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INTERACT - Integration of Innovative Technologies of PEDs into a Holistic Architecture

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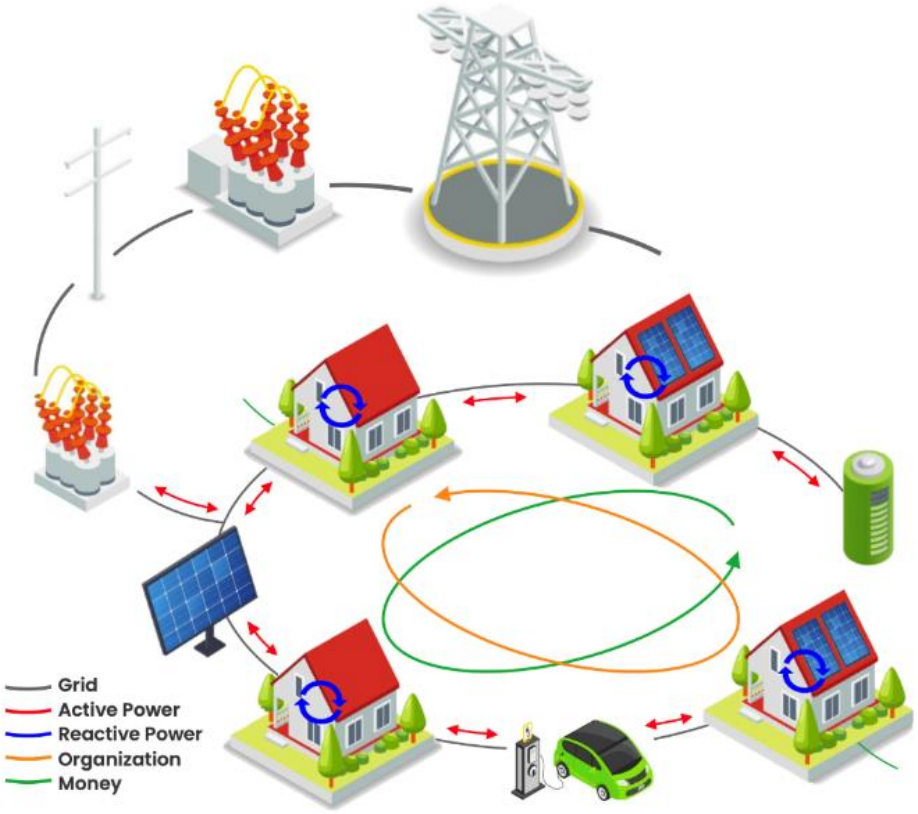
Introduction to INTERACT

- Develop a **roadmap** for the implementation of Energy Communities that operate in harmony with the grid based on
  - stakeholder analyses
  - PED best practices and success factors
  - a holistic technical system architecture
- Two pilot regions are analyzed:
  - existing village in Austria and
  - greenfield urban development project in Sweden.



Introduction to INTERACT

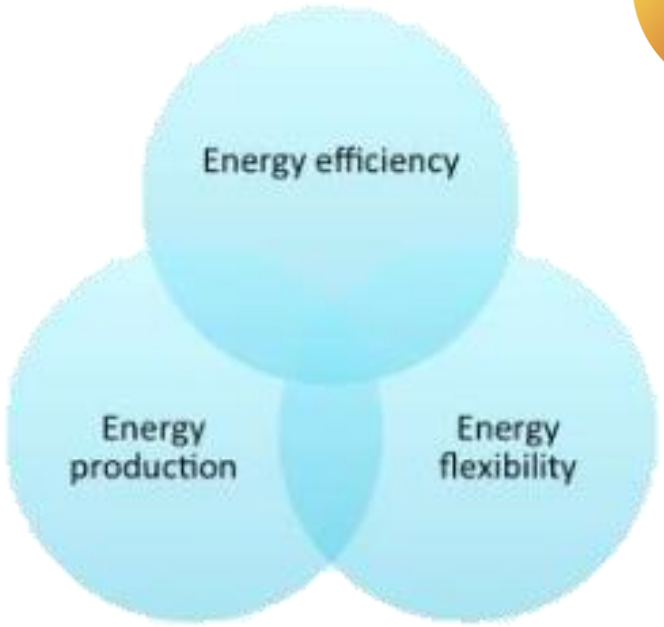
- **INTERACT** as transnational research project **is supported by** the Austrian Ministry of Climate Action, Environment, Energy, Mobility, Innovation, and Technology (BMK), Technology Agency of the Czech Republic (TAČR) and Swedish Energy Agency / Viable Cities, Sweden.
- It has received funding in the framework of the PED Programme, which is implemented by the Joint Programming Initiative Urban Europe and SET Plan Action 3.2. The project has been selected for funding in **Positive Energy Districts (PEDs) pilot call JPI Urban Europe**. See also https://jpi-urbaneurope.eu/ped/

