Crash course 7: Community participation in the European electricity markets

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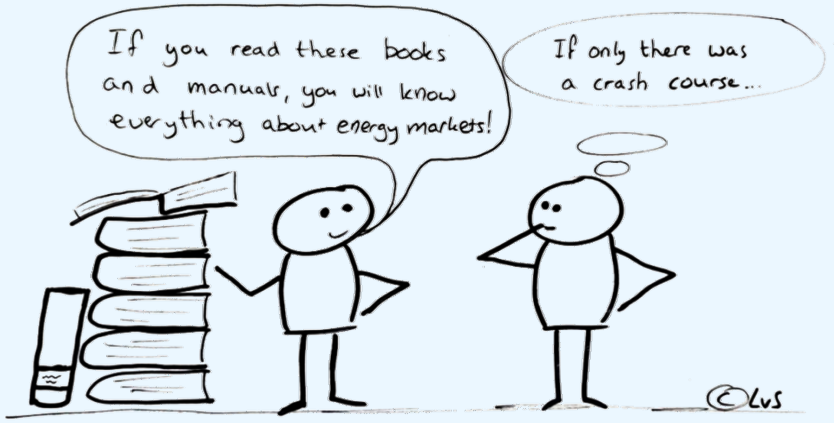
To meet the European climate targets, the energy transition needs to take place at multiple levels and scales. The main focus on large and industrial renewable energy projects is insufficient for the required CO2 emission reduction, which increasingly leads to citizens involvement in the energy transition. In the latest European energy directives of the Clean Energy for all Europeans Package (CEP), citizens and communities have been put central in the transition (EC, 2019). Energy communities have been empowering citizen mainly through awareness raising, energy coaching, and organising collective ownership projects and group purchases, but they can do so much more and there is still a lot of unexplored potential concerning new market roles and activities. The current regulatory framework and market design, however, still make it very challenging for these communities to 'do more' and exploit new market opportunities, especially because of high complexity of both technical systems and markets & regulations.

In this crash course, we guide energy communities through the current European electricity markets with the aim to inform them **(1) how these markets are organized** and **(2) which markets could be relevant for their community activities**. Insights from this crash course are based on extensive literature review, testimonials from Dutch and Flemish energy communities and talks with market experts. This research was carried out as part of the NWE Interreg cVPP project no 588.



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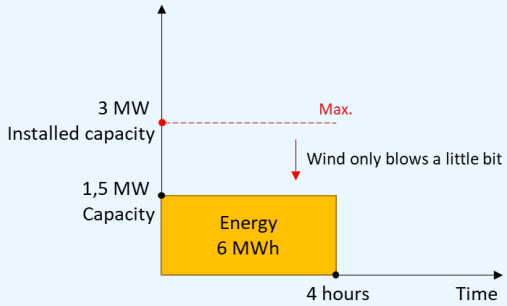
Definitions and clarifications: Capacity, Energy and Flexibility

In physics, electricity can be measured in two ways: through capacity and energy.

Capacity is the maximum amount of electricity a generator can produce under ideal conditions (expressed in kW or MW). Energy is the amount of electricity that is produced or consumed over a certain period of time (expressed in kWh or MWh). The load factor expresses the equivalent number of hours per year that a wind turbine or PV panel is producing electricity at full capacity.

Example: The installed capacity of a wind turbine is 3 MW. This means that 3 MW is the maximum output under ideal conditions. However, when the wind only blows a little bit, the actual capacity will be lower than the maximum capacity during a period of time, e.g. 1,5 MW. If the wind turbine runs at this lower capacity for 4 hours, there will be 6 MWh energy produced in this time.

Capacity and energy production of a windturbine



In the market context, electricity can be traded in multiple forms: through capacity, energy, a mix of both, and flexibility.

Capacity

When capacity is the market product, market actors are being paid to **keep a certain amount of capacity available**. This capacity must be activated when asked for it. When assets (e.g. generators, batteries etc.) are activated for a certain amount of time, energy is being delivered. As such, markets with capacity and energy remuneration mechanisms can be easily combined. Holding a certain capacity available is important to ensure grid stability and supply security.

Energy

When energy is traded on the market, market actors receive the **remuneration for their electricity production** over a certain period of time.

Flexibility

Flexibility is not a physical quantity, nor a tradable market product. However, it is often used in the market context to express that market actors can **gain financially by being flexible with their energy consumption or production**. That means actors can be paid for, for example, increasing or decreasing their generator's capacity for a certain period, switching on and off their heat pumps, charging or discharging batteries etc, which is referred to as flexibility procurement.

Flexibility can be provided in 2 directions:

Up = ↑ production / ↓ consumption

Down = ↓ production / ↑ consumption

Flexibility has a technical and a social dimension. The technical dimension includes the available capacity, how fast assets can be switched on or off, how long they need to be flexible and whether they can act along the demand or supply side. The social dimension refers to people's willingness to provide flexibility and autonomy, control, privacy and comfort in relation to the flexibility provision. (see also crash course 4)

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Definitions and clarifications: Grid management

Transmission and distribution grid operators (TSO and DSO respectively) have to perform grid management tasks in order to keep the grid stable and in balance (see crash course 2 for more information on the current energy system). These tasks are often called ancillary services.

These **grid management tasks** include (amongst others):

- Managing **system imbalances for frequency stability**
  In order for the frequency on the grid to remain stable, the total electricity production and consumption need to be equal at all times. This activity is the responsibility of the TSO, which is assisted by **Balance Responsible Parties (BRP)**. The balancing of production and consumption can be performed through the procurement of flexibility in balancing markets. The actors that provide this flexibility are called Balance Service Providers (BSP).
- Managing **congestion risks**
  Congestion occurs when the grid cables have not enough capacity available to transport the electricity at a certain moment in time. Transport capacity shortages occur when there is too much production (or load) at a specific time in an area. Congestion is a local problem, which can be solved through local grid reinforcements. Yet, this is a very costly approach, for which the whole society would pay. Another solution would be to perform smart energy management and make use of flexibility services, by e.g. decreasing the production in that area. To safeguard the entire (e.g. national) system balance, opposite actions are required in another area. This means that when production has decreased in one area to solve congestion, it has to be increased elsewhere to keep the overall system in balance. Congestion markets are currently emerging to help manage the grid more efficiently.
- Managing **voltage stability**
  Voltage levels on the electricity grid need to be stable. Voltages services are often procured through tenders. Such tenders could also be considered as markets, but these are out of scope for this crash course.
- Managing **system restoration and black-outs**
  Black-outs need to be avoided at all costs. But when one occurs, there needs to be sufficient capacity to reboot the grid again. Black-start services are procured through tenders. Such tenders could also be considered as markets, but these are out of scope for this crash course.

See the figure on the next page for a visualisation of the difference between system imbalance and congestion.

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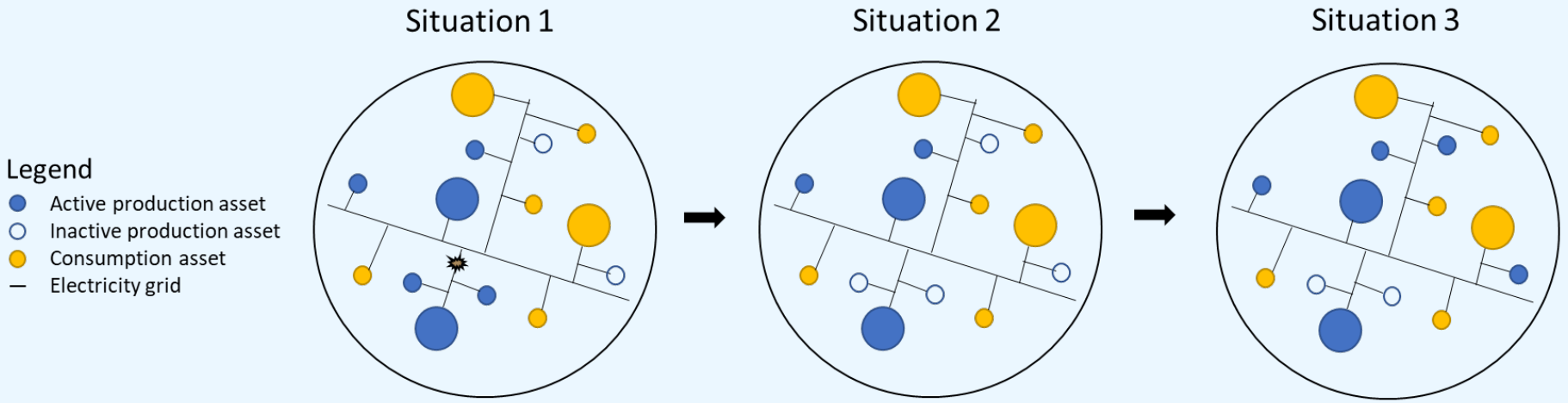
The difference between system imbalance and congestion



There is a local congestion risk at the grid point with too much production at a certain time.

