# THE SPATIALLY STRUCTURING POTENTIAL OF ENERGY INFRASTRUCTURE IN THE FLEMISH NEBULAR CITY


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## RESEARCH INFORMATION


### KEYWORDS
Energy transition, urban metabolism, nebular city, urban design


### INTRODUCTION / CONTEXT
The Flemish energy system is embedded in a condition of dispersed urbanization, that is increasingly considered to be fundamentally unsustainable. This nebular city is the result of a complex co-evolution between technical infrastructures and the built environment. This research explores the relation between the spatial logics of emerging new energy infrastructures and their impact on territorial structures, urban morphologies and public spaces. It ties in with the recent interest of design disciplines in 'urban metabolism' and 'designing with flows', and engages with local energy practices often developed without spatial designers' involvement.

### QUESTION / GOAL
What are the spatial dimensions of ongoing energy projects in Flanders? Which spatial practices are developed by local actors, and how do these practices deal with existing ownership structures, aspects of proximity and dispersion, and factors of socio-spatial inclusion? The goal is to understand the state of play of energy-related projects in Flanders and the spatially (re)structuring potential of energy infrastructures. This will form the basis for more in-depth case studies in the second phase of the research, using research-by-design to develop integrated planning and design strategies for spatial energy projects.

### HYPOTHESIS / METHODOLOGY
The research starts from the hypothesis that new energy infrastructures have a spatially (re)structuring capacity that can be used as a lever to retrofit the nebular city. It explores this potential by developing a typology of energy-related projects in Flanders. The methodology follows an iterative cycle of 3 steps:

- Non-exhaustive inventory of recent and ongoing energy-projects using a snow-ball approach to identify projects through interviews, seminars and desk-top research, until no radically new 'types' are found.
- Defining and iteratively refining project categories by both 'top-down' definition of expected project categories according to theoretical energy-conscious design methods and energy concepts (LES, REAP, Rifkin, etc.) and 'bottom-up' strategic classification of projects according to spatial characteristics.
- Identification of the spatial dimensions of each project type, and recurring spatial practices across categories that provide potential starting points for further designerly research.

### RESULTS
The typology gives insight in the spatial questions relevant to each type of energy project. Gaps between theoretical models and ongoing practice indicate how Flanders' dispersed urbanisation pattern and fragmented ownership structures limit the structural impact of existing approaches to energy projects. At the same time, spatial practices emerge across project types, that lift energy projects to a 'collective' level. Through a critical analysis of these spatial practices, three aspects of a 'spatially (re)structuring' design of energy infrastructures come to the fore: how can energy projects introduce new forms of collectivity, revalorise 'proximity' as spatially guiding principle, and how can the energy transition stimulate socio-spatial inclusivity?

### CONCLUSION
The challenges confronted in ongoing energy projects in Flanders suggest the need for a strategic and 'collective' approach that allows for a more fundamental reflection about the relation between energy systems and urbanization patterns. As the 'intermediate scale' is the usual domain of urban design and planning, this conclusion highlights the need for spatial design and planning strategies on the scale of the building block, neighbourhood, business park, town or region, to mobilise the (re)structuring capacity of energy infrastructures. The emerging practices on 'collective' level across energy projects offer valuable points of departure for such spatial concepts.

## CONTACT

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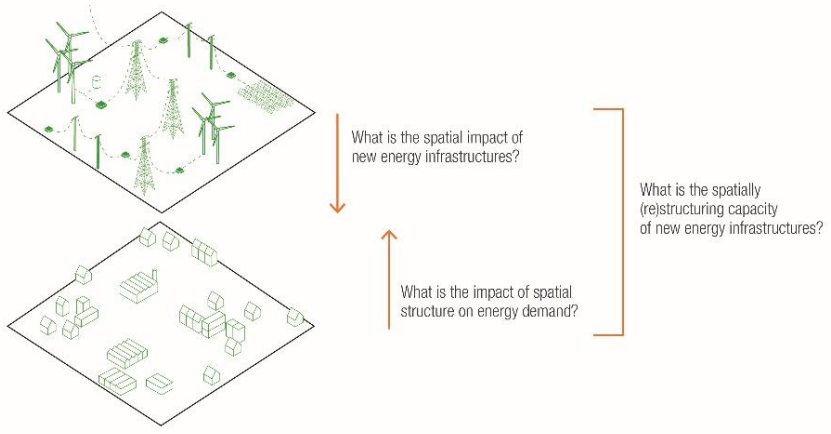