- **Project Start**: February 2021
- **Planned Project End**: January 2023
- **Total budget**: 575.000 EUR

- **Project Partner:**

PEDs and Energy Communities

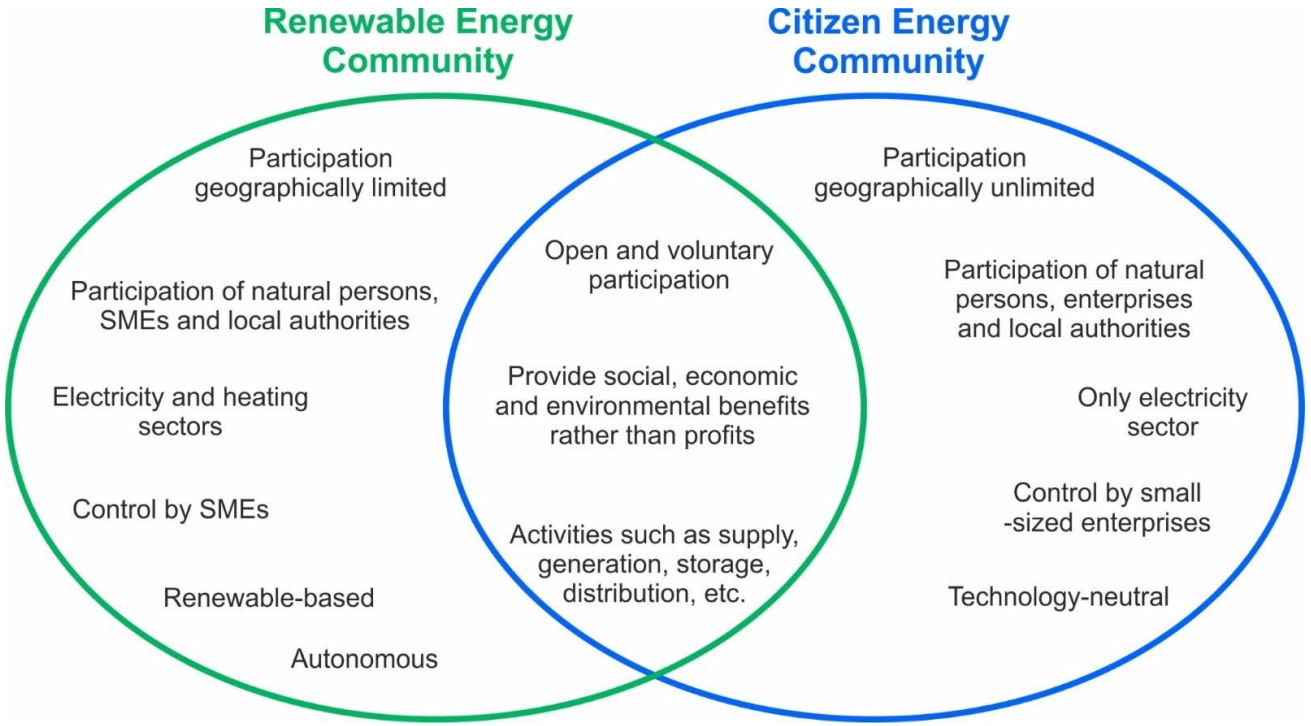
- **Positive Energy Districts** are energy-efficient and energy-flexible urban areas or groups of connected buildings which **produce net zero greenhouse gas emissions** and actively manage an **annual local or regional surplus production of renewable energy**.
- PEDs require integration of different systems and infrastructures and interaction between buildings, the users and the regional energy, mobility and ICT systems, while securing the energy supply and a good life for all in line with social, economic and environmental sustainability.



→**More about PEDs: https://jpi-urbaneurope.eu/ped/**

PEDs and Energy Communities

- **Energy Communities** organize **collective and citizen-driven energy actions** that will help pave the way for a clean energy transition, while moving citizens to the fore.
- By supporting citizen participation, energy communities can moreover help in **providing flexibility to the electricity system through demand-response and storage**.



Renewable and Citizen Energy Communities according to EU legislation.

