FAST TRACK ON ENERGY COMMUNITIES

Enabling Technologies

eNeuron

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SUSTAINABLE PLACES 2021

Sep. 28 - Oct. 1, 2021 | Rome, Italy

eNeuron in a nutshells

SUSTAINABLE PLACES

Type of Action: Innovation Action

Number: 957779

Duration: 48 months

Starting date: 1 November 2020

Total Budget (from EU): € 5,731,117.50

Coordinator: ENEA

Technical Coordinator: FOSS (University of Cyprus)

Partners: 17 from 8 European countries: Cyprus, Germany, Ireland, Italy, Norway, Poland, Portugal and Spain

Pilots: 4 different multi-energy pilot sites across Europe with high complementarity to each other

GreeN Energy HUbs for Local IntegRated Energy COmmunities optimisatioN

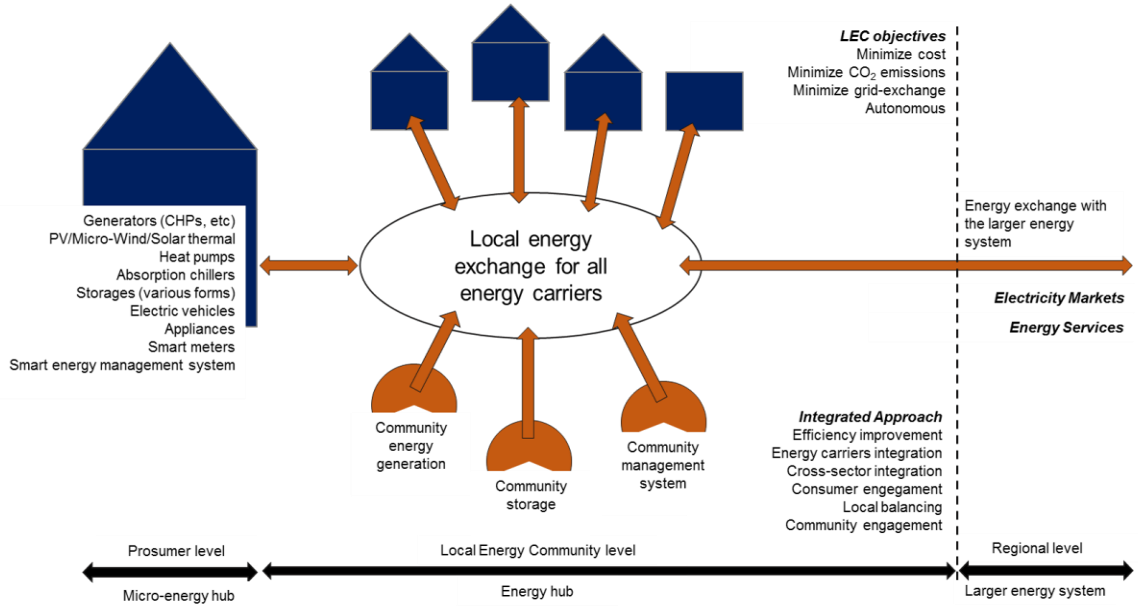
eneuron

- Develop **innovative tools for the optimal design and operation of local energy communities (LEC)** integrating distributed energy resources (DER) and **multiple energy carriers at different scales.**
- This goal will be achieved by having in mind all the potential benefits achievable for the different actors involved and by ensuring both the short-term and the long-term sustainability of this new energy paradigm and thus support an effective implementation through a multi-objective approach.

