Innovation ATELIER and Climate platform II. workshop 2023.12.05.

First Task - 'PED' (Positive Energy Districts) Overview & Supplementation of Replication Methodology with new aspects

a) New aspects to consider for the definition of PED areas

Social aspects	Economic aspects	Territorial aspects	Other aspects
• distribution of age groups • demographic trends • ownership structure • definition of potential producers • segregation	• availability of direct sources • willingness to invest • cost effectiveness	• a mix of functions • protection levels of buildings • regional energy portfolio • money spent on utilities in households • energy potential map • industrial waste source cadastre • distribution of apartments (e.g. social rental apartments)	• energy storage options • energy storage capacity • regulatory environment • free network capacity • ownership conditions

b) Barriers

Social aspects	Economic aspects	Territorial aspects	Other aspects
• condominiums: different opinions • no professional support (qualified, reliable) • there are no age-appropriate approaches • no information and training • building usage habits • trust issues	• residents' lack of resources • lack of a support system • savings (to think ahead and save up) • no state support • operation and maintenance • funding from where?	• operation • there is no district-level energy model • defining boundaries "where is the territorial boundary?"	• organizational background • regulatory environment • integration into legislation • no control • who is Budapest's "main energy expert"? who is responsible? • energy transmission network • lack of schedule

c) Opportunities

Social aspects	Economic aspects	Territorial aspects	Other aspects
• energy demand reduction • personalized questionnaire for the community • creation of incentives • energy communities • involvement of external organizations	• investment support with discounts • green loans	• creating a hybrid digital twin (top-down database and bottom-up information flow)	• treat new constructions and reconstructions/renovations separately • local government roles (facilitator) • PED co-benefit examination (e.g. increase in real estate value)

Second task – examination of the possibility of creating a PED, with a SWOT analysis for each type of the defined urban areaa (4 tables).

Task: The task is to carry out a SWOT analysis for the mix of functions found in four typical Budapest areas (see area description). Our goal is to collect the specific territorial characteristics that should be taken into account when planning a PED in the given area.

I.   Table – Metropolitan area

Area description:
The metropolitan residential area is characterized by dense built-up, buildings that contain several independent purpose units and exceed a building height of 12.5 m. There is less free or green space and the average population density is high. The nature and function of the buildings are varied, but large industrial or economic institutions do not appear.

STRENGTHS	WEAKNESSES
- strong function mix - public transport coverage - leveling of consumption curves - efficient utility infrastructure, small spread - buildings with more efficient energy requirements - population complexity	• population complexity • restriction of land use • no/little free space • environment, historical protections • no industry • there is no large consumer • no large roof area for PV installation • no biomass • drilling geothermal wells is difficult • many buildings need to be renovated • expensive to renovate (+ obstructing environment)
OPPORTUNITIES	THREATS
• solvency • reachable distances • high energy consumption density • greater change/effect is possible • innovative alternative solutions • nature-based solutions • integration of aspects of sustainable city districts • change of residential community	- lack of resources - weak residential community - economic and service sector that is changing too quickly (they are not interested in long-term planning)

II.   Table – 'Small-town' urban area

Area description:
The small-town residential area is a densely built-up urban area, which include several independent purpose units and do not exceed a building height of 12.5 m. The areas have larger green areas, parks and promenades. The nature and function of the buildings are varied, but industrial and economic functions are already appearing in metropolitan/downtown areas.