Description from European Commission: “Energy Communities”, 14.12.2020

Legal Framework around ECs

- Renewable Energy Directive (EU) 2018/2001 (REDII) →Renewable EC
- Internal Electricity Market Directive (EU) 2019/944 (EMD) →Citizen EC
- EU Member States were obliged to transpose the provisions related to CEC by the **end of 2020** and the provisions for RECs by the **end of June 2021**.
- Status as of May 2022 in the project related countries:

		Definition implemented		
	Stage of implementation	**Renewable EC**	**Citizen EC**	**Coll. Self-Con.**
Austria	Implemented 07/2021	yes	yes	yes
Belgium	Draft proposal*	yes*	yes*	yes*
Czech Republic	Draft proposal	no	no	no
Sweden	Draft proposal	no	no	yes**

* The legislation is different for the 3 regions in Belgium (Wallonia, Flanders, Brussels).
** Collective self-consumption is allowed and implemented on several places in Sweden, mainly for putting PVs on multi apartment buildings. The term Collective self-consumption however is not commonly used and cannot be found in legislation.

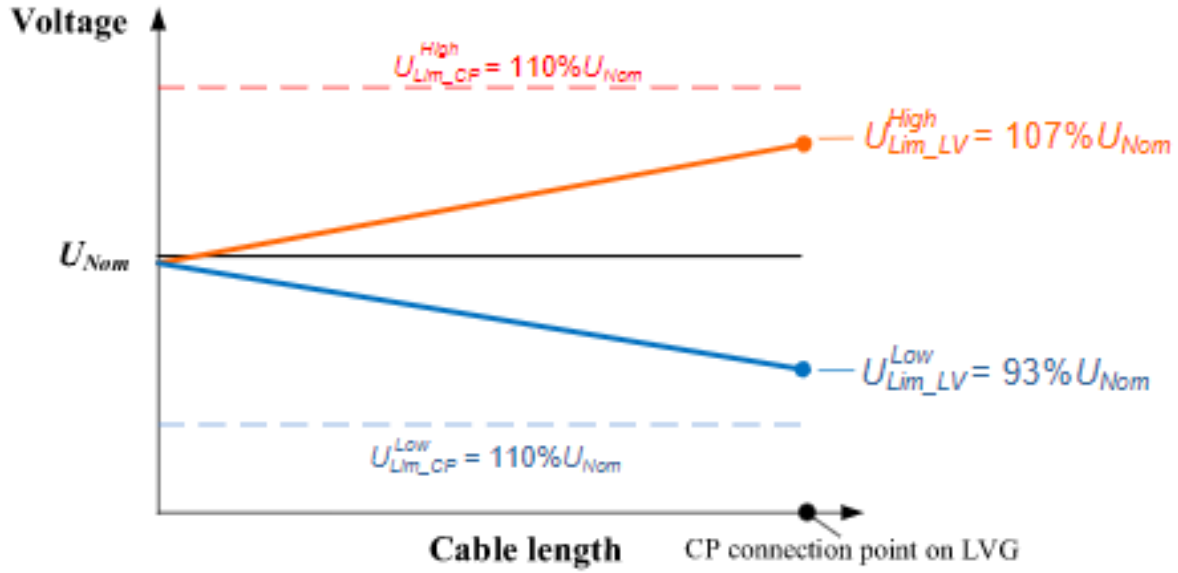
The INTERACT Energy Community

Extension of the definition of the Renewable Energy Community:

- 'INTERACT Energy Community' means a legal entity:
  a) based on open and voluntary participation; autonomous and controlled by shareholders/members located in the proximity of the renewable energy projects, owned and developed by that legal entity;
  b) shareholders or members are natural persons, SMEs or local authorities, including municipalities;
  c) primary purpose to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits;
  d) which establishes and operates local markets in harmony with the grids and other markets to enable active energy trading of the shareholders/members.

Why „in harmony with the power grid“?

