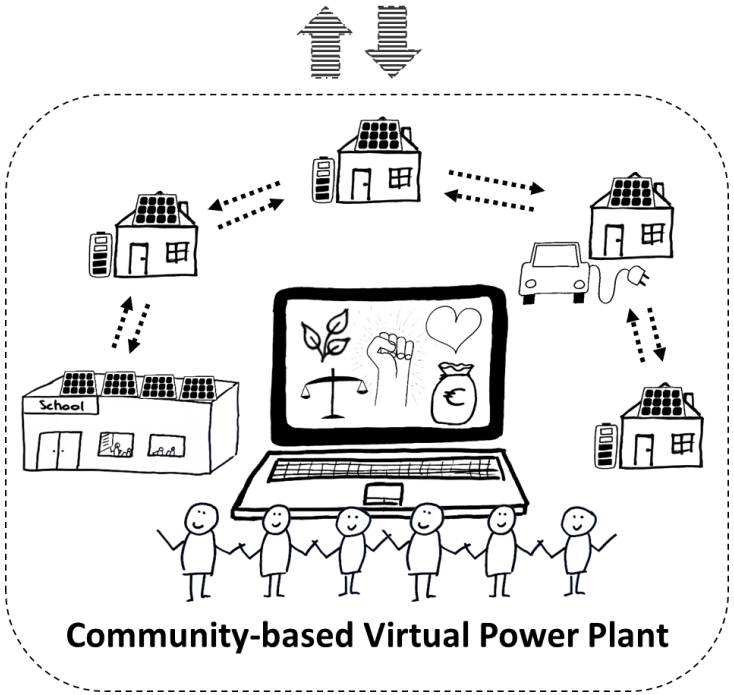
Community Energy 2.0

A support tool for advisers and process moderators to support energy communities in developing a community-based virtual power plant

The Mobilisation and Replication Model



DuneWorks

EINDHOVEN UNIVERSITY OF TECHNOLOGY

WP T2 | Activity 2 | Deliverable T2.2.4
MoRe revised & enriched with context specific lessons

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- Project number: NWE 588
- Project acronym: cVPP
- Project full title: Community-based Virtual Power Plant (cVPP): a novel model of radical decarbonisation based on empowerment of low-carbon community driven energy initiatives
- Project start date: 20-Sep-2017 (36 months)
- Project end date: 19-Sep-2020
- Work Package: WP T2 Mobilisation and Replication Model (MoRe)
- Deliverable no: T2.4.1
- Due date: June-2020
- Submission date: Oct-2020
- WP Leader: Eindhoven University of Technology (TU/e)
- Partners involved: DuneWorks (DW), Foundation Sustainable Projects Loenen (DPL), Tipperary Energy Agency (TEA), EnerGent, Municipality of Apeldoorn, KampC, Community Renewable Energy Supply (CRES)
- Version: 1.0

Colophon

The cVPP Project has received funding from the European Union's Interreg NWE programme (no. 588). For more information on the project, its partners, and contributors please see https://www.nweurope.eu/projects/project-search/cvpp-community-based-virtual-power-plant/.

Please refer to this document as follows:

Breukers, S., Van Summeren, L.F.M., Pernot, S.H.A., Mourik, R.M., Wieczorek, A.J. (2020) Community Energy 2.0 - A support tool for advisers and process moderators to support energy communities in developing a community-based virtual power plant. Eindhoven. Available at: https://www.dropbox.com/s/m7h1m1s3g06kyri/MoRe Model - Final.pdf?dl=0.

Community-based Virtual Power Plant: what, why and how?

WHAT?

A cVPP is a portfolio of renewable energy sources, controllable appliances and energy storage systems aggregated and coordinated by an Energy Management System, adopted by a community energy initiative. It enables energy communities to manage energy demand and supply within their community and to trade energy and flexibility.

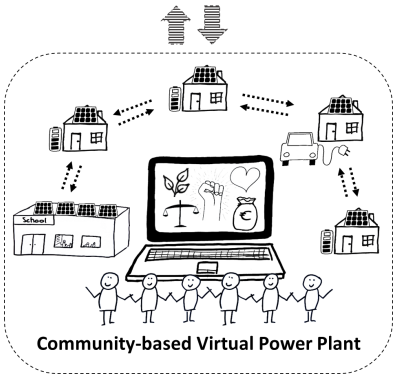
For more information on what a cVPP is and exemplar cases see the crash couse "What is a cVPP"

WHY?

A community-based Virtual Power Plant (cVPP) offers a way for energy communities to move beyond energy saving, efficiency and renewable energy generation.

HOW?

This **Mobilisation-and-Replication (MoRe) model** is a supportive tool to explore if and how a cVPP is feasible.



Click for a short animation on the What, Why and How of cVPP

Mobilisation and Replication Model: what, why and how?

WHAT?

The Mobilisation-and-Replication (MoRe) model is a supportive approach for process moderators who want to support energy communities in exploring the possibilities of a community-based Virtual Power Plant (cVPP).

As process moderators, you could be:

- active (board) members of an energy cooperative or other community initiative
- intermediary organisations or advisers specialised in supporting energy communities
- enthusiasts and professionals involved in energy community-building
- part of the community or related to the community
- volunteers or paid staff

WHY?

Finding ways to move beyond energy saving, efficiency and renewable energy generation is quite challenging for community energy initiatives. Challenges relate to technology, policy, organisational issues, resources and community engagement. The MoRe model helps you to clarify and address these challenges. It helps to reduce complexity because it clarifies what is feasible and what the first steps could be towards a cVPP in the situation that you are working with.

HOW?

The supportive approach is explained in the following pages.

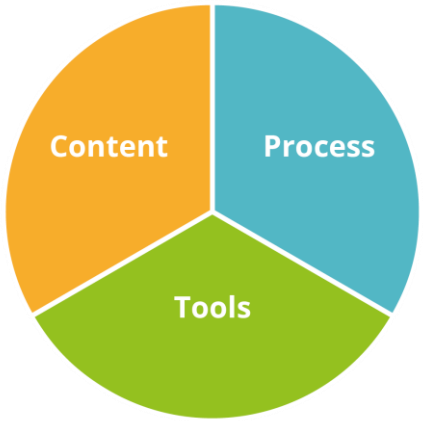
MoRe Model: focus on active community members

As a process moderator, you can use the MoRe model as a process tool to work with people who are part of an energy community initiative. **These participants to the process are already active and engaged (energy) community members** that have an interest in exploring the future energy-related possibilities.

The focus of the MoRe model as a supportive approach is on the process moderator and the active participants.

The focus of the MoRe model is *not* on providing an approach for engaging all community members. However, it will support you as process moderators and the active participants (already engaged community members) to discuss suitable ways for community engagement (see crash course “Community engagement”).

MoRe Model: Contents



The MoRe model consists of an introduction and three main parts:

0. Introduction to explain the structure of the model and introduce abbreviations and a glossary.

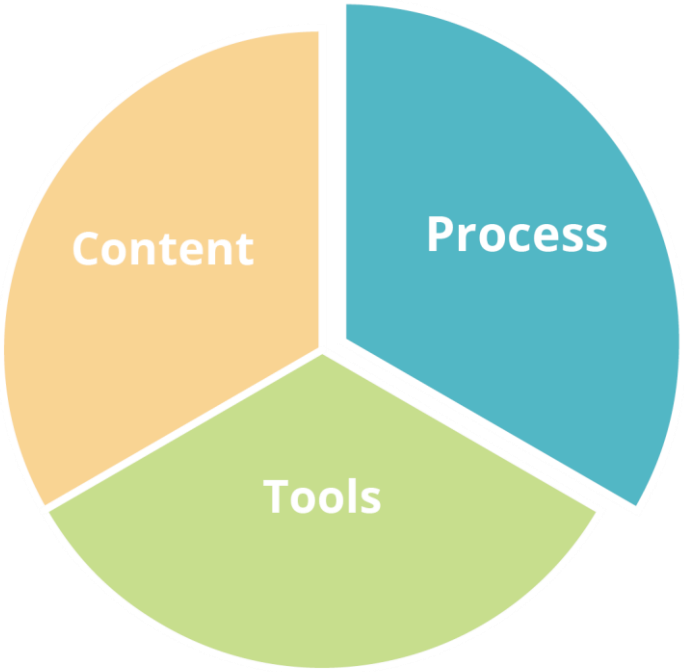
1. Process-support to explore together in a structured manner:

- What a cVPP could contribute to community goals
- What a cVPP could look like for your community
- What would be needed to realise a cVPP (first steps and actions)

2. Tools and templates that can be filled in as part of the co-creation process, which enable you to contextualise the cVPP options for your community.

3. Content-related parts include crash courses with relevant information on what a cVPP is; the history of the energy system; EU policy; energy flexibility; energy market roles and community engagement.

Process: Interactive Backcasting



WHAT?

Interactive backcasting is a method to co-create a desired future story of a cVPP. Next, the participants look back to the present to assess what steps are needed to attain that future.

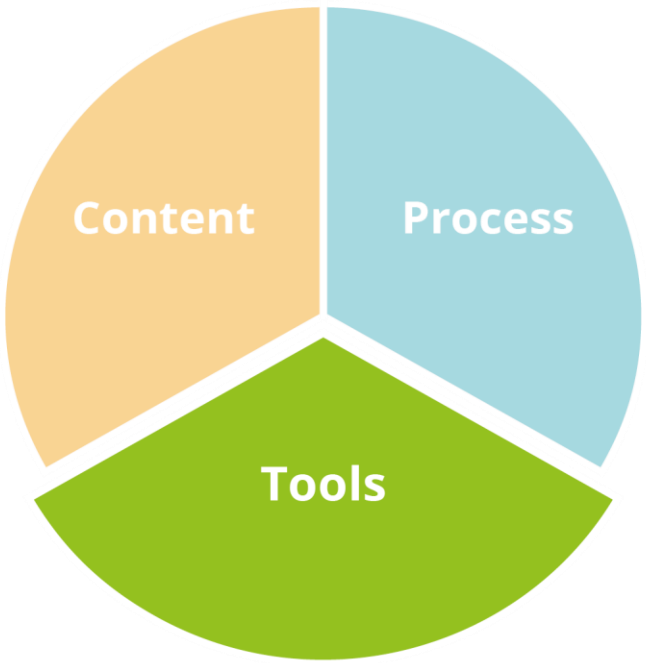
WHY?

Backcasting is a proven method to explore future possibilities. Story-telling and out-of-the-box thinking are important in (social) innovation processes because they trigger imagination, mobilise enthusiasm and help to arrive at new ideas.

HOW?

See the backcasting part.

Tools and templates

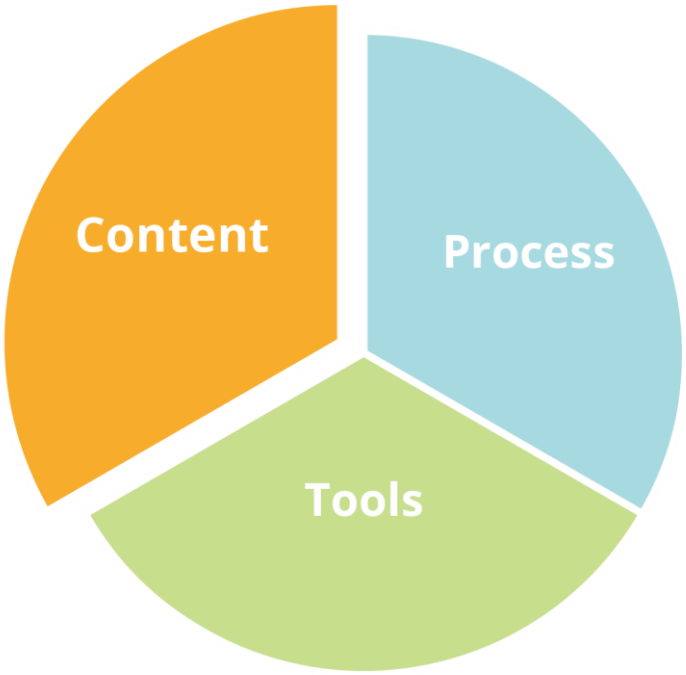


WHAT? The tools and templates provide concrete supportive steps to enable the creation, gathering, combination and analysis of ideas and knowledge.

WHY? The tools help to contextualise content that is specific for the participants and their community. The tools help in developing an increasingly clear picture of what the cVPP could look like.

HOW? The tools are described in the tools part.

Content: crash courses



WHAT? The crash courses present short information fact sheets.

WHY? cVPP is a complex topic. To enable you and participants to understand the various aspects that come into play, basic insights are needed into relevant aspects of cVPPs and our energy system – e.g. for group discussions or presentations.

HOW? The crash courses combine short text parts with pictures to clarify these aspects.

MoRe model: how to use this guide?

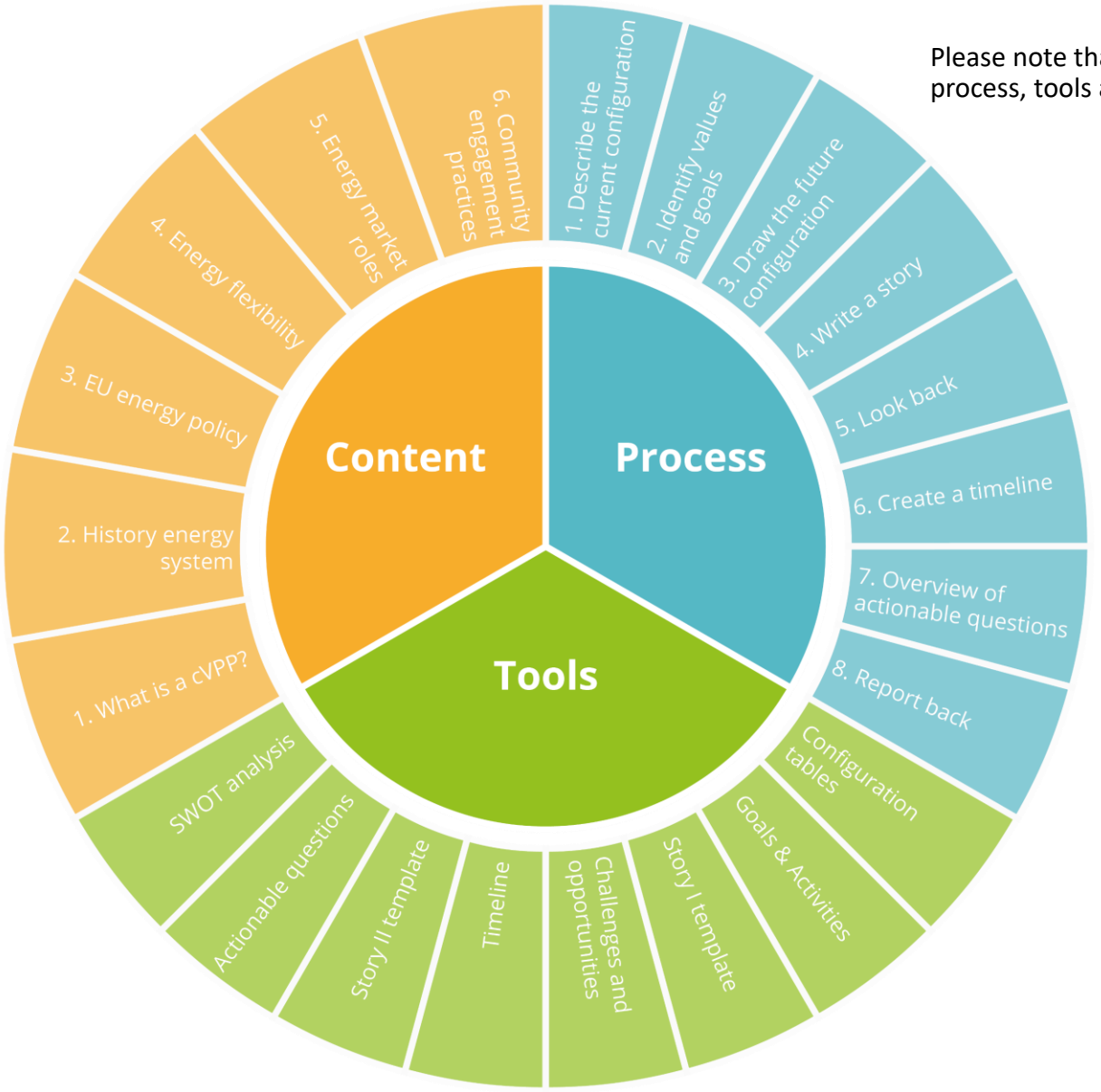
The three parts of the model are interrelated (internal references include hyperlinks).

The tools and the crash courses are connected to the steps in the backcasting process. However, some tools and all content parts still can be useful if you decide to organize the process differently (i.e. not with the backcasting).

You as a process moderator can decide which parts are relevant and to what extent, depending on your situation.

You can browse through the materials and pick out parts that seem particularly suitable for your situation.

MoRe Model: Contents in detail



Please note that you can click on all process, tools and content parts

Disclaimer: the development, testing and use of the MoRe Model

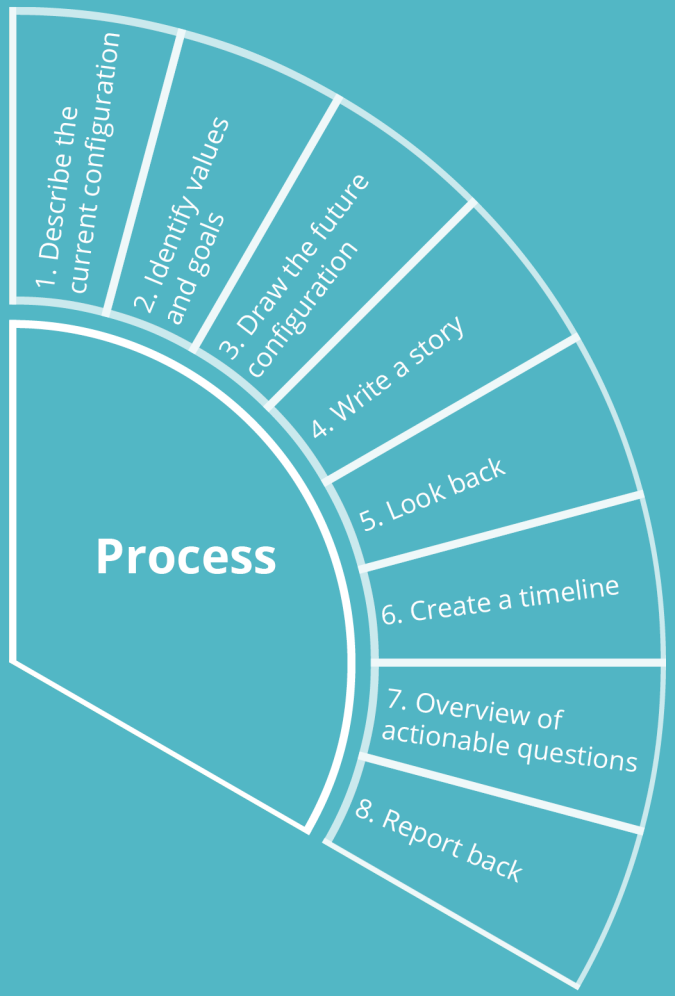
The MoRe model has been developed as part of the cVPP project. It was used and tested during interactive sessions with 3 Belgian and 3 Dutch community initiatives. This was done in the months from January 2020 until June 2020. Unfortunately, due to the covid-19 measures, no live workshops have been organised after January. Instead, online workshops were organised.

We have incorporated the lessons we learned from the interactive backcasting sessions in the current version of the MoRe model. The MoRe model is no blue-print, you will need to adapt it to the specific situation and circumstances.

In terms of the content, the MoRe model reflects the situation at the moment of writing. Policies and market opportunities are changing and there are differences between (EU) countries, which has impacts on the possibilities for cVPPs.

Part 1: Process

Interactive backcasting

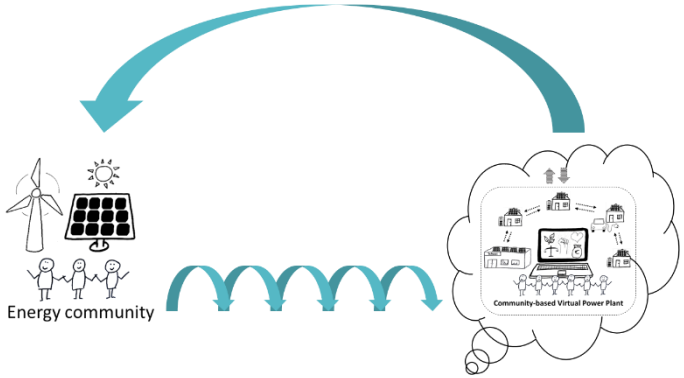


Process

Interactive backcasting

WHAT?

Interactive backcasting is a method that starts with the co-creation of a desirable future. The participants look backwards to the present to assess what steps are needed to attain that future.



WHY?

A cVPP can take many forms and shapes:

- in terms of how it is organised
- in terms of the technologies involved
- in terms of how it fits with an already existing situation
- in terms of how it engages the community
- in terms of how this cVPP enables activities and goals that the community values

Blue-prints or on-size-fits-all approaches are not helpful, because the ideas developed need to fit with the situation and circumstances of the particular community initiative that you work with. An interactive backcasting exercise helps you as process moderator to co-create together with the participants a concrete idea of a cVPP.

