# 1 Crash course | 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.

[PREZIE | What is a cVPP?](#) : 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**.

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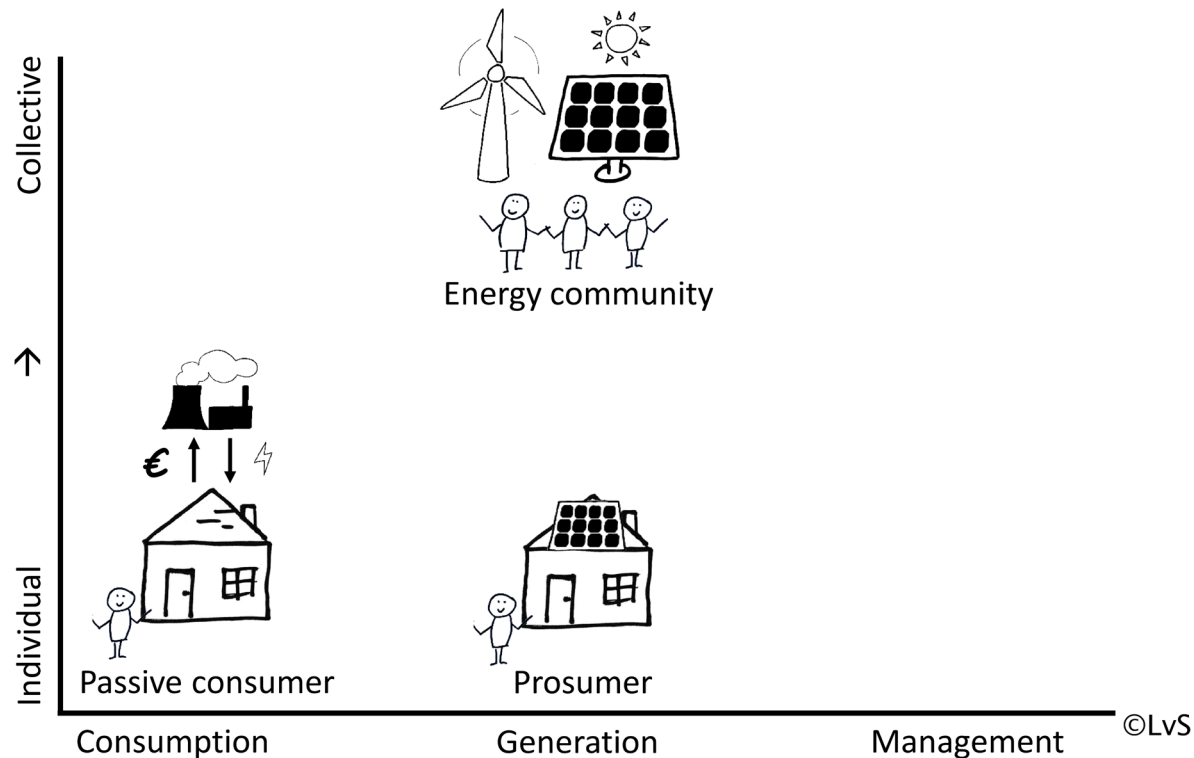
Introducing community-based Virtual Power Plant (cVPP)

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.