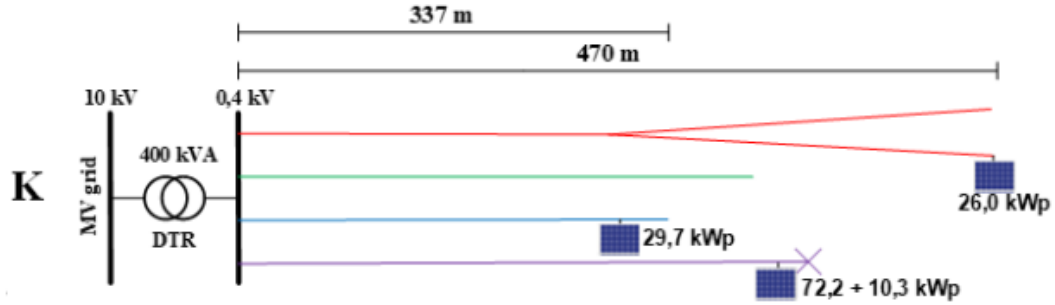
- The Power Grid is one system, where additional energy input and/or additional energy consumption leads to changes in voltage and/or frequency
- Tolerances in Low Voltage grid: 400V +/- 10%
- Tolerances in Building grid: +/- 3%



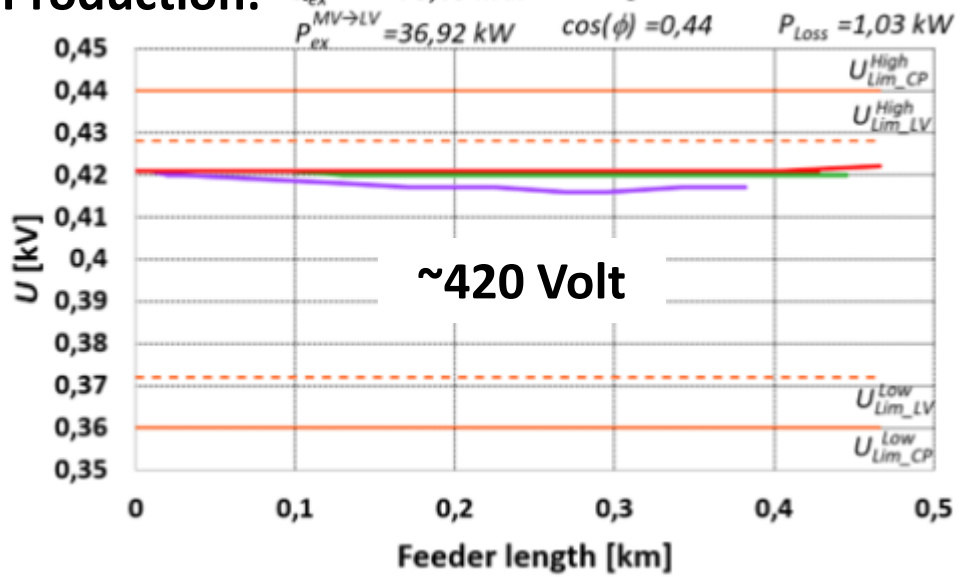
Voltage profile and limits in a low voltage feeder.

Grid Modelling for Pilot Site in Austria

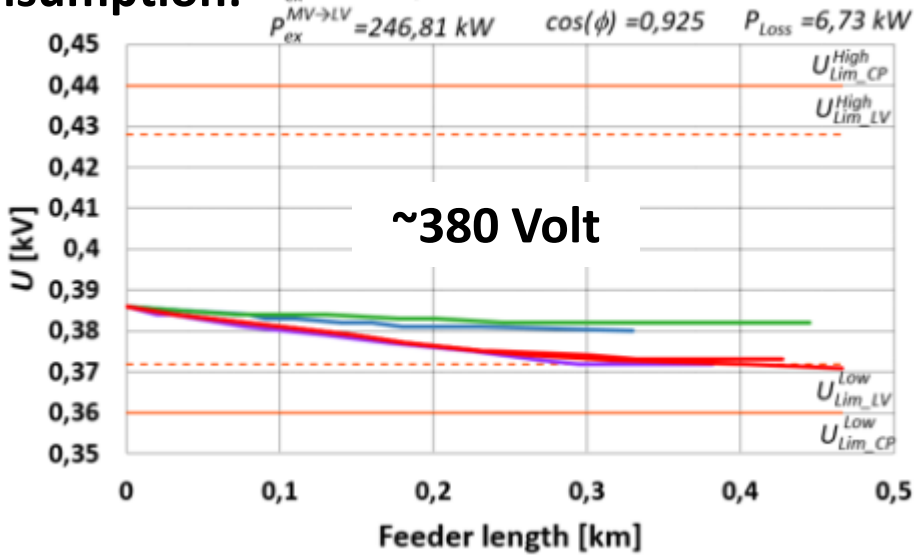
- Current Situation in Subsystem „K“ at Pilot site in Austria



At maximal PV-Production:



