

energy systems of the future

INESCTEC

FEUP Main Auditorium

May 29 ○ 14h00

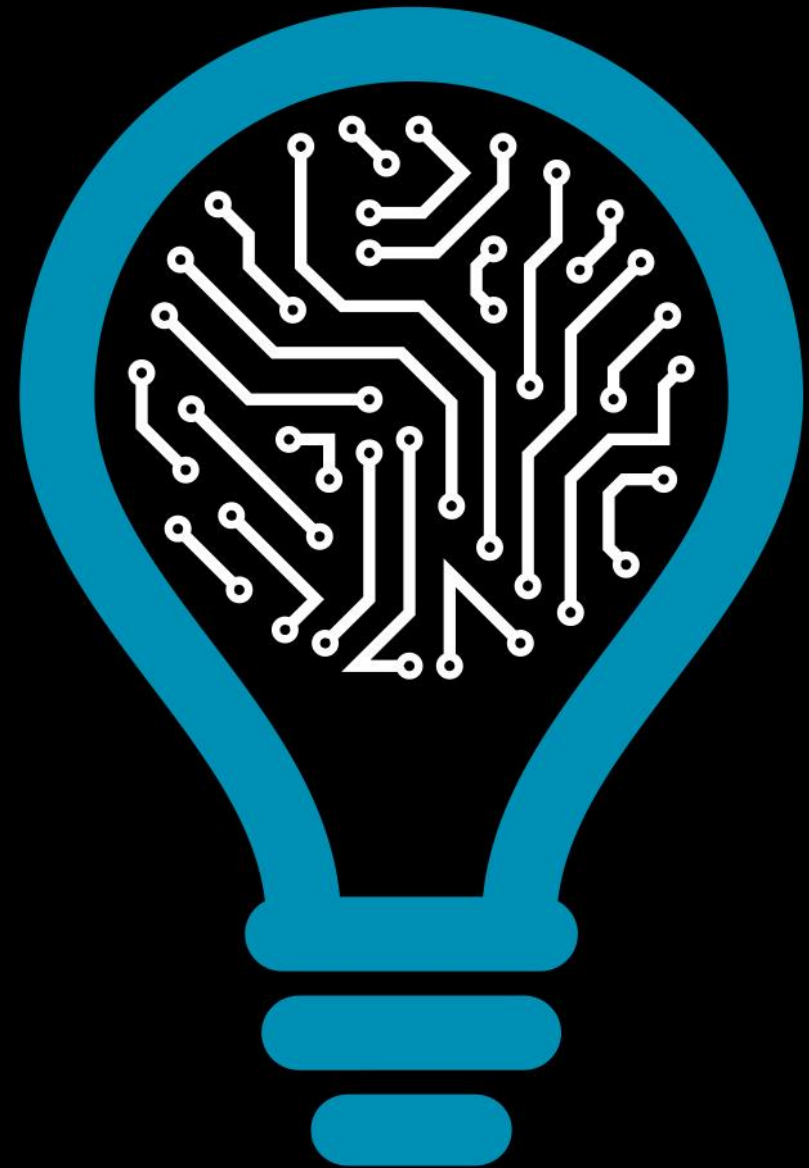


The next revolution in the energy sector: buy and sell of energy!