Energy community

Community-based Virtual Power Plant

Collective ↑ Individual

Passive consumer Prosumer Smart prosumer

Consumption Generation Management ©LvS
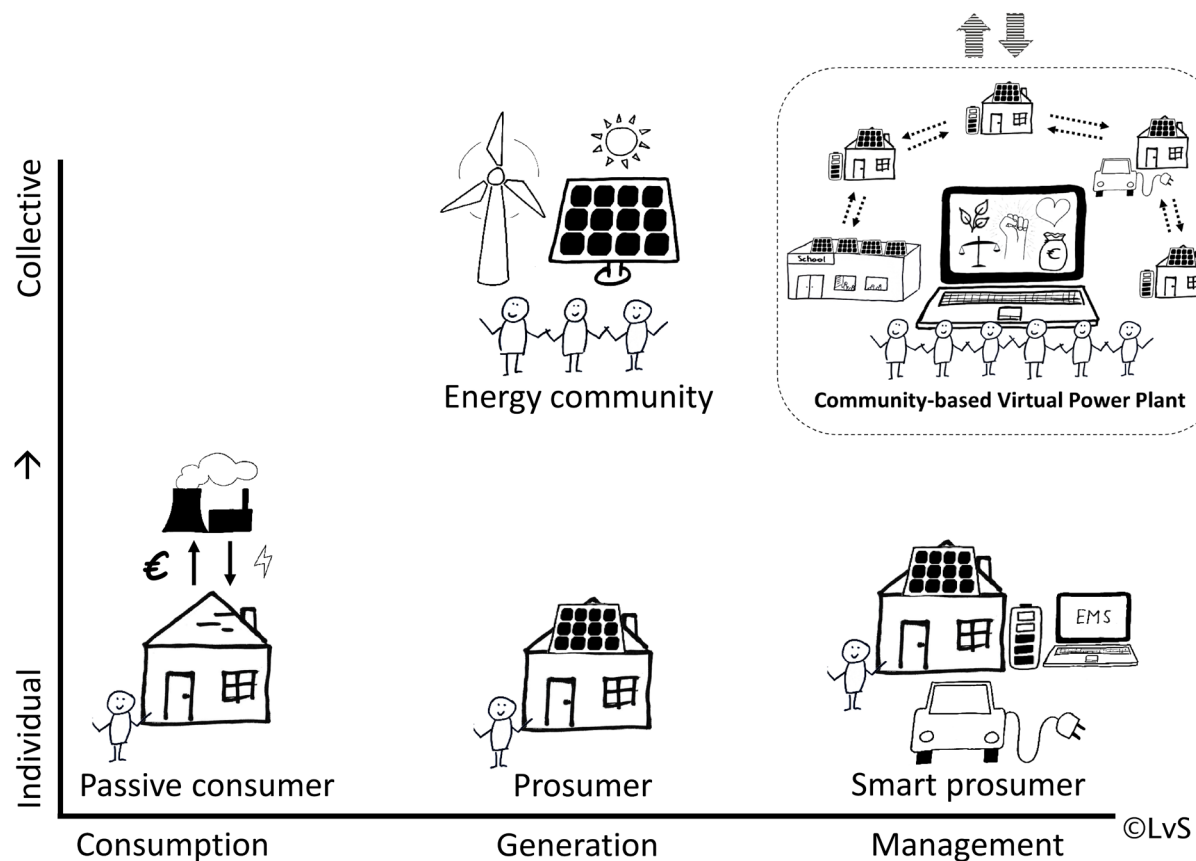
1   What is a cVPP?

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


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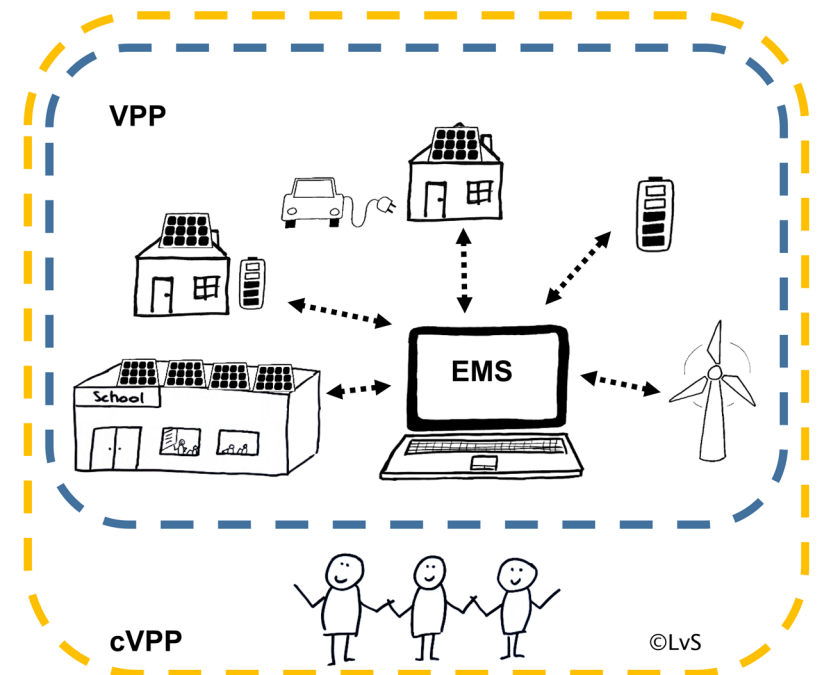
What makes a **c**VPP community-based?