Process

Interactive backcasting and cVPP

HOW?

Interactive backcasting helps to co-create a contextualised future vision of a cVPP that fits with your specific context. It points which directions to take to achieve that future. In doing so, it also shows how todays' decisions may impact future possibilities. When zooming in on the short term, concrete challenges and opportunities to deal with on the short term become clear and point towards actions to undertake.

The backcasting process has been successful if at the end the participants have a more concrete idea about the cVPP configuration in terms of these aspects.

The 8 steps that are presented and elaborated in the following pages help you to organised the interactive backcasting.

Interactive backcasting: notes before you start

Notes on participants:

- It is important to discuss with the participants what their point of departure is and what their expectations and wishes are – so that the process can be adapted to their needs.
- Depending on the participants, it can be good to rehearse each time what a cVPP is (animation).
- It is important to show the participants very clearly and each time again what the aim is of each step, of each interactive session and of the whole trajectory – even more so when 'new' participants join in.
- It is important to evaluate each step and each session with the participants, in order to change the approach if needed
- It is good to emphasise that the participants are involved in an innovation process, characterised by uncertainty and complexity and that their efforts are likely to benefit future initiatives as well.
- It is important to realise that participants are often volunteers – and limited in terms of the time they have (e.g. to fill in templates) and the moments at which they are able to participate.

Interactive backcasting: notes before you start

Notes on the sessions:

- The exact number of interactive sessions, the type of meetings, how these are exactly prepared, that is up to you as a process moderator.
- However, if you want to use the full process approach with all the steps (and perhaps even some additional activities in order to engage more community members), then you will need at least 3 meetings and in between these meetings you will need time to collect or process feedback and inputs from the participants.
- Live/face-to-face meetings are very important for a good process.
- Live/face-to-face sessions also are important for participants to meet each other. There should be sufficient time for networking and fun.
- Some of the sessions can be done with more than one community initiative. The advantage of that is that participants can also respond to and be inspired by the other initiatives. In addition, they can decide to work together in addressing questions and challenges.

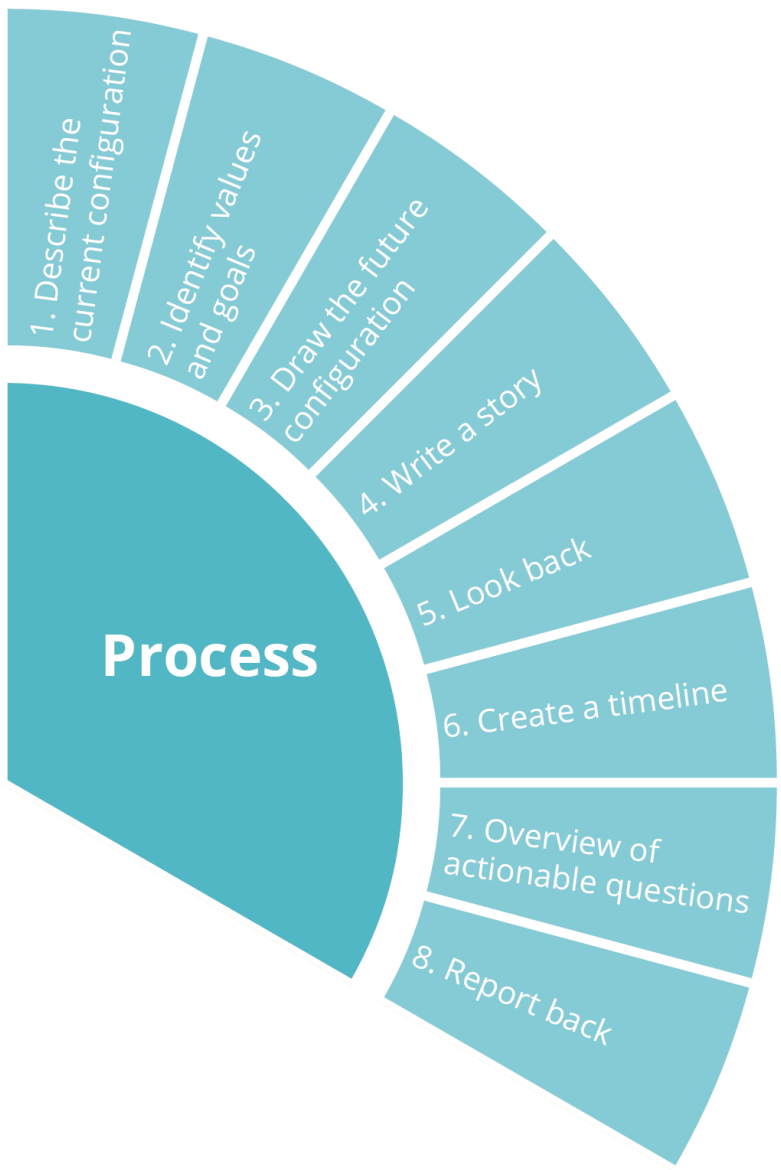
Process

Interactive backcasting: notes before you start

Notes on the process moderator:

- For you as process moderator, this process is as much an explorative journey as it is for the participants.
- While you should be able to understand and explain all the content, the main ideas and contents are provided by the participants. Good note-taking is essential to be able to use participants input to the most.
- The process is quite time intensive, and it is advisable to work with two process moderators. Not only to divide the work and tasks, but also to be able to discuss the feedback collected and translate it into next steps. Sometimes the feedback collected will be quite limited, and then you will need to rely on your own knowledge and insight in the situation to e.g. write up an inspiring story.

Interactive backcasting in 8 steps



The following pages describe the 8 steps

1 2 3 4 5 6 7 8

This backcasting approach has been developed and used to organise sessions with 6 community energy initiatives (in Belgium and the Netherlands).

Before we describe the 8 steps, the next slide shows a summary of the steps as organised with the 3 Belgian energy community initiatives in early 2020 (1 live meeting and the other meetings online because of covid-19).

Lessons learned have been included in the backcasting process as described below.

Process

Example: backcasting in steps with three energy initiatives in Belgium

Date	Interactive sessions, preparatory and feedback rounds in between the sessions	Step and/or goal
	Based on the proposals for the competition, the cVPP team developed and overview of the current configuration of the project (asking for additional information where necessary).	Step 1: describing current configuration of the initiative
Jan 30 2020	Live Workshop in Mechelen (Belgium)	Step 1: describing current configuration of the initiative Step 2: Identifying values and related goals and activities towards cVPP Step 3: First outline future configuration (cVPP)
	Based on the workshop outputs, the cVPP team developed three back-casting stories.	Step 4: Writing a story on the future configuration (cVPP)
March 26th 2020	Online session during with the three initiatives during which the three stories were presented and brief feedback was invited.	Step 5: Looking back to the present
	Each initiative was asked to fill in a template with questions about challenges and risks confronted in the process towards the desired future in 2026. Based on the feedback, the cVPP project team developed a timeline for each replication initiative as well as a short story.	Step 5: Looking back to the present Step 6: Making a timeline & brief story for each initiative
April 16th 2020	Online session with community initiative I to present and discuss the timeline and story	Step 7: Overview of actionable questions and stakeholder overview
April 21st 2020	Online session with community initiative II to present and discuss the timeline and story	Step 7: Overview of actionable questions and stakeholder overview
April 23rd 2020	Online session with community initiative III to present and discuss the timeline and story	Step 7: Overview of actionable questions and stakeholder overview
	Based on the online sessions, the cVPP project team 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.	Step 8: Final feedback to each energy community initiative

1 Step 1: Describe the current configuration of your project or initiative

Purpose of step 1 :

The aim of this step is to discuss, understand and write down the current situation of the community. It is against this background that the future vision will be developed in the next steps.

The following categories are central and recurring throughout the backcasting process. They ensure that the current (and in step 3 the future) configuration are addressed in terms of all relevant aspects:

- **Values**: economic, ecological and social values
- **Practices**: ways of doing and governance of the energy community
- **Technologies and physical elements**: generation, storage and controllable appliances
- **Infrastructures**: ICT, internet and the electricity network
- **Policy**: policies, regulation and support schemes
- **Resources**: relational, knowledge and financial resources

1

Step 1: Describe the current configuration of your project or initiative

Before you start step 1:

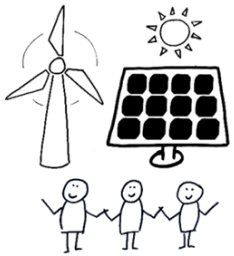
Step 1 is best started after having explained (in a meeting or webinar):

- The what, why and how of a cVPP (you can use (parts of) the crash course "What is a cVPP")
- The what, why and how of interactive backcasting (see previous slides on backcasting)
- The basic configuration categories (see previous slied and configuration document for an elaborate description)

Doing step 1:

For an elaborate description of this step, see the configuration tool. During or after a first meeting with participants from a community energy initiative, you invite the participants to fill in the configuration template (to be found in the configuration document). In case there already exists an elaborate description of the current situation of the community initiative, this can be used to fill in the template.

Afterwards you make sure that the resulting filled-in overview of the current configuration is shared with all participants.



1 Step 1: Describe the current configuration of your project or initiative

MEETING 1

1. Current configuration
2. Goals and activities
3. Future configuration
4. Write a story
5. Look back
6. Timeline & new story
7. Questions and actions
8. Report back

Description current configuration:

Step 2: Identify goals and activities

Purpose of step 2:

The purpose of this step is to help participants to better understand and discuss in what ways a cVPP can contribute to the values that they consider important. This step builds on the values that have been discussed/identified in step 1 (the first category in the configuration table).

As a moderator you will invite the participants to select goals (from a pre-defined overview) that best match their values. Next, relevant pre-defined activities that contribute to achieving these goals are discussed.

This step results in an overview of goals and activities that the participants are most interested in. They also discuss which goals and activities are *not (yet)* of interest, thereby reducing the number of possible cVPP configurations.

As such it provides a good basis for the next steps that address the future configuration.

The discussions are as important as or even more important than the resulting overviews, which provide a loose basis for the next steps, not a strictly defined path.

2 Step 2: Identify goals and activities

Before you start step 2:

Step 2 introduces a lot of information. It is important that you reserve time to present all the pre-defined goals and make sure that the participants understand these. The crash courses provide relevant information to help explain some of the goals and activities.

It is important to keep in mind (and communicate to the participants) that this step actually helps to reduce complexity and to reduce the number of options to a 'manageable level'.

Doing step 2:

This step is to be part of an interactive (preferably face-to-face) meeting. As a process moderator, you will introduce the aim of the exercise and present relevant background information e.g. an explanation of the goals and activities.

The goals and activities tool provides an elaborate explanation and presents the pre-defined overviews of goals and activities.

You share the overview with the results from this step with all participants.

2 Step 2: Identify goals and activities

MEETING 1

1. Current configuration
2. Goals and activities
3. Future configuration
4. Write a story
5. Look back
6. Timeline & new story
7. Questions and actions
8. Report back

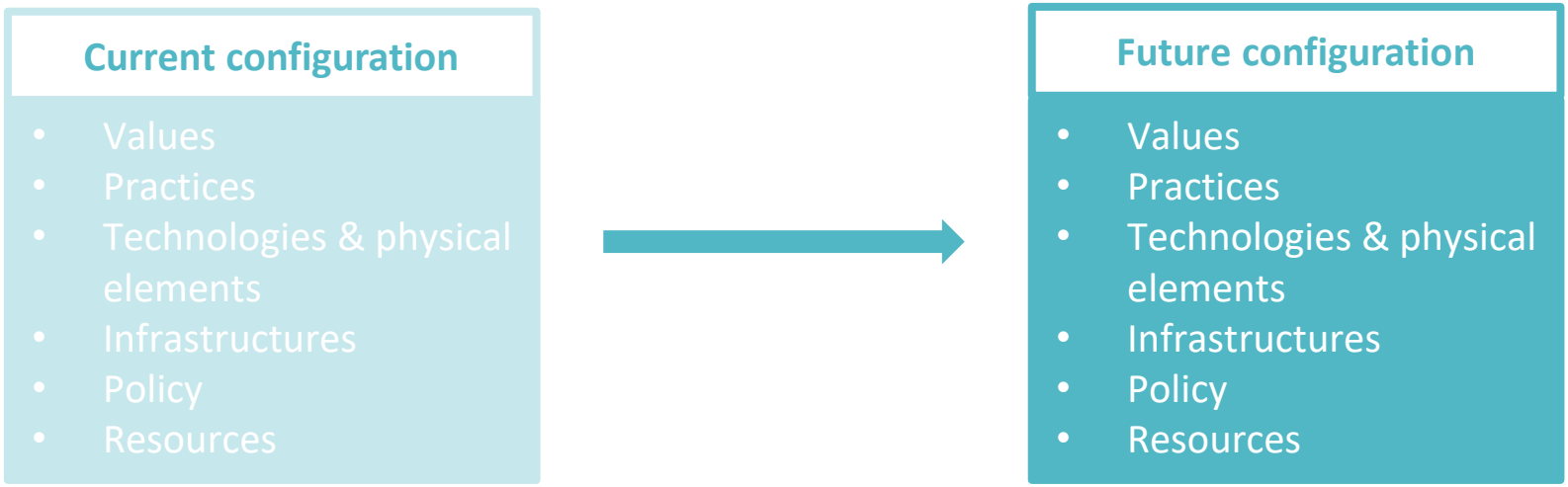
Description current configuration:

Goals & Activities

3 Step 3: Draft the future configuration

Purpose of step 3:

The purpose of this step is to start drafting the future of this particular community energy initiative, with attention for the potential of a VPP.



3 Step 3: Draft the future configuration

Before you start step 3:

This step is loosely based on the previous step. With the goals and activities' tables in mind, step 3 is started. In this way you leave room for changes in ideas, ambitions and priorities.

Doing step 3:

This step can be part of the first live meeting (if time allows) or it done afterwards. You either ask the participants to draft the future configuration of their project or initiative, addressing all relevant configuration categories. Another possibility is that you fill in the template afterwards, based on the discussions and inputs gathered (asking additional inputs from the participants where needed).

You can use the configuration table document that was used in step 1.

You share the overview with the results from this step with all participants and invite comments or additional inputs.

3 Step 3: Draft the future configuration

MEETING 1

1. Current configuration
2. Goals and activities
3. Future configuration
4. Write a story
5. Look back
6. Timeline & new story
7. Questions and actions
8. Report back

Description current configuration:

Draft future configuration:

Goals & Activities

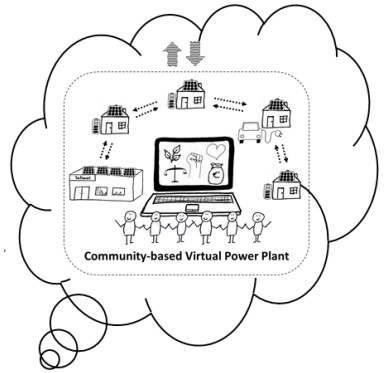
4 Step 4: Write a story about the future cVPP

Purpose of step 4:

The purpose of this step is to write a story that shows the possibilities for a cVPP for this particular community. The story provides a picture of the future cVPP configuration that covers all configuration categories.

Next to the function that the story has in the backcasting process, it helps to trigger enthusiasm and inspiration among the participants by envisioning a future cVPP that is appealing yet feasible.

Participants may want to use the story to engage other community members or in their interactions with other stakeholders.



4 Step 4: Write a story about the future cVPP

Before you start step 4:

Take care that the participants feel ownership of the future vision – that they feel that this indeed is *their* story.

Doing step 4.

You and/or the participants can use the Story I tool to write the story, combining the various inputs from the participants and addressing all the configuration aspects.

This can be done by the participants during a face-to-face meeting. Another option is that you write the story based on all inputs from the participants.

When you have developed the (final version of the) story, take time to share the story with all participants (orally and written).

4 Step 4: Write a story about the future cVPP

MEETING 1

MEETING 2

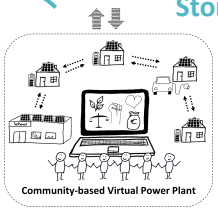
1. Current configuration
2. Goals and activities
3. Future configuration
4. Write a story
5. Look back
6. Timeline & new story
7. Questions and actions
8. Report back

Description current configuration:

Draft future configuration:

Goals & Activities

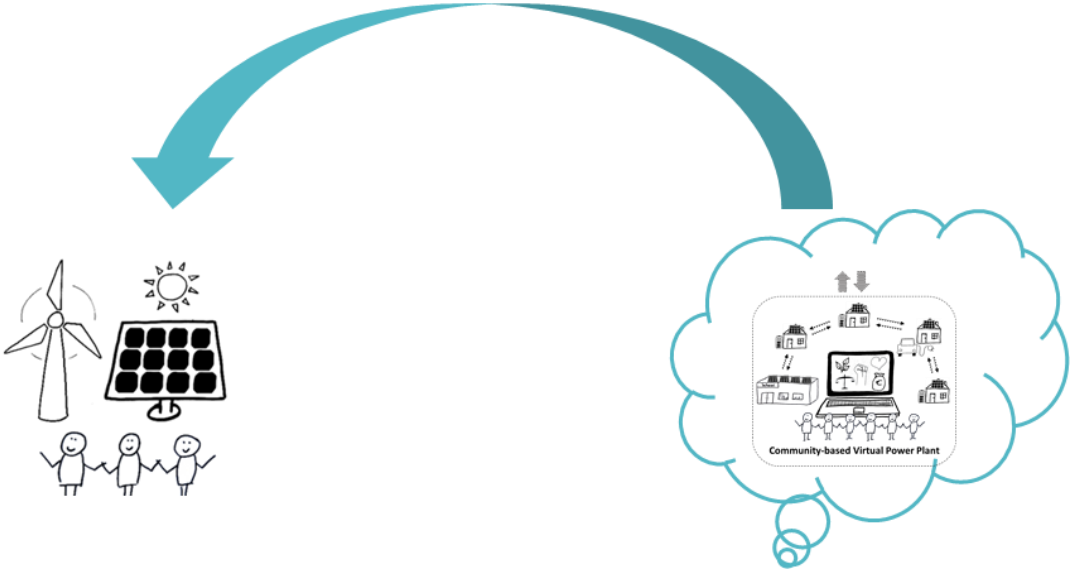
Story I



5 Step 5: Look back to the present

Purpose of step 5:

The purpose of this step is to jointly consider what would be needed to achieve the future image that has been created in the previous step. Looking back to the present allows the participants to consider how today's choices and actions will affect the possibilities of a future cVPP, what the necessary steps are to achieve the future cVPP, and what challenges and opportunities can be expected on the short and medium term.



5 Step 5: Look back to the present

Before you start step 5:

It is likely that during this step participants want to discuss the challenge of how to engage the broader community. As a support to this discussion, see crash course community engagement.

During this step, it is possible that participants feel that the story needs to change.

Doing step 5.

You organise an interactive session, where you read the story to the participants. The participants are invited to discuss the most important uncertainties, challenges and opportunities on the path towards this future cVPP. On the basis of these interactions (during or after the session), they fill in the challenges and opportunities table during or after the session. The level of detail may vary and if the participants have difficulties with filling in yet another template, you can fill it in based on the discussion and inputs.

5 Step 5: Look back to the present

MEETING 1

MEETING 2

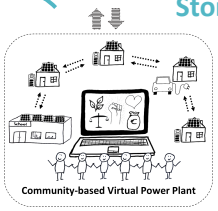
1. Current configuration
2. Goals and activities
3. Future configuration
4.Write a story
5. Look back
6. Timeline & new story
7. Questions and actions
8. Report back

Description current configuration:

Goals & Activities

Draft future configuration:

Story I

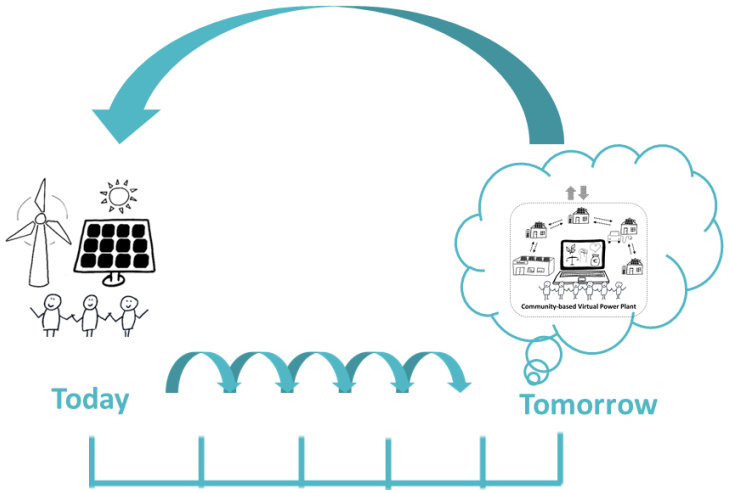


Challenges & opportunities:

6 Step 6: Create a timeline

Purpose of step 6:

The purpose of this step is to further clarify the main questions and challenges that need to be tackled – with emphasis on the short-term. Together with the participants you create a timeline and a second story. This second story is not focused on the future situation (story I) but on the path towards that desired future cVPP. Attention is given to community-related aspects (engagement over time), technological and physical developments, as well as the activities that the cVPP enables.