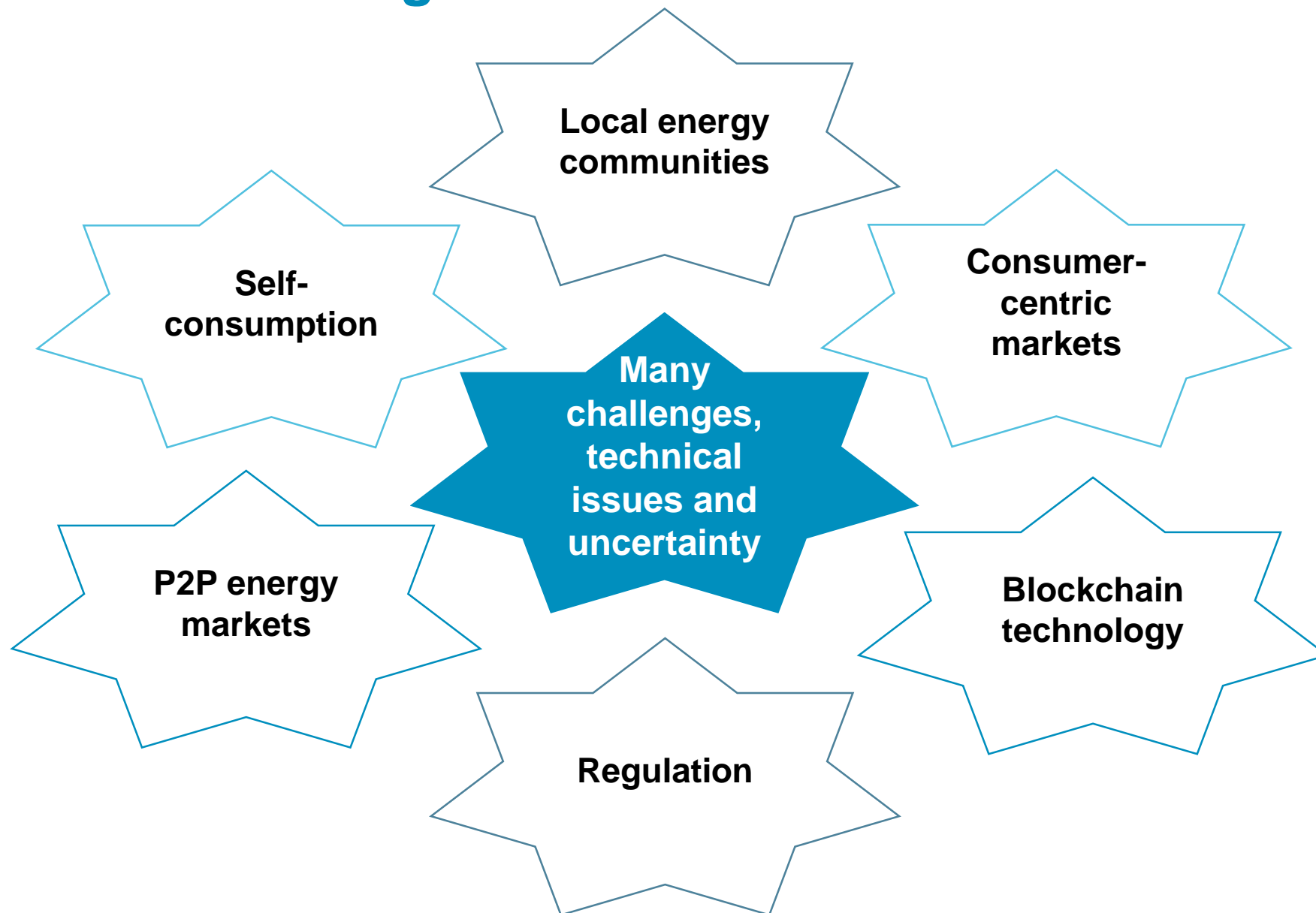
Jose Villar, jose.villar@inesctec.pt

Energy Systems of the Future, FEUP, Porto

29th May 2019



What are we talking about





Local energy communities

A blue-outlined starburst graphic containing the text "Local energy communities".

Local energy communities

- **EC** (D. on common rules for the internal market in elec, Art 2, feb 2017):

“an **association**, a cooperative, a partnership, a non-profit organisation or other legal entity which is effectively **controlled by local shareholders** or members, **generally value rather than profit-driven**, involved in **distributed generation** and in performing **activities of a distribution system operator, supplier or aggregator** at local level, including across borders”.
- **Key processes for their emergence:** (Models of Local Energy Ownership and the Role of Local Energy Communities in Energy Transition in Europe, European Committee of the Regions, sept 2018):
 - **Remunicipalisation:** increasing municipal control over local energy management
 - **Devolution:** increasing the strategic and political role of local authorities in energy policy;
 - **Participative governance:** promotion of direct democracy and citizens’ influence on energy and climate policies.

Stakeholders' positions

The EU Clean Energy Package, FSR, <http://fsr.eui.eu/publications/the-eu-clean-energy-package/>

EURELECTRIC:

- positive discrimination of LEC at the expense of other consumers and actors in the energy system must be avoided
- should not be exempted from market obligations such as balancing responsibility or cost-reflective network charges.

