use by DPL. With this project, which has been made possible by the European Interreg programme and the Province of Gelderland, the village of Loenen is laying a solid foundation for the further development of sustainable generation and alignment with local consumption.

After acceptance, the management phase will commence, which has initially been laid down for two years. This period will not only be used to match energy demand and supply more closely, but also to look at the next steps in the development of a Virtual Power Plant. Further links to energy markets and earning models are such examples.

Screen shots of EMS dashboard output screen The participants have an individual user dashboard (PC and app) where they have the near-real time information about their energy (gas and electricity) consumption, their PV production, % self-consumption and their consumption pattern (peak load, base load) as well as CO₂ -savings.

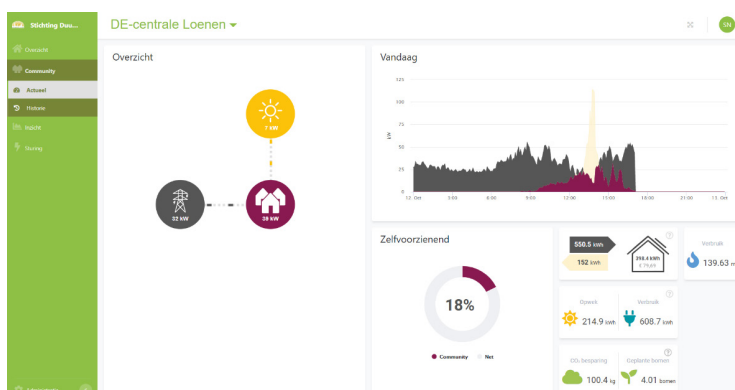
The User Dashboard

The same information is available on a community level (and published on the village bulletin board). One of the results is, that the Loenen community appeared to be a net-sustainable energy producer during the summer.

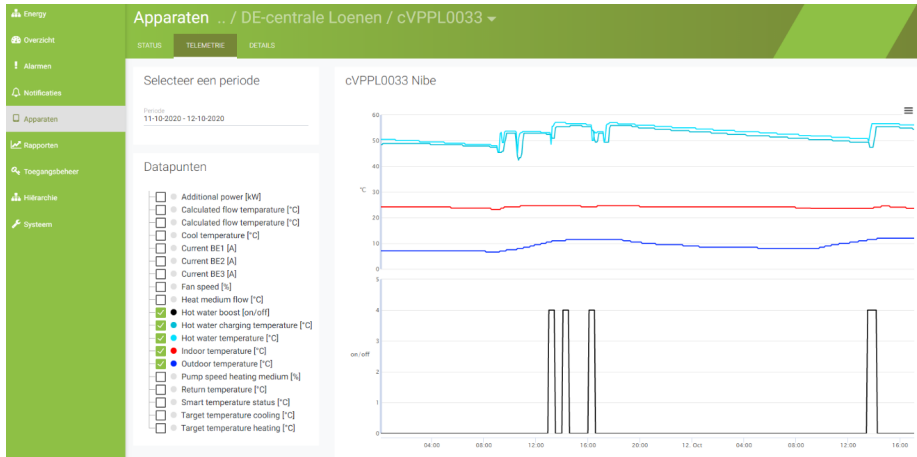


The Community Dashboard

Individual members with an appropriate heat pump PV-inverter, or EV charging device can connect these devices to the EMS and make use of the control routines and select the appropriate algorithms. The routine as pictured in the graph below steers on the algorithm "maximizing self-consumption", e.g. starting the heat-pump when there is enough PV-electricity available.

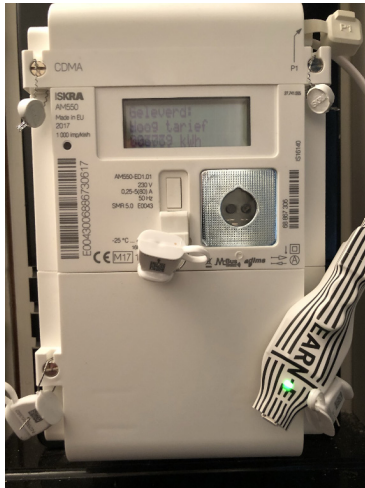


Heat pump telemetry with control signal



The EARN-E smart meter interface

The EARN-E is a WiFi operating interface that connects the Smart Meter through the P1 -gate to the EMS, transferring the energy consumption data to the software via the WiFi of the household.



