

Citizen-led energy democracy Experiences of Energy Communities:

Technical aspects of Energy Communities grid connection

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What are Energy Communities?

Energy Communities (EC) are legally recognized collective energy management models that bridge the gap between the individual consumer and the energy market.

Definition and framework

- **What is EC?** — A legal entity that enables citizens, entrepreneurs and the public sector to jointly produce, store, share and sell energy.
- From DSO's point of view, only network users and their connection points (PoC), where smart meters are installed are recognized.
- **Legal framework :**
 - The Law on Energy (amended in November 2024) formally introduces and regulates EC in Serbia for the first time.
 - It has not been implemented through the necessary by-laws, as well as through the new Rules on the work of the DS, which the DS should adopt during this year.
- **Difference from prosumer and active user:**
 - EC enables joint projects of greater capacity, cost sharing and wider social impact.
 - There is temporal decomposition, because prosumers and active users are already on grid.

Key features:



Democratic governance

"One member, one vote" — the goal is to benefit the community, not to maximize profits.



Collective capacities

Joint investments in renewable energy sources instead of individual solutions.

There is a need to pay special attention to the optimization of the necessary production capacity and its operation.



Multiple actors

Citizens, local self-government, public institutions and entrepreneurs — partners in one community.

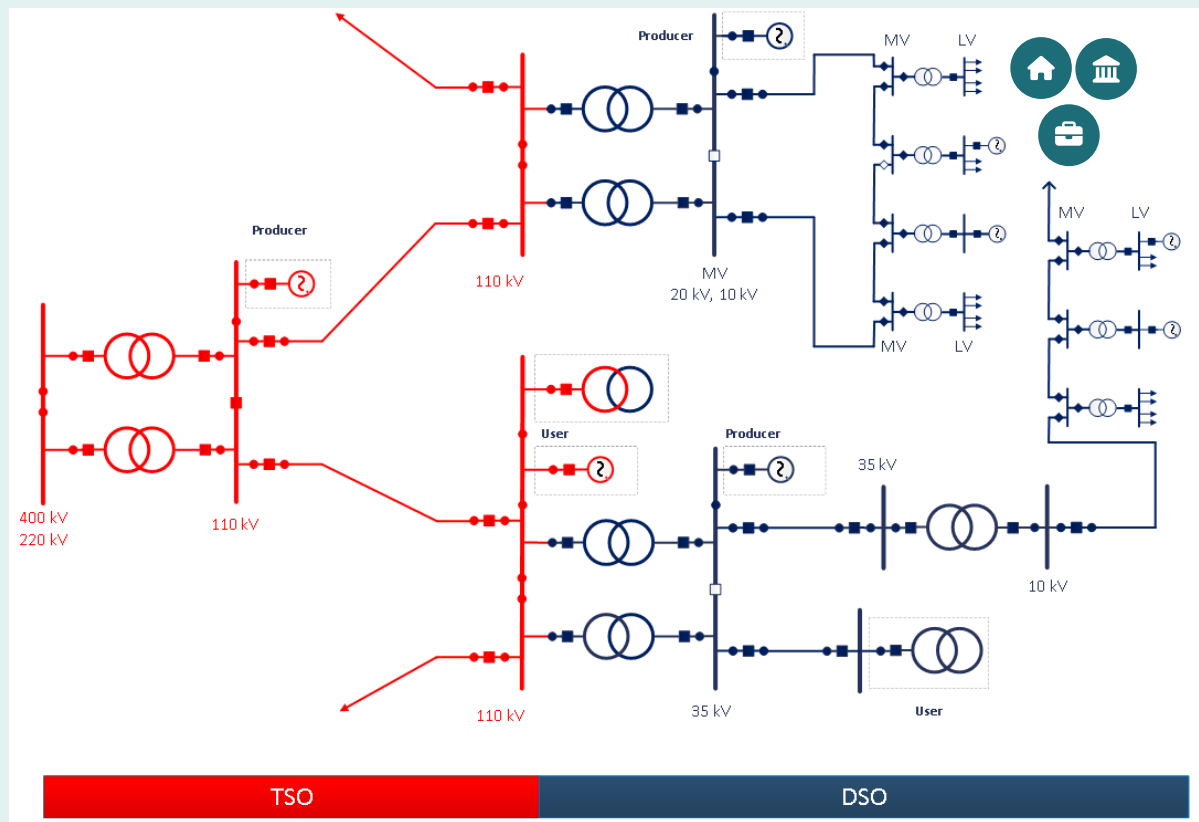
The classification of participants in one society does not correspond to the classification of electricity distribution network users.

Green agenda paradigm:

**Renewable (green) energy
should be available to everyone
in a society.**



Electric network concept (TSO - DSO)



DSO's territorial organization



Possible EC members

- Location owner
- Consumer
- Support member
- Active user



Geographical condition

Not limited by territory
DSO: 5 Distributio Areas, 34 Branchies

Who cannot be a member?

Energy entities whose main activity is energy.

Activities and Functions of the Energy Communit

Energy Communit is not only an energy producer — it is an operational platform for managing local energy resources.