Decreasing the production at the local grid point helps solving the congestion, but leads to system imbalance as there is now more consumption than production.

Increasing the production elsewhere solves the system imbalance, while there is also no local congestion risk anymore.

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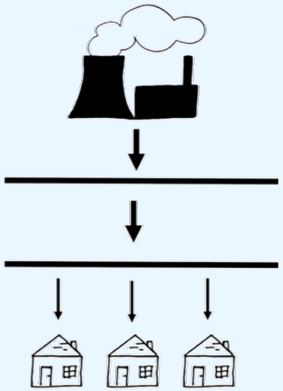
Overview electricity markets

The traditional electricity system

In the traditional electricity system, electricity was produced by large fossil-fuelled and/or nuclear power plants, and then brought via the transmission and distribution grid to the end-consumers. The grid needs to be managed well to ensure qualitative grid performance and to avoid black-outs. The one-direction electricity flows made these tasks quite easy: grid congestions hardly ever occurred and balancing was straightforward because large-scale, centralised production was easy to monitor and the demand was rather predictable. Full responsibility for these activities was given to large actors high in the supply chain. End-consumers only played a passive role.



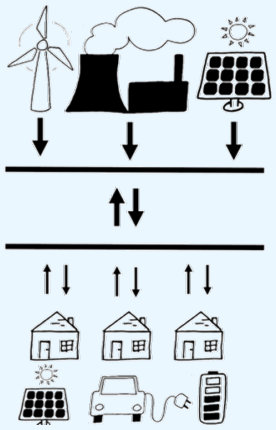
Multiple markets..

… had been developed to support this system. Because responsibilities were given to actors high in the supply chain, the traditional system consisted of multiple wholesale markets for electricity trade and grid management in combination with one large retail market that made the connection to all end-consumers at once. These wholesale markets were organised in a time sequence, to allow trade and management activities from years before delivery to real-time:

- The futures/forward markets facilitate the electricity trade from years beforehand. The trade can be organised through central trade platforms, but also directly between actors through Power Purchase Agreements.
- The spot markets facilitate the electricity trade close to real-time and enable the preparatory tasks needed for grid management.
- The balancing markets facilitate the balancing tasks, which are part of the grid management tasks.

The emerging electricity system

Due to increased implementation of renewable energy sources, the electricity production takes place more and more in a decentralised way and partly at the end-consumer level. As such, many consumers have become prosumers and can play an active role in the new system. Because of that, bidirectional electricity flows have emerged, which make the grid management tasks more complex: (i) balancing issues arose because of the many decentralised assets that need to be aligned and (ii) congestion occurs more often because the grid infrastructure has not yet been adjusted to the new system developments at many places. Furthermore, due to electrification of heat and mobility demand, the demand profiles are changing, both in size and in profile. So the traditional market organisation is no longer fit to support the system operations and activities.



New markets…

… are emerging and traditional markets are being reformed to deal with the new system developments:

- The traditional wholesale markets are being reformed to enable the participation of end-consumers and prosumers. This has also created new opportunities for the retail market.
- One central retail market for all end-consumers has become insufficient. End-consumers want local markets for the supply to their local communities and want to trade energy amongst themselves in peer-to-peer markets.
- More and more congestion risk requires the development of new markets that deal with these risks, i.e. the congestion markets.
- In some countries, the long-term supply security is at risk, leading to the creation of capacity markets to ensure new investments in production assets.

Discover all of these markets in more detail by clicking on the market of your choice in the table of content.

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Markets for Power Purchase Agreements

The market for Power Purchase Agreements (PPA) facilitates individual electricity contracting between non-residential market actors. On the one hand, the PPA market is part of the futures/forward market. In this case, the electricity is traded at a predetermined price for a specific future delivery time. The PPA market can also be part of the spot market. In this case, only the price mechanisms and conditions are predetermined, often as part of a price formula, and actual prices are calculated after delivery. By precontracting the electricity, actors already fix the prices or the conditions, which decreases price risks. Through PPA's, the trade is organised bilaterally between market actors, instead of centrally through trade platforms. Energy communities who produce their own electricity can thus arrange and negotiate energy contracts with counterparties specific for their production assets.

Market potential for communities: 

The PPA market is essential for 'producer' energy communities, because all production assets connected to the grid are required to have a contract with a licensed supplier. Such contracts can be closed on the PPA market. Luckily, the market doesn't hold severe technical, administrative or financial requirements for participation. Building new production assets, however, seems to have become more challenging according to some testimonials. Based on the low entry requirements combined with the expected increasing market size, the market potential of the PPA market is very high for energy communities.

How is this market organised? Explore market size | actor structure | market resources | market rules | prices

Learn from the experience of energy communities and market experts by considering their tips and tricks.

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Market size

The market for Power Purchase Agreements is expected to grow. The implementation of renewable energy is growing to meet European regulation and emissions targets, which will lead to a higher offer on the market. Also the demand increases as new actors appear on the market and as heat and mobility are getting electrified. These new actors are energy intensive companies who are interested to buy local, green electricity as part of their sustainability strategies and to obtain a green image. They bring new sales opportunities to the market in the form of corporate Power Purchase Agreements (cPPA).

Factsheet cPPA

What? Corporate Power Purchase Agreements (or cPPA) are electricity injection contracts which are disclosed between electricity producers and companies, cities or municipalities instead of energy suppliers. The buyers are often interested in such an agreement to meet sustainability targets and ambitions.

How? Because every grid connection must be part of a Balance Responsible Party's portfolio, a cPPA runs through a licensed energy supplier behind the scene, for which specific arrangements and conditions are negotiated and included in the contract.

Advantages?
- As most cPPA cover a fixed price for a long period of time, this provides certain revenues streams and a strong business case for new production assets and projects.
- In Flanders, the consultancy company 'Zero Emissions Solutions' has developed a sourcing platform for cPPA's which brings companies and local electricity producers together. As such, trade is facilitated.

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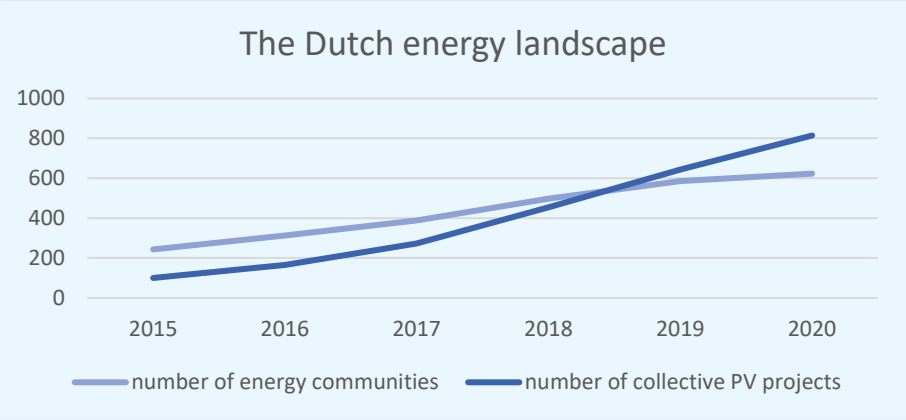
Actors

The main actors on this market are electricity producers and suppliers. Recently also actors with new business models, demands and behaviour have emerged such as large, energy intensive companies, cities and municipalities.

On the PPA market, energy communities can take the producer role.

The Dutch energy landscape is characterized by many, rather small-scale energy communities. According to Hieropgewekt, there are 623 active energy communities, who are present in 85% of the municipalities. The number of communities seems to stagnate, and communities are found to focus more on new projects, obtaining new members and the quality of the projects. Many of these energy communities are rather small and operate at the municipal level with confined geographical boundaries, which is most likely the result of the earlier postal code subsidy scheme for local energy production and the local embeddedness of community initiatives. Projects surpassing the municipal boundaries, are often realised in close collaboration with neighbour communities.



In Flanders, a few large energy communities have taken the lead in the organisation of local, renewable and collective energy production, although in the past years more and more new energy communities have emerged. Most and especially the larger communities have a widespread working area and are less confined by geographical boundaries, resulting in overlapping working areas between energy communities and increased competition for new projects.