CEER:

- LEC definition should be refined.
- Participation in LEC should be strictly voluntary
- members must not lose their rights, including the right to leave the LEC and switch supplier quickly
- legal responsibility must remain with such communities even if management is delegated
- LECs must be subject to appropriate network charges at the connection points, that should account separately for the electricity fed and consumed

EDSO:

- some rights and obligations of LECs potentially contradictory (regulated network operation vs unregulated supply). For (regulated) grid activities same conditions as to the DSOs should apply, including compliance with unbundling rules.

REScoop:

- definition should clearly distinguish LEC from traditional public and commercial energy companies
- open, non-exclusive, economic participation of all potential local shareholders, with direct democratic governance.
- reduce the emphasis on the link to distribution system operation, to avoid present LECs as DSOs
- role of LECs in addressing energy poverty, particularly in national energy action plans, should be better acknowledged.

BEUC:

- LEC should be granted a simplified access to wholesale markets.
- Market access exemptions for LEC to facilitate consumers' engagement in energy markets.
- When acting as aggregators, contractual relationships should be purely voluntary for tenants

Stakeholders' positions

The EU Clean Energy Package, FSR, <http://fsr.eui.eu/publications/the-eu-clean-energy-package/>

EURELECTRIC:

- positive discrimination of LEC at the expense of other consumers and actors in the system must be avoided
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CEER:

- LEC definition should be refined.
- Participation in LEC should be strictly voluntary
- members must not lose their rights, including the right to be heard
- legal responsibility must remain with such communities
- LECs must be subject to appropriate network charges for electricity fed and consumed

EDSO:

- some rights and obligations of LECs potentially conflicting with those of DSOs (regulated) grid activities same conditions as to those of DSOs

REScoop:

- definition should clearly distinguish LEC from traditional public utility
- open, non-exclusive, economic participation of all potential local actors
- reduce the emphasis on the link to distribution system operation
- role of LECs in addressing energy poverty, particularly in national energy action plans better acknowledged.

BEUC:

- LEC should be granted a simplified access to wholesale markets.
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- **Definition should be refined**
- **Voluntary participation**
- **Consumers rights preservation**
- **Democratic governance**
- **Not exempted from balancing or network charges**
- **Concern about unbundling rules**
- **Reduction of market barriers**



Success factors of local energy communities

*Models of Local Energy Ownership and the Role of Local Energy Communities in Energy Transition in Europe, European Committee of the Regions
<https://cor.europa.eu/en/engage/studies/Documents/local-energy-ownership.pdf>, sept 2018*

- Successful uptake of the local energy models **depends upon**:
 - A **clear political commitment to energy transition** and stable policies for the development of RES at all governance levels;
 - A **clear legal framework** that governs the establishment, functioning and access to the energy market for local energy communities;
 - **Access to financing instruments** or partnership schemes for de-risking the investments;
 - **Synergies** and partnerships **with local and regional authorities** (LRAs).

Regulation!

- **Most EU countries lack a legal definition of a ‘local energy community’, ‘energy cooperative’ or related concepts.**



Regulatory skepticism

<http://blogs.law.columbia.edu/climatechange/2018/02/21/blockchain-and-electricity-trading-in-praise-of-regulatory-skepticism/> feb 2018

Progressives: green and close to people, mean to democratise energy and escape from traditional utilities.

Liberals: focus on the individual rights of producing its own energy and becoming personal entrepreneurs in an over-regulated world they dislike (more patent in the electricity industry).

1. Unnecessarily more expensive as a path to decarbonization:

- Rooftop solar generation **costs** $\approx 4 \times$ utility scale solar costs
- Rooftop solar + **net metering** shifts grid costs from well-off to the less well-off.
- P2P all-renewables energy markets require **battery storage** (still expensive) for cloudy periods.

2. Blockchain trading may not do a better job for P2P than existing systems.

- Blockchain's ledger reduce **transaction costs** (no market oversight) with a secure, transparent platform.
- Could only make economic sense with a **cryptocurrency** (like bitcoin): enormous energy consumption
- Keeping **balance** and preventing **markets manipulation** may be more difficult in a P2P market.
- Transparent transactions, but not transactors identity: prevents or facilitates **fraudulent transactions?**

Advantages and disadvantages

- **Grid**

- Micro-generation penetration
- Reliability and resiliency
- Losses reduction and investments deferral