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

Why a Virtual Power Plant?

The larger system actors (TSO, DSO) find it difficult to work with many small entities like house-holds (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.
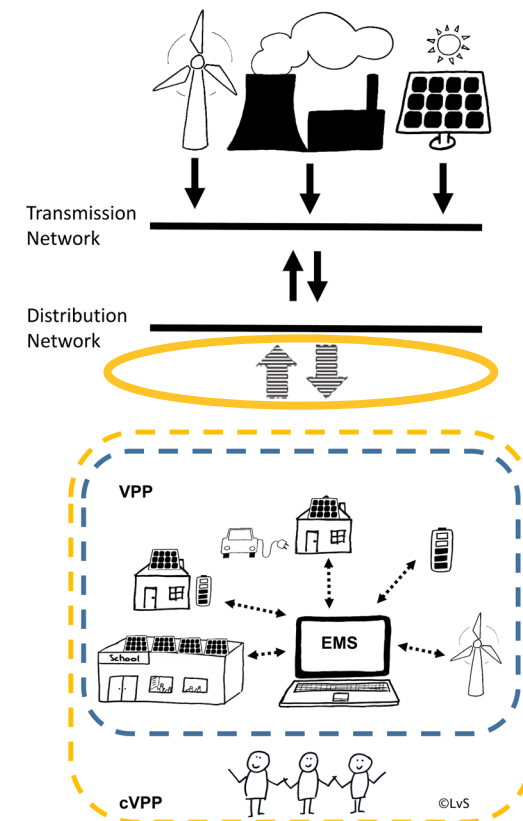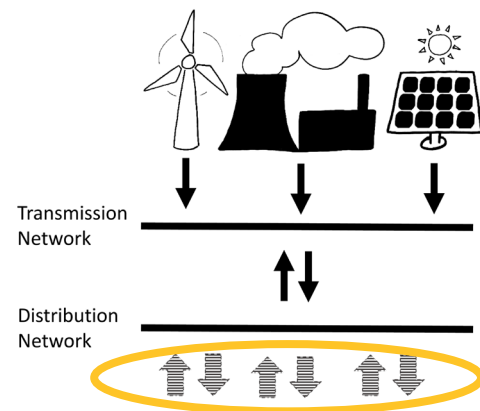
If a cVPP is the answer, what was the question?

- ☐ 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?

The answer to all these questions?
A community-based virtual power plant!
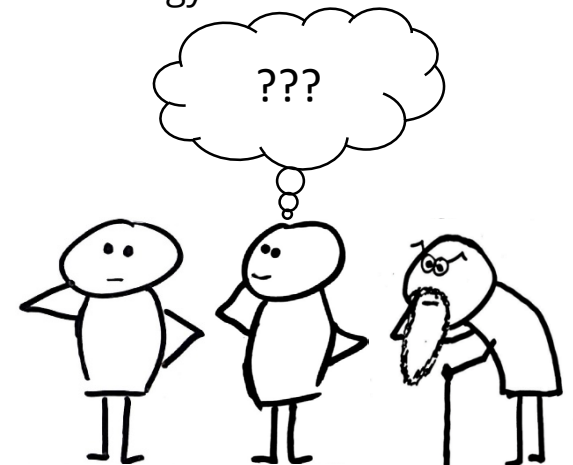
1 What does this mean for an energy community?

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 | Value - Goal - Activity**):

☐ 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

- ☐ [Starter's 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