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GeoSUSTAIN

Sustainable Medium-Depth Geothermal Solutions

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Co-funded by the European Union
Netherlands Enterprise Agency
Funded by The Research Council of Norway
Swedish Energy Agency

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GeoSUSTAIN

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EMISSIONS REDUCTION ALBERTA

NCBR

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GeoSUSTAIN

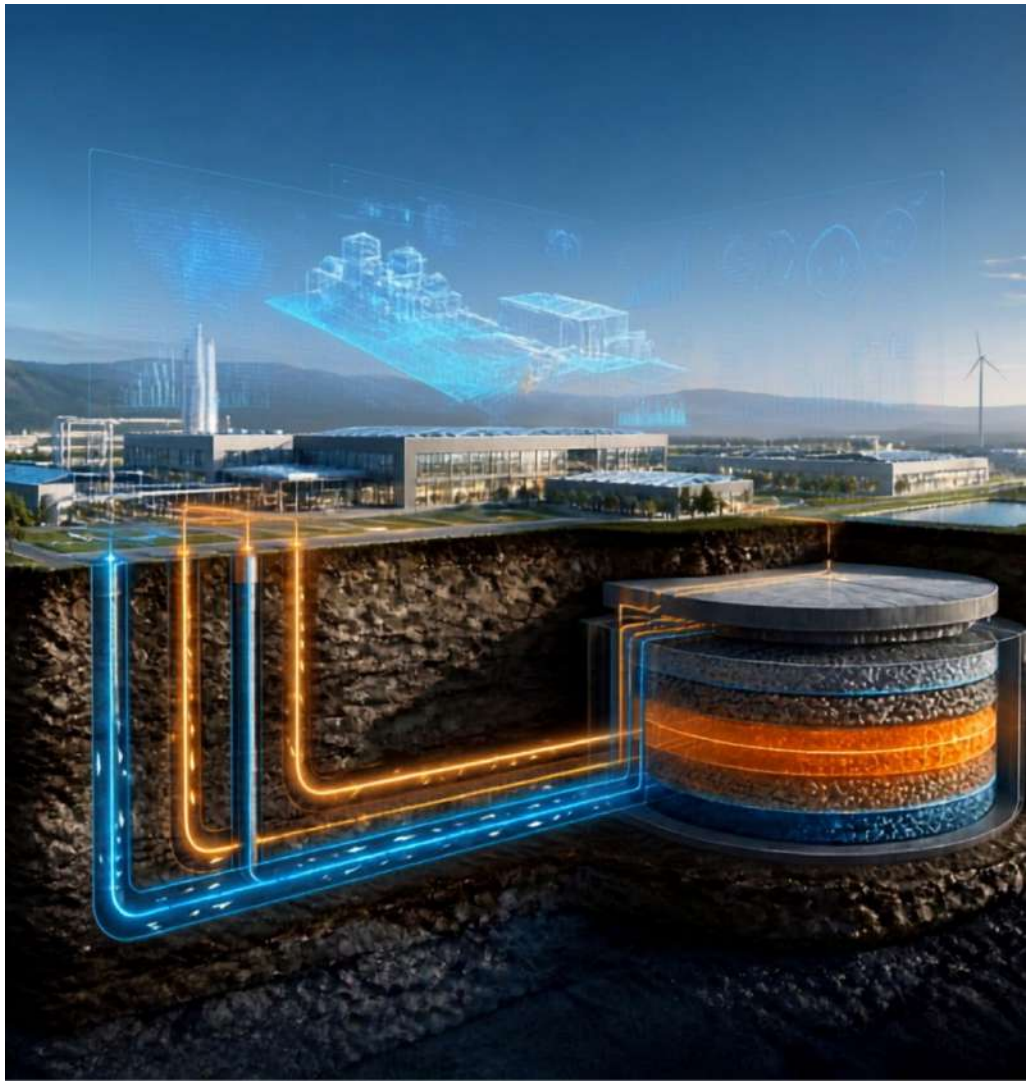
Section 01

About the Project

About the Project

GeoSUSTAIN develops next-generation geothermal energy solutions that combine medium depth borehole heat exchangers with a novel underground solid-media thermal energy storage system to deliver renewable, emission-free heating and cooling for industrial applications.