6 Step 6: Create a timeline

Before you start step 6:

Discuss beforehand with the participants what they prefer: either you prepare the timeline and Story II based on their inputs, or they do this together. Again, important is that the participants have the feeling that it is their story.

Doing step 6.

The timeline and Story II are created using the timeline tool and the Story II tool. During a live session, you read out the story and simultaneously present the timeline. You ask for feedback and zoom in on the first years in the timeline, asking the following questions:

- **What question needs to be answered/addressed in this period?**
- **Why is this question important?**
- **What and whom do you need to answer this question?**

Note down all the questions and issues brought up by participants, as input for the next step.

6 Step 6: Create a timeline

MEETING 1 | **MEETING 2** | **MEETING 3**

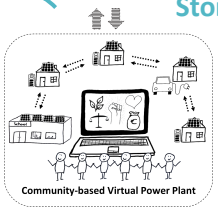
1. Current configuration
2. Goals and activities
3. Future configuration
4. Write a story
5. Look back
6. Timeline & new story
7. Questions and actions
8. Report back

Description current configuration:

Goals & Activities

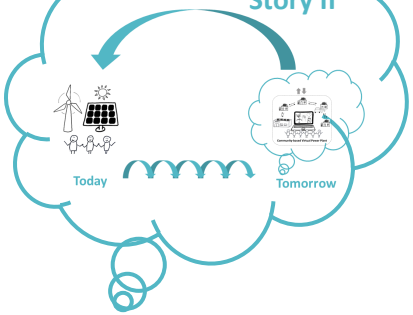
Draft future configuration:

Story I



Challenges & opportunities:

Story II



7 Step 7: Overview of actionable questions

Purpose of step 7:

Based on the outcomes of previous discussions, this step aims to generate an overview of questions to be addressed by the participants themselves in the short term and an overview of stakeholders that could support the energy community in developing their cVPP.

As such it helps the participants to define the next concrete steps and actions to be taken to further explore and/or work towards a cVPP.

Before you start step 7:

Make clear that the overview that is compiled is a ‘living document’, that can be adapted and complemented as time progresses.

Doing step 7:

You create this overview based on the outcomes of the previous steps and the notes taken during the discussion using the table with actionable questions.

7 Step 7: Overview of actionable questions

MEETING 1 | **MEETING 2** | **MEETING 3**

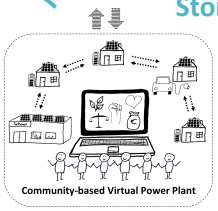
1. Current configuration
2. Goals and activities
3. Future configuration
4. Write a story
5. Look back
6. Timeline & new story
7. Questions and actions
8. Report back

Description current configuration:

Goals & Activities

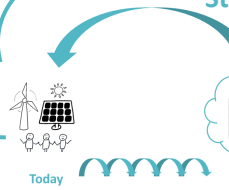
Draft future configuration:

Story I



Challenges & opportunities:

Story II



Questions and stakeholder overview

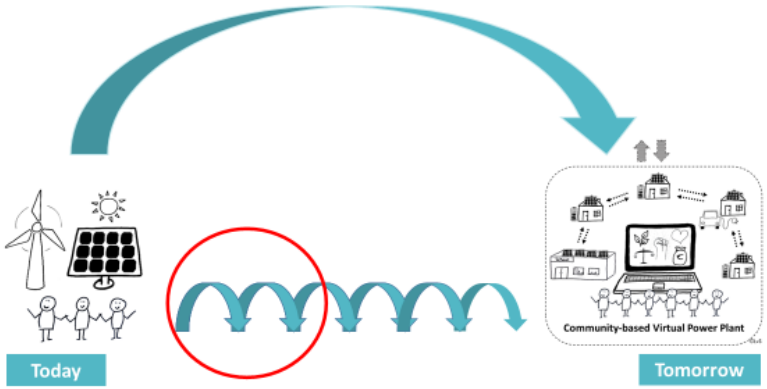
8 Step 8: Report back

Purpose of step 8:

The purpose of this step is to provide a detailed overview of the results of this backcasting process. Depending on the needs and time available, you compile a final report that summarises the main ideas developed:

- The rewritten story and timeline
- Overview of actionable questions & stakeholder overview
- SWOT: overview of strengths, weaknesses, opportunities and threats

It may also be that the participants conclude that a cVPP is not (yet) a viable option, but that they have developed other valuable ideas to take their initiative a step forward.



8 Step 8: Report back

Before you start step 8:

This report provides the building blocks for a plan of action (which is outside of the scope of the MoRe model), because at this point the ideas about the possibilities of a cVPP have become clear and concrete.

Doing step 8:

You bring together the relevant parts in one document, add a SWOT based on your analysis and share this with all participants. If possible, organise a final brief meeting to evaluate the process and discuss how participants envisage next steps.

Share the document in such a format that the participants can easily add, complement and change parts of the document.

8 Step 8: Report back

MEETING 1 | **MEETING 2** | **MEETING 3**

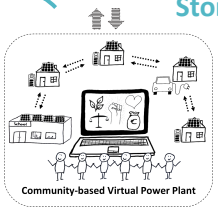
1. Current configuration
2. Goals and activities
3. Future configuration
4. Write a story
5. Look back
6. Timeline & new story
7. Questions and actions
8. Report back

Description current configuration:

Goals & Activities

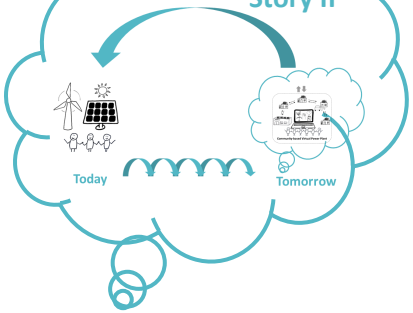
Draft future configuration:

Story I



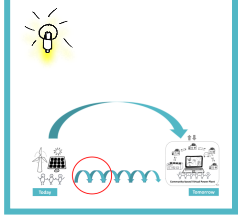
Challenges & opportunities:

Story II



Questions and stakeholder overview

Report for participants:



Process

Overview: steps and tools

Step	Tool
1. Define the current (socio-technical) configuration of the energy community initiative	Configuration tables
2. Identify values and related goals of the community initiatives	Goals-activities tool and template
3. Draft a first rough outline of the desired future cVPP configuration	Configuration tables
4. Write a story about the future cVPP	Configuration tables + story template
5. Backcast using the storylines	Template to identify challenges and opportunities
6. Make a timeline and brief story on how the initiative arrived at the cVPP	Timeline + short story template
7. Compile an overview of questions to be answered and a stakeholder overview	Actionable questions table and stakeholder table
8. Generate final feedback to the energy community initiative	Report in which the timeline, short story, questions' tables, stakeholder table, suggestions for short term actions, SWOT is included.

Process

Steps and moderator's tasks

The table below shows what your task is in each step. The exact task division will depend on the participants' willingness and available time for face-to-face meetings. It is important to have someone take detailed notes during each interactive session.

Step	Your task
	Introduce cVPP – using the Crash Course part what is a cVPP and other crash courses
1. Describe the current configuration of the energy community initiative	Explain the configuration tables, support the filling in
2. Identify values and related goals	Explain the values-goals-activities table (use crash courses for background information on e.g. flexibility, policy, etc)
3. Draft a first rough outline of the desired future cVPP configuration	Support rough outlining so that all configuration parts are more or less covered
4. Write a story that describes the future cVPP	Write a story (or support the participants in writing a story) that is appealing and that covers all configuration aspects
5. Look back to the present	Moderate the process discussing the story and gathering feedback
6. Create a timeline and brief story on how the initiative arrived at the cVPP	Based on (additional) feedback, (help participants to) draft a timeline and a story that is more specific/concrete
7. Compile an overview of actionable questions and stakeholder overview	While preparing step 6, start with this overview of questions and stakeholders. Collect additional inputs from the participants
8. Report: final feedback to the participants	Draft a final feedback document to share and discuss with the participants.

To conclude

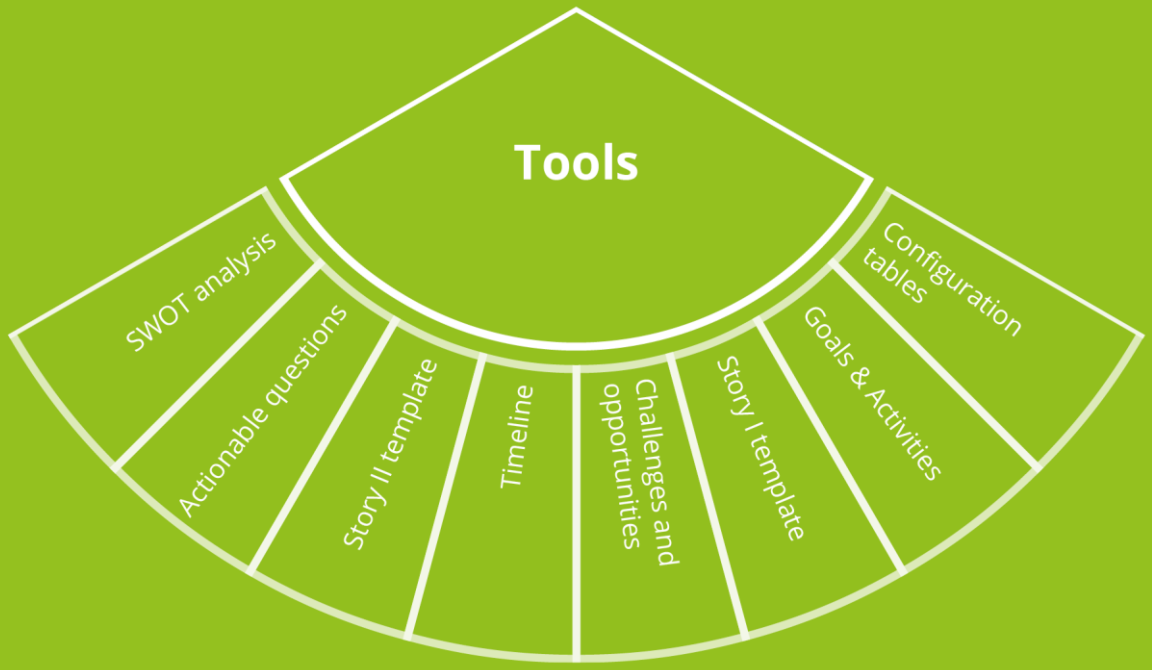
The interactive backcasting approach as presented has the aim to jointly explore how a cVPP could contribute to create value for a community.

A cVPP can take many forms and shapes.

The backcasting process has been successful if at the end the participants have a more concrete idea about the cVPP configuration in terms of

- how it enables activities and goals that the community values
- how it is to be organised (organisational, and time-wise)
- the technologies involved
- how it fits with an already existing configuration,
- how to engage the broader community
- how to learn from other, similar initiatives
- which short term choices may have crucial impact on future possibilities of the cVPP
- which actions to undertake on the short term to find answers to main questions

Part 2: Tools


Tools
SWOT analysis
Actionable questions
Story II template
Timeline
Challenges and opportunities
Story I template
Goals & Activities
Configuration tables

1 Configuration tables

WHAT?

Describe the current configuration of the project or initiative, addressing all relevant aspects – in line with the configuration table categories presented below.

WHY?

An overview of the current situation is helpful to gain a clear understanding of the starting situation of the energy community – against which the future vision will be developed. It helps to discuss the current and future configuration in terms of all relevant categories.

HOW?

The configuration document

This tool is used in steps 1 and 3 of the backcasting process.

Configuration tables

This configuration table uses the following categories:

Values	Economic, environmental and social values
Practices	Ways of doing; organisational structure; governance
Technologies and physical elements	Generation, storage and controllable appliances
Infrastructures	ICT and electricity network
Policy	Policies, legislation and support schemes
Resources	Relational, knowledge and financial resources

The next slides provide elaborate descriptions in the form of questions to be answered, either by the participants or by the process moderator based on discussions and background information. The configuration document that can be downloaded and filled in, contains the same elaborate descriptions.

Configuration tables

Values

- Economic benefits: benefits that either flow back to individual members or that are reinvested in collective community goals. Underlying values: local economic regeneration through local value creation and retention.
- Environmental benefits and decarbonisation of our energy system: ensure local consumption that is CO_2 neutral by means of: optimising between local storage, self-consumption and grid-supplied energy consumption (increase local demand when RES production is high; decrease local demand when RES production is low). Underlying values: decrease dependence on fossil fuels; support grid stability (to enable more RES to be connected to the grid)
- Social benefits related to the community: strengthening social resilience; enhancing social cohesion; improving collaboration, self-reliance and autonomy; e.g. maximizing local self-consumption of locally generated energy, using local individual or collective storage options. Underlying values: community well-being; self-control; achieving local CO2 neutrality; supporting local value creation via local self-reliance

Practices

Ways of doing; community organization; community governance; financial governance; relations and interactions with other stakeholders)

- How is the community organised?
- In case there a formal organizational structure, what does is look like (cooperative; foundation; company; other)? Since when does it exist?
- What does the governance look like?
  - how often do all members meet;
  - how do they decide on matters;
  - who is in charge of day-to-day management;
  - what are the channels through which regular interactions are facilitated (e.g. email, meetings,)
- Wat is the size (nr. of people/households) of the community and how has it evolved over time?
- How are community members involved in the current community project/activities.
- What (project related) activities are performed by the community?
- In terms of energy-related activities, how do these affect household or community level energy generation, storage, consumption

Configuration tables

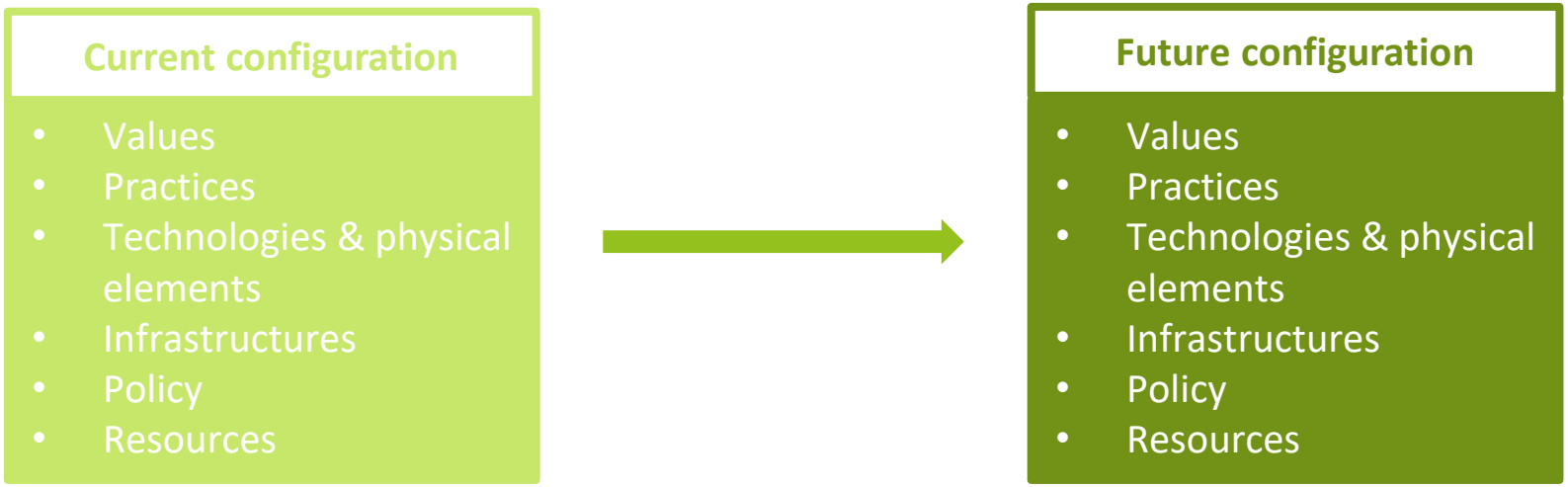
Technologies and physical elements 	Describe and characterise: ❑ The homes and other types of buildings that are part of the project ❑ Appliances at household level that can be controlled (turned off or on to change demand patterns) ❑ Appliances at community level (e.g. local industry; shared heat pump) that can be controlled (turned off or on to change demand patterns) ❑ Installed capacity of renewable energy (PV; solar thermal; wind; biomass) at household or community level ❑ Storage options at household or community level ❑ Electric vehicles
Infrastructures 	❑ Does your current project affect the energy distribution or transmission network? ❑ What sort of (connections to) energy infrastructures are in place at household and community level? ❑ Do the participating households have smart meters? ❑ Are energy management systems or user interfaces being used currently in relation to current project activities? ❑ What ICT-related infrastructure is available (e.g. internet connections to enable cloud-based systems)?

Configuration tables

Policy 	❑ To arrive at the current state of the project/activities, which subsidies or support schemes have been used? Please distinguish between EU, national and local schemes. ❑ How does current policy and legislation affect the project/activities?
Resources: Financial, relational, knowledge 	Relational resources; knowledge resources (know-how, skills); financial resources. ❑ With whom do you work together currently and to what aim? ❑ Do you have partners (e.g. other community-level organisations, companies)? ❑ Do you work together with an energy supplier, a DSO or TSO? ❑ Do you work together with (local) government? ❑ What knowledge is present within the community? ❑ What about know-how and skills? ❑ Has external knowledge been used for the current activities? ❑ What is your financial situation? (characterization in terms of financial feasibility/viability of the current project – including challenges and resources)

1 Configuration tables

The filled-in configuration table provides a reference situation and an improved understanding and agreement on what the starting situation is for this particular community energy initiative (the current configuration). At a later moment, ideas for the future configuration are also developed using these categories, thereby addressing all relevant 'system' aspects.



2

Goals and Activities tool

WHAT? *Translate the community values in a set of goals that a cVPP can help to realise.*

WHY? *This exercise helps participants to identify which activities to focus on and which activities are less relevant or interesting.*

HOW? *The tool consists of three parts:*

A	Identify what values are important to the community
B	Identify goals of the community energy initiative
C	Assess which activities support the realisation of these goals

This tool is used in step 2 of the backcasting process.

2

Before starting

The exercises in this tool provide a lot of information to both the process moderator and the participants, especially part B and C. When terms are not clear, the crash courses or glossary can help out.

Relevant crash courses for process moderators before starting this exercise are:

- What is a cVPP?
- History energy system
- Energy flexibility

A: Identify what values are important to the community

A cVPP project provides benefits in line with values pointed out as important by the community. These values form the starting point of the cVPP project and 3 different types of values can be distinguished:

- **Economic value**: benefits that either flow back to individual members or that are reinvested in collective community goals. *Underlying values: local economic regeneration through local value creation and retention.*
- **Environmental value and decarbonization of our energy system**: ensure low-carbon or carbon-neutral local consumption by means of: optimising between local RE generation, storage, self-consumption and grid-supplied energy consumption (increase local demand when RE production is high; decrease local demand when RE production is low). *Underlying values: decrease dependence on fossil fuels; support grid stability (to enable more RE sources to be connected to the grid)*
- **Social value related to the community:** strengthening social resilience; enhancing social cohesion; improving collaboration, self-reliance and autonomy**;** e.g. maximizing local self-consumption of locally generated energy, using local individual or collective storage options. *Underlying values: community well-being; control; achieving local CO_2 neutrality; supporting local value creation*

A: Identify what values are important to the community

Identify community values through a discussion with participants and by filling in the following template:

A: Outcome

OUTCOME?

An overview of values that the community has identified as important. The cVPP is supposed to deliver (some of) these values.

B: Identify goals of the community energy initiative

Based on the values that have been pointed out by the participants as important, the participants select goals for the cVPP project from a pre-defined overview of goals. This selection shows how participants envisage their future cVPP to provide value to the community and/or the energy system.

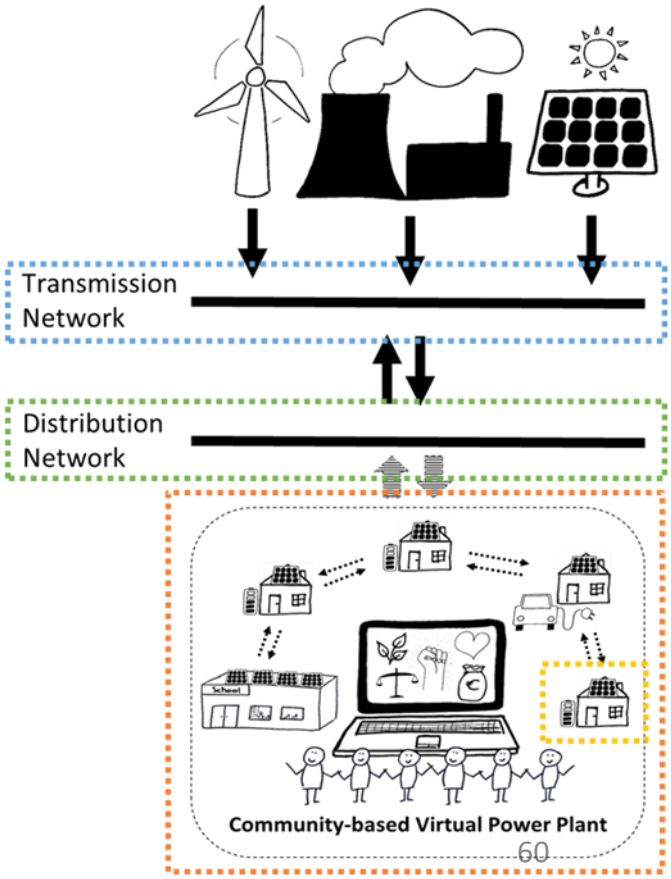
The tables on the next pages show:

- **Goals that do not require a cVPP**

And goals a cVPP can help realise at four levels:

- **Individual community members / households**
- **The community**
- **The distribution network**
- **The transmission network**

The participants read through the goal-tables and highlight goals they consider relevant.



