Wrocław Energy Cluster Model for Urban Energy Transition

NET ZERO CITIES
EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Executive snapshot

As in cities across Europe, achieving Wrocław's goal of climate neutrality requires transforming how energy is produced, shared, and consumed across urban systems. The city faces high energy demand (approximately 224 GWh annually across key stakeholders) and a very low share of renewable energy (~0.8%), combined with limited capacity to develop large-scale renewable energy within city boundaries.

To address this, the City of Wrocław, together with universities and regional partners, developed a roadmap for establishing an Energy Cluster. This model enables coordinated energy generation, storage, and balancing across multiple actors, including neighbouring municipalities, to overcome spatial and regulatory constraints. The work was supported through the City Expert Support Facility (CESF) of NetZeroCities by the partnership of JWA and CMS.

PART OF THE EU MISSIONS
CLIMATE-NEUTRAL & SMART CITIES

Funded by the European Union

Knowledge Report

THE IMPACT

The development of the Energy Cluster model provides a roadmap for Wrocław's energy transformation towards climate neutrality.

The model includes joint energy balancing using existing installations and highlights the role of energy storage in increasing self-consumption from approximately 60% to 75–85%.

It also enables savings through reduced distribution fees following cluster registration. Financial analysis indicates that investments in renewable energy and storage could achieve a payback period of approximately 8 years.

Through its phased development model and cooperation with neighbouring municipalities, the initiative outlines a pathway for the city's energy transformation towards climate neutrality.

THE APPROACH

The Energy Cluster model developed for Wrocław is phased and integrates technical, organisational, and financial elements. Diagnosis: A comprehensive assessment of energy demand, infrastructure, and renewable potential was conducted, including 760 building-level surveys and analysis of energy consumption, costs, and emissions

Design: A formal Energy Cluster structure was proposed, with Wrocław University of Science and Technology as Leader, the University of Wrocław as Coordinator, and the City as Strategic Partner

Implementation: A phased development pathway was established, enabling gradual scaling from existing assets to full infrastructure deployment. The implementation model consists of three phases:

- Start-up phase: Use of existing installations to enable energy balancing without major capital investment
- Scaling phase: Integration of external renewable energy sources (e.g. PV farms) through public tenders
- Investment phase: Development of new renewable energy capacity and energy storage systems

OUTCOMES AND LEARNINGS

- A comprehensive feasibility study and implementation roadmap for establishing an Energy Cluster in Wrocław
- A defined governance and organisational model involving the city, universities, and external partners
- Identification of renewable energy potential, including photovoltaic deployment across public buildings and partner sites
- A phased investment and development plan (2026–2030+) for scaling renewable energy and storage infrastructure
- Financial modelling including ROI and CAPEX simulations, with a projected payback period of approximately 8 years

What worked:

- A phased approach enabled early benefits through energy balancing while avoiding administrative overload
- Strong collaboration between the city, academia, and industry enabled the development of a clear governance model and distribution of roles
- Technical analysis confirmed that combining photovoltaics with energy storage is essential to achieve high self-consumption levels (75–85%) and economic viability

Transferable insight:

- Energy clusters are more suitable than small-scale cooperative models for large metropolitan areas due to scale and complexity requirements
- Urban energy transitions require extending beyond city boundaries—collaboration with neighbouring municipalities is critical where local renewable capacity is limited
- Starting with existing assets allows cities to realise early benefits before scaling investments
- Professional operational management is essential to ensure long-term viability and scalability of energy clusters

Funded by the European Union

NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

NEXT STEPS FOR THE CITY

Wrocław plans to formally establish and register the Energy Cluster in the first half of 2026, initiating organisational activities In the period 2026–2027, the city will focus on scaling the cluster through integration of photovoltaic farms and implementation of digital systems for energy management and balancing

From 2028 onwards, Wrocław aims to deploy large-scale renewable energy and storage infrastructure, alongside complementary measures such as thermal modernisation of public buildings and integration of waste heat

The city is also seeking further support in accessing EU and national funding, developing innovative procurement and governance models, and advancing digital tools such as AI-based forecasting and digital twins

WANT TO KNOW MORE?

Learn more about Wrocław

Still got questions? Ask us:
Grzegorz Synowiec, Deputy Director of the Climate and Energy Division
grzegorz.synowiec@um.wroc.pl

Funded by the European Union