**Fig. 1:** Schematic representation of the research question

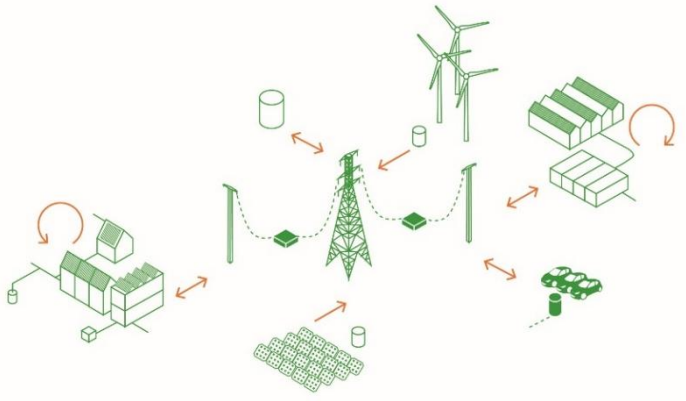

**Fig. 2:** Macro-scale evolutions in the energy system
From a centralised, linear, 'base-load' system towards a system of decentral, flexible energy production and flexible demand where energy flows 'from everywhere to everywhere', with integration of storage facilities and interactions between different energy flows (electricity, heat, fuels)

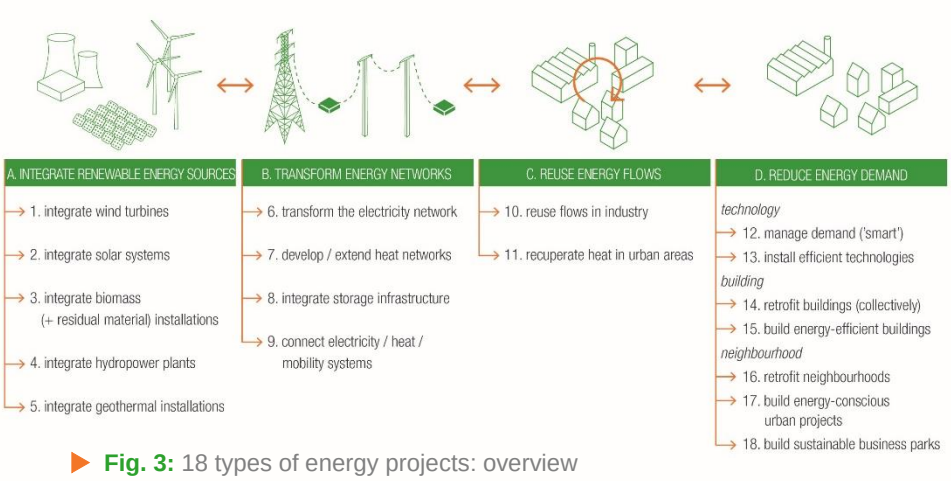


**Fig. 3:** 18 types of energy projects: overview
Projects are classified according to the part of the energy flow they (mainly) act upon: energy production, transport, reuse and demand (A/B/C/D). Subcategories are defined according to the spatial impact and characteristics of projects: differentiation between energy sources (1-5), network types and punctual interventions (6-9), type of flow reused (10-11) or scale and type of energy efficiency intervention (12-18).

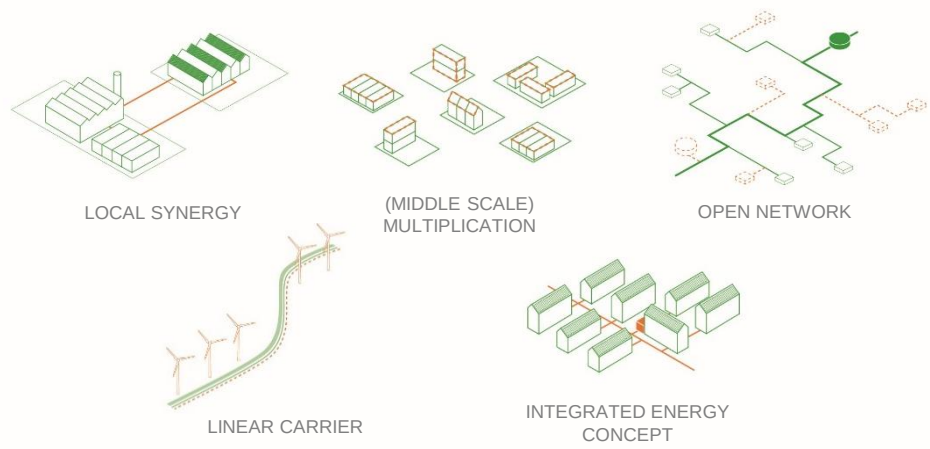


**Fig. 4:** Emerging spatial practices on 'collective' level across project types
Potential (re)structuring capacity and starting points for design and planning approaches