Demand Response Optimization in Buildings and Energy Communities

A case in value stacking

HOLISDER

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George Huitema (TNO)
Aliene van der Veen (TNO)
Vasiliki Georgiadou (TNO)
Michele Vavallo (SOLINTEL)
Moisés Antón García (ETRA I+D)

contact: george.huitema@tno.nl

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Demand Response Flexibility Services

- **Demand Response (DR)** relates to
  - programs that stimulates prosumers to make short-term changes in their energy demand.
- **Flexibility** at Prosumer level
  - ability of devices/applications to adjust the power it may take out of the grid or may feed into the grid over time.
- Positioning papers of **USEF Foundation (Universal Smart Energy Framework,** www.usef.energy**)** prove to be very useful. For a good understanding of
  - who can profit from demand-side flexibility
  - how it can be delivered (mechanisms, actors, value chain, markets)

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Demand Response Optimization in Buildings and Energy Communities
INTRODUCTION

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- Last few years demand response has been proved
  - **technically and economically viable** for large commercial and industrial prosumers
  - but **for residentials and tertiary users (for example buildings) it is still under development.**
- Many **residential pilots** have been setup to demonstrate that
    - together with adequate technology, flexibility on the demand side works
    - introduction of business applications is slow
- What next?

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CONCLUSION

- H2020 project HOLISDER (WP Business Innovation) shows that
  - energy flexibility products/services **are not commercial interesting on their own**
  - but certainly are **an add-on by cross value stacking** to regular energy services

- For groups of prosumers such as **energy communities**
  - cross stacking can **enlarge the awareness and commitment** within the communities
  - Thus play an important role in the **uptake of citizen communities** as promoted by the EU Clean Energy Package.

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Implicit Demand-Side flexibility

Ref. USEF Flexibility Value Chain

- Short-term responses **triggered by price signals** from the energy market belong to the domain of *Implicit demand-side flexibility*.

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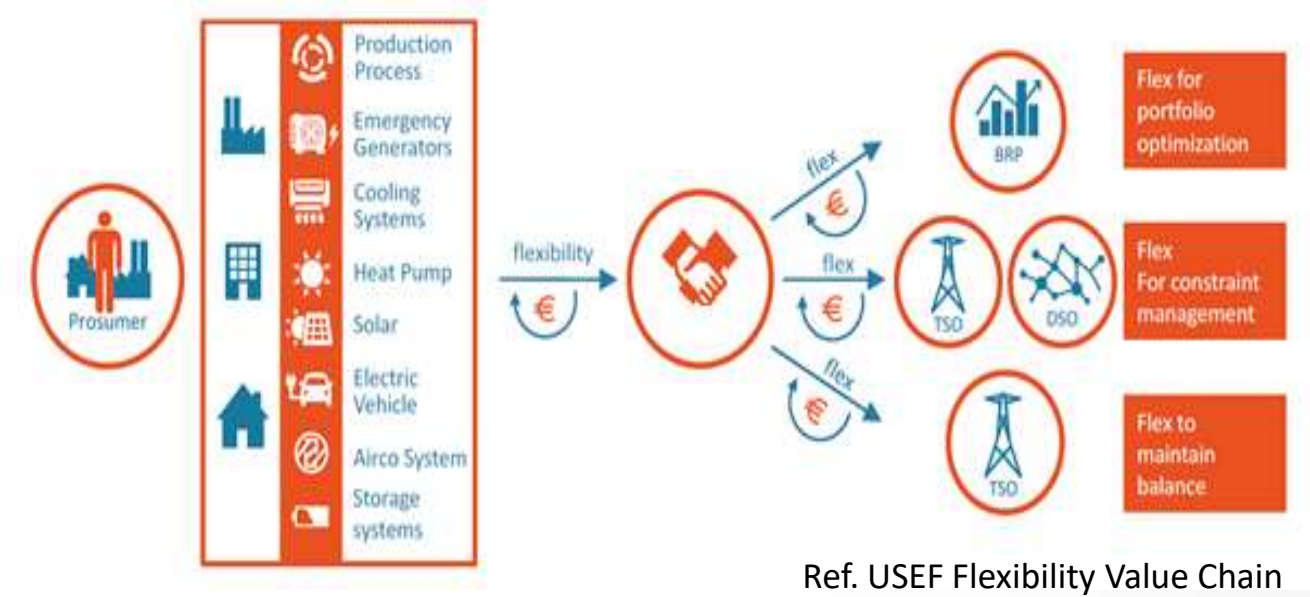
Explicit Demand-Side flexibility



Ref. USEF Flexibility Value Chain

- *Explicit demand-side flexibility* covers **flexibility services initiated by an energy party**, e.g. by the Balance Responsible Party (BRP) or the system operators: Transmission System Operator (TSO) or Distribution System Operator (DSO).

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- H2020 HOLISDER (lead Tecnalia, 2018 -2021): development of **holistic DR optimization framework**
  - to use and **combine** effective tools for **unlocking flexibility of residential and small commercial buildings**
  - HOLISDER System is based on an **“open” and modular end-to-end interoperability and data management framework** which enables open standards-based communication along the DR value chain
  - 4 different pilot sites with a mix of building owners and occupants, energy retailers, aggregators and facility managers
  - Energy flexibility products/services **are not commercial interesting on their own** but certainly are **an add-on by cross value stacking**

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Demand Response
Value stacking of Flexibility Services

- Enhancing the economics of investments in flexibility value chains regarding new technologies one may **bundle services**
- **Stacking of flexibility services** is possible on different levels such as in time, in pools and by double serving
    - Aggregators can maximize value by providing **multiple flexibility services** to one or more market parties based on portfolio of accumulated flexibility from a set of prosumers (Explicit case). In the implicit case one has for Prosumers the add-on value of stacking flexibility services.
- **Cross-value stacking:** on top of regular energy services (consumption or generation) offering of flexibility potential to an ESCo is **bonus** for Prosumers
    - more comfort or obtain less energy related (operational) costs (energy efficiency).