"In order to build new production assets (e.g. wind turbines, solar parcs etc.) and participate in markets, a certain scale is required. Creating an energy community in every municipality is not workable because of the scale requirement and because there are not enough renewable energy tenders available. Enthusiasts often found a new community out of the idea of doing something good, but then they forget to evaluate the business case and the expected demand for new production assets and tenders in that particular area." Beauvent

Another actor who is indirectly involved in transactions on the PPA market and thus also an important actor, are the banks. The funding of many projects rely on loans from banks. Being rather small and often inexperienced market players, energy communities experience difficulties in obtaining loans to finance their projects. Projects for which long-term PPA's based on fixed prices are initiated seem to have the highest chances of obtaining a loan.

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Resources

The market for Power Purchase Agreements is organized as an over-the-counter market, which means that there is no intermediary or central broker that brings the different market actors together and that trade is organised bilaterally. Electricity producers can either search for a suitable buyer themselves through the network of sales and communication channels in the market, or can participate in tenders.

Disclosing a PPA for electricity injection requires having production assets, such as wind turbines, solar parcs etc.. The most common barriers to build and implement new collective generation projects are:

- Long bureaucratic processes to obtain the license to build
- Increasing societal resistance, especially against wind turbines and PV parcs
- Difficult to find suitable locations
- Grid capacity shortages in certain regions, which prevent grid operators from allocating large capacity to new grid connections
- Lack of political vision and decision making concerning energy and climate strategies. To meet regional and national climate targets, responsibilities are often shifted to local Dutch energy communities, who get overburdened as a result.
- Replacement of support schemes by competitive auctions. This could be problematic for (i) less-experienced energy communities as it requires well-considered bidding strategies and market knowledge, and for (ii) small-to-medium scale PV projects as these are less competitive compared to large projects and other technologies. Read the policy recommendation of Wase Wind about renewable energy market organisation.

Finding a compromise through 'Contracts for Differences' - The policy recommendation of Wase Wind

"In Flanders, some politicians argue that local wind producers do not need support anymore based on the current market conditions. Market prices, however, are highly volatile and dependent on the geopolitical situation. It is therefore not fair to withdraw support and to force producers to increase efficiency in the hope that this will decrease their operation costs and thus their prices as well. As such, they are fully exposed to the market and its conditions. The oil industry cannot survive while being fully exposed to liberal market conditions – they have OPEC. This is also not feasible for the gas industry, which is a derivate of the oil industry. Also the nuclear industry needs all kind of government support to survive. So one could say the same measures should be considered for the renewable energy sector. Contracts for difference could be a solution, because it allows to adjust the level of support based on the market conditions. At low market prices, support is given, but when market prices exceed costs, then the producers give the support back to the government, and thus to the society. This is a win-win for all, for both the society and the investors/producers. Successful cases for offshore wind have already been implemented in the United Kingdom."

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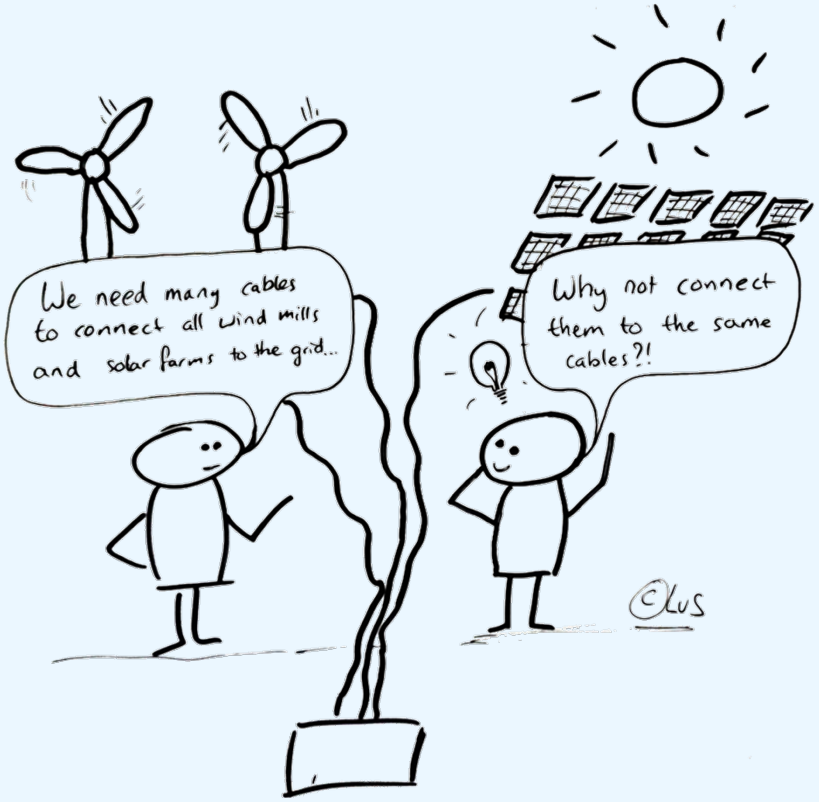
How to be less dependent from the grid and take matters into your own hands?

- Install a large-scale battery to capture excess energy during peak moments.
- Cable pooling to make use of grid connections in a more efficient way. Read the story of Deltawind.



Cable pooling – the story of Deltawind

A recently emerged phenomenon in the Netherlands is the so-called cable pooling. Cable pooling enables a shared grid connection for multiple renewable energy sources, such that the necessary connection capacity can be lowered. This solution is desirable in regions with local grid capacity shortages and is therefore often suggested by grid operators as the alternative for storage. The most optimal combination for the cable pooling consists of wind turbines and solar PV, because on average these technologies have complementary production profiles, i.e. one assumes that at sunny moments, the wind doesn't blow and the other way around that at windy moments, it is cloudy. In this way, grid connections can be managed very effectively at a rather low capacity. Nevertheless, revenue losses can occur at sunny, windy moments. Moreover, cable pooling can become complex when technologies are owned by multiple parties. In that case, it is very important to make solid and detailed agreements about how to divide production revenues to avoid conflicts.

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Rules

PV panels and wind turbines are connected to the electricity grid at the grid connection point. In the Netherlands and Flanders, for all grid connection points there must be an energy contract with a licensed energy supplier. As such, all production assets are part of the portfolio of a 'balance responsible party', who assists the grid operator in balancing the electricity grid. Because of this rule, the PPA market is an inevitable market for energy communities.

Prices

Because of the decentralized market organization, energy communities must negotiate their own contract prices and conditions. Different price formulae exist including fixed prices, variable futures (e.g. Endex) and variable spot (e.g. Epex) prices. The latter are known in the Netherlands as APX and in Flanders as Belpex.

With increased implementation of renewable energy, negative spot prices will occur more frequently which could have a large impact on the business case, especially on solar parcs and medium-to-large rooftop PV installations, because producers have to pay to inject energy production in the grid. What can be done about this? Some energy communities pledge for policy reform that erases the tax obligation on negative prices and that holds the fossil fuel producers accountable with suitable measures. Energy communities themselves, could decrease the dependency on the volatile spot prices through fixed and variable Endex contracts. Yet, more and more energy suppliers choose to limit their offer to spot contracts to decrease price risks. In addition, price conditions in general have become less attractive because of higher margins in the bill to cover balancing activities. In the Netherlands for example, these margins have increased from 4% (2020) to 30% (2021) of the electricity price and hence, cover an important cost item. Such higher margins are needed because Balance Responsible Parties (BRP's) experience more difficulties balancing their demand and supply portfolio as a result of difficult forecasting of the weather dependent renewable energy sources. Being part of the final contract price, however, these margins are negotiable. Some energy communities choose to collaborate with multiple BRP's in order to spread risks and strengthen their negotiation position in the market.

Tips and tricks

1. In the case of rooftop PV, one way of dealing with unfavourable contract prices is to use as much of the produced energy yourself instead of injecting it into the grid. This is called "maximising the self-consumption" and remains the most profitable business model for PV installations.

2. Build a diverse team with a certain level of professionalization to increase market participation. For energy communities to successfully implement new projects, grow and flourish, it seems to be important to have a group of people with complementary talents and skills, including administrative, technical, juridical, communicative, entrepreneurial and financial capabilities. In addition, having people on the pay-roll helps performing the daily market activities, as this becomes too complex and time consuming for volunteers.