- **Market**

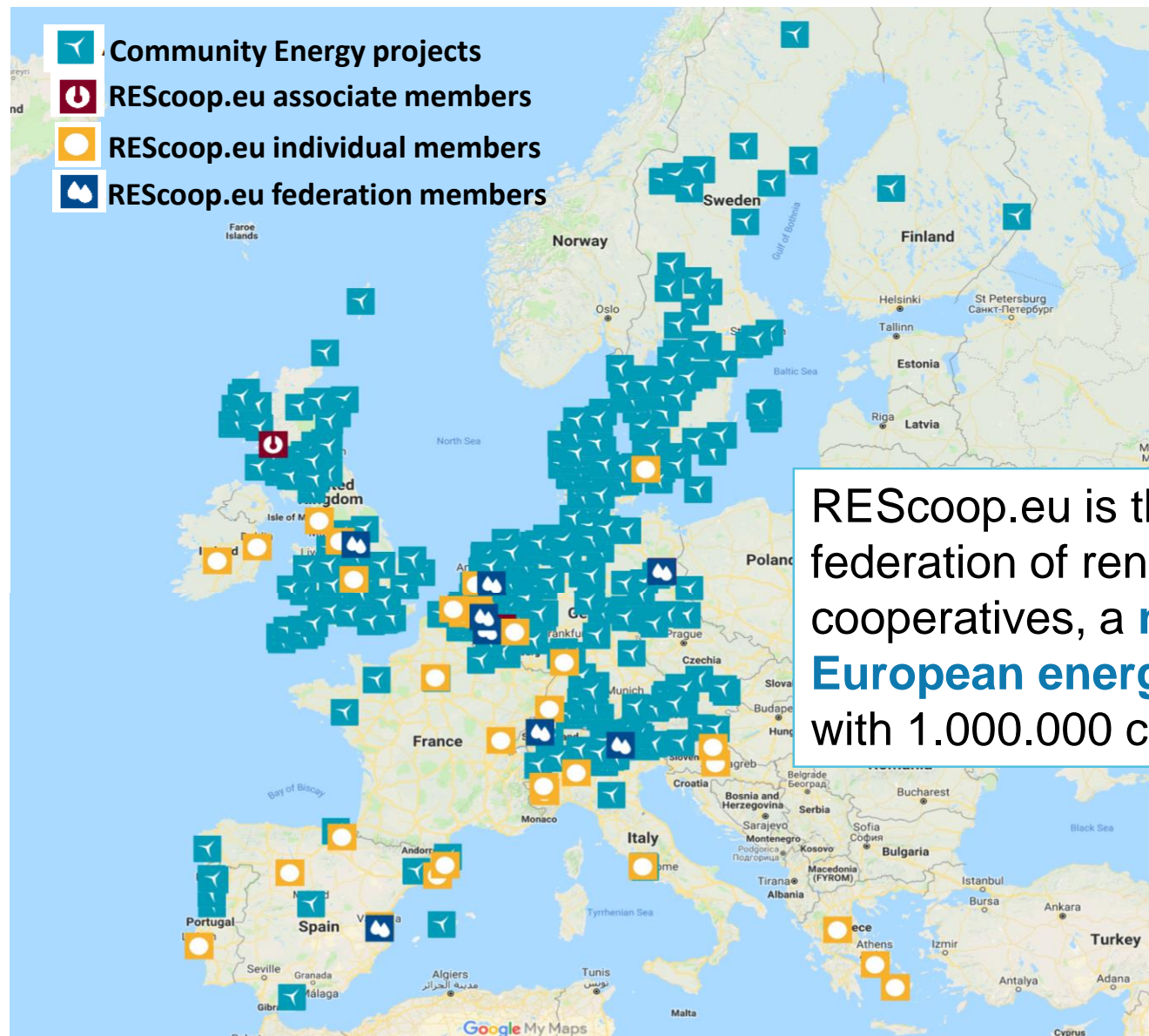
- Barriers
- Competition
- Demand and supply matching
- Personal preferences
- Smart contracts





- Centralized vs distributed
- Regulation in process
- Lower guarantees for participants
- Similar to well designed tariffs
- Grid impact

- **Social**

- Social cohesion, sense of community
- Collective organization towards fighting climate change
- Against traditional monopolies
- Contributes to decarbonization targets