What a community energy initiative has to offer to its community members (without a cVPP)

Goals that do not require a cVPP
Reduce the energy bill of households
Reduce CO_2 emissions of households
Reduce CO_2 emissions of the community
Increase awareness and enable households and the community to participate in the energy transition
Provide revenues for the community by generating and selling RE
Enabling access to sustainable (shared) mobility

What a cVPP has to offer to a household

cVPP goals that provide value/benefit on the household level
Maximise self-consumption of household RE to increase household level autonomy
Enable households to respond to dynamic prices to maximise household financial benefit
Enable households to maximise the use of RE (either locally or on national scale) and minimize the use of fossil energy (to achieve decarbonisation/CO_2 reduction of the household energy mix)
Reduce the energy bill by minimizing the capacity tariff
Enable individual households to use electricity during power outages
Support the integration of RE on the distribution network to support household decarbonisation and/or for financial benefits
Support the integration of RE on the transmission network to support household decarbonisation and/or for financial benefits
Provide (additional) revenues for households by selling RE collectively

What a cVPP has to offer to the community

cVPP goals that provide value/benefit on the community level
Maximise self-consumption of community RE to increase community level autonomy
Enable the community to maximise the use of RE and minimize the use of fossil energy (to achieve decarbonisation of the community energy mix)
Enable the community to use electricity during power outages
Support the integration of RE on the distribution network to support community decarbonisation and/or for financial benefits
Support the integration of RE on the transmission network to achieve decarbonisation and/or for financial benefits
Enable community members without access to RES to use community generated RE to support an inclusive energy transition
Provide (additional) revenues for the community by selling RE collectively

What a cVPP has to offer to the distribution network

cVPP goals that provide value/benefit on the distribution network level
Support the integration of RE and appliances (e.g. electric vehicles and heat pumps) on the distribution network to support further decarbonisation
Reduce the need for the expansion of distribution network capacity for financial benefits
Support the integration of RE and appliances (e.g. electric vehicles and heat pumps) on the distribution network to support further decarbonisation
Reduce the need for the expansion of distribution network capacity for financial benefits

What a cVPP has to offer to the transmission network

cVPP goals that provide value/benefit on the transmission network level
Support the integration of RE and appliances (e.g. electric vehicles and heat pumps) in the transmission network to support decarbonisation
Reduce the need for the expansion of transmission network capacity for financial benefits
Support integration of RE on energy markets to support further decarbonisation and/or for financial benefits

2

B: Outcome

A selection of goals that link to the values that the community considers important. Through this exercise the participants gain more insight in:

- What a cVPP has to offer to their community and the energy transition
- What they want to achieve with their cVPP project
- How they envisage their future cVPP to provide value to individual households, the community, the distribution- and/or the transmission network

2

C: Assess which activities support the realization of these goals

This exercise helps to identify which activities to focus on. These activities inform the requirements for the future cVPP.

The pre-defined lists of possible activities enabled by a cVPP includes activities that are not yet allowed or feasible (due to e.g. regulation, immature technology). These are included to evoke discussion but also to encourage energy communities to dream about going beyond energy generation, saving and efficiency and to explore the possibilities for storage, increased self-consumption, peer-to-peer exchange and activities that support the stability of the electricity network and thereby enable more renewable energy generation to be connected to the electricity network.

In part B, goals were highlighted in the goals-tables. Now it's time to place the activities-tables next to the goals-tables used in part B (see example on the next page).

C: Assess which activities support the realization of these goals

For example, the tables below show that through activities 2, 3 and 4 the cVPP can support achieving the selected goal: goal 2. From these three activities participants choose which ones they find most interesting, in this case activities 2 and 4.

cVPP goals and activities that provide value/benefit on the … level	cVPP goals and activities that provide value/benefit on the … level
Goals	**Activities**
Goal 1	Activity 1
	Activity 2
	Activity 3
Goal 2	Activity 2
	Activity 3
	Activity 4

The following pages show the goals- and activities-tables combined. These two tables can also be downloaded as two separate tables that can be placed next to each other (like the example above): Goals tables & Activity tables.

2 What a community energy initiative has to offer to its community members (without a cVPP)

Goals and activities that do not require a cVPP	
Goals	**Activities**
Reduce the energy bill of households	01. Implement energy efficiency/conservation measures (e.g. insulation, energy efficient appliances)
	02. Install RE generation capacity at household and community level (e.g. solar panels)
	03. Install other energy technologies that enable storage and optimal RE use (e.g. heat pumps, electric boilers, electric vehicles)
	04. Collectively develop an energy generation project on a single location or site (e.g. solar farm, collective solar roof, wind project) and sell the generated energy to a third-party supplier.
Reduce CO2 emissions of households	01. Implement energy efficiency/conservation measures (e.g. insulation, energy efficient appliances)
	02. Install RE generation capacity at household and community level (e.g. solar panels)
	03. Install other energy technologies that enable storage and optimal RE use (e.g. heat pumps, electric boilers, electric vehicles)
Reduce CO2 emissions of the community	04. Collectively develop an energy generation project on a single location or site (e.g. solar farm, collective solar roof, wind project) and sell the generated energy to a third-party supplier.
	05. Implementing (collective/shared) electric vehicles (cars; (freight)e-bikes; buses,) and (bi-directional) charging poles and stations
Increase awareness and enable households and the community to participate in the energy transition	01. Implement energy efficiency/conservation measures (e.g. insulation, energy efficient appliances)
	02. Install RE generation capacity at household and community level (e.g. solar panels)
	03. Install other energy technologies that enable storage and optimal RE use (e.g. heat pumps, electric boilers, electric vehicles)
	04. Collectively develop an energy generation project on a single location or site (e.g. solar farm, collective solar roof, wind project) and sell the generated energy to a third-party supplier.
	06. Implementing energy monitoring at household and community level
Provide revenues for the community by generating and selling RE	04. Collectively develop an energy generation project on a single location or site (e.g. solar farm, collective solar roof, wind project) and sell the generated energy to a third-party supplier.
Enabling access to sustainable (shared) mobility	05. Implementing (collective/shared) electric vehicles (cars; (freight)e-bikes; buses,) and (bi-directional) charging poles and stations

What a cVPP has to offer to a household

cVPP goals and activities that provide value/benefit on the household level	
Goals	**Activities**
Maximise self-consumption of household RE to increase household level autonomy	07. Use flexibility provided by storage and household appliances to maximise consumption of self-generated RE at household level
Enable households to respond to dynamic prices to maximise household financial benefit	08. Use flexibility provided by storage and household appliances to change household energy demand and/or supply in response to dynamic prices (e.g. lowering energy demand when prices are high)
Enable households to maximise the use of RE (either locally or on national scale) and minimize the use of fossil energy (to achieve decarbonisation/CO2 reduction of the household energy mix)	09. Use household-level flexibility provided by storage and household appliances to balance household energy demand and supply in line with physical availability of RE on the transmission network
Reduce the energy bill by minimizing the capacity tariff	10. Use flexibility provided by storage and household appliances to minimise the peak power usage (and peak of energy fed back to the distribution network) within households to lower the capacity tariff of households (tariff depending on size of connection with the network)
Enable individual households to use electricity during power outages	11. Use household-level flexibility provided by storage and household appliances to balance household energy demand and supply during emergencies
Support the integration of RE on the distribution network to support household decarbonisation and/or for financial benefits	15. Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at distribution level)
	16. Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at distribution level)
Support the integration of RE on the transmission network to support household decarbonisation and/or for financial benefits	17. Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at transmission level)
	18. Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at transmission level)
Provide (additional) revenues for households by selling RE collectively	21. Collectively selling RE generated by community members to a third party supplier

What a cVPP has to offer to the community

cVPP goals and activities that provide value/benefit on the community level	
Goals	**Activities**
Maximise self-consumption of community RE to increase community level autonomy	12. Use flexibility provided by storage and household appliances to balance demand and supply at the community level
	19. Buying energy from the community and selling it back to community members and/or selling it on the energy market (as a licensed energy supplier)
	20. Enable peer-to-peer energy trading between community members
Enable the community to maximise the use of RE and minimize the use of fossil energy (to achieve decarbonisation of the community energy mix)	13. Use community-level flexibility provided by storage and household appliances to balance demand and supply in line with physical availability of RE on the transmission network
Enable the community to use electricity during power outages	14. Supply power to the community during emergencies by operating a microgrid that can be disconnected from the distribution / transmission network
Support the integration of RE on the distribution network to support community decarbonisation and/or for financial benefits	15. Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at distribution level)
	16. Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at distribution level)
Support the integration of RE on the transmission network to achieve decarbonisation and/or for financial benefits	17. Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at transmission level)
	18. Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at transmission level)
Enable community members without access to RES to use community generated RE to support an inclusive energy transition	19. Buying energy from the community and selling it back to community members and/or selling it on the energy market (as a licenced energy supplier)
	20. Enable peer-to-peer energy trading between community members
Provide (additional) revenues for the community by selling RE collectively	21. Collectively selling RE generated by community members to a third party supplier

What a cVPP has to offer to the distribution network

cVPP goals and activities that provide value/benefit on the distribution network level	
Goals	**Activities**
Support the integration of RE and appliances (e.g. electric vehicles and heat pumps) on the distribution network to support further decarbonisation	10. Use flexibility provided by storage and household appliances to minimise the peak power usage (and peak of energy fed back to the distribution network) within households to lower the capacity tariff of households (tariff depending on size of connection with the network)
Reduce the need for the expansion of distribution network capacity for financial benefits	10. Use flexibility provided by storage and household appliances to minimise the peak power usage (and peak of energy fed back to the distribution network) within households to lower the capacity tariff of households (tariff depending on size of connection with the network)
Support the integration of RE and appliances (e.g. electric vehicles and heat pumps) on the distribution network to support further decarbonisation	15. Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at distribution level)
	16. Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at distribution level)
Reduce the need for the expansion of distribution network capacity for financial benefits	15. Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at distribution level)
	16. Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at distribution level)

What a cVPP has to offer to the transmission network

cVPP goals and activities that provide value/benefit on the transmission network level	
Goals	**Activities**
Support the integration of RE and appliances (e.g. electric vehicles and heat pumps) in the transmission network to support decarbonisation	08. Use flexibility provided by storage and household appliances to change household energy demand and/or supply in response to dynamic prices (e.g. lowering energy demand when prices are high)
	17. Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at transmission level)
	18. Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at transmission level)
Reduce the need for the expansion of transmission network capacity for financial benefits	08. Use flexibility provided by storage and household appliances to change household energy demand and/or supply in response to dynamic prices (e.g. lowering energy demand when prices are high)
	17. Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at transmission level)
	18. Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at transmission level)
Support integration of RE on energy markets to support further decarbonisation and/or for financial benefits	19. Buying energy from the community and selling it back to community members and/or selling it on the energy market (as a licenced energy supplier)
	21. Collectively selling RE generated by community members to a third party supplier

2

C: Outcome

- Participants better understand the variety of activities enabled by a cVPP.
- Participants have a list of activities through which the cVPP is to provide value to individual households, the community, the distribution- and/or the transmission network.
- Participants have more clarity on what a cVPP has to offer for to *their* community, which provides a starting point for developing more concrete ideas about your cVPP project.
- Participants have more clarity on the cVPP activities that are not (yet) interesting for their community.

Once it is clearer what the cVPP is supposed to do, participants can have a more informed discussion on the requirements and steps towards their envisaged future cVPP configuration.

3 Story I template tool

WHAT? *Ask participants to draft the future configuration of the project or initiative, addressing all relevant configuration categories.*

WHY? *The generated ideas of discussions or the previous tool can be fed into a first rough overview of the future cVPP.*

HOW? *The story I template*

This tool is used in step 4 of the backcasting process.

Story writing I template

The story should be no longer than 2 pages. Drawings can be added of course. The configuration tables can be used as a reminder of what each category is about. The story is an appealing and inspiring account of the situation in 2030 (the exact year can be changed depending on your preferences). The story presents a desired yet realistic image.

Story writing I template:

(Name of the initiative) in 2030: .....(Title)

It is .....(date in 2030) and we are together to celebrate .....(an inspiring brief introduction)

(Values): Title heading

Story part that expresses the values that the cVPP project creates

(Practices): Title heading

Story part that expresses the practices in the 2030 (e.g. the organizational form, day-to-day governance)

3 Story writing I template

(Technical and physical elements): Title heading

Story part that expresses how the cVPP looks like in 2030 in technical and physical terms

(Infrastructures): Title heading

Story part that expresses how the cVPP relates to and is connected to infrastructures

(Policy): Title heading

Story part that expresses how policy and regulation enables the current cVPP (this part is difficult and very speculative, can also be left out or kept short and very general)

(Resources) Title heading

Story part that expresses how knowledge, human and financial resources have been found and used

Back in (current year) we were still struggling with.....

However, today we see/have managed to/have reached.....

4

Challenges and opportunities tool

WHAT? *Participants re-read the written story about their initiative and try to imagine the future scenario. With that in mind, they look back to the present.*

WHY? *Looking back to the present allows the participants to consider how today's choices and actions will affect the possibilities of a future cVPP, what the necessary steps are to achieve the future cVPP, and what challenges and opportunities can be expected on the short and medium term.*

HOW? *The challenges and opportunities template*

This tool is used in step 5 of the backcasting process.

Challenges and opportunities: questions about the story and about the path towards the future cVPP

Template to be filled in by the participants:

Please read the story about your initiative and try to imagine yourself in this future situation. Afterwards, try to answer the questions and fill in the template document. NB: there are no wrong answers. Write down what is relevant to you.

Values

- ❑ Have values changed in the process towards realising the cVPP? (e.g. a change in priorities)?
- ❑ If so, how? Why?

Practices

Organisational structure in the future situation

- ❑ In the process towards realising the cVPP, what were the largest challenges (and/or uncertainties) with regard to the organisational structure, way of governance, and energy-related practices?
- ❑ How and when have you addressed these challenges and with what result? (can you mark this on the timeline with the letter C?)
- ❑ Did you receive external help/support in this? From whom and how?
- ❑ What changes in organisational structure were necessary and why?
- ❑ What (if any) opportunities have occurred that have affected your organisational structure, governance mode, energy-related practices? When? (please mark these on the timeline below with the letter O).

Practices and routines among households in the future situation

- ❑ What have been the most important changes for households that occurred in the process towards realising the cVPP - in terms of changes in their daily practices and routines/ways of doing?

Timeline to mark challenges, opportunities, changes

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

Challenges and opportunities: questions about the story and about the path towards the future cVPP

Technologies and physical elements

- ❑ In the process towards realising the cVPP, what were the main technical and physical challenges and uncertainties?
- ❑ How and when have you addressed these challenges and with what result? (can you mark this on the timeline with the letter C?)
- ❑ Did you receive external help/support in this? From whom and how?
- ❑ What (if any) opportunities have occurred that have affected the physical and technical choices for the cVPP? (can you mark this on the timeline with the letter O?)

Timeline to mark challenges, opportunities, changes

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

Infrastructures

- ❑ In the process towards realising the cVPP, what were the main infrastructural challenges and uncertainties? (e.g. smart meters, connection to the grid)
- ❑ How and when have you addressed these challenges and with what result? (can you mark this on the timeline with the letter C?)
- ❑ Did you receive external help/support in this? From whom and how?
- ❑ What (if any) opportunities have occurred that have affected the infrastructural aspects of the cVPP? (can you mark this on the timeline with the letter O?)

Timeline to mark challenges, opportunities, changes

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

4 Challenges and opportunities: questions about the story and about the path towards the future cVPP

Policy

- ❑ In the process towards realising the cVPP, what have been the main policy and regulation-related challenges and uncertainties?
- ❑ How and when have you addressed these challenges and with what result? (can you mark this on the timeline with the letter C?)
- ❑ Did you receive external help/support in this? From whom and how?
- ❑ Can you mark when you addressed uncertainties on the timeline below?
- ❑ What (if any) opportunities in terms of policy and regulation have occurred? (e.g. subsidies) (Can you mark this on the timeline with the letter O?)

Timeline to mark challenges, opportunities, changes

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

Resources: financial, relational, knowledge

- ❑ In the process towards realising the cVPP, what have been the main challenges and uncertainties in terms of financial, relational and knowledge resources?
- ❑ How and when have you addressed these challenges and with what result? (can you mark this on the timeline with the letter C?)
- ❑ Did you receive external help/support in this? From whom and how?
- ❑ What (if any) opportunities have occurred in terms of financial, relational and knowledge resources? (Can you mark this on the timeline with the letter O?)

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Timeline to mark challenges, opportunities, changes										

Do you have any comments and/or suggestions for changes in the story?

5 Timeline tool

WHAT? *You create a timeline (together with the community) which specifies community-related aspects (engagement over time), technological and physical developments, as well as the activities that the cVPP enables provides a further clarification of what the cVPP and the process of developing this cVPP could look like for this specific community.*

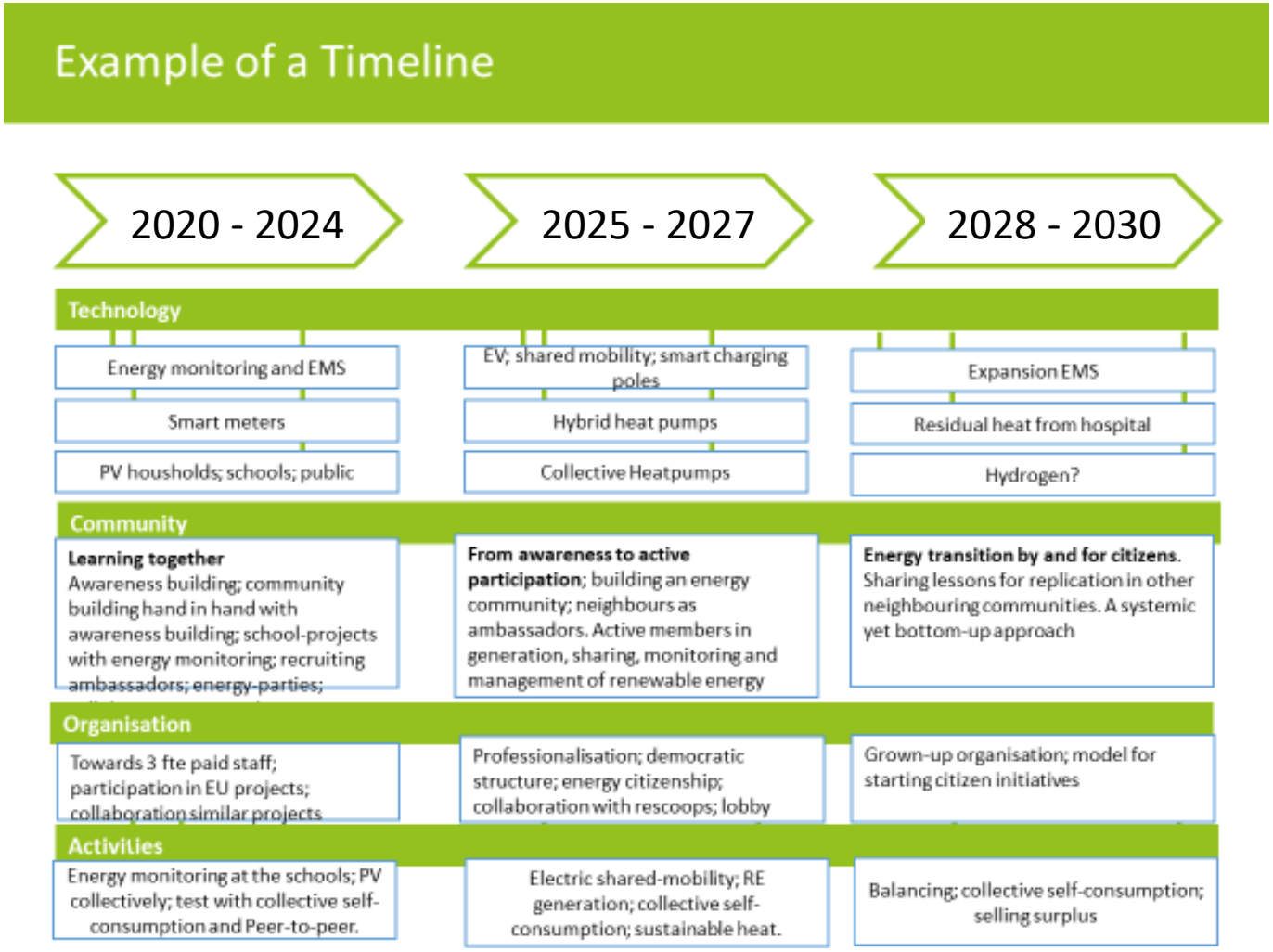
WHY? *It will contribute to a more concrete picture of the process towards the cVPP.*

HOW? *The timeline template*

This tool is used in step 6 of the backcasting process.