3. Consider the geographical density and the existing community landscape when deciding to found a new energy community in the area. It could perhaps be more beneficial to join an existing one. (read the testimonial of Beauvent in the actor section)

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The wholesale energy markets: Futures/forwards and spot markets

The wholesale futures/forwards and spot markets' main purpose consists of facilitating energy trading at the large-scale, industrial level, but also other purposes are served indirectly. These markets are brought all together under wholesale energy markets, because they are highly connected in time through a time sequence, and in space through central trade platforms.

Markets / Purpose	**Futures/forwards markets**	**Spot markets**	
		Day-ahead Market (DAM)	**Intraday market (ID)**
Risk management	Managing price risks by trading energy at a predetermined price for a specific future delivery time	/	/
Energy trade		Energy trade 1 day before delivery	Energy trade on delivery day
(First steps to support) Grid management Performed by Balance Responsible Parties (BRP's)	/	At the end of the day, BRP's need to submit a balanced trading schedule for the next day to the TSO in which consumption equals production on a 15 minute base. The market enables energy trading to complete the trading schedule.	At delivery, the final trading schedule of the BRP needs to be fully balanced. The market provides the last chance to optimize the trading schedule and solve unforeseen imbalances because of last-minute outages and mistakes in weather forecasts. What if the BRP didn't succeed in balancing its schedule beforehand? The TSO will solve the imbalance through procurements on the balancing markets, and … … the BRP gets the bill.

Market potential for communities: ★☆☆☆☆

The wholesale energy markets are not very interesting for energy communities because of the scale and market knowledge requirements. Even large energy communities, cooperative suppliers and small, commercial energy suppliers outsource the wholesale trade activities to specialised traders. Although it is important to have a basic understanding of how these markets work, energy communities are recommended not to be directly active on them.

How is this market organised? Explore market size | actor structure | resources | market rules | prices

Learn from the experience of energy communities and market experts by considering their tips and tricks.

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Market size

The spot markets are expected to grow in size and importance. The main reason for this lies in the fact that it will become more difficult for BRP's to balance their trading schedule because of more renewable energy sources in the energy mix. Solar panels and wind turbines are weather dependent, so their production profile is highly variable and very difficult to predict in advance. In the future, activities to balance the trading schedule will thus happen closer to real-time, leading to more activities on the spot markets and especially on the intraday market which comes latest in line. A growing market size creates potential for energy communities. Energy communities can for example help the BRP with his balancing activities by being flexible in their energy production and consumption and as such sell this flexibility to the BRP.

Actors

The main actors on the wholesale energy markets are suppliers, producers, traders and BRP's. Often energy producers and suppliers are not directly active themselves on these markets but collaborate with specialised traders who trade on behalf of them. Also new actors have emerged on these markets, i.e. aggregators.

What are aggregators?

Aggregators collect and accumulate the available flexibility from small assets to provide it in bulk on the market. The flexibility cannot only be used on the wholesale energy markets, but also on the balancing markets or the congestion markets. Clear arrangements have to be made between the aggregator and the owners of the small assets as well, which could take place on the emerging retail flexibility market.

Energy suppliers cannot avoid being on these markets. This means that also energy communities who are only interested to supply their locally produced energy back to their members, cannot avoid the wholesale energy markets. Cooperative supplier OM explains why:

"The goal of the supply activities is to consume the own production and exchange it within the community. Yet, the energy does not stay within the community. Because in the evening, the sun is gone, but people still need electricity. So, you always have a link to the outer world and thus the wholesale energy markets on which you have to buy additional energy and on some moments maybe sell surplus energy. So, there is a trade aspect as well when being a supplier."

Resources

The wholesale energy markets are organised as centralised trade platforms, which means that the market infrastructure consists of bidding platforms (e.g. the European platforms ICE Endex and EPEX Spot, and the Dutch ETPA)

Forecasting tools are very important to adequately predict production and consumption profiles. Often energy communities however lack the resources (e.g. finances and skilled people) for such advanced forecasting.

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Rules

The platforms require a trade license, which can be received after training. *"Obtaining access to the platform and a license, is not the problem,"* admits Ecopower. *"What is the most challenging is developing competitive bidding strategies and the trading itself, because that requires extensive market knowledge and experience."*

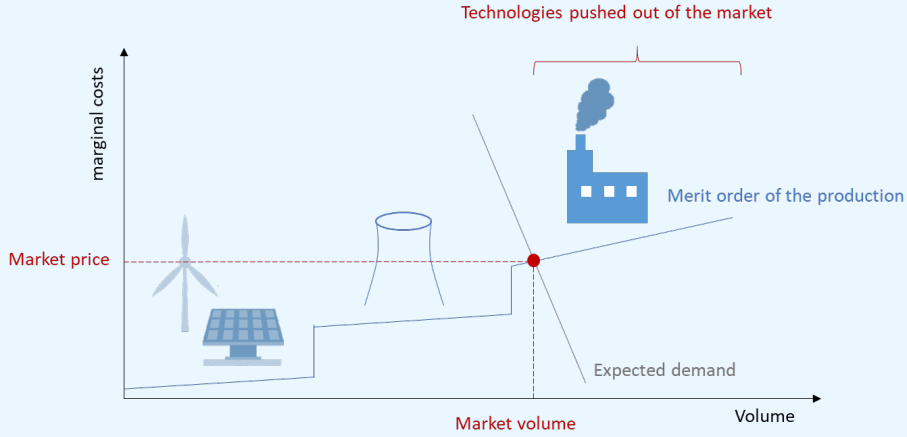
Other rules on the market concern amongst others:

- Opening hours of the market
- Minimum bid size (e.g. 0,1 MW on European spot markets)
- Frequency of price calculation: daily prices in futures markets at the end of the day, hourly prices in day-ahead markets and quarter-hourly prices in intraday markets
- Market type and price mechanism
    - Auction: Market actors do bids and offers, which are all brought together for a specific period after which 1 uniform price is calculated for all market actors. (E.g. European Epex Spot acutions)
    - Continuous market: Market actors do bids and offers, which are continuously matched with each other. Market prices are different for each trading match. (E.g. the Dutch ETPA, European Epex spot trading platforms)

Prices

Wholesale prices are currently historically high, meaning that the renewable energy producers get very good prices for their production. Yet, on the long term, prices are said to decrease.

Why will prices decrease in the long term?
Prices are calculated based on the equilibrium of production and consumption. Production bids are ranked according to increasing prices, which reflect the marginal costs (= the costs for producing one additional unit of energy). Renewables have low marginal costs, because the wind and sun are free, whereas fossil fuelled plants have high marginal costs depending on the fuel and CO2 prices. Higher shares of renewables in the product mix will push fossil fuelled plants out of the market and lead to lower market prices.



Why are prices sometimes negative?
At sunny and windy moments, it could occur that there is too much electricity production. While at these moments, there is already enough production from renewables, some fossil and nuclear power plants keep producing because they cannot easily be shut down temporarily. Such overproduction leads to very low, and even negative prices. That means that renewable energy producers have to pay for energy sales, which is of course very bad for their business case.

How to deal with negative prices? By curtailment (shutting down the PV installation or wind turbine), energy storage on batteries or smart energy management. Read here an interesting article about the wholesale prices, why they have increased so much and are so dependent on gas prices, and what can be done about it.

