Smart-BEEjS
Human-Centric
Energy Districts

WP4 – Techno-economic Aspects and Pathways Towards PEDs

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Outline

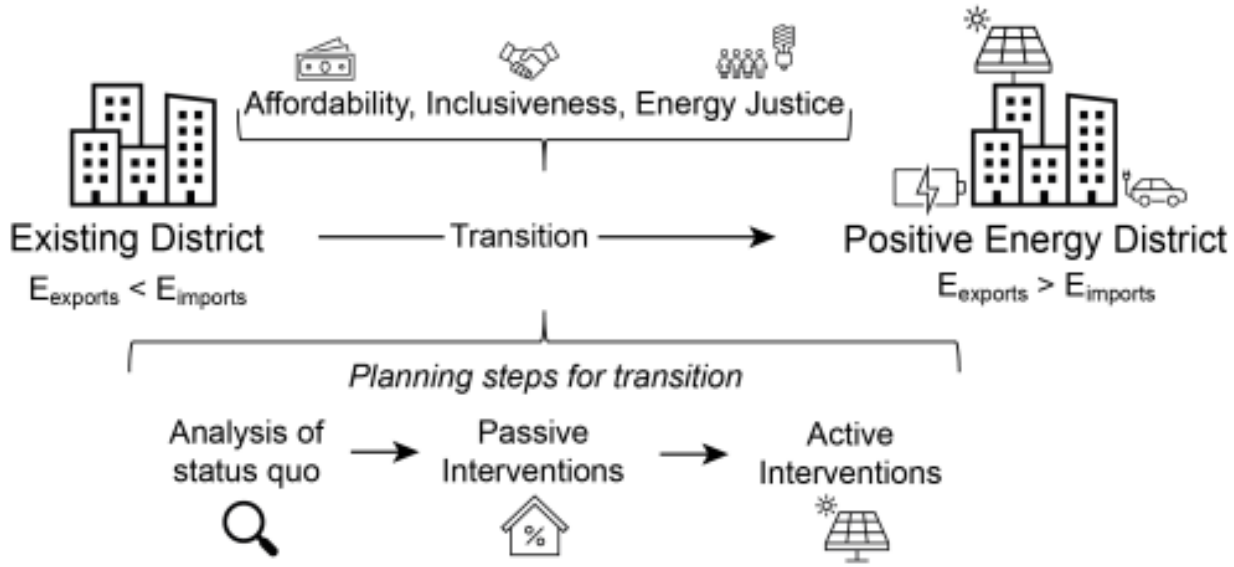
- WP goals/tasks
- Deliverables
  - Status quo
  - Methods and models
  - Transition pathways
- Conclusion
  - Limitations and Outlook
  - Achievements and lessons learnt

WP aim and the deliverables

Develop a methodology for systemic planning of infrastructure investments by designing a systemic modelling approach combining techno-economic aspects and pathways towards PEDs

Tasks	Deliverables
Task 4.1. Status quo and framework conditions as a basis for techno-economic pathways	D4.2 - **Status quo and framework conditions** as a basis for developing techno-economic pathways in selected case studies
Task 4.2. Investigating the infrastructure requirements for developing PEDs sustainably	D4.3 - Report on **infrastructure requirements** for developing sustainably PEDs, summarizing the outcome of the techno-economic modelling activities
Task 4.3. Energy provision and emerging needs system modelling for future	D4.4 - Report on **developed methodologies and models** for techno-economic modelling of PEDs and the transition towards their realisation