- The research addresses one of Europe's most pressing challenges: decarbonising industrial heat, which accounts for roughly 66 % of industrial energy consumption and remains largely dependent on fossil fuels.
- By improving geothermal efficiency, reducing installation costs, and integrating an AI-based digital twin for smart energy management, GeoSUSTAIN enables flexible, reliable, and cost-effective renewable H/C, supporting the EU's goal of climate-neutral industry by 2050.



About the Project

The Consortium and Funding Organisations



cet Partnership
Co-funded by the European Union
Netherlands Enterprise Agency
EMISSIONS REDUCTION ALBERTA
NCBR National Centre for Research and Development
FFG Promoting Innovation.
Funded by The Research Council of Norway
Swedish Energy Agency

About the Project

Website and Social Media

Project's website

GeoSUSTAIN Project

Geo_Sustain

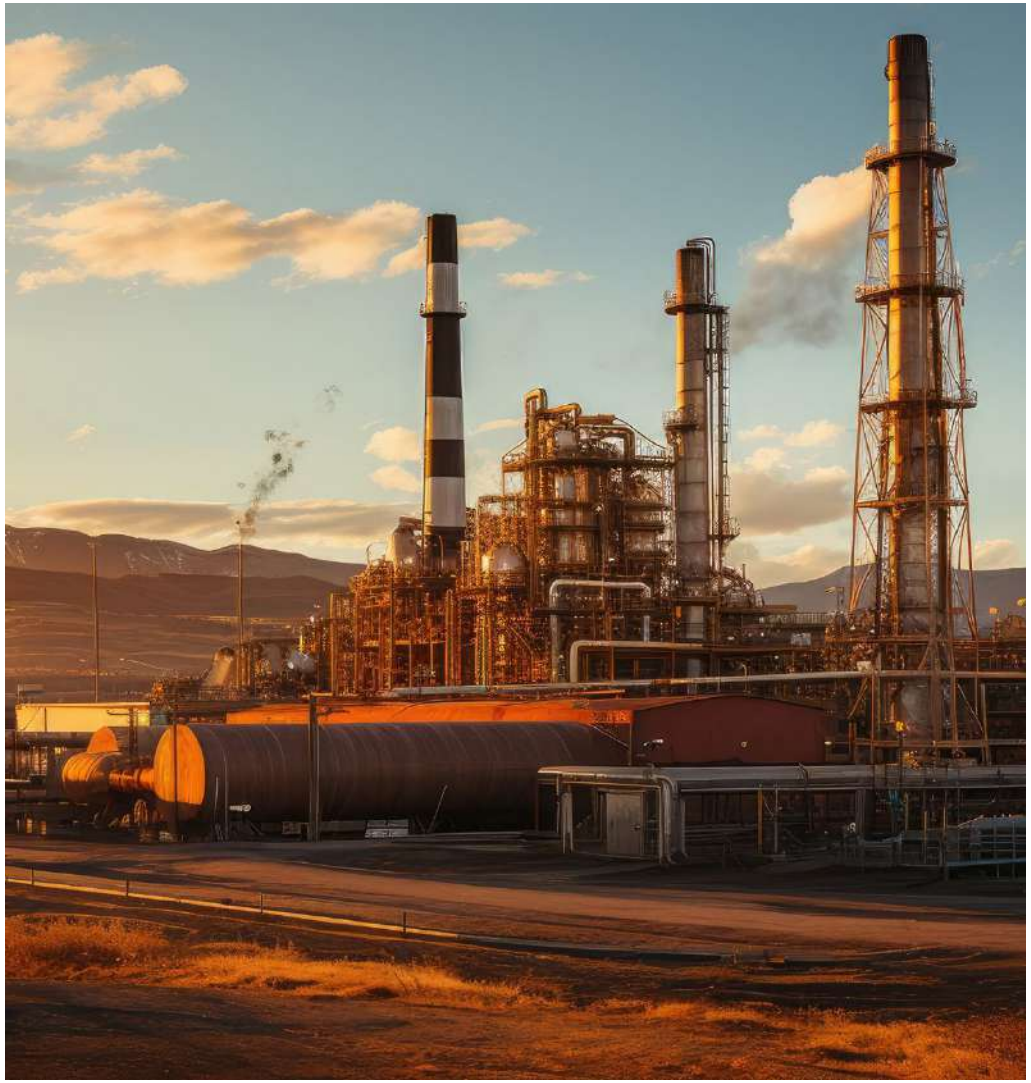
Section 02

Project Objectives

Project Objectives

Non Technological Objectives

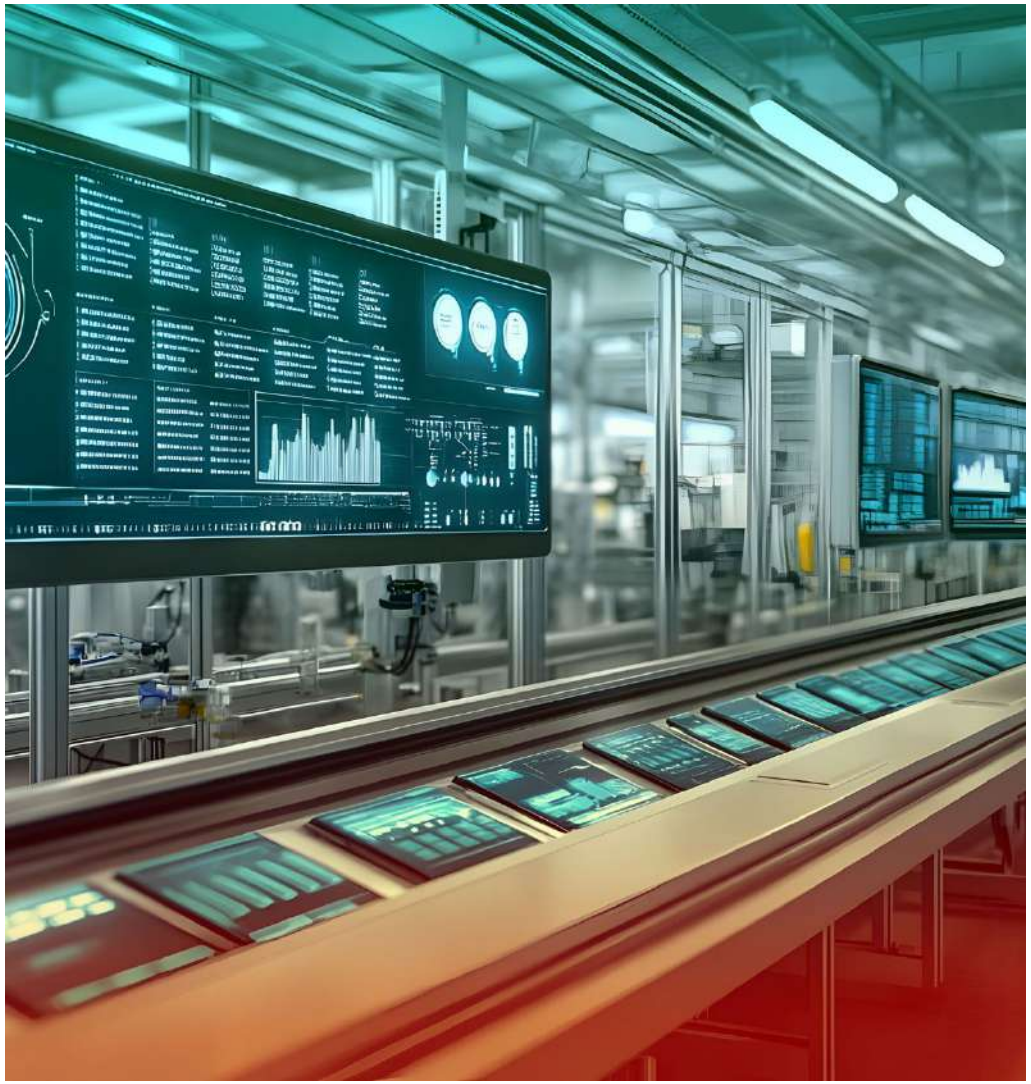
- Map and translate industrial needs into technical specifications for new H/C concepts based on GeoSUSTAIN technologies.
- Assess the techno-economic, environmental and social impacts of GeoSUSTAIN solutions.
- Engage stakeholders (industry, policy makers, wider community) to build awareness and acceptance for geothermal H/C.
- Define an exploitation pathway, IPR management strategy and replication plan for GeoSUSTAIN Key Exploitable Results.