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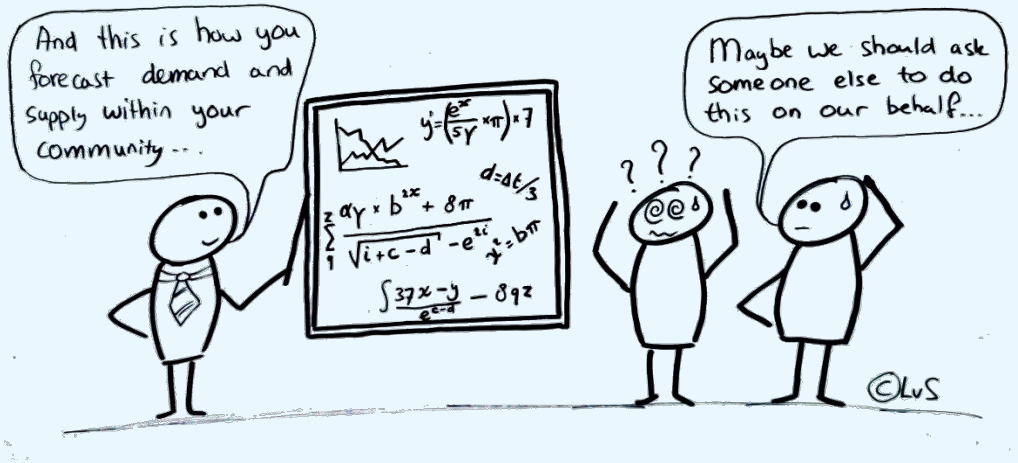
Tips and tricks

Even the large energy communities and the cooperative suppliers try to stay away from these markets, because they include high price risks caused by price volatility, and they require extensive market knowledge and large scale. Their recommendations are:

1. As a supplier, try to match as much as possible your consumption with your production to avoid wholesale market activities and being exposed to the wholesale spot prices.
2. Buy your energy in advance on the futures/forwards to lower the price risk, but be aware that you are never risk-free because it is very difficult to predict what the market will do. In 2020, for example, the electricity demand collapsed due to the covid lockdown and companies that bought their energy in advance on the futures/forward market were forced to dump the energy on the spot markets at extremely low prices. In 2021, the opposite was true. Companies were rather hesitant to buy in advance. Spot prices rose and companies were forced to buy the additional energy at extremely high prices (especially in Q4). It is thus very difficult to develop a good trade strategy.
3. Seek collaborations with reliable traders and BRP's. The 'cooperative of cooperative' structure is well-suited to explore new market activities, because the participating communities have full ownership and control of the operating entity. For collaborations with commercial parties, try to spread risks by setting up multiple collaborations.



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Retail markets

On retail markets, energy is brought from the wholesale level to the end-customer, which are residential and SME consumers and prosumers. The retail market can be of interest for energy communities who want to supply their local energy production to their members, keeping the energy supply chain short and under full control of the community.

Market potential for communities: ★★★★☆

The retail market is a very relevant market for energy communities, because it makes the connection to the end-customers, i.e. consumers and prosumers who are also the target groups of energy communities. The largest barrier to enter this market is the required scale and professionalization, which is indirectly required by the current regulations. In fact, unfavourable regulations are the main reason why the retail market potential is not at its maximum. Several solutions, however, are in place to deal with these barriers: collaboration with licensed suppliers, unique positioning of the electricity offer in the market targeting green-minded consumers, expanding the electricity supply with sustainable heat to benefit from economies of scale and exploring new retail market opportunities, such as the local and the flexibility market.

How is this market organised? Explore market size | actor structure | resources | market rules | prices

Learn from the experience of energy communities and market experts by considering their tips and tricks.

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Market size

Demand

Because every grid connection is legally required to be supported by a supplier contract, the market size of the retail market is highly dependent on demographics. Concerning number of customers, the market size can be considered stable. The electrification of heat and mobility demand however, the total demand is expected to increase again.

Facts and figures

Flanders:

- Number of consumers and total volume
- Green power supply per municipality

The Netherlands: energy monitor

- Increasing number of supplier switches
- More customers switch contract through online channels compared to previous years
- Price remains main motivation to switch contract
- 80% of the consumers/prosumers has a green energy contract

Supply

Liberalization of the market has caused higher levels of competition. A large part of the supply side, however, still consists of a few large companies with large market shares.

Facts and figures

Flanders:

- Market shares of the energy suppliers
- Contract offer
- 33 active electricity suppliers in 2020 in Flanders (VREG)

The Netherlands:

- 59 active electricity suppliers in 2020 (ACM)

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Actors

The main actors on the retail market are energy suppliers, end-consumers and prosumers. Energy communities could take the role of energy supplier. Although Dutch and Flemish energy communities are very much interested in supplying their locally produced electricity directly to their members, they are not necessarily interested in taking the supplier role on the retail market.

The most important reasons not to become a supplier on the retail market are:

- Supply license required
- Large financial capital and liquidity required
- Many administrative activities
- Risk that customers don't pay the bill
- Risk that customers switch to another supplier

Consequently, many energy communities seek collaborations with licensed suppliers. The decisive factors to initiate and sustain a collaboration with a licensed supplier are:

- Supplier required to be 100% green
- Price conditions
- Existence of co-owned generation projects
- Good ongoing relationship
- Cooperative organizational structure, but to a lesser degree

Over the past years, new supplier business models have entered the market, promoting short energy supply chains through platforms that directly match local producers and consumers, e.g. Bolt in Flanders and Vandebron, Greenchoice, All-in Power, etc in the Netherlands. Recently, the business model of the cooperative supplier has emerged, adding the aspects of full control and ownership to participating energy communities because of the cooperative organizational structure. Examples are OM energie and Energie van ons in the Netherlands. In Flanders, this business model has not yet emerged, although energy communities call for it.

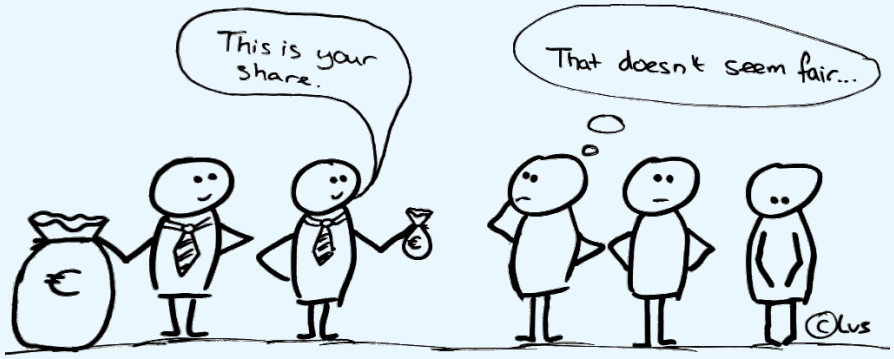
NEW: the supplying cooperative of cooperatives

Pros

1. Overhead and investment costs are kept centrally, such that also small energy communities can benefit from economies of scale
2. The cooperative mindset allows for full ownership and control by participating communities, allowing to prioritize the community values and be less dependent from profit-seeking third parties.

Cons

1. The contract prices depend on the number of participating communities. The only recent emergence leads to a hesitant and cautious attitude of communities, preventing the model from breaking through.
2. Co-investments in new generation projects do not fall under this business model.



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Regulations

Retail markets are highly regulated to protect the end-customers. Keeping up with the changing regulations (e.g. invoice format, tariff structure etc.) is time-consuming, which market entrants are not always aware of.

Some market requirements:

European regulation requires certificates that proof the origin of the electricity, called **Guarantees of Origin** (GoO), to avoid double counting of green energy. These certificates can be traded on a separate, European market. Yet, when collaborating with green energy suppliers, these certificates are often part of the Power Purchase Agreement.

Facts and figures:

- National and international trade in GoO
- Number of GoO's in relation to the type of energy source

Energy suppliers need to have a **supply license** for supply activities on the retail market. Energy communities experience this requirement as the largest barrier for market participation, because of high administrative, financial and scale requirements. Read more about the specific requirements in Flanders and the Netherlands, by following the links.

The European Clean Energy Package (CEP) and its translation into national law offer new market opportunities though.

New market opportunities within the retail market:

The Clean Energy for all Europeans Package aims to put citizens and communities central in the energy transition. Existing markets, both at wholesale and retail level, are being reorganised to enable increased participation for citizen and communities. See the next page for more information about these new market opportunities

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1. Local retail markets

Current market regulation prevents discrimination from suppliers against customers, which means that suppliers need to provide an energy contract for all consumers that ask for it. Often energy communities are interested to supply their locally produced energy only to their members and not to non-members.

In Flanders, this type of market already exists. Wase Wind already operates on a local retail market because potential customers must be member-shareholder of the community. As such Wase Wind can supply their wind energy locally in the region of Waasland. Also, Ecopower operates in a similar way, although it seems like they operate at the non-local level because of their large geographical working area. Nevertheless, Ecopower is also an example of a local retail market.