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Leveraging Energy Communities

- **Enhanced role of energy communities in the market**
  - Clean Energy Package (CEP) establishes Citizen Energy Community (CEC) as new energy market entity
  - driving forces: social cohesion, member acceptance and community well-being
    - guide decisions and promote business case continuous viability
    - by bundling seemingly unrelated services
- **Stacking of services in energy communities**
  - Members extract added value by stacking various services that match the community's local needs, both short and long term.
  - A CEC may choose to act
    - as **its own aggregator** and pursue a role within different flexibility markets.
    - simply **actively manage self-consumption and generation** (towards for example a Positive Energy District (PED).
    - **Bundling services** with peer-2-peer trading (see H2020 POCITYF,www.pocityf.eu)

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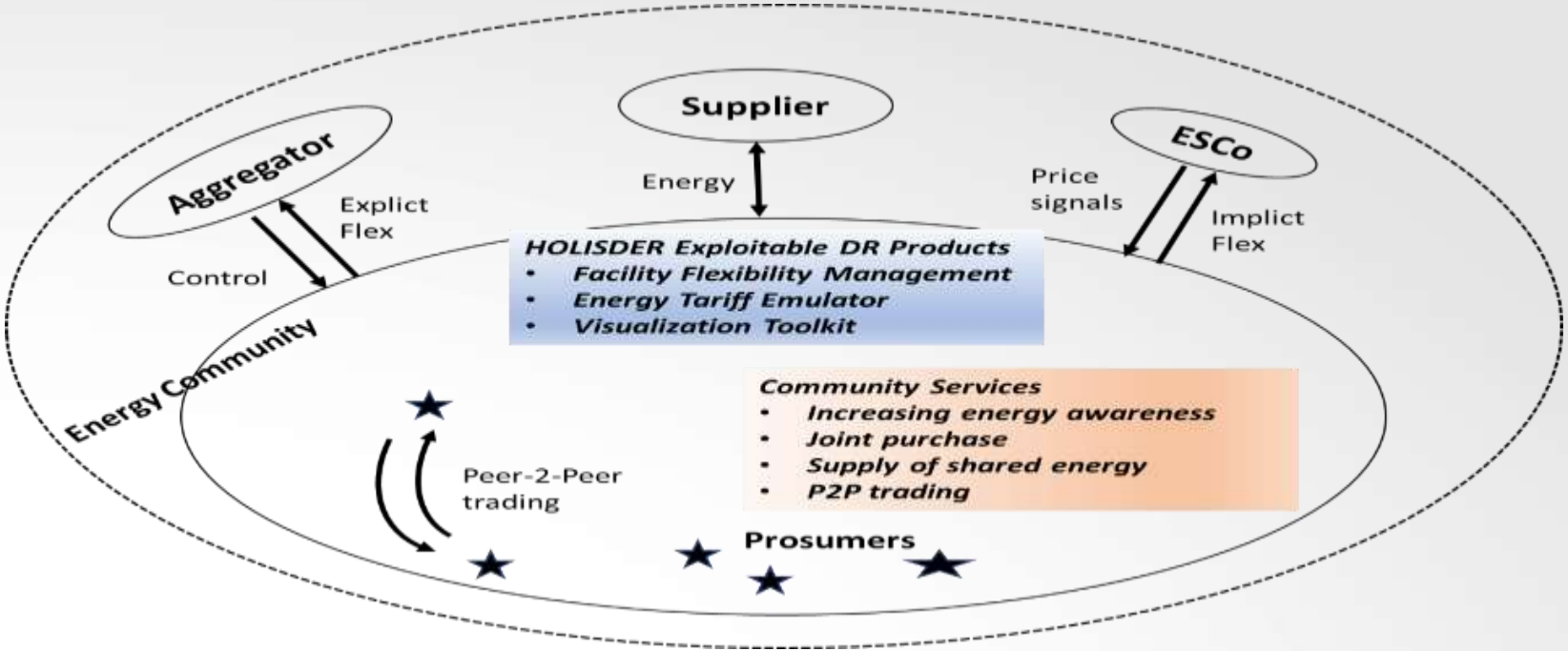
Overview Energy Communities Services



- **Community Services** offered to its own members (prosumers)
- **Energy services** and **stacking Flexibility services** that Energy parties can offer to the community as a whole.

(Dashed contour: energy community takes on the roles of the energy parties itself)

Demand Response Optimization in Buildings and Energy Communities
CONCLUSION

- To conclude,
  - energy flexibility products/services **are not commercial interesting on their own**
  - Around energy communities: the **value of demand-side flexibility is increased by** aggregating parties that perform **value stacking** by providing multiple services to other parties in the business eco-system

  - the **cross-value stacking of flexibility products** as promoted within H2020 HOLISDER project
  - can be an **important driver** for the uptake of Citizen Energy Communities (CEC) as envisioned within the EU defined Clean Energy Package

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Thank you!

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