The EARN-E connected to a local smart meter



Heat pump connected to EMS



Opening of 900 kW PV-roof

On 18th August 2020 the 900 kW PV-roof on a warehouse of Thomassen in Loenen had been officially put in commercial operation. The project was financed by participation of the Loenen community through buying of project bonds through the energy cooperative.

Over 15 years there is a payback plus 4% of interest. The whole development has been a project goal of the cVPP project underway to achieving the goal of Loenen Energy Neutral in 2030.

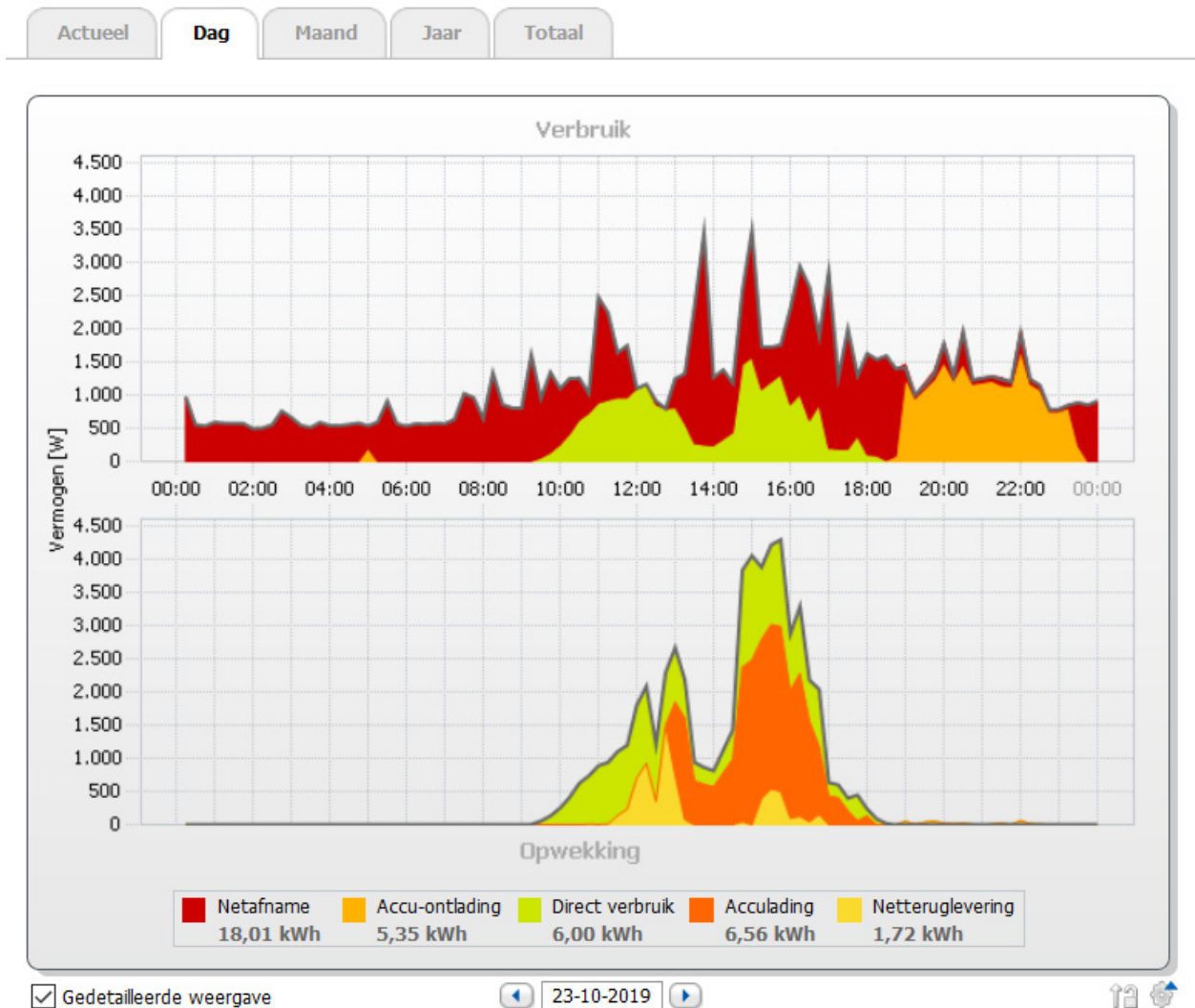
Ghent BE | EnerGent

In Ghent, the energy cooperative of EnerGent has developed a cVPP in the neighbourhood of St-Amandsberg.