In the Netherlands, the new energy law will create opportunities for local retail markets to emerge, because energy supply will be made possible without the supply license. Proposition of the new energy law (26/11/21): Energy communities can supply their produced electricity without a supply license if Art 2.19):

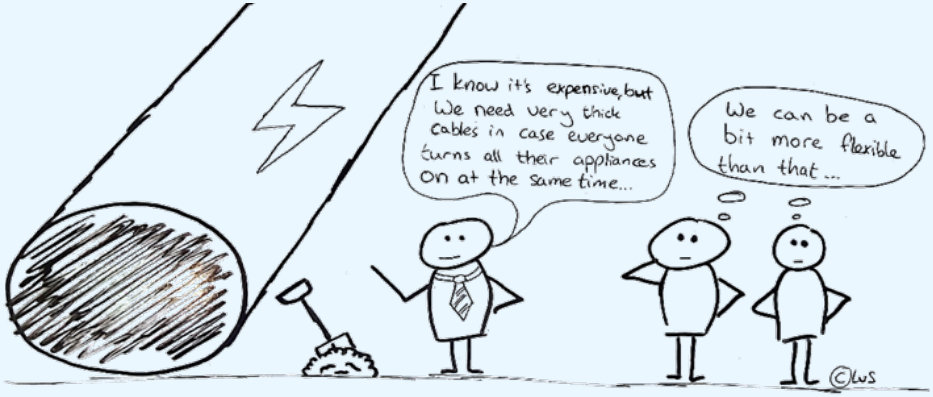
- The community doesn't deliver more electricity than injected into the grid annually
- The end-customers with a small connection are members or shareholders of the community
- The maximum number of members or shareholders will be determined by ministerial decision.

2. Retail flexibility markets, which could be local or not

As a result of increased implementation of renewables, grid management tasks become more challenging and grid operators can use all the support they could get to perform their tasks, also from households and SME's. As such, retail markets facilitating flexibility in addition to energy trade are emerging. This means that consumers and prosumers can negotiate contracts based on which they are paid by commercial market parties for being flexible with their electricity consumption and production. These market parties are called aggregators. This doesn't necessarily have to be an independent party. Also, suppliers could play an aggregator role. The main advantage of such a double role is the cost saving for shared infrastructure (website, invoice system, customer help desk, customer relation management system etc.). Depending on the scope of the activities, these markets could be organised local or not.

The flexibility from households on these markets could be collected and accumulated and then sold further:

- To the TSO on the balancing markets to keep the national grid in balance
- To the TSO/ DSO on the congestion markets to solve local congestion problems in the grid
- To the BRP's on the spot markets to help them optimising their trading schedule



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Resources

The retail market is a decentralized market, which means that suppliers need to build their own market infrastructure connecting to customers and distribution grid operators. This infrastructure includes customer services, customer relation systems, billing systems, communication channels to grid operators and customers etc. Market infrastructure is expensive and complex to build and sustain. Organising supply activities centrally through 'cooperatives-of-cooperatives' can offer economies of scale for shared infrastructure. Furthermore, diversification towards other activities for which similar market infrastructure is needed, e.g. heat supply, gas supply and flexibility aggregation, could be an option. To deal with complexity, system can be automated and digitalised, which facilitates the processing of new contracts, the preparation of contract renewals and the anticipation on new market trends, especially useful with a large number of customers.

The most important resources according to Flemish and Dutch cooperative suppliers are:

- Own production assets

Ecopower: "*What causes that we have not gone bankrupt in the past years, while many other suppliers have? We match our consumption and production. Because we have a lot of production assets, we can control prices for consumption. Without own production assets, you are fully exposed to market prices. … Production assets create stability. It is not a requirement, but it certainly helps to be active on the retail market on the long term."*

Energie Coöperatie Loenen and Translyse*: "You also need dispatchable power assets (e.g. hydropower or biomass). If you only have wind and solar, you are still very vulnerable"*

- Customer service and help desk.
- Financial resources to cover the more expensive winter period as customers only pay (monthly) provisional sums
- Guarantees of Origin

Energie van Ons: "*You need these certificates to show that you supply green electricity. If you don't have these certificates yourself, then you are dependent on external producers. So it is nice to have own PV parcs for example. … Also, you can ask for a slightly higher price because you are offering a unique product: local, renewable energy from the neighbourhood. That is a big advantage.*"

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Prices

Electricity prices (at the end users) consist of energy costs, distribution and transmission grid costs and taxes and levies, of which the energy costs usually only take about 1/3 of the total energy bill. Increasing wholesale electricity prices (2021 – 2022), however, have had a large impact on energy costs and as such on the entire retail market.

On the supplier side:

- Increasing number of bankruptcies with energy suppliers, especially the price-fighters who are predominantly active on spot markets and completely exposed to spot price volatility
- Suppliers increasingly cancel their offering of fixed price contracts, even the large suppliers. (Flemish news article)
- Increasingly misleading communication and aggressive sales techniques (Flemish news article)

On the customer side:

- Energy poverty: Households and SME's have difficulties to pay their electricity bills and the number of vulnerable consumers has increased.
- Rising number of complaints about untransparent prices and unreasonably high prepayments

In compliance to European law, it should be made possible for households to have dynamic price contracts, which follow the spot prices on an hourly base. Suppliers offering such contracts are required to inform the customers about the possibilities, costs and risks of the contract. Dynamic prices are especially interesting for flexible consumers, because they can shift their consumption to low price hours.

Energy communities express concerns whether this price information will reach the end-consumer in time. Given the current and extremely high prices, it is also questionable whether households will have faith in this type of contracts.

 As from 1/07/2022 the distinction between day and night grid tariffs will disappear in Flanders. Grid tariffs will be based on the peak capacity to incentivise users to spread their consumption over time. (VREG)

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Tips and tricks

1. First inventorize the interest of your community

In general, customers increasingly value renewable energy that is locally produced. This trend creates opportunities for new supplier business models that connect consumers directly to local producers. Before initiating collaboration or becoming a supplier, it is very important to identify the members' interests and motivations towards local supply. Although creating a direct connection between local electricity production and consumption and as such keeping the energy chain short sounds very appealing, it doesn't work for all communities.

Testimonial: *Deltawind started collaborating with Vandebron, because they supported the idea of short energy supply chains and virtually connecting local producers and consumers. They spend quite some effort and finances to advertise the collaboration, even using billboards on large events. In the 5 years that they had the collaboration, only 8% of the members made use of it and thus consumed electricity from the community wind turbines. The rather low financial benefits were their main reason to remain customer of large, commercial suppliers, who were able to offer discounts and gifts.*

Concluding, it is important to explore underlying motivations of the community for the sake of assessing the relevance of taking the supplier role for your individual community.

2. Ensure sufficient production assets before becoming a supplier on the retail market

"It is not a requirement to have production assets as a supplier, but it certainly helps to be active on the retail market on the long term." *Ecopower*

What are the main advantages?

- It helps communities to deal with price risks, because of not being exposed to the volatile wholesale market prices. In that sense, also matching the production with the consumption is important. When production assets are lacking, a temporary stop on customer acquisition can help finding the balance again.
- It helps communities to obtain the required number of Guarantee of Origins without heavy market negotiations.
- It helps communities to make a unique product offering to your members based on your community values and priorities
- It helps communities who would only have a small customer base and thus not benefit from economies of scale, to run break-even.
- In addition, dispatchable assets (e.g. hydropower and biomass) can provide a baseload production, meaning that their production is quite stable over time and not weather dependent. Although hydropower is often perceived to be a stable producer, it is dependent on the flow rate of the river and the degree of rain and drought, which increases the variability in the production.

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Balancing markets

TSO's organise the balancing markets to procure capacity and energy to stabilise the grid frequency as part of their grid management tasks. Market actors can provide the needed capacity and energy by being flexible with their electricity production and consumption. That is why flexibility is said to be traded on this market. Energy communities could collect this flexibility from members and sell it on the market, or they could collaborate with existing aggregators that sell the flexibility on their behalf.

There are 3 different balancing submarkets: Frequency Containment Reserve (FCR), automated Frequency Reserve Restoration (aFRR) and manual Frequency Reserve Restoration (mFRR). The flexibility traded in these submarkets serves different balancing purposes, which require different levels of urgency. As such, these markets are also connected with each other through a time sequence. Instabilities first need to be solved on the FCR market. When not solved, it is passed through the aFRR market and then to the mFRR market, which is the last one in the sequence.

	FCR	aFRR	mFRR
Purpose	Primary reserve to stabilise minor frequency disturbances in the high-voltage grid	Secondary reserve to maintain short, real-time power balance	Tertiary reserve to maintain balance in case of incidents and substantial long-lasting power deviations and in addition to aFRR
Urgency			

Market potential for communities: 

The overall market potential of the balancing market for communities is 3 stars, but this potential differs per submarket. The aFRR market seems the most promising for community participation, while the mFRR the least.