STRENGTHS	WEAKNESSES
• smaller residential community, easier decision-making • microclimate • an investment that pays off more easily • good infrastructural provision - it does not have to be developed from scratch • good value for invested money • more likely to use e-mobility • there is space for RES installation • fewer legal barriers related to protection • there is an attachment to the area • innovative development	• small-town-like information dissemination (gossip) • uncertainty of applications • lack of information & knowledge • lack of infrastructure • it is difficult for residents to give up the "quiet, rural" life, it can lead to conflict • separation from the urban fabric
OPPORTUNITIES	**THREATS**
• residential division • separation from the urban fabric • typification of projects and investments • community decision-making • free areas • brownfield areas • diverse energy portfolio • possibility of scheduled investment • "small-town center"	• uncertainty of government decisions • homogeneous building stock • limited job opportunities, commuter town • difficulty of using rainwater

III. Table – Residential complexes

Area description:
A metropolitan area, high-intensity housing estates serving to satisfy the mass demand for housing in previous decades. The number of levels of buildings is usually between 5 and 11. In addition to residential buildings, service functions are characteristic of the area (educational, commercial, health, service buildings, etc.). These create a primary supply network of smaller centers.

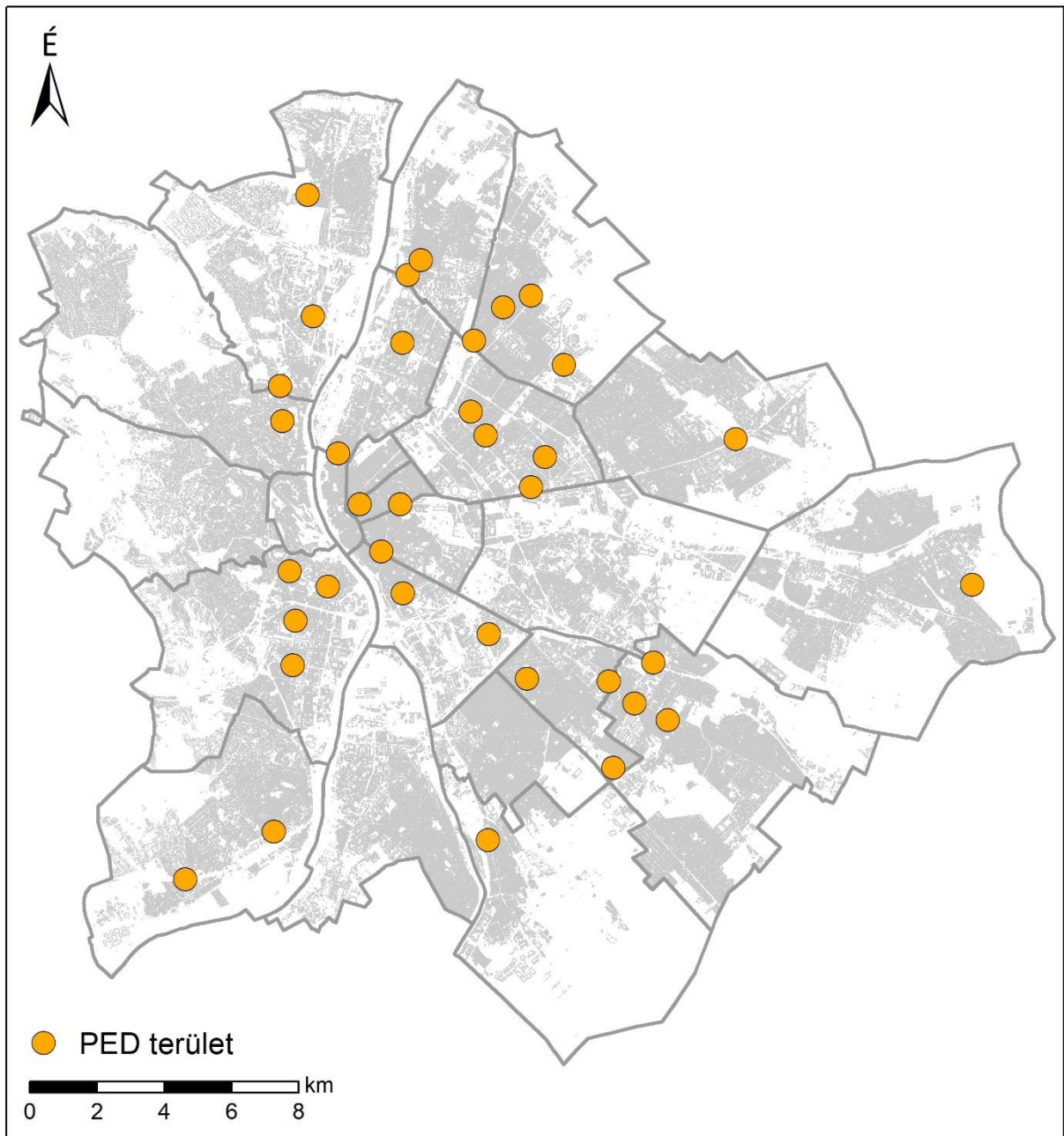| STRENGTHS	WEAKNESSES
• district heating • heat pump system • a mix of functions • energy renovation is simpler • water/wastewater line – heat pump – heat exchanger • solar panels above parking lots	• dependence on gas – high heating demand • energy demand is higher in the evening • for placing solar panels, the surface area projected on the number of inhabitants is small
OPPORTUNITIES	**THREATS**
• standardization of renovation • energy communities • examination of nearby areas that can be designated for energy production • use of excess energy produced in public transport	• condominium form • regulation of solar panels • electronic settlement (gross) • legal background • overhead reduction • there are no savings or support options • consumer behavior