5 Timeline

Fill the timeline in in the template or draw it on a large sheet of paper. This example shows how the timeline could be filled in.



5 Timeline

First period: (e.g. 2020-2024)	Second period: (e.g. 2025-2027)	Third period: (e.g. 2028-2030)
Technology		
Community		
Organisation		
Activities		

5 Timeline

First period:
(e.g. 2020-2024)

Technology

Community

Activities

Period 1:

- Which question needs to be addressed in this period?
- Why is this question important?
- What and whom do you need to answer this question?

6 Story II template tool

WHAT?

Write a short story that goes together with the timeline from the previous step, to describe the process towards the desired end scenario.

WHY?

Together with the timeline, the story will contribute to a more concrete picture of the process towards the cVPP. Furthermore, the story will clarify concrete choices and trade-offs and priorities that need to be considered.

HOW?

Following the story II template

This tool is used in step 6 of the backcasting process.

Story writing II template

The story should be no longer than 1 to 1.5 pages and it should reflect the time-line. The story is not an account of the situation in 2030, but describes the process towards that end situation. The headings are the periods in the timeline. Subheadings address technology and physical aspects, organization, community and activities undertaken (in line with the timeline template).

Title

2020 – 2024: Subtitle

2025 – 2027: Subtitle

2028 – 2030: Subtitle

7 Actionable questions tool

WHAT?

Create an overview of questions to be addressed by the participants in the short term and an overview of stakeholders that can support the energy community in developing cVPP.

WHY?

It translates the unclarities during previous discussions into a clear set of questions that are to be addressed. The stakeholder overview helps to understand what actors are involved in what way with the process. Together it helps to define the next concrete steps.

HOW?

The actionable questions template

This tool is used in step 7 of the backcasting process.

Actionable questions tool

The challenge for you as process moderator is to fill in all the relevant questions that came up during the interactive sessions – in particular the sessions where the story and timeline were discussed.

In addition, based on the final future configuration or story, you may also have identified relevant questions to add. The categories show overlap with the configuration categories. You can of course change or add categories if needed or wished for.

The second table provides an overview of stakeholders that need to become involved in order to successfully develop a cVPP.

Actionable questions tool

Table with actionable questions:

Questions	Why is this important?	What and who is needed to find an answer?	Who will start with this question? When?
Technological and physical			
Policy and Regulation			
Financial and costs			
Community-related questions			
Organisation and governance			
Other:			

Actionable questions tool

Table with relevant stakeholders:

Stakeholders	Relevance	Easy to approach?

8 SWOT analysis tool

WHAT? *Analyse the strengths, weaknesses, opportunities and threats of the community energy initiative.*

WHY? *It brings together the relevant aspects in one document that can be shared with all participants.*

HOW? *The SWOT template*

This tool is used in step 8 of the backcasting process.

SWOT analysis tool

A SWOT gives an overview of the **S**trenghts, **W**eaknesses, **O**pportunities and **T**hreats.

It helps to focus on the important positive aspects and opportunities for improvement and adaptation. It points out the internal strengths of the current initiative, that can be further strengthened and exploited. It points to external opportunities that can help the initiative to proceed. Internal weaknesses and external threats are also important to be aware of. These weaknesses are not absolute, they can be regarded as challenges that are to be addressed. As for the threats that come from the external environment (e.g. regulation), these need to be acknowledged, and may be a reason to adapt plans (or to adapt the timing of plans).

The SWOT table is best treated as a living document that can be adapted over time as the situation changes and the initiative progresses.

The table includes examples (from a backcasting trajectory with a Belgian energy initiative) to show the sort of issues that are relevant – these can be deleted so that you can fill it in for your own situation.

8 SWOT analysis tool

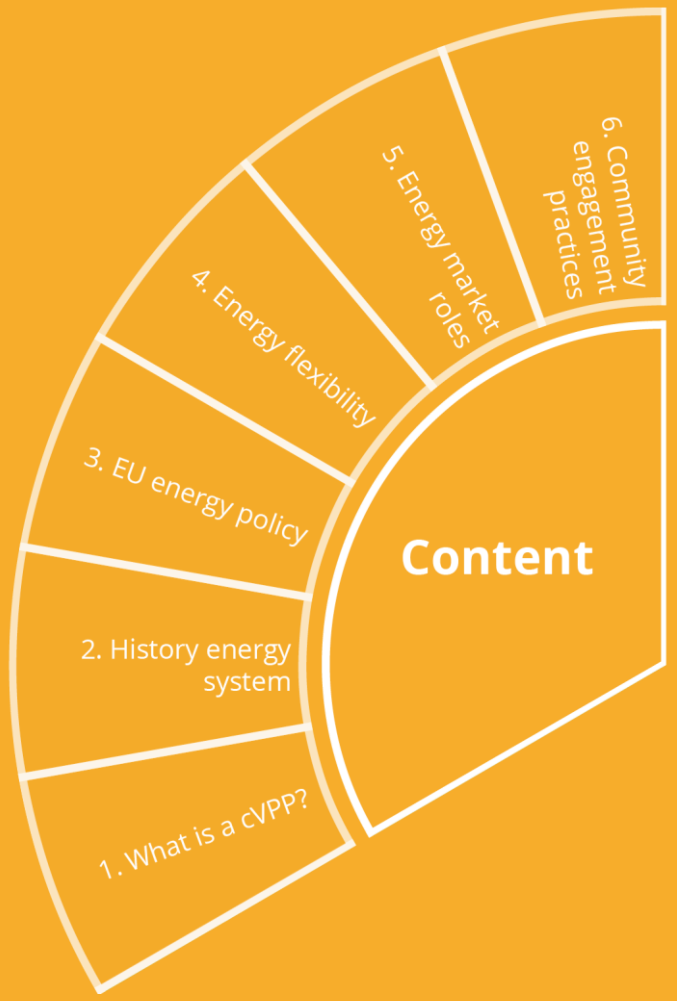
INTERNAL	
Strengths	**Weaknesses**
➢ A diverse group of smart and capable participants that together form a strong basis for a community initiative ➢ An interesting and strong vision and aim: making the future energy system understandable for everyone ➢ A strong network with diverse expertise ➢ Established personal connections with local schools ➢ Insights in important questions that have to be asked now in order to avoid limitations of opportunities	➢ Worries about how to maintain a strong supportive basis (volunteers, ambassadors) ➢ Limited financial means to hire external expertise ➢ Difficulties to professionalise the organization, due to limited financial means

8 SWOT analysis tool

EXTERNAL	
Opportunities	**Threats**
➢ Local schools are interested in participating ➢ Next to the schools, the local youth movement is approached as well and in time, the approach can be broadened to include high schools ➢ There are strong neighbourhood associations to align with ➢ Changes in subsidy schemes will make self-consumption of self-generated renewable energy more attractive ➢ Opportunities to connect with another cVPP project – join forces ➢ Opportunities to join in an EU-or national level subsidy trajectory to get part of the costs financed; to get support in engaging the community; to get technical support ➢ Inspiring examples elsewhere ➢ EU policy that explicitly names 'citizen energy communities' and 'renewable energy communities'	➢ Timing of the community engagement is difficult due to Covid-19 ➢ Recent policy changes will affect the business case for solar panels ➢ Changes in subsidy schemes ➢ Low gas price ➢ Lack of clarity in policy which makes project planning difficult

Part 3: Content

Crash courses



1

Crash course 1: What is a cVPP?

WHAT?

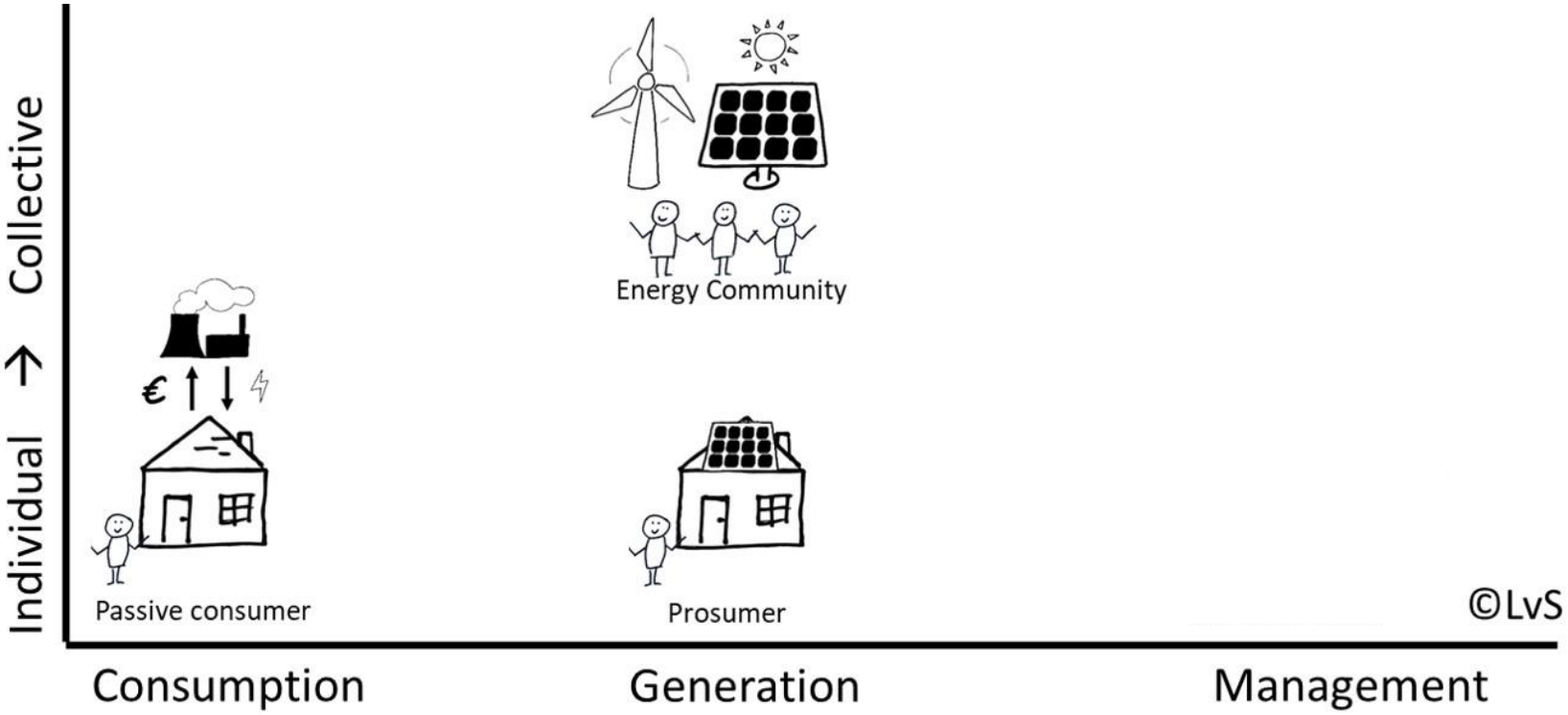
This Crash Course explains the concept of a community-based Virtual Power Plant (cVPP). It discusses the building blocks of a VPP, what makes a cVPP community-based and it elaborates on the relevance of cVPPs.

Link to animation: short intro to community-based Virtual Power Plants

Introducing community-based Virtual Power Plant (cVPP)

Until recently citizens' role in the electricity system was best characterised as **passive consumers** who consume electricity bought from suppliers.

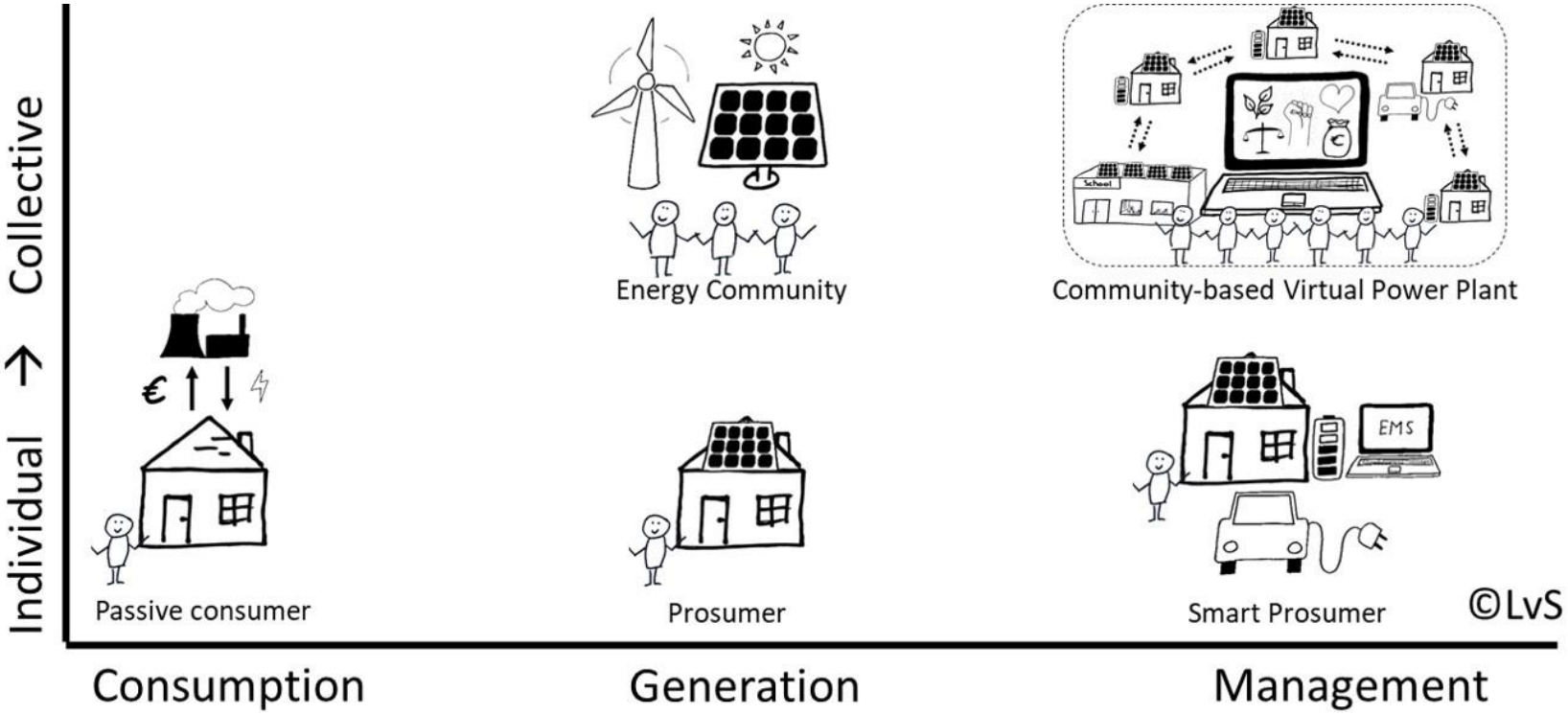
These passive consumers are increasingly becoming **prosumers**, who actively invest in and become owners of renewables, either individually or collectively as part of an **energy community**.



1 Introducing community-based Virtual Power Plant (cVPP)

Novel technologies like batteries and energy management systems in turn enable prosumers to become **smart prosumers** who manage electricity demand and supply within the household.

This can also be done collectively by means of a **community-based Virtual Power Plant**, which enables energy communities to manage energy demand and supply within their community and to trade energy and flexibility.



1 What is a Virtual Power Plant?

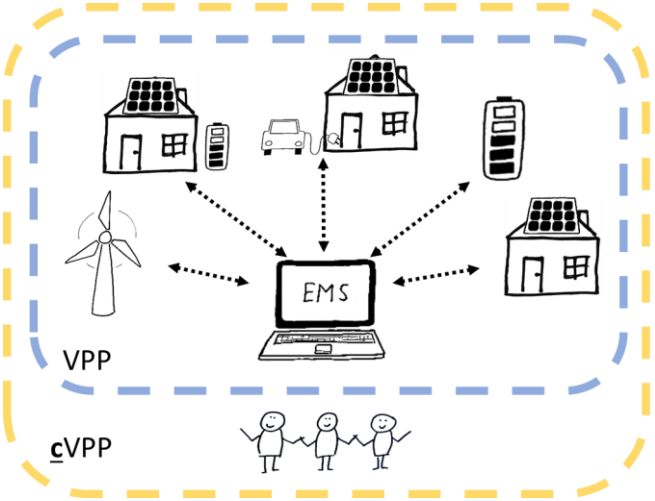
The core of the VPP is an ICT platform called an **Energy Management System** (EMS), which controls and coordinates a portfolio of:

- Renewable energy sources (e.g. solar panels, wind turbines)
- Controllable appliances, i.e. which can be turned on/off using ICT (e.g. heat pump, smart dishwasher)
- Energy storage systems (e.g. batteries, electric vehicles)

A VPP operates as one single entity similar to a conventional power plant, which allows for performing activities in the electricity system related to managing and trading of electricity.

The EMS enables energy management within the community based on:

- Information about renewable energy sources , controllable appliances, storage systems
- Expected demand and production
- Weather forecasts
- Energy prices



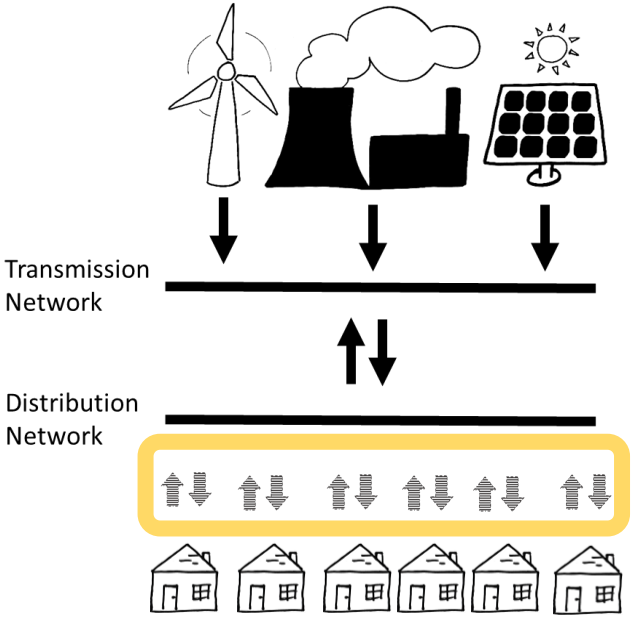
1 What makes a cVPP community-based?

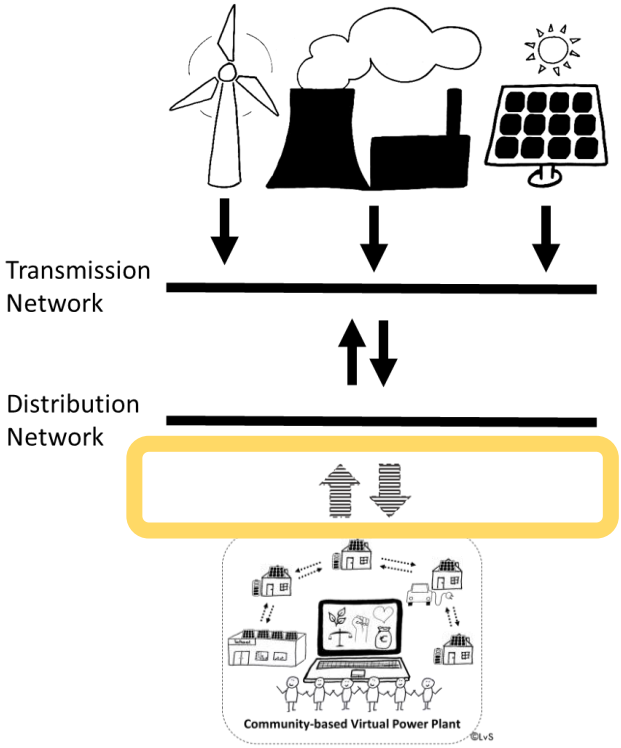
The **c** of **c**VPP means that the configuration is based on community-logic, which describes the core-principles shared by many (but not all) community-based (energy) projects:

- Community energy initiatives are driven by community needs, motivations and values
- The community owns the project
- As owners of the project, community members make the decisions
- Community projects aim for a fair distribution of benefits, costs and risks among community members
- Community projects engage all community members in planning and decision-making – in line with community members' wishes, needs and capabilities
- Community projects are open and inclusive to the whole community, regardless of status and resources
- The scale of the project and its technologies fit the community needs and motivations

1 Why a Virtual Power Plant?

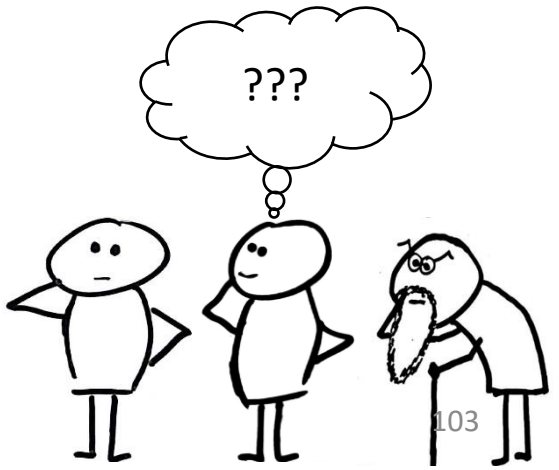
The larger system actors (TSO, DSO) find it difficult to work with many small entities like households (this has to do with the way the existing energy system has been organized). A collective such as a cVPP can make this collaboration easier. VPP technology can help local community members to unite in a single virtual entity (cVPP) that can interact with the large system actors.





