



Innovation for Smart Cities

A spin-off from





Distributed Flexibility: Maximising Local Optimisation

*The Role of Positive
Energy Districts
(PEDs)*

What are PEDs?

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**.

Positive Energy Districts

Types of PEDs



PED Autonomous

(Energy System is constrained within a geographical area, no imports)



PED Dynamic

(Energy system is constrained within a geographical area but allows dynamic exchanges with the wider systems to compensate momentary shortages)

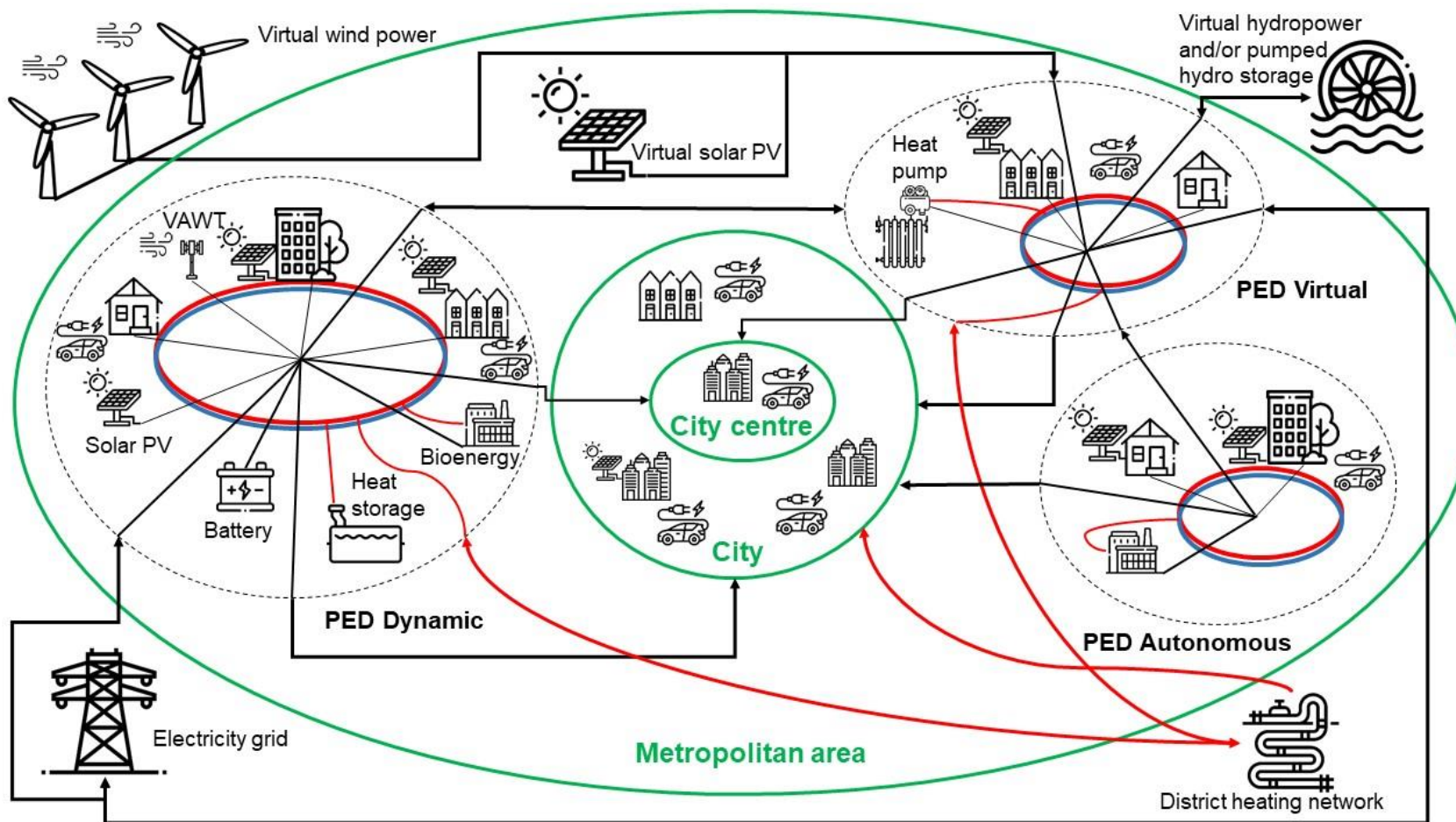


PED Virtual

(Energy systems could be located outside geographical boundary in the surrounding areas setting a virtual boundary)