IV. Table – Suburban and economic mixed areas

Area description:
The area is loosely built, with large connected green areas, where the building height does not reach 7.5 meters. Most of the typical functions are residential buildings, surrounded by service buildings and institutions, as well as areas for economic and development purposes. They are typically located in mountainous, suburban or transition zones.

STRENGTHS	WEAKNESSES
• development of public transport • advantageous capital concentration • cost efficiency – profitable green investments • more efficient cooperation • utilization of geothermal energy • dynamic charging V2G • they can be prosumers	•
OPPORTUNITIES	**THREATS**
• substitution of central natural gas • terminal charging • suburban railway, metro • ASCEND waterworks – heat exchanger • e-mobility logistics • energy storage / transport • car-sharing • 5th generation district heating system • regulation of production and consumption • Possibility of R+D+R capacity development • as large a connected energy network as possible	• heat transport infrastructure • differences of interest between the population and economic institutions • city view, HÉSZ (building regulations) • view on public transport • network development

Third task - Designation of the locations in Budapest deemed by the participants to be potential PED development areas.

ANNEX

CARTIF féle PED replikációs metodológia

		Total Heating energy demand	W_{11}	
Efficient buildings	Building stock characterization (energy needs) W_1	Heating energy demand per m2	W_{12}	WP2 ENERKAD MODEL
		Cooling energy demand	W_{13}	
		DHW energy demand	W_{14}	
		Electrical energy demand	W_{15}	
	RES potential W_2	Solar energy potential	W_{21}	
Zero energy imports		Wind energy potential	W_{22}	Google API PVGIS API Lidar Data
		Geothermal potential	W_{23}	
	Room availability W_3	Land surface available for RES production	W_{31}	
		Roof surface available for RES production	W_{32}	
Energy flexibility	Alternative energy resources (outside) W_4	Distance to industries (heat)	W_{41}	Corine Land Cover
		Distance to water surfaces(heating & cooling)	W_{42}	
		Distance to forest (biomass)	W_{43}	
Affordability	Economic context W_5	Share of energy expenditure in income	W_{51}	Questionnaire
		Investment plan existence	W_{52}	
Liveability	Social cohesion W_6	Aging rate	W_{61}	Eurostat Questionnaire
		Educational level	W_{62}	
		Per capita income level	W_{63}	
		Ownership of the property	W_{64}	
		Employment rate per district	W_{65}	
	Urban complexity W_7	Residential and other land uses balance	W_{71}	Corine Land Cover
		Proximity to green spaces	W_{72}	

PED potential index (at district scale)

Data sources: Buidling data, Climate data, Statistical data, Stakeholders data, Statistical data