



Oulu at a Glance

Oulu, with a population of 200,000, stands as Northern Europe's largest city, characterized by a subarctic climate featuring distinct seasons and an average annual temperature of 3°C with 500 mm precipitation. Home to a thriving multidisciplinary university with 14,000 students and 4,000 employees, the city prides itself on sustainable practices, notably in transport, with a 15% cycling mode share, supported by well-maintained cycling lanes even in winter.

Urban challenges such as high consumption and complex decision-making processes are addressed through innovative solutions like retrofitting buildings, integrating heat pumps with smart district heating control, and leveraging renewable energy sources like wind power. As a lighthouse city in the MAKING-CITY initiative alongside Groningen, Oulu spearheads sustainable development efforts, particularly in areas like the Kaukovainio suburb. Engaging stakeholders ranging from tenants to suppliers, Oulu demonstrates a commitment to a greener, more efficient future.

Lighthouse City in the Scalable Cities Community

Oulu, a "Lighthouse City" in the MAKING-CITY project, leads urban energy transformation in Northern Finland. As part of the Scalable Cities Community, **120 cities across 18 Smart Cities and Communities** projects have collectively achieved impressive results:

- 53% energy saved
- Up to 88% CO₂ emissions reduced
- 5,270+ electric vehicles introduced
- Nearly 500 e-charging stations installed
- Over 1 million m² of floor space refurbished
- 17,500+ smart meters installed
- Over 260,000 engaged citizens



Oulu
 The 7 other MAKING-CITY cities
 48 Lighthouse Cities
 72 Fellow Cities



Scan the QR code to access the interactive online map with all 120 cities or access the list of the 18 EU projects.

Oulu is actively pursuing decarbonization through a multifaceted approach. Initiatives include extensive adoption of **solar panels**, heat pumps utilizing various heat sources like ventilation exhaust air and excess heat from refrigeration, and stringent building regulations to minimize heat loss.

Oulu's Decarbonization Strategy



Additionally, the city promotes energy-efficient practices such as LED lighting and mandates energy-saving investments during building renovations. Fuel transitions in CHP production, particularly replacing peat with wood, and a commitment to carbon neutrality by 2035 underscore Oulu's dedication.

Furthermore, urban planning prioritizes existing urban and suburban areas, reducing reliance on motorized transport and boosting district heating usage. These measures collectively propel Oulu towards a sustainable, low-carbon future.

Oulu's PED Implementation

What is a PED ?

A **Positive Energy District (PED)** is a eco-friendly urban area that produces more renewable energy than it uses. Featuring sustainable tech, energy-efficient buildings, and smart grids for eco-resilience, community engagement, and reduced carbon footprints. **PEDs exemplify sustainable urban living and a greener future.**

PED: Kaukovainio District

The Positive Energy District (PED) in Oulu is located in the Kaukovainio district, 3 km southeast of the city center. In this area, which developed rapidly between 1965 and 1974, there are high-rise apartments to the east and south and low-rise terraced and detached houses to the west. The PED consists of six main buildings, including apartments, a supermarket and a multi-purpose building.

Oulu's PED concept integrates efficient heat pumps with a recovery system that utilizes excess heat from refrigeration, exhaust air and DH return water. This excess heat is fed into the district heating system, which supplies all PED buildings via a DH pipe. This optimizes energy distribution within the PED district.

PED in action

Scan the QR code to watch a video that will help you to understand how a PED works and another one to get to know Oulu as a lighthouse city and **its Positive Energy Districts in action.**



More info?
Scan the
QR code
and watch
our video!



Inspiring Success Stories

In the MAKING CITY success stories, we showcase Oulu's sustainability achievements and its key players. Oulun Energia Group leads with innovative energy solutions, while Raimo Hätälä, CEO of Sivakka, discusses retrofitting existing houses and constructing sustainable ones. Samuli Rinne, project manager for MAKING-CITY in Oulu, provides insights into project development and implementation. Read more in the interviews.

Scan the QR
code and read
about Oulu's
success stories!



The solutions chosen provide green and affordable energy to the local community, which can be reflected in housing prices and overall desirability of the area.

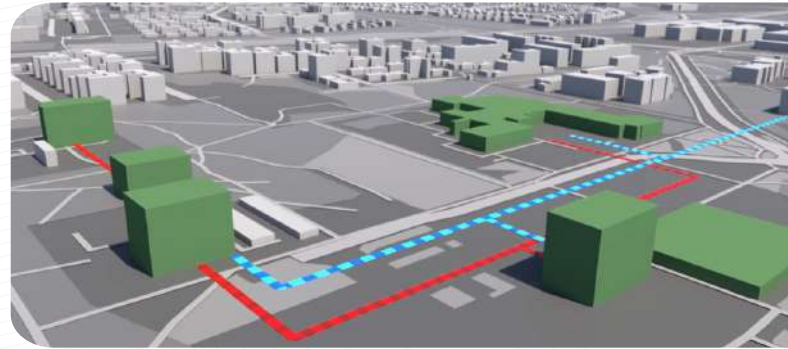
Mikko Ojala, Oulun Energia



Oulu's PED Business Model & Financial Plan

In Oulu's Business Model the Special Purpose Vehicle (SPV) refers to Oulu Energy (OE). OE produces district heating and electricity through its CHP plants and also owns and operates the district heating network. Citizens benefit from OE by receiving heat and electricity, with advantages enhanced when prices are affordable, supply is reliable, and environmental considerations are met.