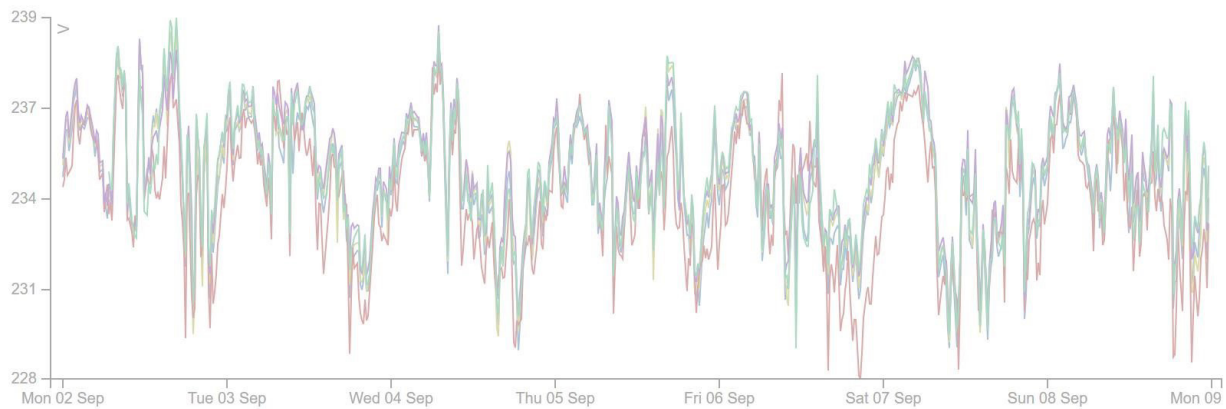
In order to get so far, several very important steps had to be taken. First, the amount of renewable energy had to increase. As the neighbourhood involves several socio-economic vulnerable groups and, more generally, a high level of diversity, this increase involved a challenge on its own. Several technical, practical, financial and communicative tools were developed to convince the involved citizens and companies to invest in renewable energy. In total, over 100 families and over 10 companies invested and installed a PV system in the course of 2018 and 2019. In

addition, sufficient storage had to be added to the cVPP system. Therefore, 13 families, and 1 company installed a battery system in 2019. Lastly, a working EMS that could control the involved assets of the cVPP system was developed in 2018 and tested in 2019. This testing involves several values that could become possible in the future energy system such as peak shaving, collective self-consumption and voltage control.

EnerGent is finishing the basic tests with 14 PV- and Battery systems. During the summer of 2020, the connection was made with all involved PV systems. A further expansion of the project involves the connection of heat pump flexibility, which will be organized within the cVPP capitalization project.



In this picture you can see the activity of battery peak shaving. The battery is charged the most at moments that the production of PV is highest. This reduces chances on grid congestion and could become a community business case in the future.



*Variability of voltage level within the neighbourhood.
The idea of voltage control is reduce this variability through active peak shaving during the summer.*



A large guided tour for stakeholders was organized on 29/01/2020.

EnerGent is actively promoting the cVPP model and thereby recommending on policy the required adaptations for successful scale-up. Unfortunately, the largest yearly energy cooperative meeting in Frankfurt, was postponed.

The project has proven that it is possible for a young cooperative to become a cVPP. To realise this, a community was successfully engaged and an energy management system

was successfully implemented. While EnerGent started as a renewable energy producer, it now sees potential in energy supply and energy management. EnerGent hopes that the regulatory framework in Flanders will soon enable a steady community business model in order to become a cVPP for its entire community. This means that all of the members of the cooperative will be technically connected and will therefore play a relevant role in the energy system of the future.

Ireland | Community Power – CRES – TEA - FOEI

The Irish cVPP partnership have been working to build up the levels of community based renewable generation in Ireland, and are testing new flexible technology which delivers benefits to the grid, and really puts the power in consumers hands!

Tipperary County Council have installed 250 kW of solar PV across four sites, including two leisure centres, the municipal district building, and a ground mounted array on an old landfill. Read

the blog here and watch the video here. In addition, our community partners have supported the installation of solar PV arrays on schools within their communities in four locations across Ireland. The next stage of these developments is to ensure that any excess power from these sites spilt onto the national grid is monitored by Community Power to ensure minimal wastage. Engagement with the grid operator is ongoing on this issue.



