

# OUR CONSORTIUM



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# GET IN TOUCH

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# SEEDS

Cost-effective and replicable  
RES-integrated electrified heating and  
cooling systems for improved energy  
efficiency and demand response



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# CONCEPT AND OBJECTIVES

Energy in European households is mainly used for heating, cooling, and the production of hot water. Heating is the dominant use of energy, responsible for about 70%, and gas is the most common fuel used in buildings. To rapidly reduce the dependency on (Russian) gas and other fossil fuels and fast forward the green transition, the building sector should replace thermal systems with renewable energy-based solutions complying with energy efficiency first principle, large degrees of electrification and smart energy systems. There is a need to find **cost-effective, highly replicable, and integrated systemic solutions** that will significantly speed up the electrification of thermal systems through energy renovation and system smartification in the building sector.



SEEDS unites a multidisciplinary and complementary team of SMEs, LEs, RTOs, and stakeholders that constitute the whole (local) value chain of energy efficiency in buildings and thermal demand electrification, from planning, design, and construction to operation and commissioning. SEEDS is built upon the consortium's **vast experience in developing, testing, and valorizing decarbonization solutions, supervising real-life demonstrations of building renovation and smartification, and deploying energy flexibility**. Thus, the challenge for the SEEDS consortium is to **innovate solutions to be replicable, exploitable, and scalable**.

Addressing that every building is unique and requires tailored solutions to be cost-efficient and energy efficient, we develop **scalable and generic design and operational optimization methodologies**, deploy multiple proven heat pump technologies at scale, and optimally integrate them into the building and broader energy system.

The project demonstrates these in five pilot sites in **Denmark (CDK), Belgium (SWECO), Hungary (EMI), Slovenia (PETROL) and Greece**, providing real-world settings spread across the different climate zones and European construction markets. SEEDS is centered around three key themes: **cost efficiency through optimization, system integration through holistic design and control, and replicability through configuration modularity and scalable building types**.

These are addressed in 7 focus areas:

- 1) Iterative design of the component and integrated system;
- 2) Secure and interoperable data platforms and IoT,
- 3) Integrated system optimization for energy efficiency and flexibility,
- 4) Deploying energy flexibility to enhance grid stability,
- 5) Replication strategies, exploitation, and business models,
- 6) Decision making support framework for replication,
- 7) Dissemination, communication, and stakeholder outreach.

*"We are excited to coordinate this ambitious project which combines the expertise of partners from 8 European countries representing 5 local value chains with a strong background in design, construction and optimal operation of RES-based heating and cooling systems. We will demonstrate grid services by activating energy flexibility of these systems and accelerate the decarbonization of energy use in buildings with SEEDS solutions, which are beyond the physical boundaries of buildings".*

**Rongling Li**, Associate Professor in the Department of Civil and Mechanical Engineering at the Technical University of Denmark, and coordinator of the SEEDS project.