Positive Energy Districts (PEDs)
Annex proposal

Pekka Tuominen
Francesco Reda

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Background

- 2015 Paris Agreement (COP 21) & COP 24
- Cities account for ~70% of global CO$_2$ emissions
- UN Sustainable development Goal 11 – Sustainable cities and communities: supporting the transition towards low-carbon and inclusive cities to substantially increase the number of cities implementing highly sustainable and integrated solutions and making cities and human settlements inclusive, safe, resilient and sustainable.
IEA on the role of cities

- IEA Energy Technology Perspectives 2017: Cities lead the way on clean and decentralized energy solutions.
- EBC Strategic Plan 2019 – 2024 vision statement: For new buildings and communities sustainable solutions have been adopted by 2030 giving near-zero primary energy use and carbon dioxide emissions, and a wide range of reliable technical solutions have been made available for the existing building stock.
Positive Energy District (PED)

- Positive Energy Districts (PEDs) aim to an area in the city capable of generating more energy than consumed.
- PED aims to be agile/flexible enough to respond to the variation of the energy market.
- PEDs can include all types of buildings present in the city environment and they are not isolated from the energy grid.
- In the research community PEDs are a rising concept but there is no comprehensive agreement yet on definitions or terminology.
Motivations & Aims: Definition
Various aspects of PED definition

Office buildings, data centers etc. with solar PV, EVs, heat pumps and boreholes

New residential buildings with solar PV and EVs and hot water storage tanks

Virtual powerplant?

Flexible bio CHP (back-up power)

Electrical storage

Wind turbines

Industrial heat pump

Solar heat collectors

Old residential buildings with solar PV, EVs, heat pumps and hot water storage tanks

School building with solar PV

District heating network

District cooling network

Value of energy?

Citizens and society?

Embedded Energy?

System boundaries?

Timeframe?
Motivations & Aims: Mapping stakeholders

- Cities are a complex mechanism in equilibrium
- Many actors are involved for ensuring the conventional services to citizens
- Transformation of the status quo requires to involve even more actors
- Mapping stakeholders, their needs and roles for enabling PEDs
Motivations & Aims: Emerging technologies

Creating a PEDs Multi-level Taxonomy of technologies

L1: Domain (Building, District..#)
L2: Tech. categories (RES, Storage, Control, Monitoring, Data Management..#)
L3: Technologies
L4: Functionalities

Technology 3D radar per climate, maturity of the technology, rural & urban use
Motivations & Aims: Policy and regulatory framework

- Current market design and existing regulations are not yet ready for integrating a local energy model
- A more integrated approach to policy making is needed, linking the power, heat and transport sectors
- New energy trading asset class: energy flexibility → new transversal multi-market player
- Integrated governance models, local and regional
Thank you!

Pekka Tuominen
Senior Scientist, D.Sc.
Sustainable and Smart City
+358-40-7345580
Pekka.Tuominen@vtt.fi

Francesco Reda
Senior Scientist, D.Sc.
Sustainable and Smart City
+358-40-8403680
Francesco.Reda@vtt.fi