	FCR 	aFRR 	mFRR 
Summary	The FCR market has already been opened for small, residential assets. Although economically, this market is very interesting, it is very difficult for the small, residential assets to meet the severe technical requirements corresponding to the high urgency and accuracy.	In ongoing experiments, TSO's are exploring an opening of the market for small, residential assets. This market is both economically and technically very interesting, because of less severe technical requirements, increasing market size, relatively high prices and high potential revenues.	The mFRR market requires very high volumes and provides a rather low financial return. The flexibility from market actors is only required a few times per year being for incidental balancing.

How is this market organised? Explore market size | actor structure | resources | market rules and price mechanisms
Learn from the experience of energy communities and market experts by considering their tips and tricks.

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Market size

The market size of all submarkets of the balancing market is expected to increase because of (i) higher shares of renewables in the energy mix, which have weather dependent production profiles that are difficult to accurately predict and (ii) electrification of the heat and mobility demand which are also more difficult to predict in the future. A lot of the balancing will already be done on the spot markets, especially on the intraday market, but prediction errors will remain inevitable making the balancing markets very important to solve real-time imbalances.

Facts and figures from Flanders and the Netherlands:

	FCR	aFRR	mFRR
Market volume		Expected to grow	
	86 MW	145 MW	904 MW
	110 MW of which at least 30% procured in the interior	310 MW up; 310 MW down	1000 MW up; 750 MW down which has tripled over the last 10 years!
Number of participants			
	15	14	12

Prices

In the short run, prices are expected to increase because of high market demand for flexibility. Increasing prices will make the market more attractive for market entrants. In the long run, prices will probably decrease again because of market saturation.

More information:

https://www.elia.be/en/grid-data/balancing

https://www.tennet.org/bedrijfsvoering/index.aspx

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Actors

The main actors on the balancing markets are the Transmission Grid Operator and the Balance Service Providers. In the past, the Balance Service Providers were companies with large generators and thermal power plants. Currently, markets are being reformed such that aggregators of small, flexible assets can also participate on the market to provide the balancing services. These aggregators, however, need a very large scale of assets to have a feasible business case and to meet the minimum scale requirements on the markets.

For energy communities, collaborating with an existing aggregator can be a way to participate in these markets. The main hurdles are:

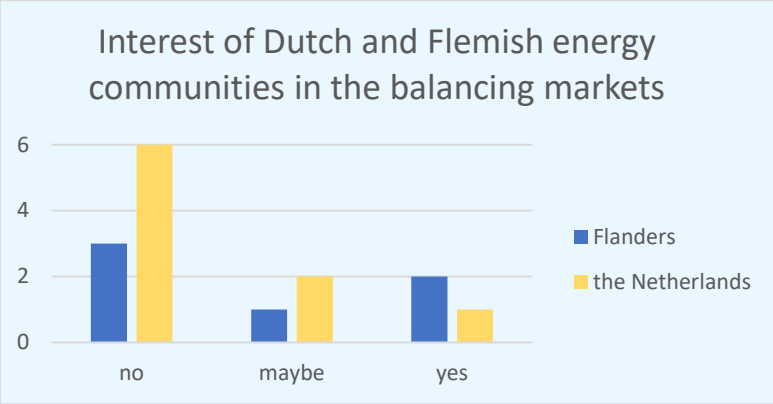
- The few market participants have substantial market power making it difficult to negotiate sharp contract conditions.
- Because of large market shares, the market participants can more easily manipulate prices.
- Market participants are commercial actors driven by profits, who do not share the community values.

Potential solution? **The cooperative aggregator**

"The underlying reason of why we are setting up a cooperative aggregator: We think that individual cooperatives should not be active on these balancing markets but should pass this activity to a trusted party. And who is that trusted party? That is a party of whom you have ownership, so cooperatives with cooperatives as members … Then you are certain that when money is earned, that you also see that money back." (Escozon)

Learn here more about Wattflex, the first Dutch project in which the flexibility from a community-owned PV parc and a large battery is sold on the (aFRR) balancing market to support national grid balancing.

Many Dutch and Flemish energy communities are not interested in selling their flexibility on the balancing markets.



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Instead of activities on the balancing markets, energy communities can also provide flexibility outside these markets, for example:

- For own usage by optimising the community's collective self-consumption and their members' individual self-consumption, which helps decreasing the members' electricity bills.
- In the case of cooperative suppliers: for own usage by optimising the community's asset portfolio to avoid being exposed to spot markets and to decrease costs paid to BRP's.
- In the case of cooperative BRP's: for own usage by balancing their asset portfolios (e.g. PV curtailment, battery charging and discharging etc) and as such avoiding penalties for imbalance induced by the TSO. This is also called "passive balancing".
- Prevent local grid congestions (see the story of Lochem)

If the community doesn't want to provide flexibility, they could also support the roll-out of flexible assets by:

- Organising group purchases for home batteries and heat pumps
- Raising awareness about the importance of flexible electricity consumption and production for the future energy
- Providing technical support for the implementation of smart energy systems and the use of apps.

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Rules

In order to participate in the balancing markets, technical assets need to pass a prequalification test that validates whether they can meet the product/service requirements concerning asset activation. These requirements are highly dependent on the level of urgency for each balancing product (FCR, aFRR and mFRR) and impacts how easily communities can participate in the market and which assets they could use to fulfil the market activities.

	FCR	aFRR	mFRR	Impact on community participation
Time investment	Activated all the time	High number of activations	Low number of activiations	
Activation process	Actors need to read out the frequency themselves and react directly on the fluctuations	Actors receive an activation signal which they need to respond to	Actors receive an activation signal which they need to respond to	Frequency readers are expensive. There might be opportunities to centrally measure the frequency instead of in every house separately. But then internal communication costs will be higher.
Response time and activation speed	Very fast = first reaction within 2 sec and full activation within 30 sec	Rather fast first reaction within 30 sec and full activation within 7,5 min first reaction within 30 sec and full activation within 15 min which will go to 5 min in the future.	Not very fast = 15 min	Some technologies cannot be switched on and off fast enough for FCR requirements and for the performance of the technology and comfort levels of the users it is advisable not to switch it on and off too often in a row. This is the case for solar inverters, heat pumps and electric vehicles.
Contract types and remuneration	Contracted capacity to keep a certain amount of capacity available and for which actors receive an availability remuneration. Assets are constantly activated during the activation period, but don't receive remuneration for this.	Contracted bids: Contracted capacity to keep a certain amount of capacity available and for which actors receive an availability remuneration. When activated, actors also receive an activation remuneration. Free bids: Actors are paid for delivered energy	Contracted capacity to keep a certain amount of capacity available and for which actors receive an availability remuneration. When activated, actors also receive an activation remuneration.	Energy communities could earn additional revenues by keeping a certain amount of capacity available, which seems an easy job. Yet, the capacity requirements are high. Not being able to activate the promised capacity could lead to large penalties.

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	FCR	aFRR	mFFR	Impact on community participation
Activation direction Up = ↑ production / ↓ consumption Down = ↓ production / ↑ consumption	2 directions: “up **and** down” =	1 direction: “up **or** down” = Activation signals are sent for 2 directions, but market actors can chose for which direction they want to provide the flexibility	1 direction: “up **or** down” Only market for ‘Up’ Activation signals are sent for 2 directions, but market actors can chose for which direction they want to provide the flexibility	Some technologies cannot be used easily in 2 directions, e.g., solar inverters can only decrease production by switching them off. Also heat pumps cannot be easily used in 2 directions because of the impact on comfort level for the households. This makes them not suited for the FCR market.
Activation time and contract period	Long = 4 hours	Short = 15 minutes	Short = At least 15 minutes	Solar PV and wind turbines are weather dependent, which makes them more difficult to control than fossil power plants. The longer the activation time, the more difficult these technologies can be used. Also, long activation times have a large impact on the comfort levels of the households that provide the flexibility.
Minimum amount of power capacity	Rather large = 1 MW	Large 5 MW contracted bids 5 MW contracted bids 1 MW free bids	Large 1 MW 20 MW	With the flexibility from household assets, you would need a very large scale to meet the requirements, because the capacity of heat pumps, batteries and invertors from households lie in the range of 2 – 12 kW and households will not be able to provide 100% of their capacity as flexibility. How much this percentage will be, needs to be studied!
Allowance of small assets (low voltage)	Yes	Emerging	Emerging	Increased participation of energy communities possible when small, residential (low voltage) assets will be allowed on the market.