1 If a cVPP is the answer, what was the question?

- How can we keep the self-generated renewable energy within our community?
- Can I share or sell the surplus energy generated with my solar panels with/to my neighbours?
- What if our community generates more energy than we need ourselves, can we sell this surplus on the market?
- Is it possible for households without investment power and/or without suitable roof to participate in our community energy initiative?
- How can we better understand the challenges of the energy transition so that we can decide how we want to participate?
- How can we support the matching of supply and demand of the energy network?
- How can we contribute to a more sustainable and just energy system?



1 What does this mean for an energy community?

Working towards a cVPP can provide an opportunity for energy communities to take up new activities to work towards their environmental, economic and social goals. It also enables them to work together with other parties (e.g. TSO, DSO) and to participate in existing energy markets.

Examples of activities enabled by cVPP are (see also tool 3.2 Goals & Activities):

- Buying energy from the community and selling it back to community members and/or selling it on the energy market (as a licensed energy supplier)
- Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at distribution or transmission level)
- Enable peer-to-peer energy trading between community members
- Collectively selling RE generated by community members to a third-party supplier

1 Additional information on cVPP & real-life examples

cVPP Webinar – which includes descriptions of a Dutch and a Belgium cVPP example

Starters guide community-based Virtual Power Plant – Guidelines for energy communities interested in cVPP. This document contains additional background information on cVPP and detailed descriptions of three cVPP examples in the Netherlands, Belgium and Ireland

In-depth academic paper on VPP, cVPP and three cVPP examples

cVPP project website – on which news and reports on the cVPP project are published

2

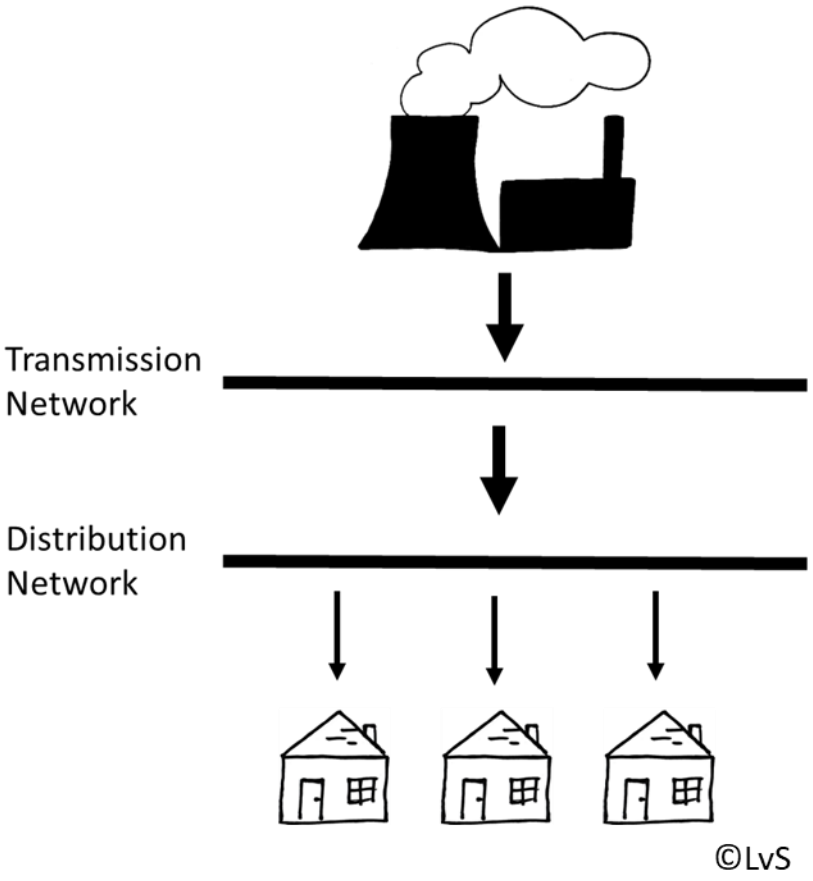
Crash course 2: History of our Energy System

This Crash Course first describes the traditional working of the energy system. Next, it discusses how the increase in RE challenges the incumbent organization of the energy system. Finally, the potential opportunities that current changes could provide to energy communities are discussed.

History of our energy system

Traditionally,

- electricity has been generated by large scale fossil-fuel fired or nuclear power plants that feed electricity into the transmission network, that feeds electricity into the distribution network which then distributes electricity to consumers.
- our energy system has been characterized by a one-way flow of electricity, from the large-scale generators, towards consumers
- the operation of electricity markets, control of the network and matching of generation and demand has taken place at the level of the transmission network

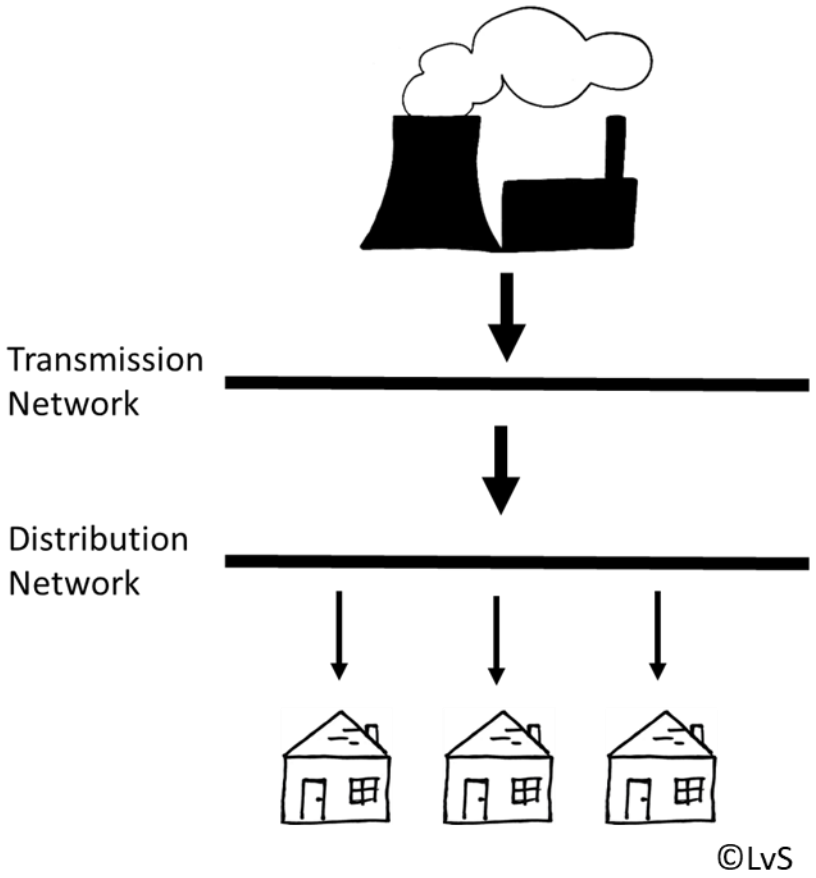


History of our energy system

In the electricity network, electricity supply and electricity demand always have to be in balance. This balance has mostly been assured by generating more energy when demand is high or generating less when demand is low.

In other words, **supply follows demand**.

Furthermore, in case of insufficient capacity of the network to meet electricity demand, the solution has mostly been to upgrade the transmission and/or distribution network to enlarge capacity.



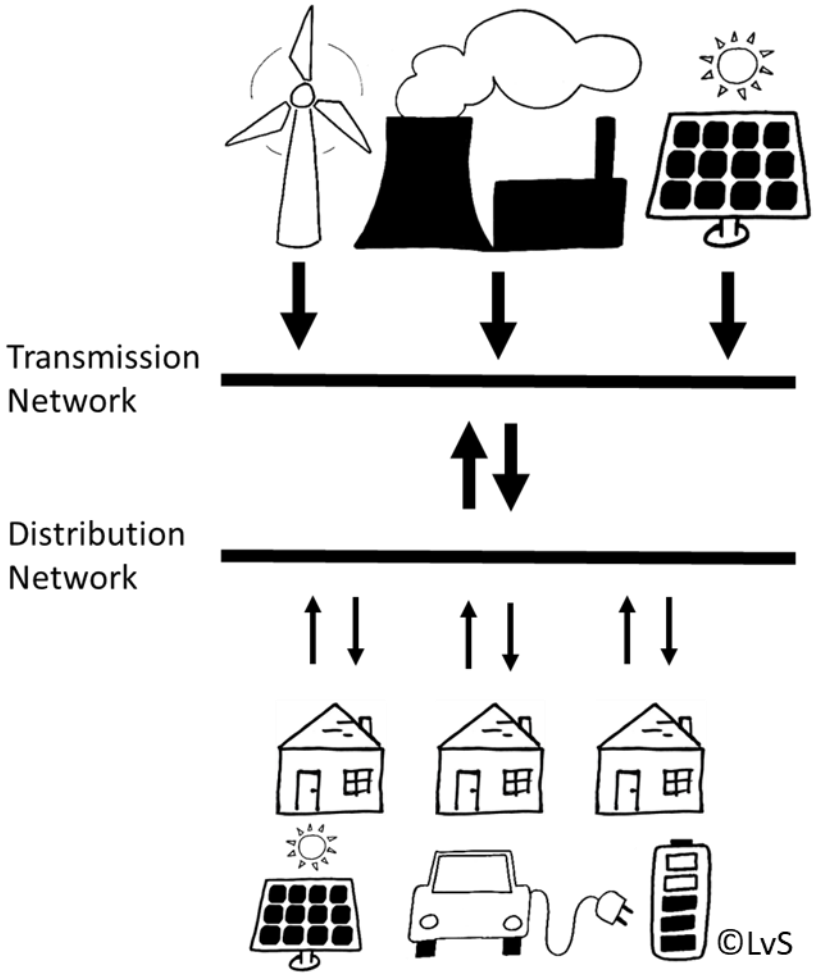
The future of our energy system

However, today:

- renewable energy sources (RES) are increasingly connected to the distribution rather than the transmission grid
- many of these RES are weather dependent (e.g. solar panels, windmills) and therefore lack controllability

If the share of renewable energy further increases, it will become increasingly difficult to adjust supply to follow electricity demand.

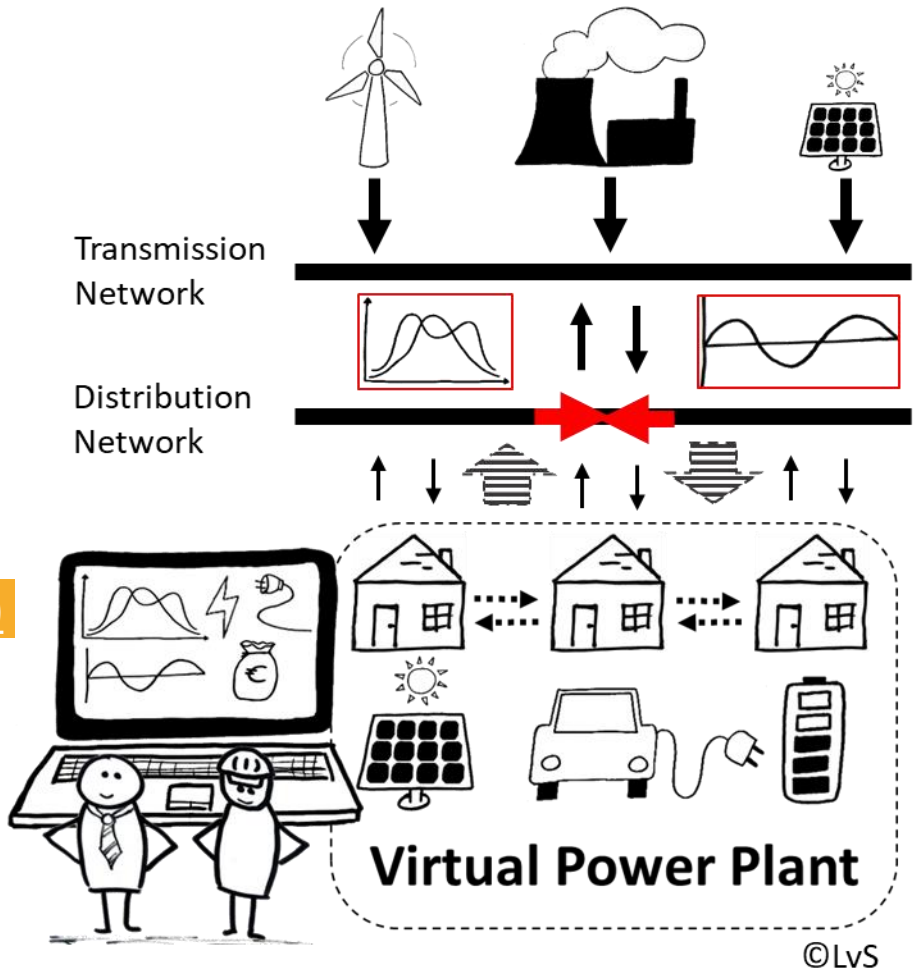
Another way to match the supply and demand is to adjust demand, by controlling appliances (e.g. heat pumps) and energy storage systems (e.g. batteries).



The future of our energy system

At industrial scale, adjusting of demand (called Demand Response) is already an established practice: financial incentives are provided to industry to encourage changes in their energy consumption patterns – which often means that energy-intensive processes are shifted in time towards moments when overall demand is low. This ability to adapt demand is called (demand-side) flexibility

At household and community level, flexibility at the demand side increasingly is considered an important way to contribute to the overall balance of demand and supply in the network. This flexibility is enabled by ICT systems like a virtual power plant.



2 What does this mean for energy communities?

Energy communities can play an important role in increasing the share of RE and in the adjusting of the electricity demand (demand-side flexibility). A cVPP can help organize this by enabling communities to take up new activities.

Examples of such activities (see also tool 3.2 Goals & Activities) are:

- Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at distribution or transmission level)
- Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at distribution or transmission level)
- Use flexibility provided by storage and household appliances to minimise the peak power usage (and peak of energy fed back to the distribution network) within households to lower the capacity tariff of households (tariff depending on size of connection with the network)
- Use community-level flexibility provided by storage and household appliances to balance demand and supply in line with physical availability of RE on the transmission network

3

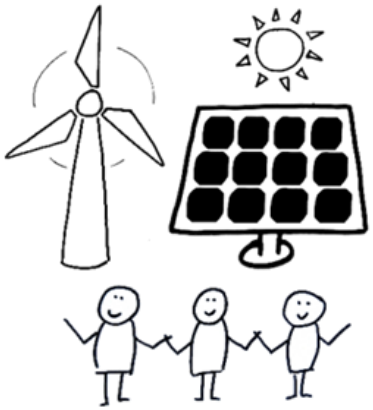
Crash course 3: Energy policy

This Crash Course describes the recent changes in EU energy policies that are relevant for energy communities and for cVPPs.

Crash Course: EU Policy regarding Energy Communities

The EU commission acknowledges that new policies for electricity markets are required to:

- Accelerate the energy transition
- Fit better to current developments
  - Prosumers rather than consumers
  - More and more collective organization and participation in electricity markets
  - Adhere more value to flexibility (see crash course on flexibility)



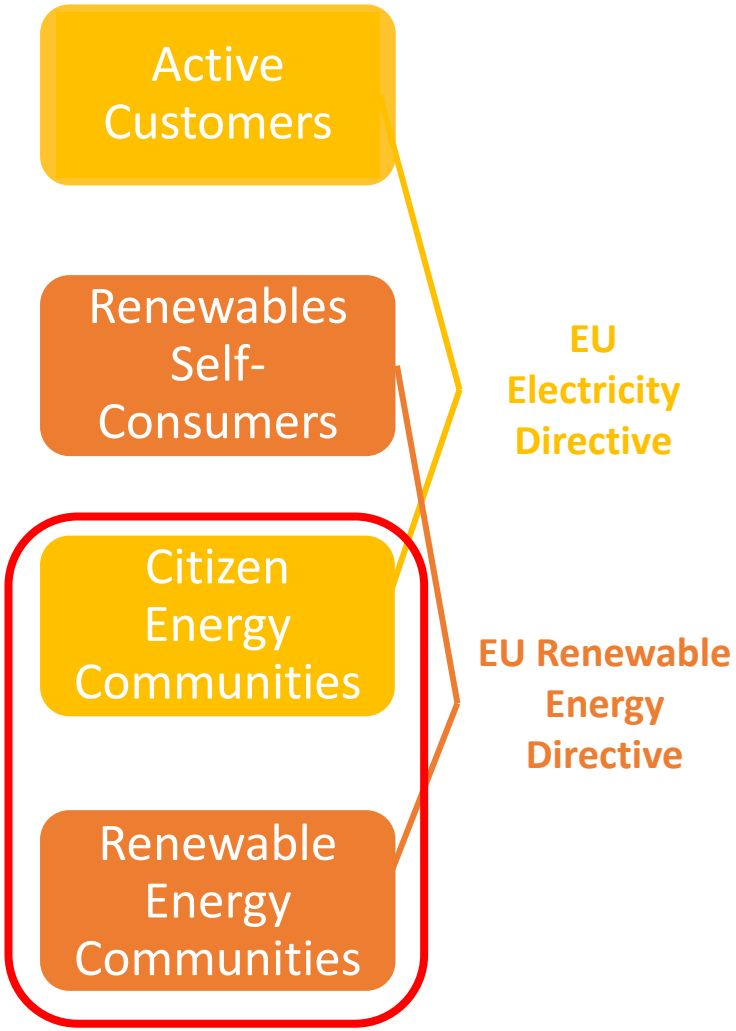
Crash Course: EU Policy regarding Energy Communities

EU recast Electricity Directive

- Focus on electricity market regulations
- Mentions new actors: 'Active Customers' and 'Citizen Energy Communities'
- To be translated into national law by 31-12-2020

EU recast Renewable Energy Directive

- Focus on renewable energy action plans
- Mentions new actors: 'Renewables Self-Consumers' and 'Renewable Energy Communities'
- To be translated into national law by 30-6-2021



To whom does this apply?

A Citizens Energy Community (CEC)

- Engages in generation, distribution, supply, consumption, aggregation, storage, other energy services
- Has the purpose to provide environmental, economic, social benefits to its members, rather than generating financial profits
- Is based on open and voluntary participation (from citizens to large enterprises)
- Is effectively controlled by members/shareholders who are natural persons, local authorities or small enterprises.

A Renewable Energy Community (REC)

Is very similar to a Citizens Energy Community. Most notable differences:

- REC is about *renewable* energy (in generation, selling, trading, etc.)
- Control of a REC should be 'in proximity' to the location of the project
- Participation of enterprises in REC is limited to small and medium size enterprises

3 What changes are envisaged by the EU directives?

Topic	Current EU Electricity Market	Future EU Electricity Market
Position of individual customers/communities in electricity markets	Individual customers are regarded as end-users, not as active market participants. They have the right to a free choice of supplier.	Individuals as well as communities will have *access to all electricity markets*
Dynamic electricity prices	Availability of dynamic electricity prices is very limited, mostly in the form of a day and a night tariff.	All customers will have the right to *dynamic electricity prices*, when contracting a supplier that has more than 200,000 customers
Fixed electricity bill components (e.g. grid tariff per kWh , cost for grid connection per year)	Tariffs for electricity network access should be non-discriminatory.	Optional: Fixed components of electricity bills may become dynamic.
Energy sharing within community	Energy sharing within communities is very difficult to organise, since each party that supplies energy is obliged to have a supplier license.	*Energy sharing* within a community will be allowed (e.g. peer-to-peer)
Aggregator role (collective organisation) to sell electricity/flexibility in electricity markets	In reserve and balancing markets a TSO should facilitate the participation of final customers' aggregators.	New definition of *aggregator role* (collective organisation) in all electricity markets (see also crash courses on flexibility and energy market roles)
Demand response by individual customers/communities	Demand response is mostly performed by large industrial consumers.	Individuals as well as communities will be allowed to participate in *demand response* (see also the crash course on flexibility)
Distribution network operation	Only industrial or commercial parties are able to get exemptions with regard to operation of 'closed distribution systems'. Systems to which household consumers are connected, are not allowed to get these exemptions.	Optional: Communities may be allowed *to own and operate a distribution network*

3 What does this mean for energy communities?

The EU Electricity Directive and Renewable Energy Directive reflect the vision of the EU on the future energy system. What matters most for energy communities is how these directives will be translated into national legislation. Both opponents and proponents of energy communities will engage in negotiations to influence national legislation to their advantage. Depending on the outcome of this process, various activities beyond energy generation, efficiency and saving, might become possible, feasible and attractive for energy communities.