Positive Energy Districts

Types of PEDs



Positive Energy Districts

Challenges for PEDs at the Local Level

Need for smart consumers



- Lack of awareness, interest and policy co-development with consumers
- Need for consumer participation models supporting energy efficiency and demand response

Stakeholder engagement



- Lack of multi-way communication between key stakeholders
- Rigid, pyramid approach within the SG stakeholder network

Funding and incentives



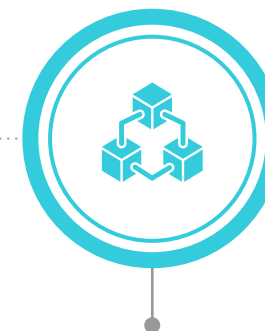
- Concentrated risks in particular stakeholders
- Lack of incentives provided via stable and long-term policy framework
- Expand policy framework beyond supporting SG infrastructure

Market development



- Need for a more open market (competition and innovation)
- Need to lower entry barriers to distributed energy resources aggregators and platforms

Standards and frameworks



- Need for policies that directly and indirectly support interoperability and integration of both technologies and market actors

Positive Energy Districts

Main drivers for PEDs at the Local Level



SPARCS Project Project Scope



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 864242.

SPARCS is working to create a network of Sustainable energy Positive & zero cARbon Communities in two lighthouse and five fellow cities.

The project supports these cities as they deal with the multifaceted challenges they face on their path to sustainability. By setting up inclusive management and planning models and processes, SPARCS aims to demonstrate and validate innovative solutions for smart and integrated energy systems that will transform these cities into sustainable, zero carbon ecosystems with improved quality of life for their citizens.