Tipperary Energy Ballaghveny Landfill

The first community owned solar farms have also been given the green light to progress, which is a huge victory for people power in Ireland. Once constructed this will mean two solar farms, each capable of producing 4 MW of power will be owned by Irish communities, and will be able to sell their power through the Community Power utility. Citizens in these communities will also be buying their electricity back from Community Power, allowing the community based virtual power plant to grow.

At the same time an energy management system trial is underway which is testing grid flexibility and demand side management using smart controls of heat pumps and testing flexible tariffs. Building on the results of this trial the partnership will bring energy management systems into more communities to allow them to participate in the cVPP.

Negotiations are ongoing with the Irish network operators, and following significant stakeholder engagement the Irish Electricity Regulator is starting to change how energy communities and energy citizens can participate in the energy transition. This has included, introducing a separate community category in the market auction, a new grid connection process for community projects, and signals that community generators will be allowed to sell and share renewably generated power. These elements will be a game changer for energy communities in Ireland and will allow the Community based virtual power plant to grow and replicate. Our Community Power partnership has a vision to support communities to increase renewable generation and to be able to benefit from this. In a way we are facilitating communities to become leaders in the energy transition.

Municipality of Apeldoorn NL | GA

In the beginning of this year, four contestants entered a cVPP design in to Apeldoorn's "energy competition". The cVPP concept was still new to the communities when they joined the competition kick-off event in October 2019.

The communities got interested in the possibilities and followed the trajectory - 3 workshops which focused on the elements of the cVPP, the community and the values a cVPP can bring to a

community. The contestants did a great job on writing down their own implementation of a cVPP and we are very proud of their final designs. Sadly, the price announcement was planned on the 17th of March, 2020, 4 days after the first Dutch lockdown. The event was canceled and the winning teams could not be announced during a live event. See a short descriptions of the teams (communities) below:



1. K&N, onze energie (our energy)

The winner of the competition is the cooperation "Zon op K&N". The community is centered around a "postcoderoos" project in the neighbourhood Kerschoten. A collective solar roof has been placed on the community center "De Groene Hoven". Their idea of a cVPP revolves around up-scaling the renewable energy sources and then implementing a system that matches demand and supply as much as possible. Their project could be as large as the postal codes included in the "Postcoderoos", which includes around 10,000 households. Interestingly, they are looking for a cooperation with the development of a collective heat net within the same neighborhood. The connection between a cVPP and a heat net may become more common in the future in the Netherlands.

2. Homerus Energiek

The second place goes to the energy community named Homerus Energiek. As a small energy cooperation revolving around the Homerus Straat, they had a written plan describing which steps they can take to become more sustainable as a community. The cVPP took their interest because it could add to these goals. Their goals are hidden in the name of their cVPP design; MOOS - which is a Dutch abbreviation for "Reduce, Produce, Store, Together" (Minderen, Opwekken, Opslaan Samen). Within three years, they first plan to start energy monitoring, implementing a (salt water) battery, and producing more renewable energy. Once those are in place, they are looking to include the eMS architecture.

3. Warenargaarde

The Warenargaarde is a street containing a lot of apartments which are collectively heated by boilers. The boilers consume a lot of energy and often do not contain sufficient heat for the apartments. The team has written a plan in which they first place solar panels, and use those to power the boilers. This way, the benefits of the energy production are directly translated to the residents of the apartments (through lower cost of better heating). The system is very original, but unlikely able to upscale in the future. The team won a 3rd spot in the competition.



Next steps will be taken during the capitalisation initiative. In which two communities will take further steps get more help towards achieving more collective renewable energy production and then focus on the future eMS architecture. This way, we facilitate the teams to reach their own goals and claim their own benefits.

Province of Antwerp BE | Kamp C

Eventhough, the cVPP project adventure for Kamp C is coming to a close in 2020, the lessons learned and the will to continue this journey with the existing and new energy communities is still strong. From the inspirational trajectory Dream-Dare and Do days in 2019, the eight applicant-communities of the Open Call, to the 3 Competition finalists and their interactive sessions exploring the potential of cVPP in their communities; all this has been a motivating and enlightening journey for all involved.

Via an overarching interactive backcasting approach, with face-to-face and then a series of online meetings (during the first covid-19 lockdown) the 3 Belgian replication community initiatives: Gummaar (or Gummarushof), Klimaan and ZuidtrAnt were supported in exploring their cVPP potential.