The main goal

- Develop a **cloud-based with a web-based user interface tool** for
  - the **long-term design optimisation of multi-carrier local energy systems**, aiming at identifying the optimal architecture of such systems, in terms of optimised configuration alternatives through a multi-objective approach to account for both technical, economic and the environmental priorities / objectives
  - the **optimal daily operation of the integrated systems through a stochastic approach**
  - the **simulation of peer-to-peer energy trading** to investigate the feasibility and convenience of the optimised scheduling strategies from the prosumers point of view in a local real time market employing block chain technology
- Offering a **set of functionalities for LEC** (e.g. minimizing CAPEX through optimal investments on RES and other assets), **operators** (e.g. local congestion management) and **prosumers** (e.g. activate demand response and energy sharing)

The eNeuron technologies



- eNeuron promotes the **Energy Hub concept**, as a conceptual model for controlling and managing multi-carrier and integrated energy systems in order to optimize their architecture and operation
- Synergies among energy carriers in the eNeuron integrated LEC are enabled by **connecting technologies**

Micro energy-hub connecting technologies:

- Heat pumps
- Hybrid heat pumps
- Electric boilers
- Electric chillers
- Electric cooling technologies
- Cogeneration and trigeneration
- EV charging stations (wall-box)

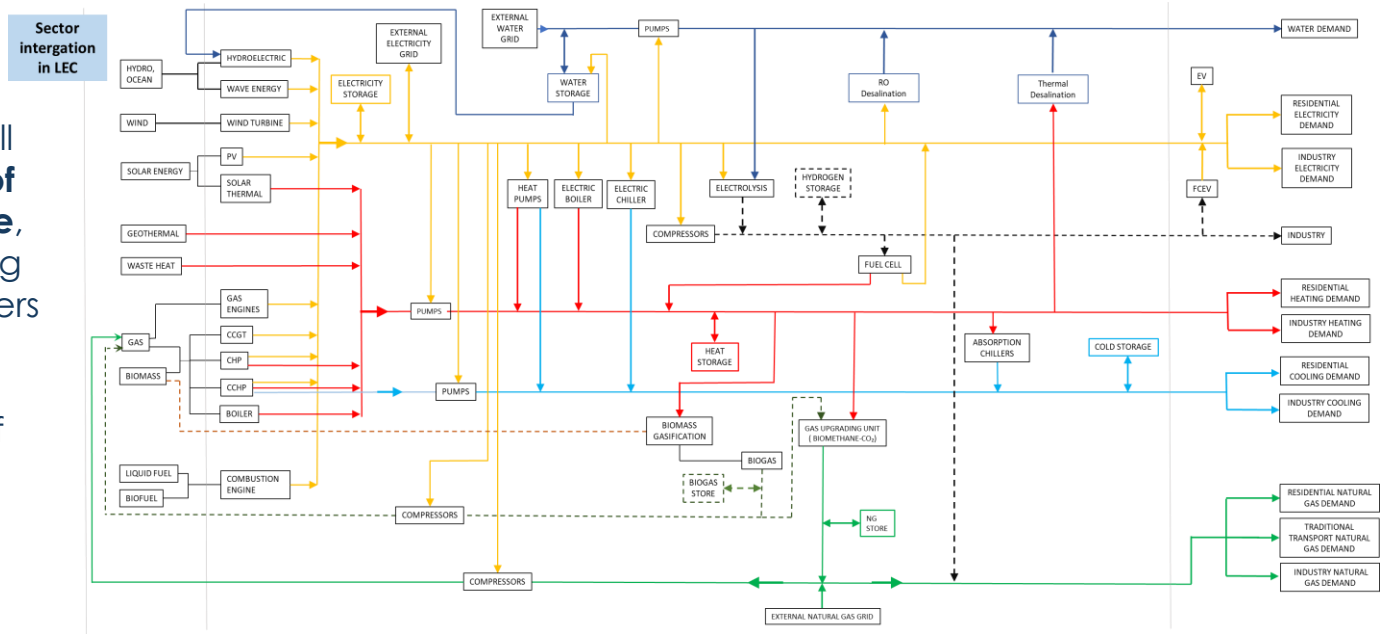
Energy-hub connecting technologies:

- Heat pumps
- Cogeneration and trigeneration
- Electrolyzers
- EV charging stations
- Electric Planes, Electric Ferries, Hydrogen transport such as trains, vessels, and lorries
- Desalination