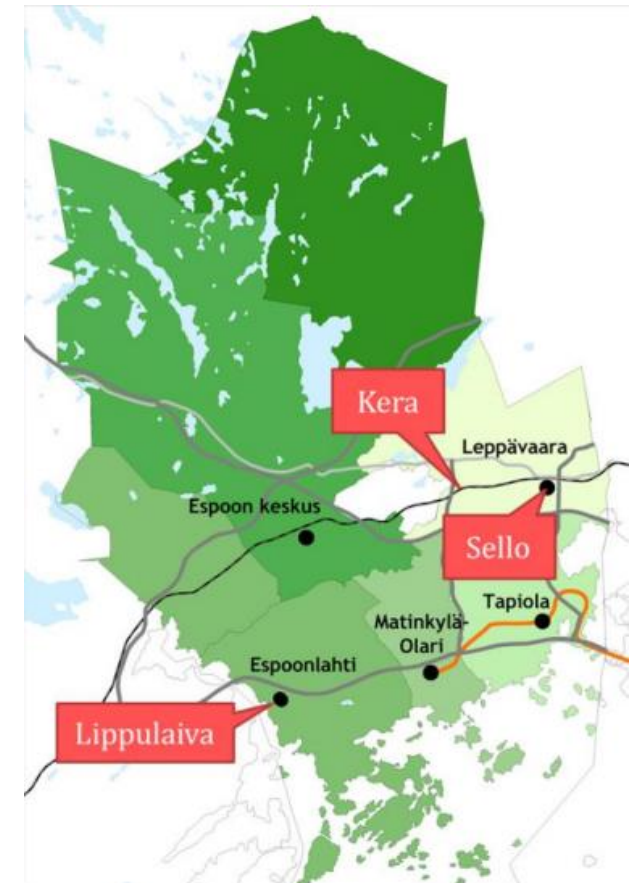


SPARCS Project PED Example - Espoo



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The Subtask 3.2.1 RES integration in Energy Positive Lippulaiva blocks focuses on integrating renewable energy sources in the Lippulaiva shopping centre and surrounding residential buildings to achieve energy-positive status. This includes utilizing a regenerative ground source heat pump plant, PV panels for electricity generation, and optimizing energy consumption through smart control strategies. The interventions aim to decrease electricity costs, utilize excess heat, and participate in reserve markets. Detailed outcomes can be found in Deliverable D3.4.



Map showing Espoo's five city centres and SPARCS' demonstration locations in Espoo. Source: City of Espoo

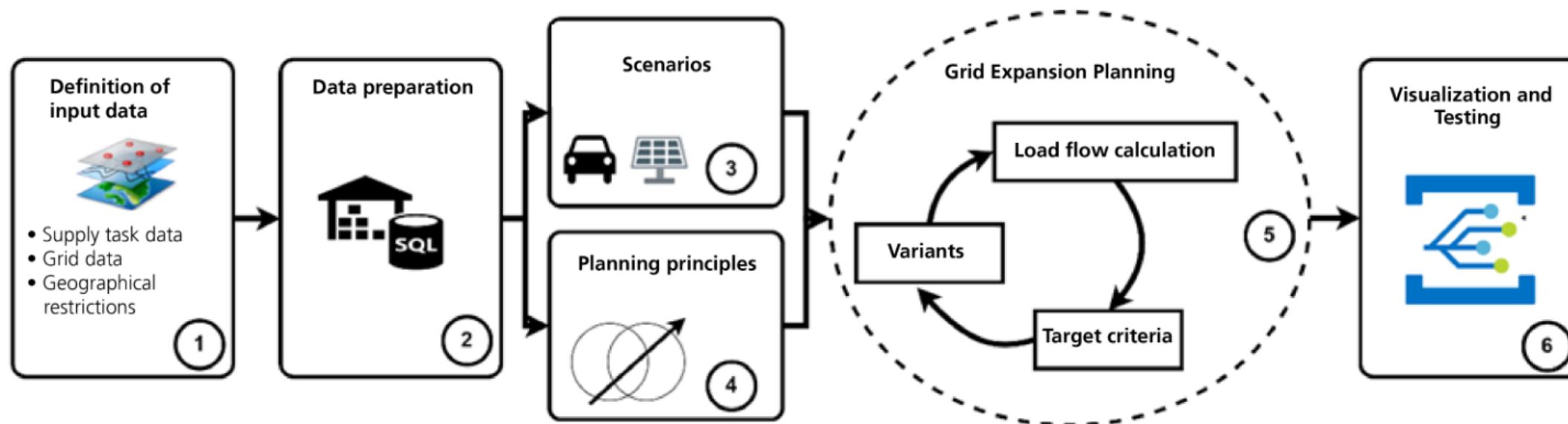
Bonus Slides



Breaking down Smart Grids Innovation

PEDs can represent challenges for local grids

Challenges for grid planning in Positive Energy Districts (PEDs) include managing variable renewable energy generation, integrating diverse energy sources, optimizing energy management with data-driven approaches, ensuring economic viability, stakeholder engagement, navigating regulatory complexities, and ensuring scalability while maintaining positive energy performance.