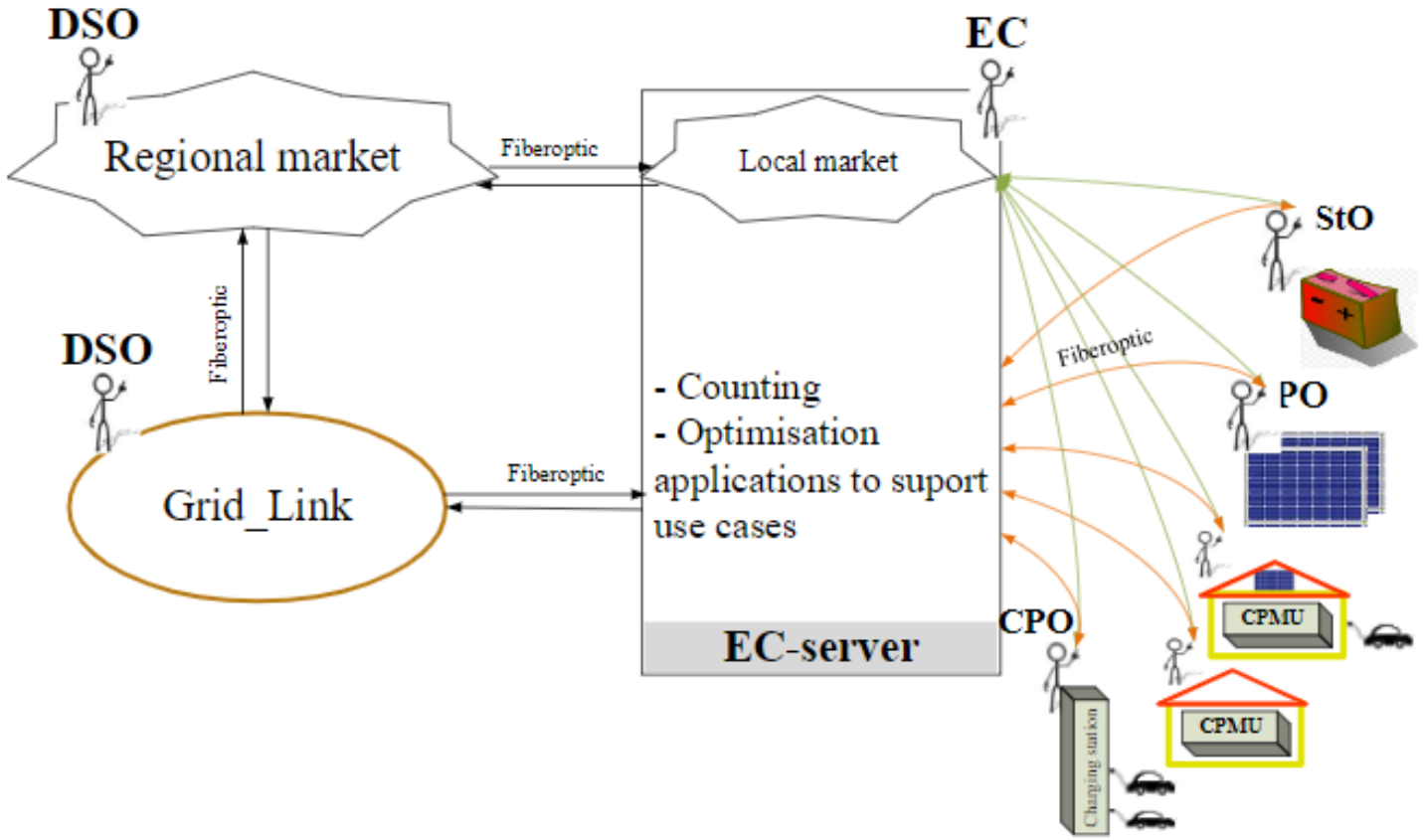
At maximal Consumption:



INTERACT solution: local optimization

We propose:

- Integration of EC´s and it‘s members into the power grid
- Local optimization based on same automized principles as the higher-ranking Voltage-Grids
- Usage of flexibilities from EC´s and it´s members to support the power grid