Local energy communities in the EU

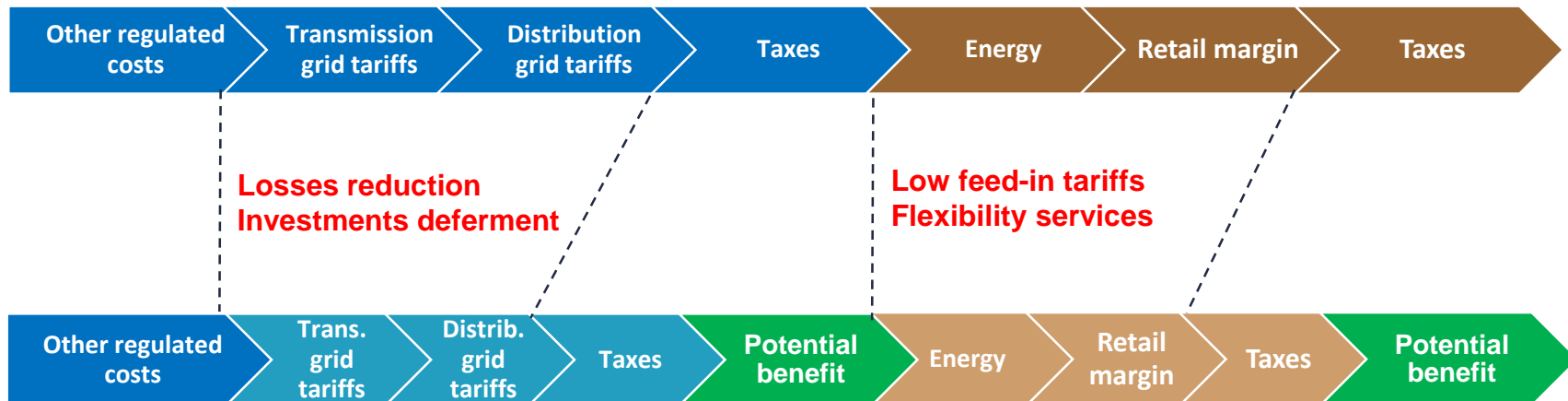
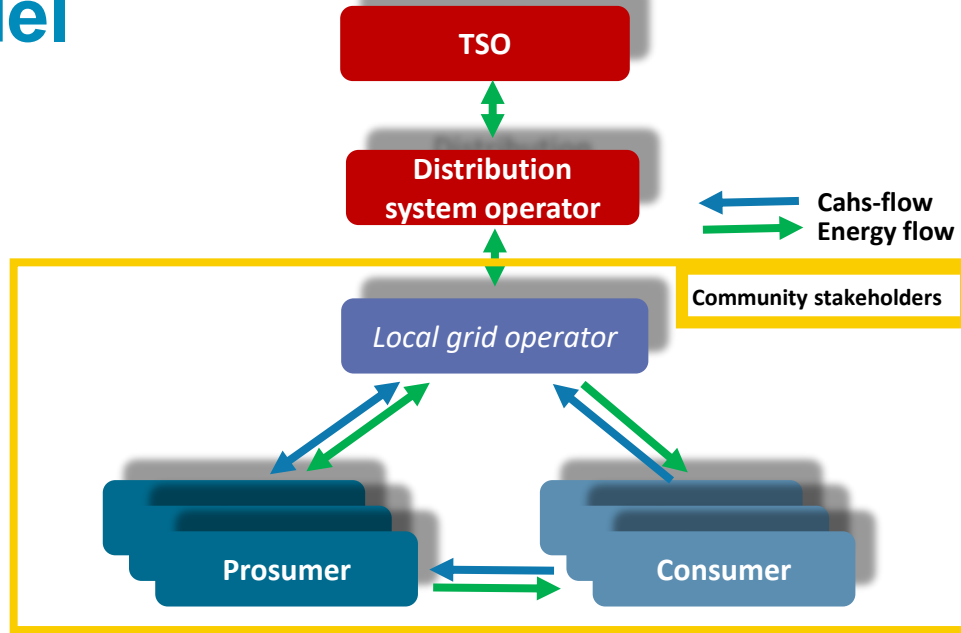


-  Community Energy projects
-  REScoop.eu associate members
-  REScoop.eu individual members
-  REScoop.eu federation members