Connection between the deliverables



Status quo and framework conditions as a basis for techno-economic pathways

D4.2

Developed methods and models for transition towards PEDs

D4.4

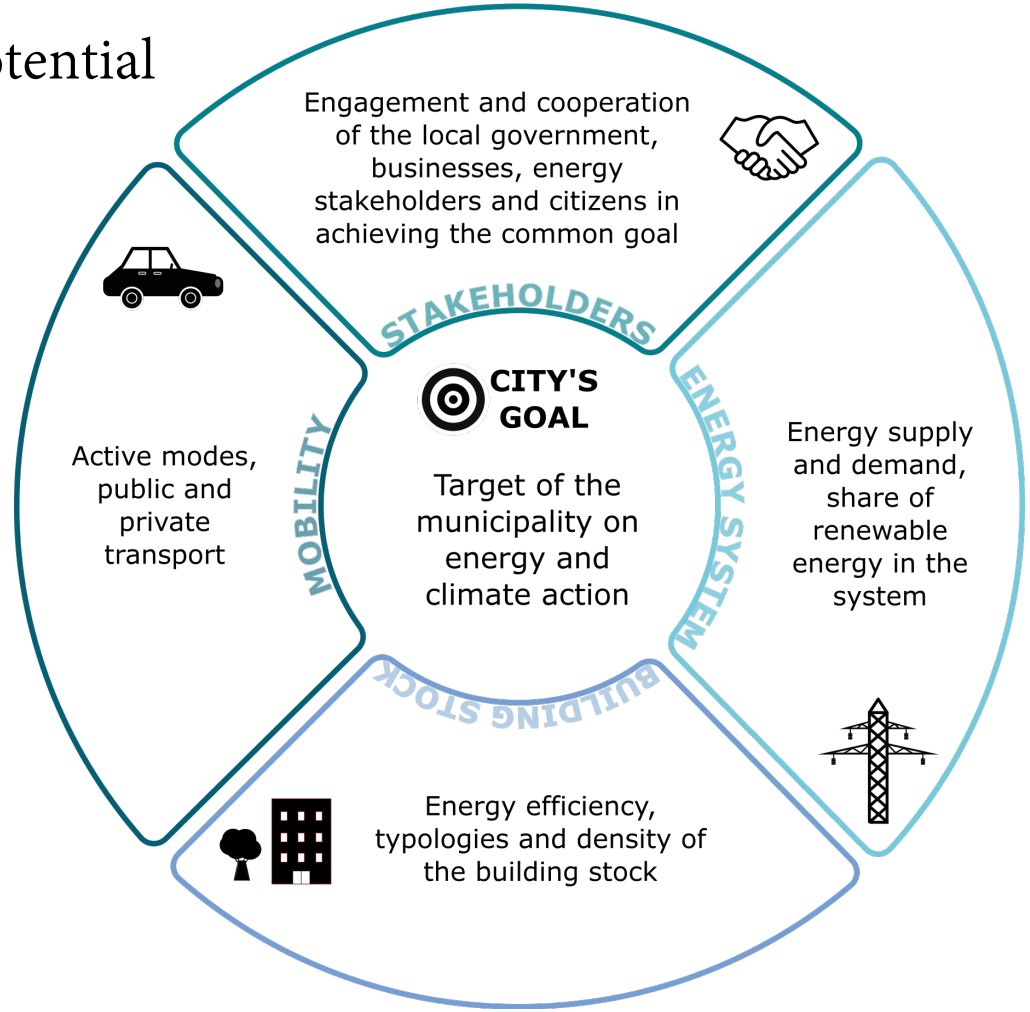
Infrastructure requirements for developing PEDs sustainably

D4.3

Status quo & framework conditions (D4.2)

Present the context that frames the development of potential PEDs

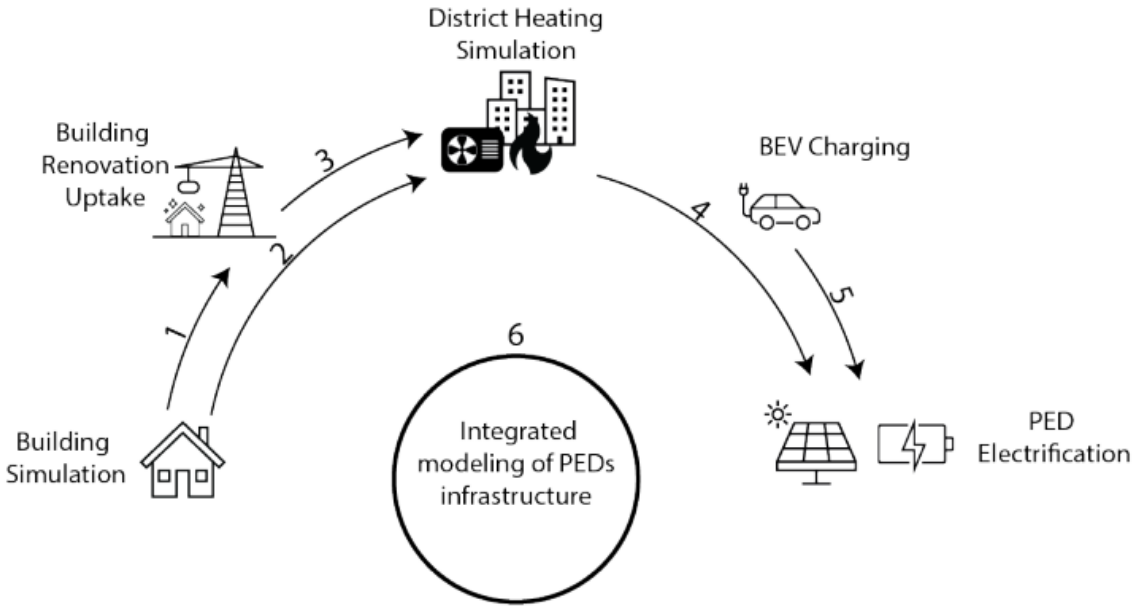
- 4 case studies
  - Frankfurt
  - Vienna
  - Torres Vedras
  - Nottingham
- 5 Analysis Dimensions
  - Policy Framework (City‘s goals)
  - Building Stock
  - Energy System
  - Mobility
  - Stakeholders