Examples of such activities are (see also tool 3.2 Goals & Activities):

- Enable local energy trading through peer-to-peer electricity trading or through a community energy market
- Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at transmission and/or distribution level)
- Actively collecting flexibility from RE, controllable appliances and storage (to earn money) and sell this through a third-party aggregator (at transmission and/or distribution level)

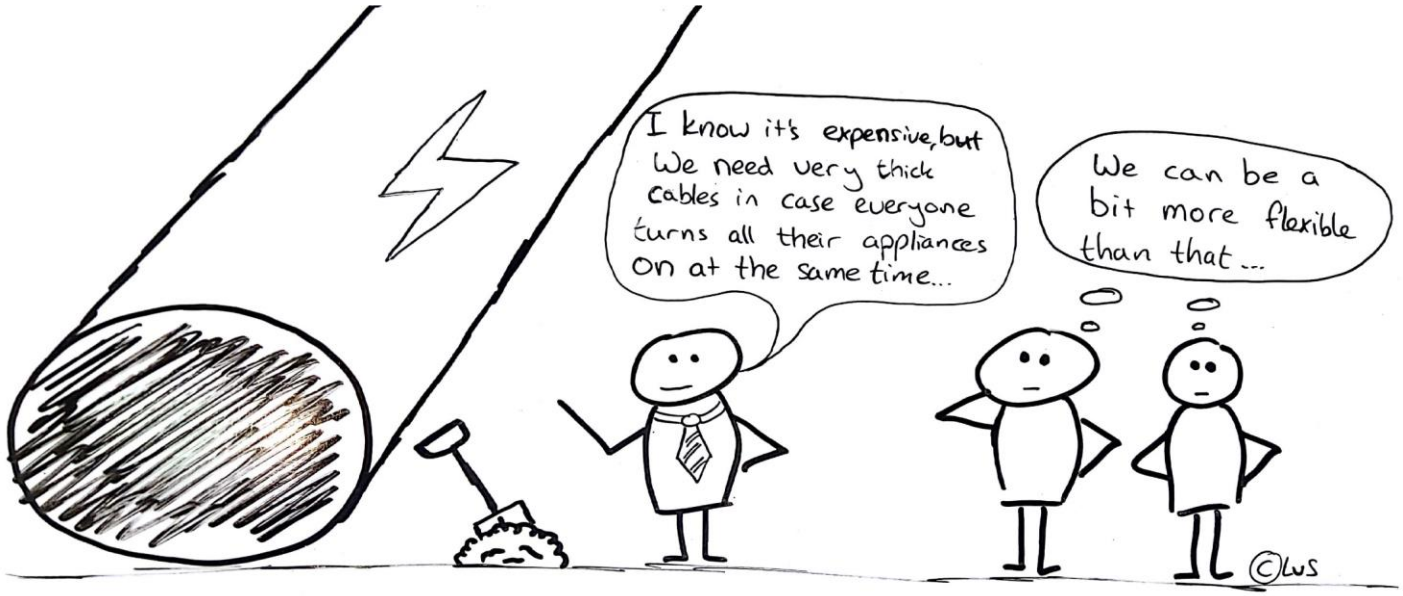
Further information about CEC and REC can be found on the website of REScoop.eu.

4

Crash course 4: Energy flexibility

WHAT?

This Crash Course explains what flexibility is, why it is increasingly important and how energy communities can benefit from providing flexibility.



Crash Course: Energy Flexibility

Flexibility means being able to adapt. Energy flexibility entails an adaption in the timing of energy supply and/or demand. Two types of flexibility can be distinguished:

- **Supply-side flexibility:** Changing the moment at which energy is generated and supplied --> With RES this is difficult because we cannot influence the weather (we can only decrease supply by disconnecting RES, which leads to a loss of RE).
- **Demand-side flexibility:** Changing the timing of electricity use, and therewith the timing of the energy demand. --> Use of appliances can be shifted to other moments in time.

Providing demand-side flexibility means: 'Changing the moment at which electricity is used'. This can be achieved in several ways: controllable appliances can be used at a different moment compared to their usual use, and/or an energy can be stored in storage systems.

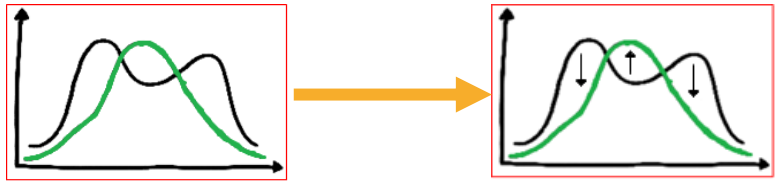
The following slides focus on demand-side flexibility, as this fits best to the possibilities of energy communities.

Why does the electricity system need flexibility?

In order to ensure a safe and reliable electricity system, supply and demand of electricity must be equal at each moment in time. However:

- RES that generate electricity depend on the availability of sun and the wind, which are not always present.
- Households use electricity when they need it, regardless of the availability of sun or wind.

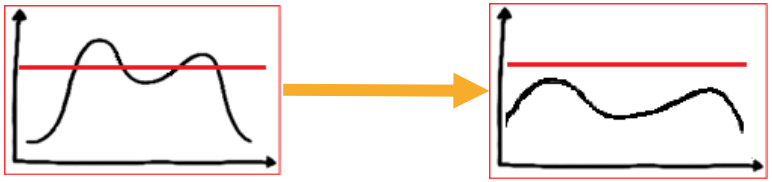
The figures below exemplify how demand-side flexibility can be used to balance demand and supply. It presents an example of **solar generation** (green line) and an **average household consumption pattern** (black line) over the timespan of a day.



By using fewer appliances at moments when no RE is available, and using more appliances when RE is available, the **household consumption pattern** becomes more similar to the **solar generation pattern**, which contributes to a better 'matching' of supply and demand.

Flexibility in order to prevent the need for grid reinforcement

Next to the need for balancing, demand and supply must also stay within the limits of the maximum capacity of electricity that can flow through the cables of the distribution and transmission network (**red line** in the figure below). In case capacity is insufficient to meet demand or supply, networks need to be reinforced, which is costly.



Demand side flexibility can provide a solution: by shifting energy demand (or supply) in time, away from the peak moments, the amount of electricity transferred can stay within the capacity limits. This way network reinforcements can be prevented.

Why is flexibility interesting for energy communities?

- There can be a financial reward for providing flexibility and contributing to solving balancing and capacity issues.
- This way more flexibility can contribute to the integration of an increasing number of RES to the electricity network.
- Flexibility offers an opportunity to maximise use of self-generated, renewable electricity, by balancing demand and supply within the community. Thereby minimising the amount of electricity to be bought from third party suppliers.

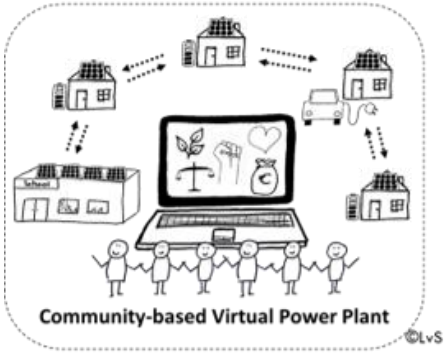
Flexibility provided by controllable appliances

Examples of appliances that are suitable to use for flexibility are: heat pumps, electric vehicles, electric boilers and other electrical appliances such as washing machines and dishwashers.

Households can offer demand-side flexibility in two different ways:

- Behaviour and routines are changed to reduce or shift energy consumption in time, e.g. the dishwasher is used at different moments in time.
- Appliances are controlled autonomously by an ICT based energy management system to reduce demand, e.g. energy is stored in batteries at moments when generation is higher than demand.

In a cVPP flexibility is provided *collectively* by connecting all households to one energy management system (EMS), which controls not only generation, controllable appliances and storage systems installed in households, but potentially also collective resources (e.g. wind turbine, solar farm, neighbourhood battery).

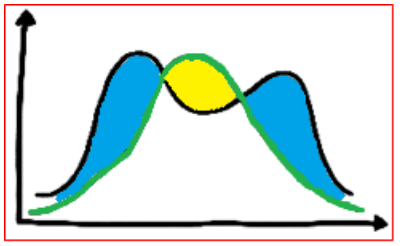


How can energy communities provide flexibility by means of energy storage systems?

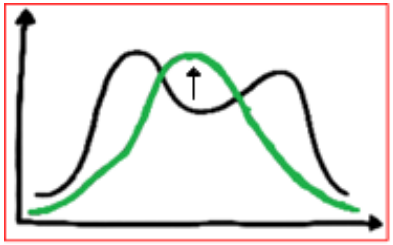
A storage system, such as e.g. a battery, can provide flexibility in a special way. Storage can influence electricity demand (just like other appliances), but also can influence the supply of electricity.

A storage device can act in two modes:

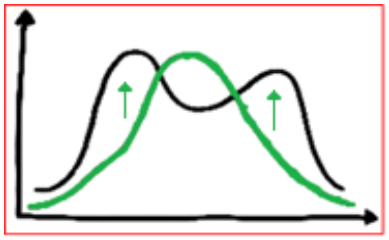
- Charging mode: acts as a 'normal' appliance by demanding energy
- Discharging mode: acts as an energy source by supplying energy



During yellow moments (more supply than demand), the storage device can be set to CHARGING mode. This results in an increase of demand.



During blue moments (more demand than supply), the storage device can be set to DISCHARGING mode. This results in an increase of supply.



Explicit and implicit Demand Response: providing flexibility to the energy market

It is still uncertain how exactly the future market for flexibility will look like for individual households and energy communities.

Often a distinction is made between two demand response categories, each with its own financial incentives for demand-side flexibility:

Explicit Demand Response: The community has a contract with an aggregator or directly with an actor interested in flexibility (e.g. a DSO or TSO). When this actor needs flexibility and notifies the community, the latter is required to deliver the amount of flexibility for a specific amount of time, which is agreed upon in the contract. Non-compliance may result in a penalty.

Implicit Demand Response: Energy prices are dynamic and reflect the (dis)balance between demand and supply and/or the available capacity of the network. This creates a financial incentive for households and communities to shift energy demand to moments in time when prices are low.

4 What does this mean for energy communities?

Participating in flexibility activities can provide opportunities for individual households and energy communities to work towards their environmental, social and economic goals. Examples of such activities are (see also tool 3.2 Goals & Activities):

- Use flexibility provided by storage and household appliances to change household energy demand and/or supply in response to dynamic prices (e.g. lowering energy demand when prices are high)
- Use flexibility provided by storage and household appliances to balance demand and supply at the community level
- Use flexibility provided by storage and household appliances to minimise the peak power usage (and peak of energy fed back to the distribution network) within households to lower the capacity tariff of households (tariff depending on size of connection with the network)
- Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at distribution or transmission level)
- Actively collecting flexibility from RE, controllable appliances and storage and sell this through a third-party aggregator (at distribution or transmission level)

Further information regarding flexibility, related to citizen energy communities can be found in the whitepaper of USEF on Energy & Flexibility Services for Citizens Energy Communities.

5

Crash course 5: Energy market roles

This Crash Course discusses the diverse roles in the current and future electricity market and explains which roles can potentially be adopted by energy communities.

Crash Course: Energy market roles

Various market roles can be distinguished in the current and nearby future electricity market. Below the roles, as defined by USEF, are presented.

Focus of this course is on the roles that are relevant and interesting for energy communities.

- **Prosumer**: Consuming and producing of energy (end-user). Households that have PV panels on their roof consume as well as produce energy. Therefore, these households are prosumers.
- **Facilitator:** Facilitate implementation of RES. For many energy communities one of the reasons to become an energy community is to facilitate the uptake of RES in their community by for example proving help with financing, informing and joint-purchasing.
- **Producer**: Generation of energy and feeding this energy into the grid. If energy communities have decided to invest in a collective generation project, such as a collective PV roof or wind park, they are fulfilling the role of producer.
- **ESCo** (Energy Service Company): Offering of energy profile optimization services. An energy community can offer technologies/managements systems that can optimize energy profiles in response to external inputs such as energy or flexibility prices.

Crash Course: Energy market roles

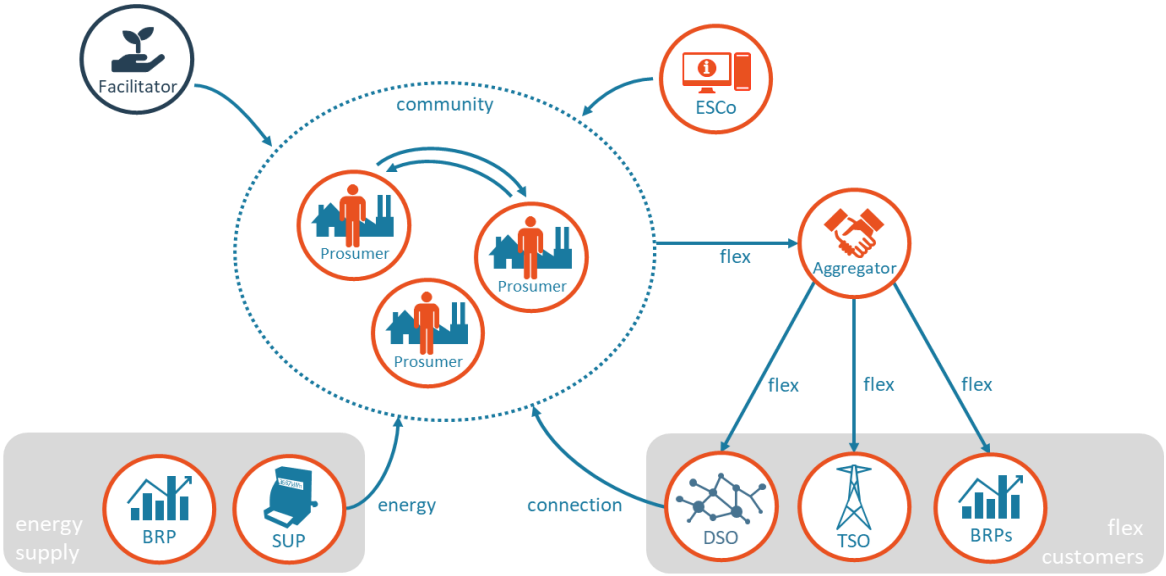
- **Aggregator**: Accumulation and selling of flexibility. An energy community can combine the flexibility of multiple households and together as one 'package' bring this to the electricity market and sell this to a party that wants to buy flexibility.
- **Supplier**: Buying and selling of energy. In case that a collective generation project has been established by an energy community, and it decides to supply this energy to its members, the role of supplier is being fulfilled.
- **DSO** (Distribution System Operator): Active managing of the low- and medium-voltage distribution grid. Responsible for regional grid stability. In the future, energy communities may be allowed to operated their own, low-voltage distribution (micro) grid.
- **TSO** (Transmission System Operator): Active managing of the high-voltage transmission grid. Responsible for system balance. Since the working field of a TSO often is large in geographical terms, practically always this role is out of scope for energy communities to fulfil. However, the TSO can still be an interesting partner, as they have an increasing demand for flexibility.
- **BRP** (Balance Responsible Party): Actively managing of and responsible for the balance of supply and demand in its portfolio. This party is responsible for and manages a very large portfolio. Therefore, it can be interesting for communities to collaborate with.

Crash Course: Energy market roles

There are a lot of organisations and companies active in the electricity market and they can play multiple different roles. However, some roles are (currently) not allowed to be combined in one organisation (e.g. the role of supplier and distribution system operator cannot be both played by one and the same organisation).

The roles, explained and elaborated by USEF, reflect the current electricity system. Change is however underway and it is possible that new roles emerge or that current roles are changed, for instance in response to new EU policies.

The figure below shows the roles that are most relevant for energy communities.



Changing energy market roles

The roles citizens play in the energy system are changing. For a long time they acted as passive consumers who buy energy from energy suppliers. The rise of RE allows them to act as a prosumer who not only consume but also produce electricity. Acting collectively in energy communities enabled citizens to play the roles of producer and facilitator. A (c)VPP potentially enables energy communities to take up even larger roles, through which they can work towards their environmental, economic and social goals.

Next to changes also new roles emerge as a result of the ongoing energy transition. An increasing number of RES are connected to the electricity system. In contrast to conventional power plants these RE installations are difficult to control in their generation and connected to the distribution network. To address the resulting challenges related to balancing demand and supply, demand-side flexibility can be a solution. As demand-side flexibility can be provided by households and communities, new opportunities arise for these parties to collectively take up new roles: Aggregator and ESCo.

See also the crash course Energy Flexibility

Crash Course: Energy market roles

In many cases, energy communities start by adopting the *facilitator* and/or *producer* role. As facilitators they are initiating projects related to energy conservation, energy efficiency and supporting the implementation of RE generation. When RE generation is on the scale of household, consumers become prosumers. Energy communities can however also develop collective RE generation projects to act collectively as a producer.

When energy communities grow and mature, they can expand the number of roles they play in the energy system, which often require and increase in scale, financial resources, knowledge, skills and technologies that offer flexibility (e.g. controllable appliances and storage systems).

Which roles an energy community is able and willing to adopt over the course of time depends on (changes over time in) the community's goals, abilities and also on external developments such as policies that state the requirements for- and possibilities to play and combine different roles.

5 What does this mean for energy communities?

In the future, individuals and communities can adopt roles that they could not take up before. This provides opportunities to participate in new activities that contribute towards achieving their environmental, social and economic goals.

Examples of such activities are (see also tool 3.2 Goals & Activities):

- Install RE generation capacity at household and community level (e.g. solar panels) - *(Prosumer role)*
- Collectively develop an energy generation project on a single location or site (e.g. solar farm, collective solar roof, wind project) and sell the generated energy to a third-party supplier - *(Producer role)*
- Buying energy from the community and selling it back to community members and/or selling it on the energy market (as a licensed energy supplier) - *(Supplier role)*
- Enable households to respond to dynamic prices to maximise household financial benefit - *(ESCo role)*
- Actively collecting, aggregating and selling flexibility from RE, controllable appliances and storage (bundling this with flex from other communities, as an aggregator) (at distribution or transmission level) - *(Aggregator role)*

(An indepth academic paper on VPP and cVPP can be found here and additional background information on energy market roles can be found here and here)

6 Crash course 6: Community engagement in practice

During the process of exploring the cVPP possibilities, questions regarding community engagement will rise. This crash course offers support to participants in developing an approach to engage the broader community.

This crash course gives background information on community engagement.

The crash course is not a tool for developing a community engagement strategy.

Crash Course: Community engagement

Community engagement refers to an equitable co-creative process that enhances mutual relations, trust and wellbeing for the community. A community-based VPP aims to create (environmental, social and economical) value for and by the community, which can only be achieved if the community is involved.

A distinction can be made between a community of place (e.g. neighborhood, village, region) and a community of interest (e.g. shared interests in energy or sustainability).

Crash Course: Community engagement

Because of the large diversity of (energy) communities and the context they operate in, there is no one-size-fits all engagement approach. Rather, this crash course provides:

- Generic suggestions for a community engagement approach based on best practice cVPP examples.
- A framework based on environmental justice literature which contains questions that are helpful to consider when developing a community engagement approach.

General suggestions based on best practice cVPP examples

The high complexity of a cVPP makes it challenging to engage a broad range of community members. One way to go about this is to take the time to work towards a cVPP together with the community. Ideas for this can be developed during the backcasting process, for instance when developing the timeline and story II.

Several suggestions on how to deal with complexity:

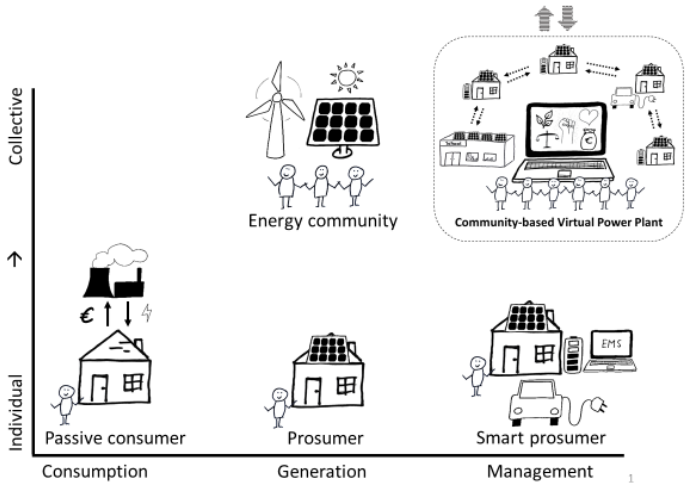
TIMING - allow community members the time to understand

- Start with installing RE generation and a monitoring system to monitor consumption and generation on both the household and the community level.
- These can be installed first in homes of 'ambassadors', who invite community members to share their experiences with these systems.
- These visits combined with energy monitoring systems allow for having conversations with community members about differences between generation and demand and the implications for the energy transition.
- These conversations form the basis of a collective learning process in which community members learn about challenges of the energy transition and opportunities for cVPP, while the initiators of the cVPP project learn about the needs, goals and motivations of community members.

General suggestions based on best practice cVPP examples

SIMPLIFY - use a good basic story line to explain the challenges of the energy transition and the changing role of citizens/communities

- The energy transition is not only about opportunities to save energy, to generate renewable energy and to use this ourselves. The energy transition increasingly is also about when we use energy, how we store energy, how we exchange energy with others and or feed it back into the grid (see also crash courses History of the Energy System and Energy Flexibility for backgrounds on why this is the case).
- When you generate your own energy, the question may rise: how can I use as much of this self-generated energy by myself?
- Energy monitoring is a first step towards gaining more insight in one's own patterns and volumes of energy generation and consumption, and provides a start in answering this question.
- When community members have a better idea on energy demand and supply within their community, the (c)VPP concept can be introduced as a potential way to change the way energy is used, produced and shared within the community.