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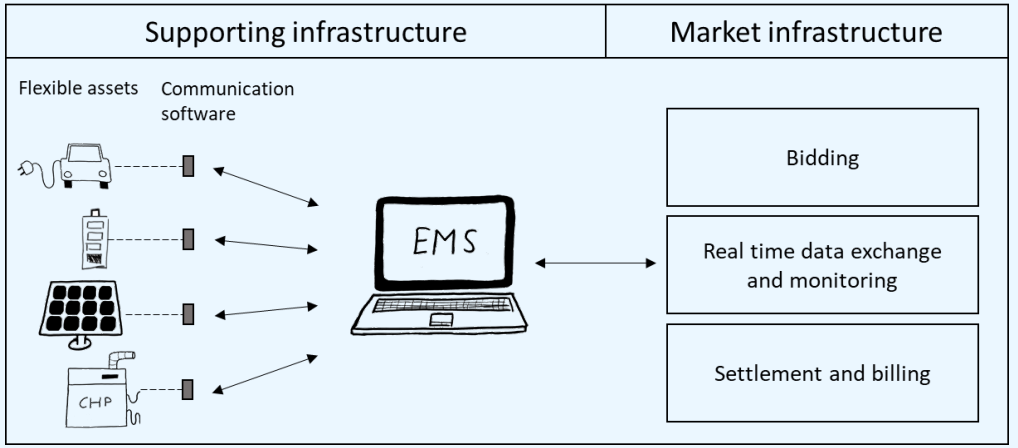
Resources

The market infrastructure of the balancing markets is a complex structure consisting of platforms for bidding, real time data exchange and monitoring, and settlement and billing. Depending on how the TSO has organised the market, these activities can fall under one or more platforms. Communication between market actors and the TSO can be facilitated through, amongst others leased lines (private telecommunication), blockchain platforms, virtual power networks and web portals. Although some adjustments on the infrastructure of the market actor is often required to comply to the communication system and connect to the TSO back-end.

Not all flexible assets from households can be used to provide flexibility on the market. Much depends on the technical market requirements. The most severe requirements are to be found on the FCR market. Assets are required to switch on and off fast and many times, which makes only home batteries suited for this market. Heat pumps, electric vehicles and solar invertors cannot meet the requirements. Home batteries are also suited for the aFRR and the mFRR market. Yet, they have not yet a feasible business case. Moreover, it probably is financially more interesting to use the batteries for optimising self-consumption then to use it for flexibility services on the balancing markets. Reserving some space on the battery to charge and discharge sufficiently when the market asks for it, means that the battery cannot be always used maximally.

Many assets have already built-in frequency readers and communication software to participate in the FCR market, which makes it easier for energy communities to be on this market as the technical infrastructure is already in place. Energy communities could also build this infrastructure themselves to connect more easily with their energy management system, but this would expose them to severe competition from asset providers and their built-in options.

Interested in how communities can provide flexibility and manage their energy flows? Read crash course 8 about community energy management systems, which will be published soon on the cVPP Interreg website under the tab ‘downloads’.



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Tips and tricks

1. Choose the right market.

The balancing market contains 3 submarkets: the FCR, aFRR and mFRR market. Market requirements differ per submarket and impact how easy energy communities can participate in it. Therefore, it is very important to choose the right market for your community. While doing this assessment, consider the technical, economic, and social feasibility:

- Technical: Can the community assets meet the technical requirements on the market?
- Economic: What are the financial benefits from flexibility provision? How are the market prices evolving? What is the level of market competition?
- Social: What is the impact on our members' living comfort? Do members want to be flexible in their electricity consumption and production and with which assets? …

2. Make sure you can deliver what you promise.

Testimonial Escozon: *In the aFRR balancing market, market actors can promise to keep a certain amount of capacity available through contracted bids. Actors with this contract type are obliged to bid, others can decide freely because they didn't make any promises. Non-delivery of the bid can lead to high penalties for the contracted bids, whereas the consequences for free bids are only minor. Because these penalties form a high risk for unexperienced energy communities, it is recommended to only precontract bids with a capacity of sufficient scale coming from reliable assets. Solar PV and wind turbines are less reliable because of their weather dependency. With renewables it might be better to only participate in the free bids.*

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Congestion markets

Congestion markets are currently in development to avoid and solve congestion problems in the local electricity grid. Read here more about congestion problems. Because the congestion markets are still emerging, there is not yet a dominant market design.

 Example: GOPACS (https://www.gopacs.eu/)

1. Actors:
   Grid operators on the demand side, and BRP's and congestion service providers, such as aggregators at the supply side

2. Market design choice:
   The market is organised centrally through a national trade platform, called GOPACS, on which actors can make location-specific bids after they receive a call for flexibility from the grid operator. Solving congestions, e.g., by decreasing the production in an area, could bring the larger system in imbalance if this is not compensated by an increase in production in another area. Therefore, the GOPACS platform is also connection to the ETPA day-ahead/intraday platform, such that counterparties can be found to make opposite actions. Check the videos on the website for more information about the market design.

3. Prices:
   Actors receive a remuneration for their offered flexibility

Instead of solving congestion through national trade platforms, distribution grid operators could also explore the opportunities of local, over-the-counter markets, i.e. markets which facilitate bilateral trade between the grid operator and the flexibility providers (aggregators, energy communities etc). Such markets could then be organised tailored to the needs of both parties.

Opposed to solving congestion, dynamic grid tariff contracts are a way to prevent congestions, because they incentivise spreading consumption and production over time, which avoids capacity peaks. Households can very easily participate in such a construction as well.

Exploring the boundaries of the system – the story of Lochem Energy Cooperative

"*We wanted to show the grid operator that if 20% of the households in the street have an electric car and if all these cars are charged at the same time (e.g. 8 P.M.), the local electricity grid would be overloaded resulting in a black out for all households in that area. These numbers definitely represent a realistic scenario, especially with the increasing numbers of electric cars and solar panels in local neighbourhoods. … At first, the grid operator wouldn't believe us. They were willing to bet for a bottle of champaign that we wouldn't succeed. The grid was strong enough, they argued. But, we succeeded because part of the medium-voltage cabin took fire. Luckily, the technicians of the grid operator stood ready to solve the damage quickly. Nevertheless, households in the street experienced a black-out for several minutes, something that hadn't happened since WWII. … They were not angry though, they came running outside screaming 'Yes, we have won! The system is down!' So, in order for our local electricity grid to be future proof, it is important to explore how energy can be shifted to other moments in time. Our experiment proved that this is indeed most needed.*"

In the 'Slim Net' project, Lochem Energy Cooperative studied the need for flexibility in relation to congestion and how dynamic grid tariffs could support this. Here is a link to the project.

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Peer-to-peer markets

In peer-to-peer (P2P) markets, prosumers and consumers can trade energy amongst each other. Although these markets have only yet emerged in experiments and there has not yet been decided on the best suited market design, centralised trade platforms, operated by a third party, seem to be the preferred option. Energy communities could then also facilitate the P2P trade by playing the role of platform owner and operator.

 According to the new Dutch energy law:
Prosumers are allowed to supply energy to other consumers or prosumers without a license, if the total annual energy supply is not larger than the energy injection into the grid. (Art 2.19 1b)

 Implementation in multiple phases. To do these activities, energy communities need to be officially acknowledged as energy communities, for which they must notify the Flemish regulator and give yearly updates. Yet to come:

- 2022: regulatory framework for energy sharing in collective buildings
- 2023: energy sharing in energy communities + P2P trade of green energy, with initially the requirement that all people involved have the same back-up supplier, which can be later alleviated.

More information can be found here.

Apart from regulatory changes in favour of the peer-to-peer trade, the current tariff structures including high taxes and grid costs also need to be reformed as well to get feasible business models.

Capacity markets

The purpose of capacity markets is to guarantee the long-term security of supply by incentivising investments. European regulation restricts the electricity market design to a so-called 'energy-only' design, in which there is no place for capacity markets. The 'energy-only' markets are the futures/forwards, spot and balancing markets. Yet, it is heavily discussed whether such an energy-only market design could sufficiently guarantee supply security, especially on the long-term. Therefore, some European countries have introduced capacity markets, which incentivize investments in new capacity. According to European law, these markets are only allowed temporarily and need to be suspended when supply security in the countries is no longer at risk.

CONCLUSION

The required scale and professionalism hinder community participation in electricity markets. Yet, translation of the European directives into national law will open doors for increased market participation. Nevertheless, some markets will remain more relevant than others for energy communities. Important is to not lose ambitions because of the many barriers, but to stay positive and focus on the things that communities already can accomplish in the current energy system, or as Ecostroom would say:

> *"At the moment, we are too small to participate in all of these markets, but we do big things in our way, and that's enough."*

Acknowledgements

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