ZuidtrAnt and Stalinsstraat, in the city of Antwerp

The residents of the Stalinsstraat in Deurne want to focus on energy-sharing. Together with knowledge partners ZuidtrAnt, Ecohuis, the innovation coach and Woonhaven social-housing, they are looking for roofs on which solar panels can be installed.

The proceeds from these panels will then be shared with residents whose roofs are not suitable for installation. In order to store the surplus of the generated energy, they are looking at whether a salt water battery can offer a solution. In this way, the sun is there for everyone and the neighbourhood for each other. Energy sharing also means focusing on e-mobility. For example, it will be investigated whether it is possible to buy a shared electric cargo bike and car.

The inspirational 2030 storylines of these initiatives were deep and engaging. The initiatives started seeing how the cVPP concept could help them clarify their goals and they started taking ownership of the evolving ideas.

The cVPP project team helped them to further developed the timeline, specifying questions to be answered/addressed, actions to be taken on the short term and areas where the replication initiatives could collaborate. At the end of the interactive sessions trajectory, Sylvia Breukers (Dune-Works) and Luc Van Summeren (TU Eindhoven) provided the three energy community initiatives with a final feedback, which included an overview of shared questions, worthwhile addressing in collaboration with each other and with Kamp C and implementation partner EnerGent.

Below a short overview of the initiatives:



BM Gummaar, in Mechelen

Gummarushof is a cohousing group from Mechelen that is converting an old school into 6 houses, 17 apartments and communal areas. They choose to live future-safe by building Near-Zero-Energy, be energy efficient and CO2 free. They will do this by means of geothermal drilling connected to a mini heat grid with individual heat pumps, electrically supported by PV solar panels. The cVPP project gives them the opportunity to experiment with the exchange, storage and management of renewable energy. Cohousing is actually in itself an energy-efficient form of living, by choosing to living smaller and more compact, close to the centre, sharing an energy-efficient vehicle and common areas such as laundry room, guest rooms, workshop, multi-purpose room and garden.

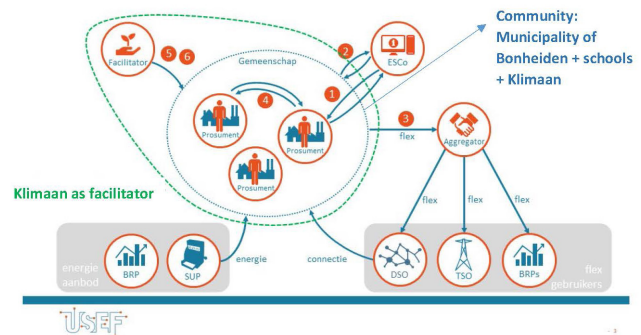


Klimaan, in Bonheiden

“Generating and consuming energy together, as school, with your neighbourhood and your municipality” is the starting point of the submitted project proposal of Klimaan CV. Klimaan CV is an enthusiastic starting cooperative from the region of Mechelen, originated from the citizens’ movement Klimaan vzw with the goal to realize tangible, profitable and sustainable projects with 100% direct citizen participation.

Currently Klimaan CV together with ZuidtrAnt cv-ba-so is realizing solar panels on the roofs of the town hall and the library of Bonheiden. With their project proposal Klimaan also wants to involve the schools in Bonheiden in the solar project. Klimaan focuses not only on the school community

Klimaan CV assumes the role of facilitator in the municipality of Bonheiden and incorporates the schools into the community.



itself, teachers, parents and of course the pupils, but also on the neighbourhood around it.

Future

The seeds for future collaboration with Kamp C have been planted, regardless of the limitations caused by the covid-crisis.

Kamp C remains committed to further promoting the cVPP project in the province of Antwerp and intends to engage the remaining competition communities as well as starting initiatives by involving them in a new trajectory of workshops using the Starter’s Guide and assisting them in becoming replicating communities in the future. Plans are already made with a municipality and a

citizens’ initiative to begin a cVPP trajectory as a pilot project with Kamp C.

The province of Antwerp will be integrating the cVPP approach in its climate plan and housing strategies with Kamp C in an advisory and process guiding role. The Klimaan and ZuidtrAnt cooperations are already engaged with the 2nd stage of the cVPP project (capitalisation) together with EnerGent and will be providing not only an inspiring but also a tangible example of the potential of cVPP. Watch this space for more news from the province of Antwerp!

FUTURE CHALLENGES & OPPORTUNITIES

So far...