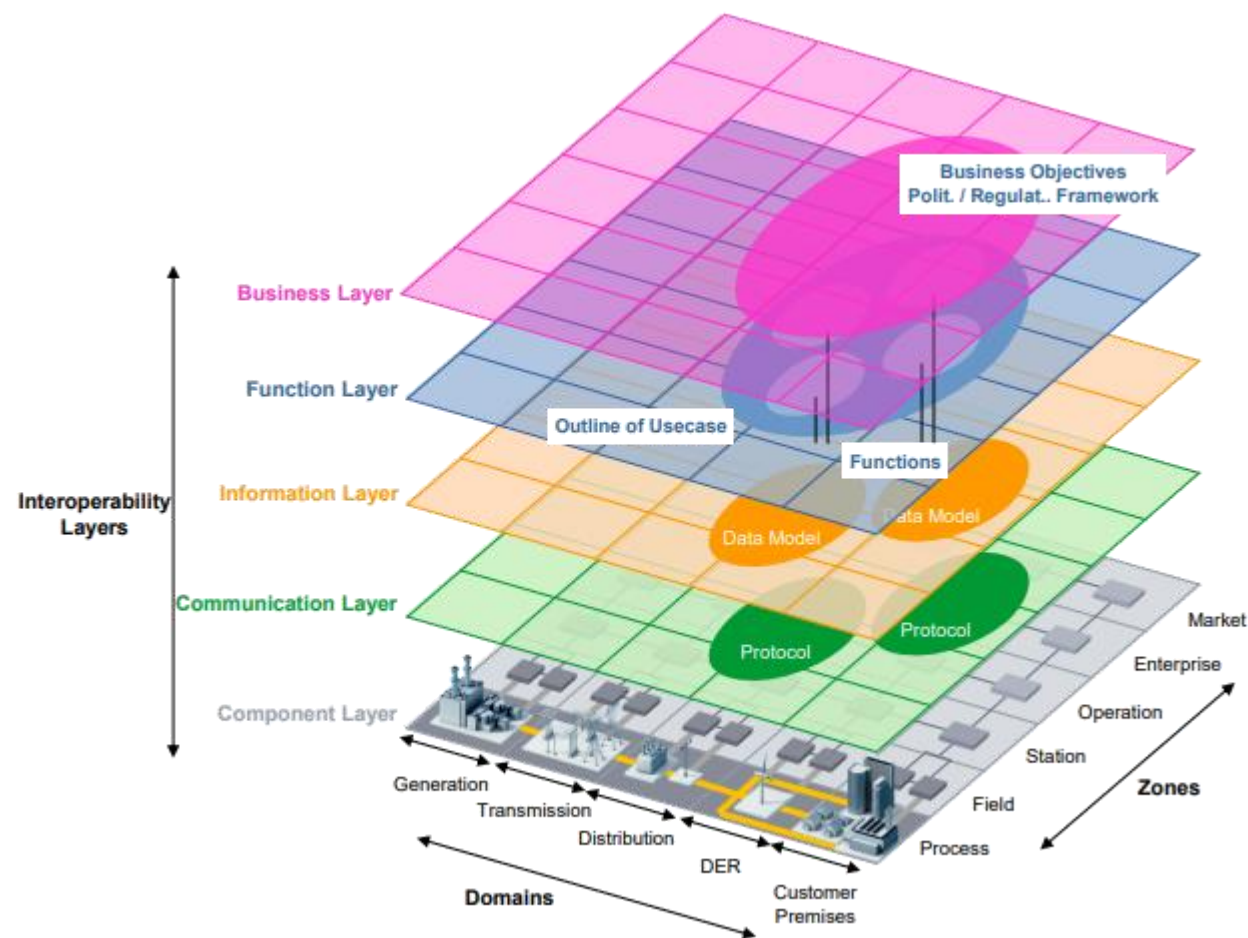


Breaking down Smart Grids Innovation

SGAM – Smart Grids Architecture Model

The European Model co-developed by CEN, CENELEC, and ETSI

- **Based on NIST model** but with some changes to include specific requirements to the EU context that were not addressed.
- **Two main elements were added:**
 - A separate Distributed Energy Resource (DER) domain
 - “Flexibility” entity grouping consumption, production and storage.
- **The model focuses on interoperability:** Provides a holistic framework on the most important existing standards and architectures





Feel free to contact us.
Whenever you like.

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