<https://www.rescoop.eu/>

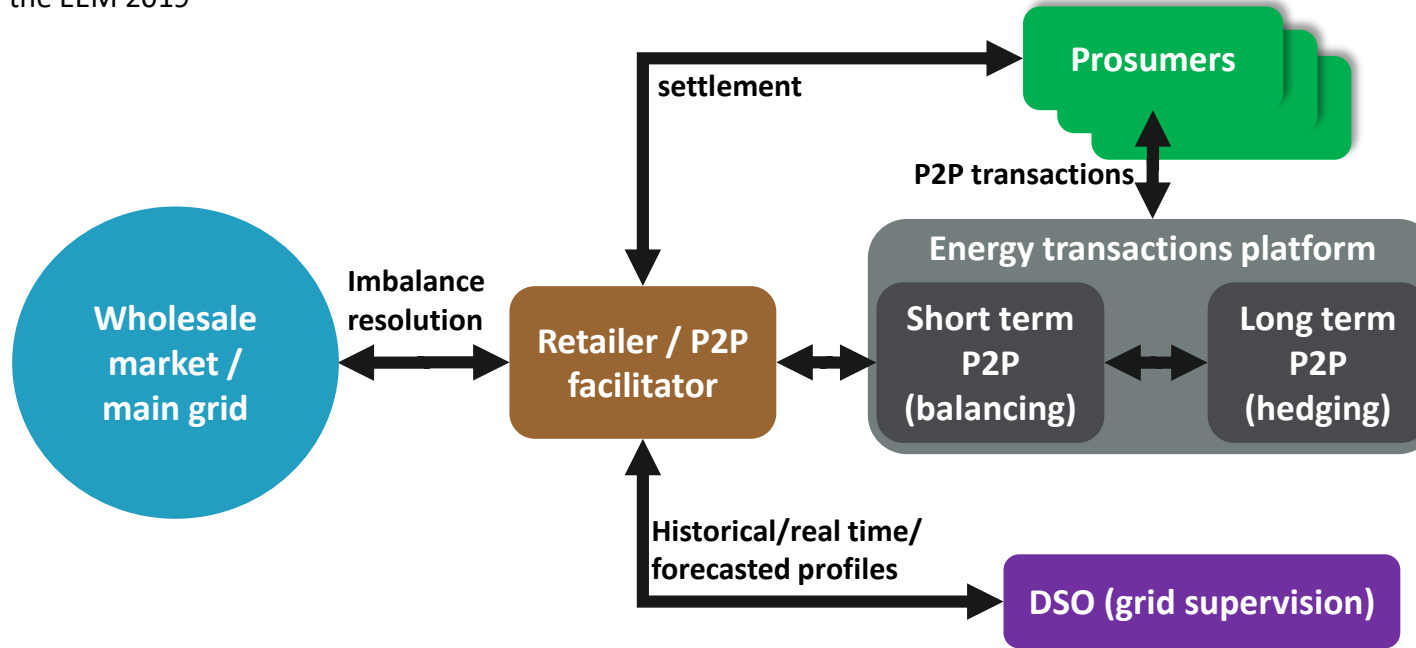
REScoop.eu is the European federation of renewable energy cooperatives, a **network of 1,500 European energy cooperatives** with 1.000.000 citizens.