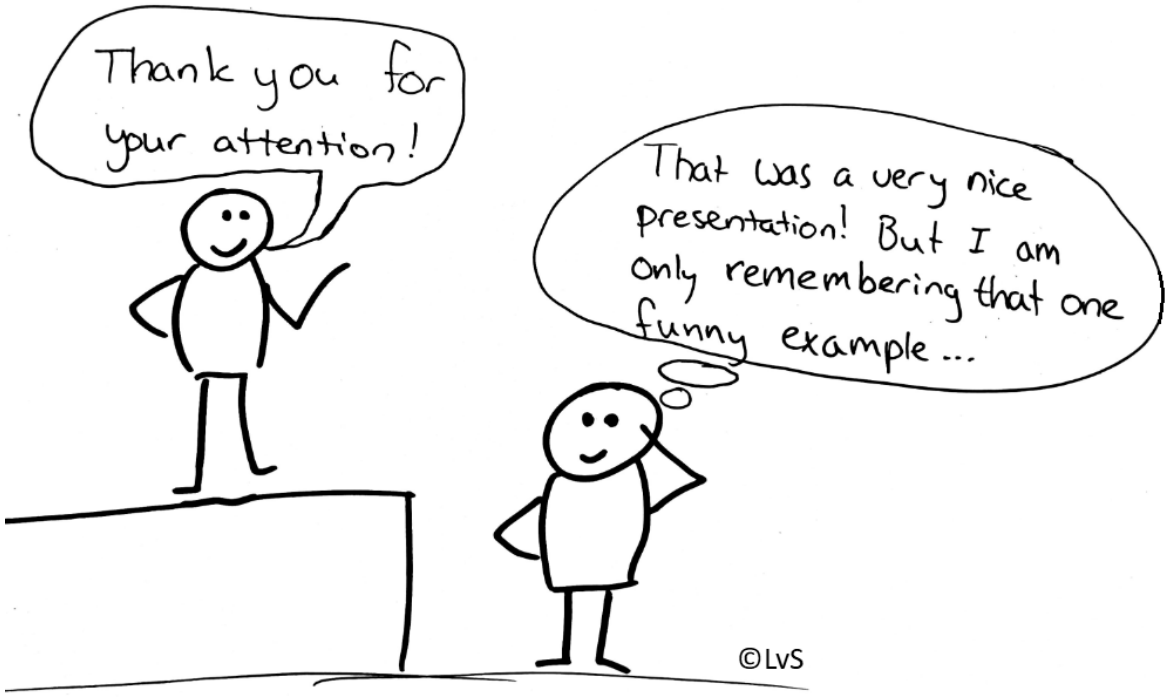


General suggestions based on best practice cVPP examples

This story line is very general and can be further fleshed out based on peoples' ideas and preferences. The figure and animation also help to clarify the story line.

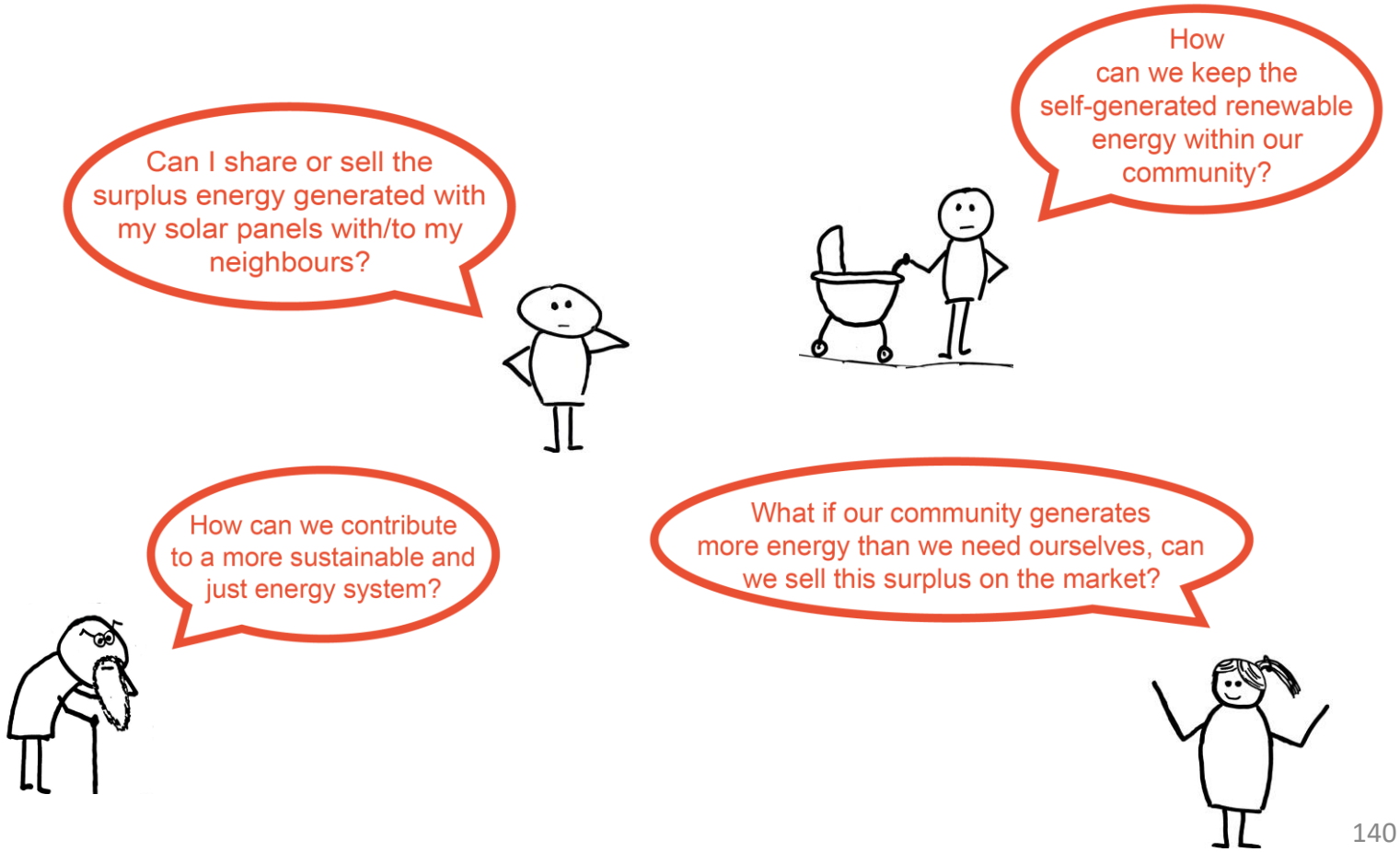
Inviting people from an existing cVPP project to share experiences can contribute to making the cVPP concept more tangible.

In case you develop a story line as part of the back-casting, this can also be used as a tool to engage community members (e.g. inviting them to add to/change the story so that it better fits their needs and ambitions).



Why Virtual Power Plant?

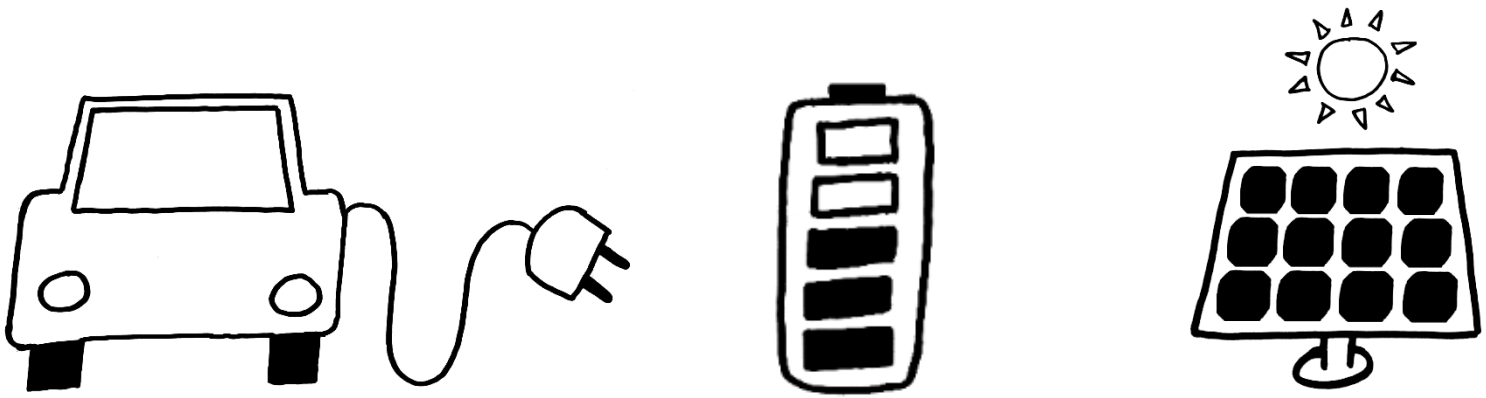
The goal of an engagement approach is not just to inform and make community members aware about the challenges of the energy transition. Rather the aim is to make a story about cVPP that relates to their own questions, needs, ambitions and envisaged role in the energy transition.



General suggestions based on best practice cVPP examples

Developing a cVPP is a long-term process in which choices made at the outset affect future possibilities. For example, to enable a cVPP in the future, todays choices regarding e.g. heat pumps, charging poles for electric vehicles and batteries must take into account that they need to be controllable by a future EMS.

It is important to engage community members at the outset so that they become aware of these issues to enable them to make choices of no-regret.



Environmental justice for community engagement

Community engagement can take several forms and we do not offer an overview of all the methods that you can use. What we do offer is a framework with questions that is helpful to consider and discuss how you want to engage the community. This framework is based on environmental justice literature and has been used (in different variations) in practice.

We first present the 5 dimensions of this framework. Next we explain how they have relevance in view of cVPP-related challenges.

A justice framework as strategic checklist

Recognition: who counts?

- Are all community members recognized? How are they recognized in their diversity of perspectives, needs, ambitions, expectations?

Participation: who gets heard?

- How are community members involved in defining needs, solutions, and priorities in various stages of the process?
- How do they have a say about the way in which co-creation process is organized?

Distribution : who gets what?

- What sort of problems are addressed/are to be solved by the cVPP? Whose problems?
- What vulnerabilities are important to reckon with in this community – how might these be affected as a result of steps towards a cVPP?

Capabilities: **who does what?**

- What are the capabilities of different community members to contribute to the process (e.g. participate in meetings, help organize, invest, help engage others, act as 'ambassadors')?
- What capabilities and competences are needed to be able to meaningfully participate in the cVPP process? How can community members be supported in acquiring these?

Responsibility: **what matters (to whom)?**

- Who is interested in taking what responsibilities?
- How are the community members supported in adopting responsibility?
- How much room is there for not actively taking responsibility?

Recognition

Most energy communities start with a small group of enthusiasts who pull the chart. Other community members can vary in their interest to participate and this interest can also change over time. To properly recognise the diversity of needs, backgrounds, interests and ambitions, the following questions are relevant to ask:

- How well do you know the community members?
- Who are the (energy) community members? What are their needs and interests? How to best find out?
- Are there community members who already have solar panels, electric vehicles, batteries, etc. and who could potentially play a role as ambassadors?
- Are there existing community (energy) initiatives, social networks or organisations that the cVPP project can align with?

Participation/procedural justice

There are multiple levels and ways to engage community members. A cVPP initiative can actively engage community members in each step. Or those who have initiated the project can offer their services to the community, taking into account community values and needs. Different community members can play different roles in a community energy initiative, and this can of course also change over time. Not everyone is willing or able to invest the same amounts of time, effort and money. When the cVPP community is organised in a cooperative, then the cooperative structure can provide the rules of the process.

The International Cooperative Alliance (ICA) has developed principles which put fairness, equality and social justice at the heart of a cooperative:

1. Voluntary and Open Membership
2. Democratic Control by its Members
3. Economic Participation by its Members
4. Autonomy and Independence
5. Education, Training, and Information for its Members
6. Cooperation among Cooperatives
7. Concern for the Community

Participation/procedural justice

An inclusive and appealing process, whereby it is clear for community members how they can participate (in the design, planning and implementation) is crucial for any community initiative.

Organising such a process takes time and effort. Municipalities or other (public) organisations may provide support in cases – e.g. financial support, professional/coaching support with tools on how to engage community members. Examples of such organisations are:

Europe: REScoop.eu

The Netherlands: EnergieSamen, HIER, Buurkracht

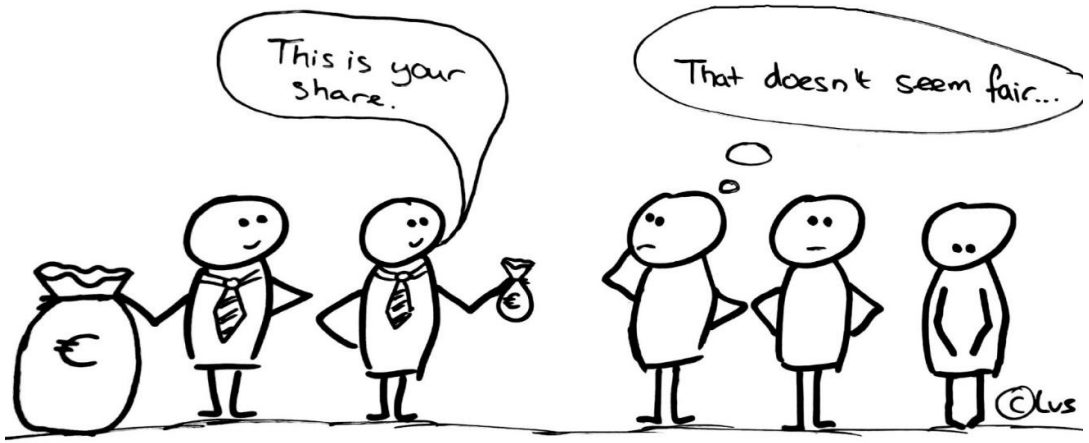
Belgium: REScoop Vlaanderen, KampC

Ireland: SEAI, Friends of the Earth

Distributive justice

The basic idea of a cVPP is that is enables the creation of value for and by the community. That means that the cVPP should enable activities that community members consider relevant and important. Community members can be invited to share their ideas on this. In order to arrive at an equitable distribution of benefits, costs and risks, it is important that community members without time, money, suitable roofs for PV, etc. are also invited to become part of the cVPP.

- What sort of problems are addressed/are to be solved by the cVPP? Whose problems? Who benefits from the solutions?
- What vulnerabilities are important to reckon with in this community – how might these be affected as a result of steps towards a cVPP?



Capabilities

The challenge is to engage community members in developing a project that is relatively complex – compared to e.g. an energy saving project.

- What are the capabilities of different community members to contribute to the process (e.g. participate in meetings, help organize, invest, help engage others, act as ‘ambassadors’)?
- What capabilities and competences are needed to be able to meaningfully participate in the cVPP process? How can community members be supported in acquiring these?

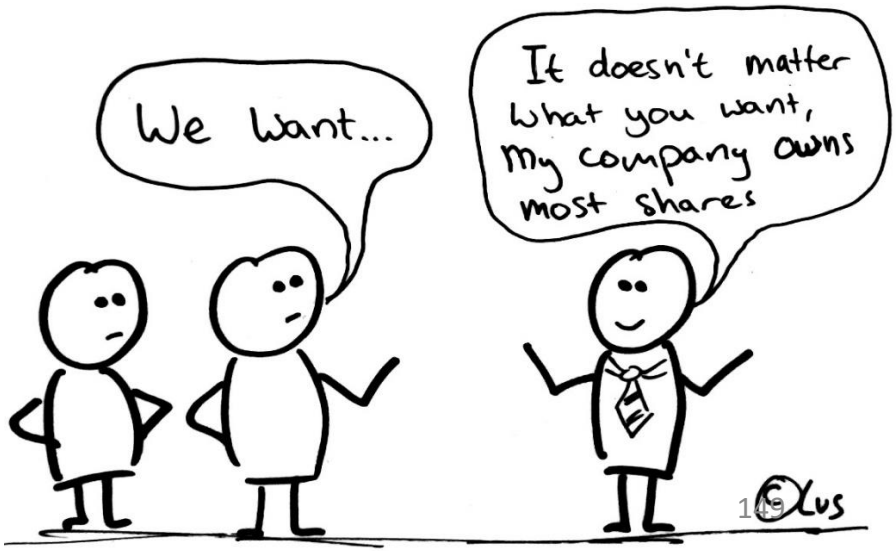
Earlier suggestions about timing and a clear story line can be helpful.

Responsibility

Not everyone wishes for the same level of active engagement and responsibility. You can discuss this with community member as part of the engagement process, so that they can make their own choice with regard to ownership and responsibility. This can be part of a discussion with community member on the role(s) that they would like to adopt.

In many initiatives, a small group takes the lead and others are happy with that. It can also be that members' ideas about how to contribute change over time.

- Who is interested in taking what responsibilities?
- How are the community members supported in adopting responsibility?
- How much room is there for (not) actively taking responsibility?



Environmental justice for community engagement

- **Recognition: who counts?**
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- **Capabilities: who does what?**
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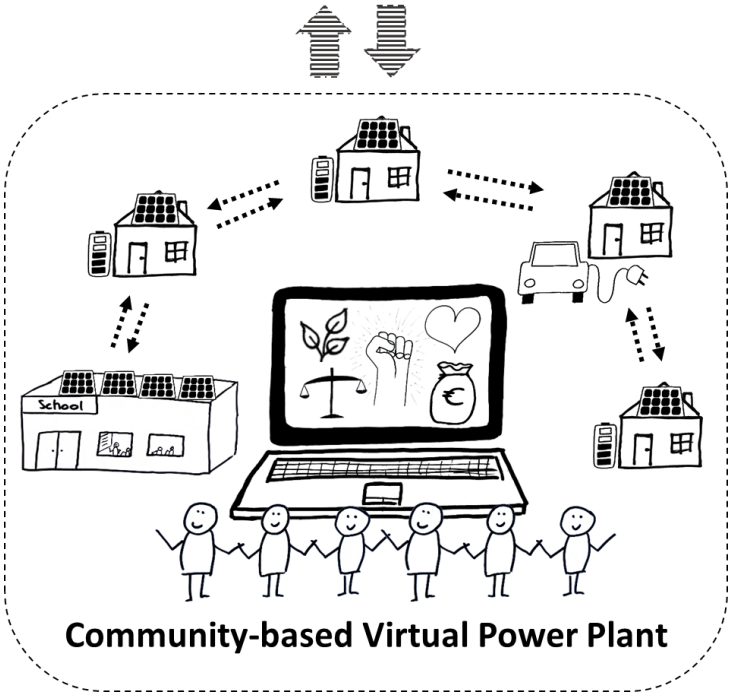

Abbreviations

- **cVPP:** community-based Virtual Power Plant
- **DSO:** Distribution System Operator
- **EMS:** Energy Management System
- **EV:** Electric Vehicle
- **ICT:** Information Communication Technology
- **RE:** Renewable Energy
- **RES:** Renewable Energy Sources
- **TSO:** Transmission System Operator
- **VPP:** Virtual Power Plant

Glossary (1)

- **Aggregator:** An entity that aggregates and sells flexibility.
- **Capacity tariff:** A fee that energy consumers pay to a DSO in order to be allowed to use the electricity network. The tariff depends on the maximum capacity needed to supply a consumer in a certain timespan.
- **Community-based Virtual Power Plant (cVPP):** A cVPP is a portfolio of renewable energy sources, controllable appliances and energy storage systems aggregated and coordinated by an ICT-based control architecture, adopted by a (place- and/or interest-based) network of people who collectively perform a certain role in the energy system. What makes it community based is not only the involvement of a community, but also the community-logic under which it operates.
- **Controllable appliances:** Appliances which can be turned on/off using ICT to lower or shift energy demand in time (e.g. heat pump, smart dishwasher).
- **Demand Response:** A specific form of flexibility that focuses on the demand-side. It refers to changing the energy demand of controllable appliances and energy storage systems.
- **Dynamic prices:** Energy prices that fluctuate throughout the time of the day, depending on the difference between demand and supply.
- **Energy community:** A group of citizens that actively invest in and become owners of renewable energy sources.
- **Energy Management System (EMS):** An ICT system that monitors and controls renewable energy sources, controllable appliances and energy storage systems. An EMS can operate on the household, building or community level.

Glossary (2)

- **Energy monitoring:** The monitoring of the demand and supply of energy facilitated by an energy monitoring system.
- **Flexibility (flex):** Flexibility means being able to adapt. Energy flexibility entails changing or the shifting in time of supply and/or demand.
- **Interactive backcasting:** A method that starts with formulating a desirable future. Next, the participants look backwards to the present to assess what steps are needed to attain that future.
- **Licensed energy supplier:** An entity that has a license through which it is legally allowed to sell energy to customers.
- **Peer-2-peer energy trading:** The trading of energy from one entity (e.g. a household) to another entity.
- **Prosumer:** An entity (e.g. a household) that is both a consumer and producer of energy.
- **Self-consumption:** The consumption of self generated energy.
- **Virtual Power Plant (VPP):** A software-based solution that aggregates renewable energy sources, controllable appliances and energy storage systems into one coordinated and controlled portfolio that operates as one single entity similar to a conventional power plant, and which allows for performing roles in the electricity system related to managing and trading of electricity.

Community Energy 2.0
A support tool for advisers and process moderators to support energy communities in developing a community-based virtual power plant

The Mobilisation and Replication Model

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