Different status-quo, Different needs, Different aims, Different Solutions

Same Objective Different Path

Methods and models (D4.4)



1.Positive Energy District system optimiser model - MILP model for PED system planning and analysis;

2. District Heating Model: assessment of the building renovations necessity (EnergyPlus); the total cost of renovation, NPV and sensitivity analysis of the system to energy prices;

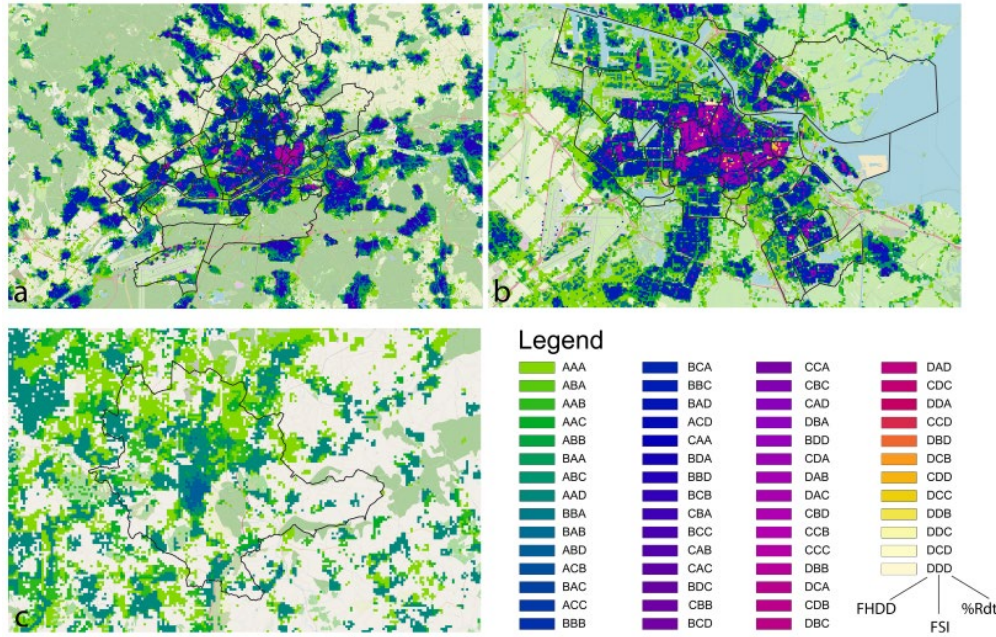
3. Agent-based model of neighborhood-level retrofitting evaluates the uptake of retrofitting in a neighbourhood by different building owners;

4. Evaluation of accessibility of EV charging infrastructure for understanding potential future demands at a district scale (g a linear regression model)