Replication potential

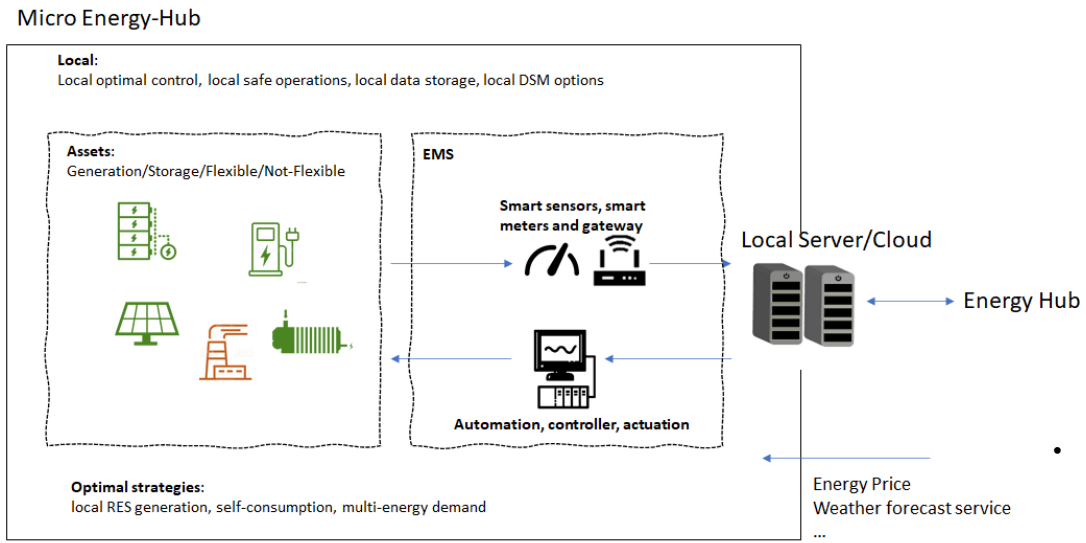
- **eNeuron optimisation tools** will be developed with a **general mathematical formulation**, by creating a **holistic framework for multi-carrier LECs** planning and operation
- The modular structure of the tools allow **detailed modeling of a number of technologies and energy flows**

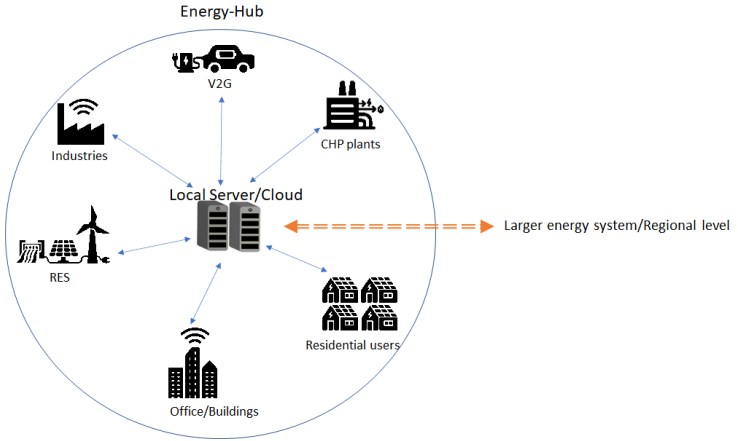
- This type of approach will ensure a **high potential of replication across Europe**, with a valid tool providing support to decision-makers in understanding the benefits derived by the optimal management of local energy resources



Role of ICT and AI in eNeuron LEC

- In eNeuron LEC, micro-energy hubs (mEH/prosumers) are provided with **energy management systems** (software and hardware) that, locally, **coordinate the operation of multiple carriers** accelerating the development of multi-energy technologies and improving the energy efficiency.





- The EH is composed of heterogeneous mEHs belonging to industrial, commercial and residential sectors and its aim is to **coordinate them and manage the multiple carriers to achieve the LEC objective**.

- **AI is the key for the long-term prediction** of energy consumption/production and load/demand forecast.

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eneuron
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