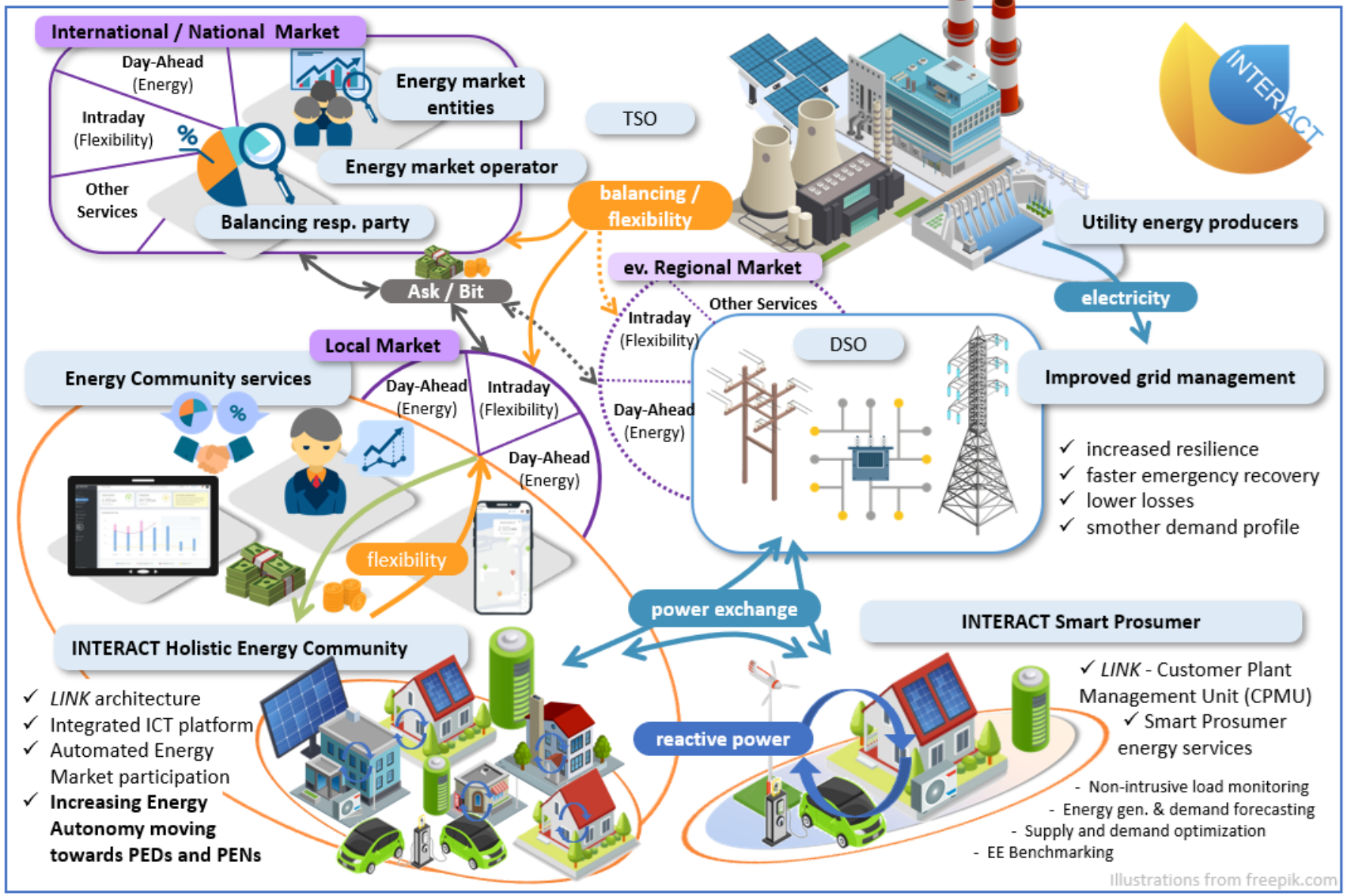


Overview of the ICT architecture for the *LINK*-Energy Community.

INTERACT solution

- To develop a roadmap how to implement the INTERACT solution, we did:
  - ✓ identifiy and describe **best practice PED projects** in AT, BE, CZ and SE
  - ✓ analyze **stakeholder needs** at the 2 pilot sites
  - ✓ develop **key success factors** for the EC and INTERACT EC implementation
  - ✓ describe **organizational structures**, activities and functions of Ecs
  - ✓ did the technical description and **grid modelling** at the pilot sites and
  - ✓ analyzed the current **legal framework** in relation to energy markets and ECs
- Furthermore, we will still:
  - ✓ describe the **use-cases** and **business cases,** and do an **economic evaluation**
  - ✓ define the **market structure** and how INTERACT ECs can be integrated
  - ✓ and summarize all results in a **roadmap** for interested pioneers and policy makers

Vision: Integrated Energy Community as a PED building block



INTERACT solution

→All Deliverables and all information:
https://www.ped-interact.eu/

Thank you for your attention!

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