Business model



Business model

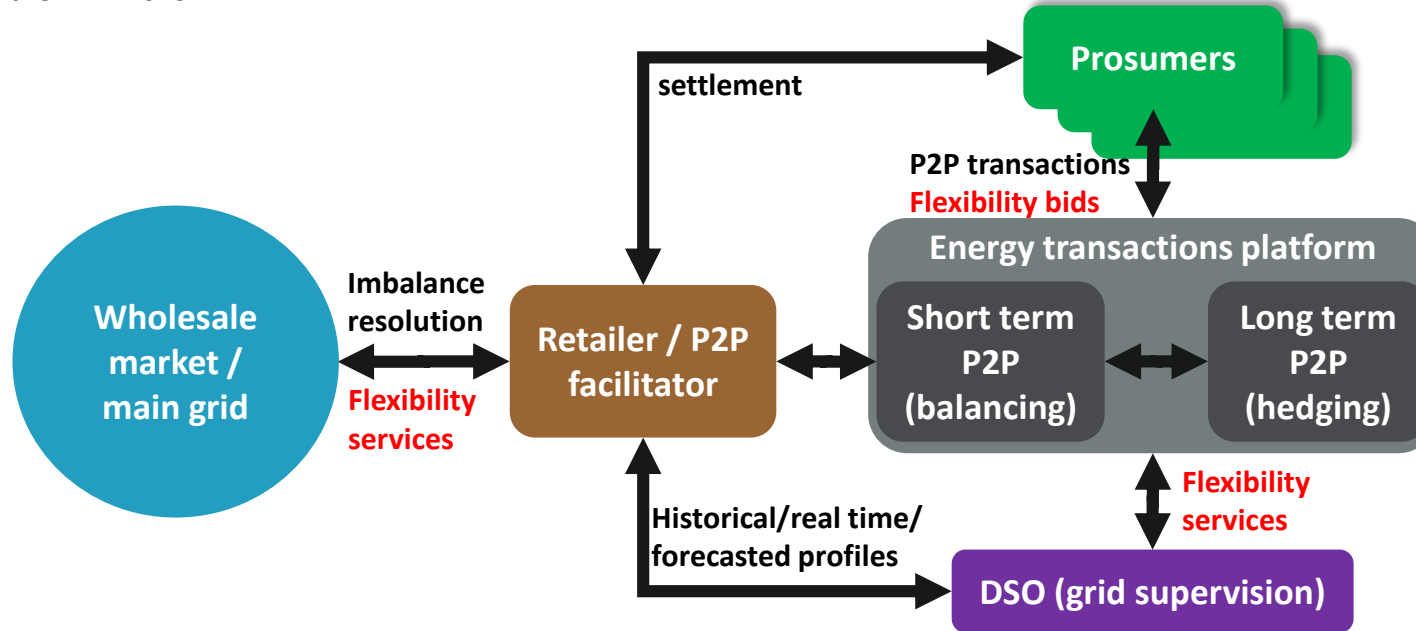
To be submitted to the EEM 2019



- The retailer is also the P2P market facilitators.
- This facilitates the settlements needed: retailers-customers and P2P.
- If self-consumption is allowed, this system can already be set up.
- Retailer buys the final imbalance to the grid (based on forecasts and P2P information).
- Retailer can provide historical data and forecast to the DSOs for grid supervision
- DSOs guarantee the grid secure operation based on this additional information.

Business model

To be submitted to the EEM 2019



- In addition to P2P trading, customers could also offer flexibility products to the DSO
- Aggregated by the retailer they could also be offered to the global AASS markets

INESC TEC involvements

ESGRIDS (P2020)

- Regulation
- P2P business models and potential benefits

P2PChain (Internal initiative)

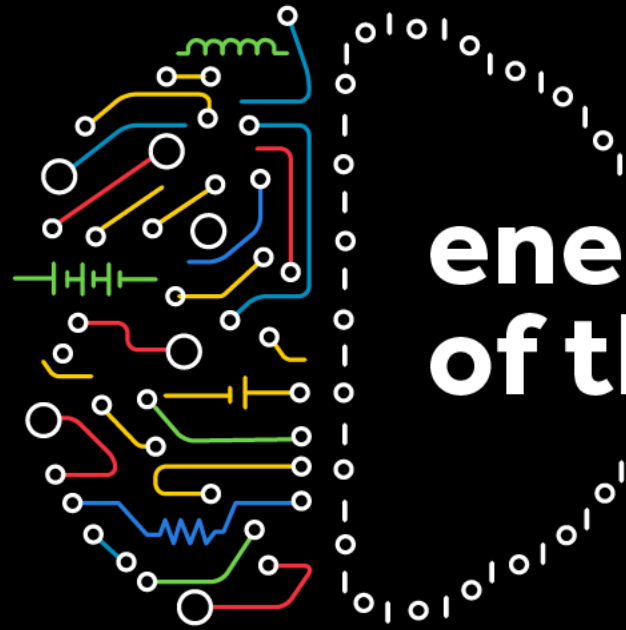
- Energy P2P market platform prototype
- Blockchain based
- Grid constraints

InterConnect (H2020)

- ICT infrastructure
- Interoperable marketplace toolbox
- Novel IoT reference architecture for interconnecting different digital platforms
- Aligns existing standards and ontologies like SAREF

Conclusions

- Decarbonization targets will be more easily reached if all available means are used, from centralized to distributed new capacity.
- Energy communities and local markets emerge as an additional way to promote distributed renewable generation, promoting active consumers participation and improving balancing.
- Therefore, a sustained growth of proposals and pilots for energy communities can be expected, which will add pressure to regulators.
- However, more research and cautious incremental experimentation are surely needed to support efficient regulation designs (fairness, sustainability, etc).



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