Comparability among EU districts

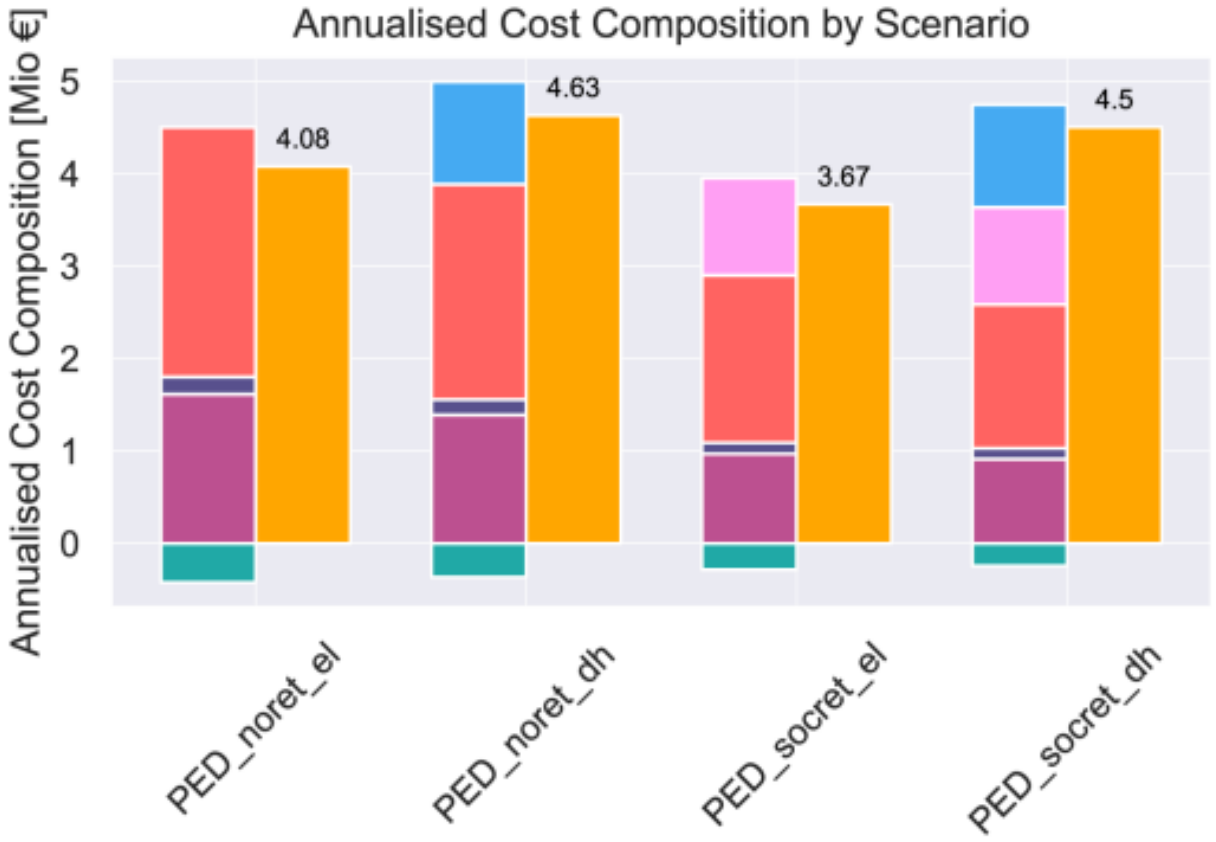
- Creating Comparability among European Neighbourhoods to Enable the Transition of District Energy Infrastructures towards Positive Energy Districts, 2022, Energies
- Can induce knowledge transfer over similar districts in terms of the energy infrastructure required
- Based on HotMaps data

	Heat demand density (GWh/year)	Floor Space Index	Residential building share	Climate Zone
A	< 417	< 0.25	0.25	All climate zones in Europe
B	417-1417	0.25-1	0.25-0.5	
C	1417-2961	1-2	0.5-0.75	
D	> 2961	> 2	> 0.75	



Transition pathways (D4.3)

- Building envelope retrofitting crucial for PEDs
- Individual heat pump solutions more economical than newly introduced district heating grid in discussed archetype



Summary of the main findings

1. Different status-quo, different needs, and different aims→ Different Solutions (contextual factors)

2. A holistic method for early planning of PEDs
   - consisting of quantitative models
   - considering techno-economic aspects and social aspects of renovation
3. Retrofitting of buildings is essential for becoming PEDs in Northern European districts

Limitations & Future work

- Only one case study
- A certain set of technologies (spatially bound district → PV, heat pumps)
- Waste heat from data centers
- Only public charging infrastructure
- Hence, only one out of many pathways to obtain the infrastructure requirements for PEDs

Thank you for your attention !

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