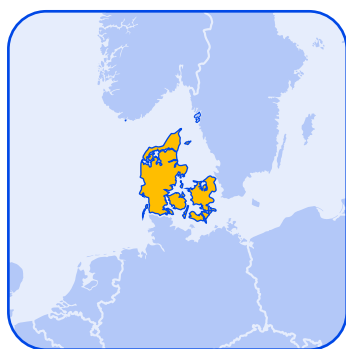


Digital Comfort and Flexibility Services for Social Housing

ABSTRACT

The Danish pilot of DEDALUS shows how **digital tools** can optimise district heating and indoor climate management in **social housing**. Implemented across two residential blocks with 56 apartments, it combines **smart predictive heating control** and **tenant-facing services**. Crucially, it highlights that successfully deploying DR in diverse demographics requires highly **accessible, in-person onboarding** to overcome severe language and digital literacy barriers.



KEY POINTS

- Interoperable digital platforms to seamlessly connect indoor climate sensors and smart thermostats for advanced district heating management.
- Heating optimisation with passive feedback mechanisms to guarantee resident comfort while bypassing severe demographic barriers.
- Validation of AI-driven heating control and decentralised apartment-level flexibility within a real-life social housing complex.
- Practical lessons for inclusive replication of DR in diverse social housing environments.

The Danish pilot was implemented across two renovated residential blocks in Herning with a total of 56 social housing apartments. The site provides a real-world testing ground for combining district heating control, indoor climate monitoring and tenant-facing interfaces within a highly diverse demographic context.

INTEGRATED TECHNOLOGIES AND SERVICES

The Danish pilot combines a suite of **interoperable digital tools** supporting automated heating optimisation and indoor climate management:

- **NEOGRID PreHeat App V2**, enhanced to manage sensor hierarchies from entire buildings down to individual apartments and rooms.
- **Resident web-app interface**, allowing tenants to interact with the system and set flexibility preferences linked to comfort or financial savings.
- **Predictive central heating control**, connected to the district heating system and supporting more efficient building-level operation.
- **Integrated monitoring and control layer**, including smart thermostats on radiators, indoor climate sensors, water and heating meters and monitoring of decentralised ventilation systems.
- **Interoperability support for structured data exchange**, including for additional services such as the digital twin and the comfort flexibility model.

ENGAGEMENT

- **10 engagement activities** were implemented, including co-creation workshops, technical training, SMS communication and personalised verbal assistance for residents with specific accessibility needs (e.g., dyslexia).
- Relied on **continuous, direct household-level engagement** by building managers to successfully onboard tenants, overcoming severe communication barriers **across 24 nationalities**.
- Adapted to tenants' low digital literacy and reluctance to use digital apps by pivoting from app-based feedback to **passively inferring comfort** directly through physical thermostat interactions.



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● KEY RESULTS

- Achieved **27–31% actual heating savings** compared to the baseline control systems.
- Reported **30% reduction in district heating operational costs**.
- Achieved a **30% reduction in carbon emissions** linked to the local district heating grid.
- Supported the enrolment of **32 apartments out of 56**, despite severe socio-technical challenges.

● REPLICATION RELEVANCE

- **Interoperability** is essential for replication, connecting sensors, heating control, tenant interfaces and data services within one coherent system.
- **User uptake cannot be taken for granted**, even when the technical system is operational and user-friendly.
- Replication in social housing should account for **language diversity**, varying levels of digital literacy and the need for personalised onboarding support.

● RECOMMENDATIONS

- The Danish pilot confirms the value of combining **digital monitoring, predictive heating control and tenant-facing interfaces** in one integrated social housing system.
- The pilot demonstrates the value of **comfort-oriented optimisation** in social housing, while showing the practical relevance of accessibility and user diversity.
- **Interoperable architecture** remains a core design principle, so that sensing, control and user interaction operate as one connected service environment.
- Effective engagement requires **accessible language, personalised support and practical onboarding**, especially in residential settings characterised by diverse user backgrounds and uneven familiarity with digital tools.

REFERENCES

D5.4: DEDALUS impact and social acceptance analysis, 2026.