REHEATEAST : Digitalised Demand-Side Optimisation for District Heating Systems Pilot implemented by Technical University of Cluj-Napoca

Policy brief: Lessons Learned from the REHEATEAST Pilot Implemented by Technical University of Cluj-Napoca

Executive summary

District heating systems across the Danube Region are under increasing pressure to improve energy efficiency, operational flexibility, and decarbonisation. Although substantial investments have been directed toward heat generation and network modernisation, building-level optimisation and demand-side digitalisation remain underdeveloped.

To address this gap, the Technical University of Cluj-Napoca implemented a pilot laboratory within the REHEATEAST project focused on the digitalisation and optimisation of heating systems. Results show that low-cost digital monitoring and control solutions can deliver measurable operational benefits without requiring major infrastructure upgrades.

These findings highlight a scalable and cost-effective pathway for enhancing district heating efficiency and sustainability, with strong potential for replication across cities and regions throughout the Danube Region.

Policy context

The REHEATEAST pilot directly supports the objectives of the European Green Deal, the Energy Efficiency Directive (EED), RED III, and the Energy Performance of Buildings Directive (EPBD) by improving energy efficiency, enabling renewable heat integration, and promoting the digitalisation of heating systems through smart monitoring and adaptive control solutions.

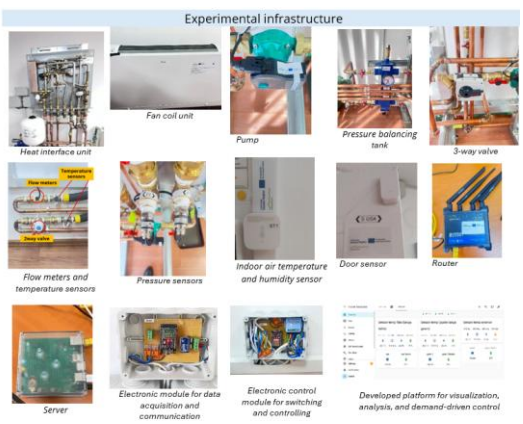
The Challenge

The lack of building-level digitalisation limits the ability to adjust heat delivery to actual demand. As district heating systems move towards lower temperatures and greater integration of renewable energy sources, flexible and demand-driven operation is becoming essential for improving efficiency and supporting decarbonisation goals.

The UTCN Reheateast Pilot Solution

Within the REHEATEAST project, UTCN developed a pilot laboratory for the digital optimisation of heating systems combining:

- Real-time monitoring and data acquisition infrastructure
- Smart control hardware and software integration
- Adaptive demand-driven control algorithms



Results at a Glance

Up to 40–60% reduction in heating demand during March monitoring period

Up to 70% reduction in operating time during March monitoring period

Stable indoor temperature: 22–23°C

Successful operation at low supply temperatures : 35-37°C

Key Findings

01 Adaptive demand-driven control improved heating efficiency by reducing unnecessary operation, eliminating overheating, and maintaining indoor comfort.

02 Using digital monitoring, control optimisation, and low-cost instrumentation, the solution can be replicated in universities, schools, public and residential buildings, and other district heating-connected facilities without major infrastructure upgrades.

03 The system operated successfully at low temperature, demonstrating direct compatibility with low-temperature district heating networks and supporting integration of renewable heat sources.

Policy recommendations

Based on the REHEATEAST pilot results, the following policy actions are recommended for Interreg programme authorities, national governments, and local/regional stakeholders:

- **Support Digitalisation and Smart Control** - Promote the deployment of smart monitoring systems, adaptive control technologies, and digital energy management solutions in district heating systems across the Danube Region.
- **Prioritise Demand-Side Optimisation** - Encourage demand-side optimisation and smart control measures as cost-effective alternatives to major infrastructure upgrades. These solutions offer rapid payback and broad applicability.
- **Enable Low-Temperature District Heating** - Support low-temperature operation, flexible building-level control, and the integration of renewable heat sources through updated technical standards and targeted incentive schemes.
- **Continue Supporting Pilot and Demonstration Projects** -Expand Interreg and national funding for pilot and demonstration projects to accelerate innovation, cross-border replication, and knowledge transfer among Danube Region partners.
- **Strengthen Technical Capacity** Invest in training and capacity building for municipalities, district heating operators, and facility managers to implement digital and demand-driven heating solutions effectively.

Conclusions

The REHEATEAST pilot demonstrates that low-cost digital monitoring and adaptive control can significantly improve district heating performance without major infrastructure investments. The approach supports low-carbon and low-temperature district heating, offers strong replication potential, and provides a practical and scalable pathway for accelerating the digitalisation and modernisation of district heating systems across the Danube Region.

Contact & Project Information

REHEATEAST UTCN Project Manager
Assoc. Prof. PhD Eng. Paula Ungureșan
paula.unguresan@termo.utcluj.ro

https://interreg-danube.eu/projects/reheateast/about-us
https://www.linkedin.com/showcase/reheateast/posts/?feedView=all
https://www.facebook.com/reheateast/

Interreg Danube Region
Co-funded by the European Union
REHEATEAST
TECHNICAL UNIVERSITY OF CLUJ-NAPOCA ROMANIA
EnTREC Energy Transition Research Center