In the **first project phase (2017-2020)**, which ends now, the concept of a cVPP has been developed and tested in 3 communities in Ireland, the Netherlands and Belgium. Also, a Mobilisation and Replication (MoRe) model has been developed to help 8 other communities configure their own cVPPs in the specific regulatory context in which they operate. The model is now being considered by Rescoop EU, a federation of over 1500 European cooperatives.

... and in the future

In the **2nd phase (2020-2022)** that is starting now, the team moves away from replication (doing more of the same), towards upscaling.

We will specifically focus on:

(i) technical upscaling of the ICT by adding new flexible assets and experimenting with trade and flexibility services, and (ii) social upscaling of the business cases through connection of new target groups such as SMEs, industries and rental sector in new territories. The insights from this process and from the transposition of the European Clean Energy for All

Package will inform the MoRe model upgrades. In addition, REScoop.eu has joined the cVPP team as a project partner, leading to a collaboration between the cVPP, H2020 Flexcoop and REcoopVPP project. In the scope of these three projects, a webinar was held sharing insights and stories from energy communities that are trying to capture the benefits of a citizen-centred approach to manage decentralised energy resources and unlocking flexibility.

A recording of the webinar, the presentations and more information can be found here:

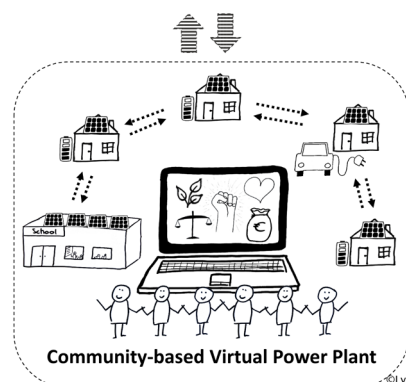


The Mobilisation & Replication model (MoRe-model)

One of the main objectives of the cVPP project was to develop the Mobilisation and Replication (MoRe) model, a supportive approach that can be used by process moderators to support energy communities in exploring the possibilities of a community-based Virtual Power Plant (cVPP). It supports energy communities in finding ways to move beyond energy saving, efficiency and renewable energy generation, and to become involved in energy management and trading. Challenges relate to technology, policy, organisational issues, resources and community engagement.

The MoRe model helps to clarify and address these challenges. It also helps to reduce the complexity by clarifying what is feasible and what the first steps could be towards a cVPP.

The MoRe model has been developed as part of the cVPP project. It builds strongly on the lessons learned by the three cVPP pilots, its application with Dutch, Belgian and Irish energy communities, the doctoral research of Luc van Summeren



and on knowledge and insights of TU/e and DuneWorks.

The MoRe model is developed by Sylvia Breukers (DuneWorks) and Luc van Summeren (TU/e), with support from Sjoerd Pernot (TU/e), Sandra Greven (TU/e), Ruth Mourik (DuneWorks), Veerle Heijnen (DuneWorks) and Anna Wiczorek (TU/e).

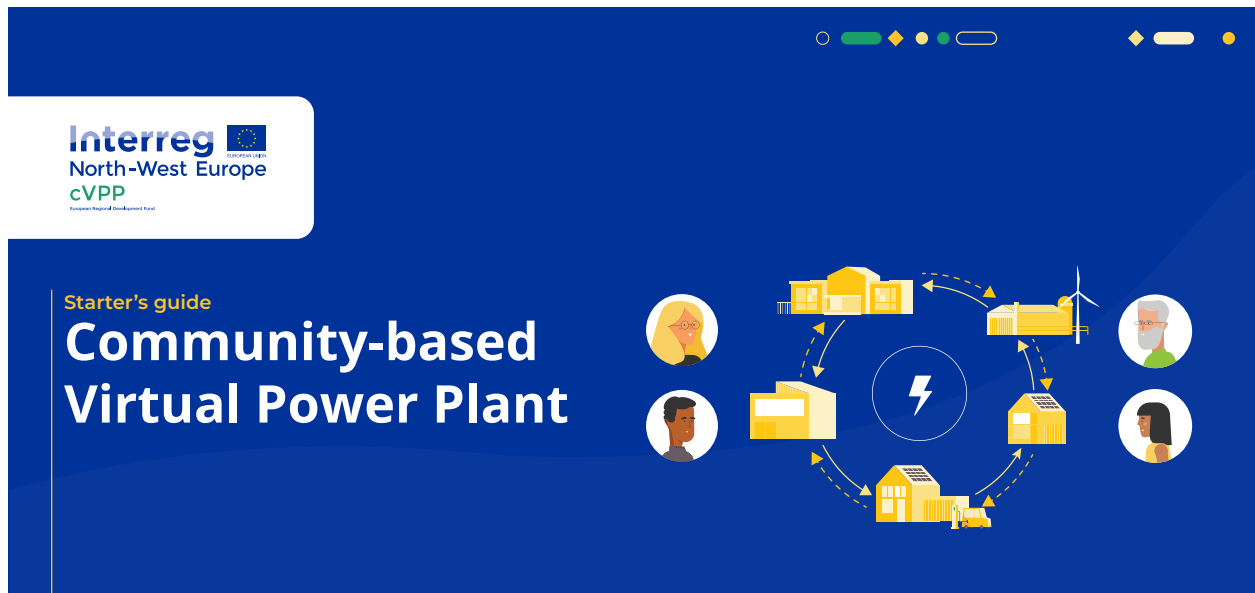
Launching the Starter's Guide & cVPP Animation