Energy production

Solar power plants, wind generators, biomass — joint capacities of higher power instead of individual investments.



Energy storage

Common systems for battery storage.



Energy sharing

Distribution of electricity between members through the public network; energy sharing models.



Microgrid management

Local energy infrastructure and consumption balancing.



Sale of surplus energy

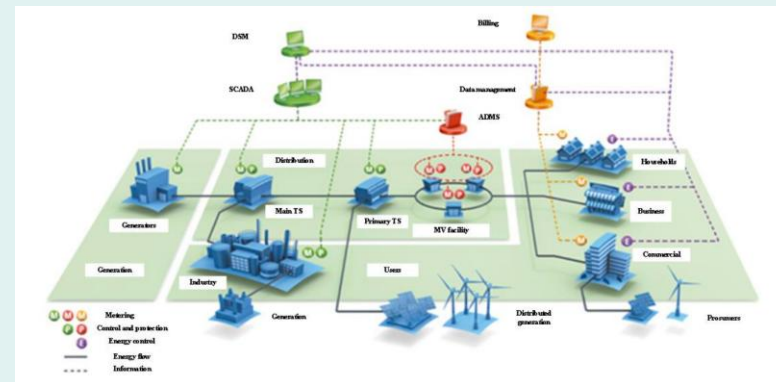
Placement of unused electricity on the market.
„Zero“ injections into the distribution network are not desirable due to EC's market approach.



Energy service

Provision of services on the electricity market, independently or through an aggregator.

„Smart Grids“ concept



Geographical proximity within which final consumers are allowed to participate in an energy sharing initiative:

For ECs located with resources at LV network, it is exclusively prescribed to belong to common area of the substation MV/LV.

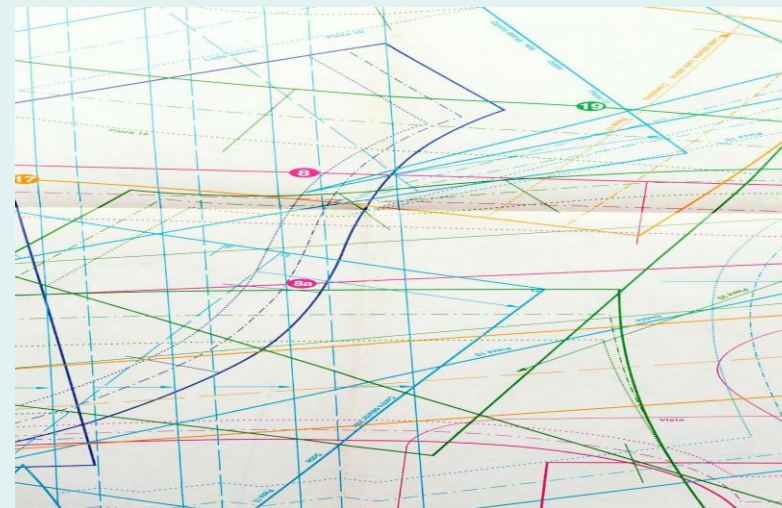
For larger capacities of EC installed on the MV network, it is possible to stipulate that they belong to the area of a local community or region (city).



Type or size of the installations that may be used for renewable energy production:

In the initial period, the connection of EC to the LV grid should be limited to 100 kW with a prospective connection of 400 kW in some cases.

On the MV network, the approved EC connection power must be limited to a maximum of 3 MW when it comes to the 10 kV electrical distribution network. Of course, the principle of "localization" is satisfied, i.e. belonging to a specific area or region.



Advantages and Benefits

EC simultaneously bring economic efficiency, ecological contribution and strengthening of local resilience.



Economic benefits

- Lower energy costs through economies of scale.
- Joint ventures lower the price per kWh.
- Division of investment costs between members.
- Local income and retention of value in the community



Ecological benefits

- Accelerated transition to renewable energy resources.
- Reduction of CO₂ emissions at the local level.



Social benefits

- Democratic energy management — empowering citizens and local actors.
- Reducing energy poverty through a collective approach.
- Strengthening trust and cooperation in the local community.

Limitations and Challenges in the Republic of Serbia

The legal framework exists, but implementation lags behind — key risks are regulatory incompleteness and limited capacity of local actors.



Geographical and spatial restrictions

- The condition of the same local self-government narrows the potential, especially in rural municipalities. This applies primarily to LV networks.
- In the case that EC are connected to the MV network, it is necessary to extend the possibility of connection to one city, which as a rule includes several municipalities.
- Avoid defining the spatial extent of connection.



Electric grid limitations

- It is necessary to ensure that the connection to the LV network is exclusively carried out in the area of one substation MV/LV.
- When connecting to the MV network, it must be performed exclusively on one MV feeder or adjacent parts of the MV network that is supply from one primary transformer station.



Impact on the operation of the electrical network

- Optimization of the resources belonging to the EC, will lead to a favorable impact on the reduction of losses and better voltage conditions.
- The realization of EC will enable the controlled penetration of DERs within the electric distribution network while achieving optimal impacts on the electric network.