In Finland, subsidies for energy efficiency improvements, provided by ARA (The Housing Finance and Development Centre of Finland) and the government, are widely utilized, particularly by housing cooperatives. These cooperatives can receive up to 50% assistance, while detached houses receive a smaller subsidy.

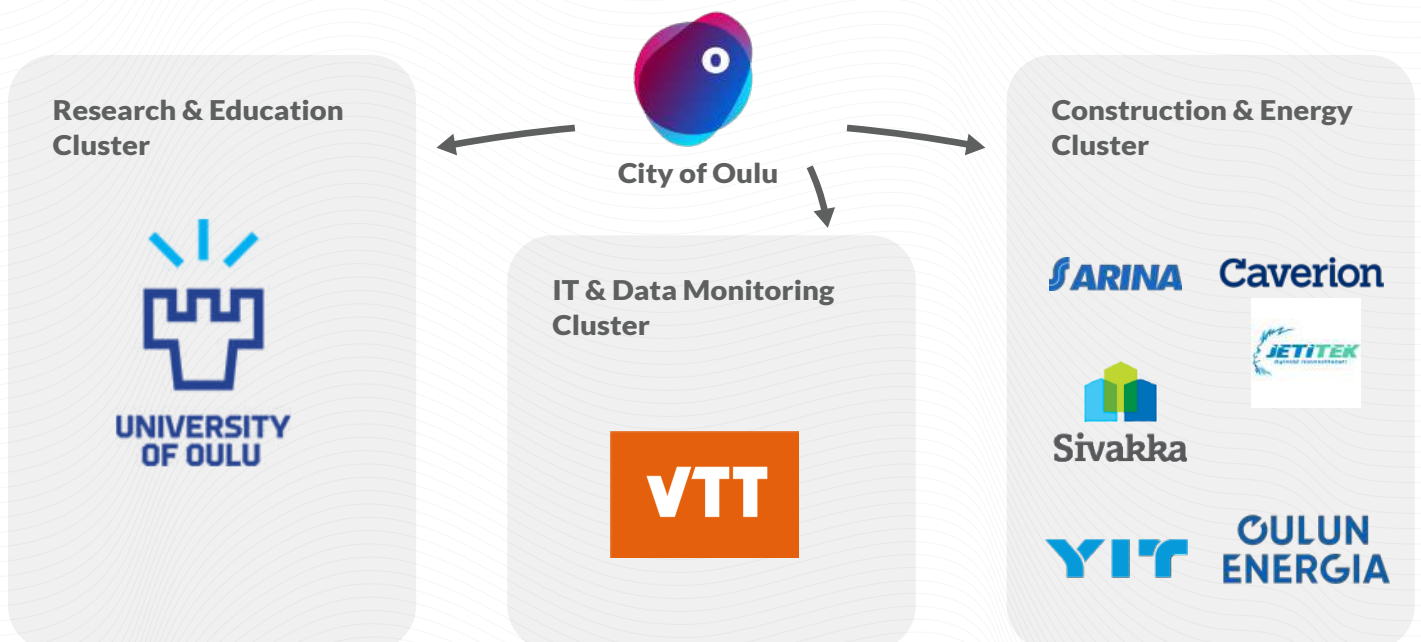


These financial incentives have proven highly effective. The carbon emission trade and energy taxation guide investments toward renewable energy sources and efficiency. City regulations provide guidelines for PV and heat pump installations, with connection to the district heating network being optional. Legislation supports energy efficiency and renewable projects.

New constructions must comply with strict building standards, and renovations require energy efficiency studies. Public procurement laws prioritize eco-friendly solutions, although cost remains a significant consideration. Ongoing discussions continue to explore potential changes in these areas.



Stakeholders & Partners of Oulu's PED Development



MAKING-CITY innovates with enhanced thermal performance and HVAC technology, creating a cost-saving, energy-efficient hybrid model that optimizes waste energy use for environmental benefits.

Raimo Hätälä, CEO, Sivakka

Throughout the MAKING-CITY project, energy awareness has risen, leading to increased public demand for innovative solutions.

Mikko Ojala, Process Engineer, Oulun Energia



In Finland's cold climate, Positive Energy Districts (PED) leans towards Positive Energy Regions (PER), yet it's replicable. With local energy sources and efficient practices, regions can achieve near self-sufficiency.

Samuli Rinne, project leader for the MAKING-CITY lighthouse city Oulu

Lessons Learned: PED System Development & Citizen Engagement Strategies

While the cost of the PED system compared to its benefits may raise significant questions, leveraging existing components and inexpensive digital duplication can yield substantial long-term benefits. The primary effort lies in development work, with paramount concerns for privacy and security from hackers. Residents must maintain control over factors like temperature and ventilation rates. From a technical standpoint, there are no significant obstacles. Environmentally, the system offers flexibility to integrate variable renewable energy, provided its manufacturing cost is justified. Compliance with GDPR regulations is essential.



In terms of citizen engagement, the buildings have been equipped with 50 PDA modules that measure the impact of system data on human behavior and provide residents with comprehensive information on local resources and energy performance. VTT has developed a digital application prototype for Android and macOS platforms, supported by an online database. The aim is to engage citizens in their homes and raise energy awareness. The MAKING-CITY project interface allows participants to access energy and water consumption data, evaluate climate comfort, and receive environmental impact feedback. The application offers advice on carbon emissions compensation and energy reduction. Additionally, the digital mobile application interface provides access to PED status and solar production data, with toggleable functionalities for a simpler interface. Information is also visible on building staircase displays.



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