We are very proud to announce the launch of the **Starter's Guide** and **cVPP explainer video animation!**

Kamp C, as Communication Partner, has developed the Starter's Guide, an interactive pdf in English and Dutch, full of inspirational stories from Belgium, Ireland and the Netherlands and a con-

densed and easy to read "what can cVPP mean to my energy community?" guide.

This Starter's Guide is meant to trigger the interest and inspire energy communities and municipalities to use the MoRe model. Do not hesitate to approach us with any questions that you may have.

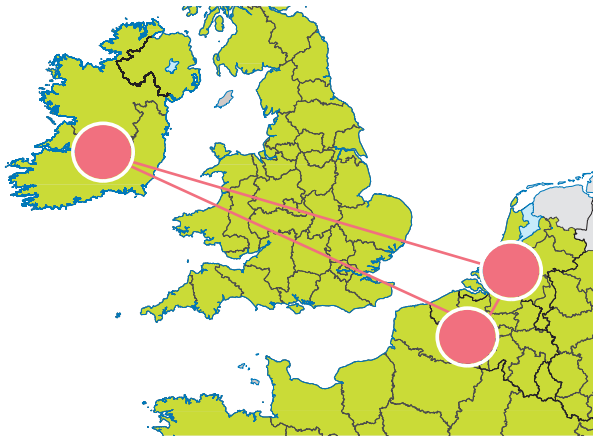


We would also like to end with a **BANG!**

Therefore, the cVPP explainer video animation is now also launched, signalling the start of the roll-out campaign of the community-based Virtual Power Plant in Europe.



We wish you all an inspiring read and viewing!



The cVPP Partnership network

Project facts

September 2017 till September 2019
 € 6.11 million total project budget
 € 3.66 million funded by ERDF

The Partners

- Eindhoven University of Technology (TU/e)
- Sustainable Projects Foundation Loenen
- Tipperary Energy Agency
- EnerGent
- municipality of Apeldoorn
- Kamp C (Autonomous Province Company)
- Templeberry Renewable energy Supply Limited; T/A Community Renewable energy supply
- Tipperary County Council

cVPP-website

Want to know more about cVPP?

Visit the [cVPP-website](#)

We would like to invite everyone to keep up to date with the upscaling developments of the cVPP's, the MoRe upgrades and many more interesting project results, webinars and workshops.

Follow the cVPP project on our website and social media.

Latest Events

- **19th June 2020** | EUSEW 2020 | "Energy communities supporting the energy transition - Interreg NWE project: community-based Virtual Power Plant"
- **30th October 2020** | Sustainable Places 2020 webinar | Paper Sessions on energy communities
- **10th November 2020** | Sustainability meeting at the province of Antwerp | Launching the cVPP Starter's Guide for municipalities
- **19th November 2020** | HIER Opgewekt Living room Sessions | Sustainable Projects Loenen: Local generation and consumption with the Loenen Virtual Power Plant
- **20th November 2020** | RESCOOP webinar | "Unlocking community-based flexibility to transform the energy system"
- **2nd December 2020** | Book Launch! "Community Energy, a practical guide to reclaiming power" | Friends of the Earth Europe
- **10th December 2020** | TU/e Technology, Innovation & Society Research Group Seminar | "The merits of becoming smart: How Flemish and Dutch energy communities mobilise ICT to enhance their agency in the energy transition"

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