Project Objectives

Scientific and Technological Objectives

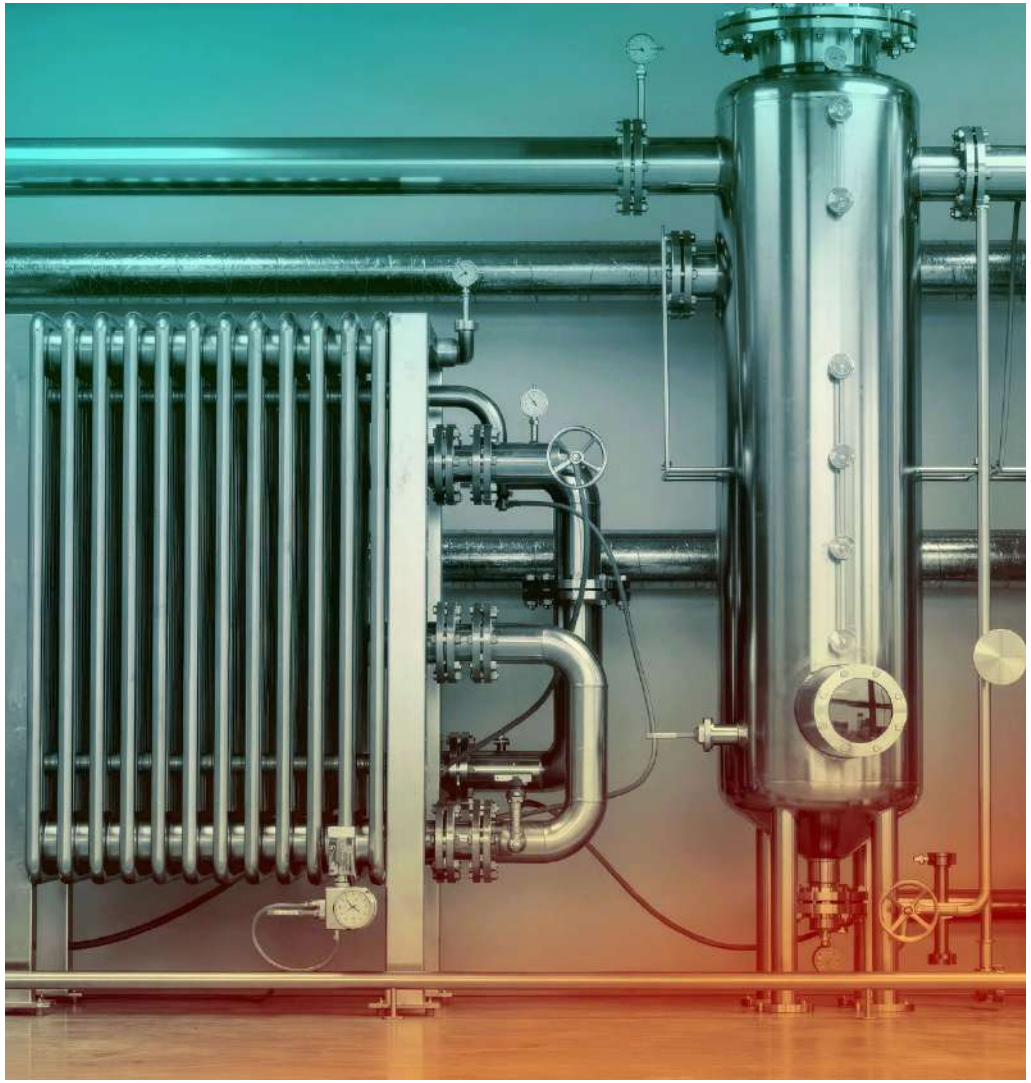
- Develop and test innovative ground-source heat supply systems for industry based on Medium Depth Borehole Heat Exchangers, targeting TPC > 1 (thermal-hydraulic performance coefficient above single-U baseline), 25 % longer lifetime and 25 % lower engineering cost.
- Develop and test innovative SMTES technologies enabling 104 kWh/m³ at 110 °C (≈ 80 % higher energy density than UWTES), trafficable covers, 60 % smaller environmental footprint, 35 % CAPEX/OPEX reduction, and 55 % lower LCOSH.
- Develop an ML-based Digital Twin with dynamic energy-management and control strategies, enabling real-time efficiency improvements, demand-side management and integration of thermal cascading.
- Demonstrate and validate the integrated GeoSUSTAIN system at TRL 5 through three industrial use cases (Euro-Centrum Technology Park, Reve Kompost, Takeda pharmaceutical plant) and a Decision Support Toolkit.



Project Objectives

Expected Outcomes

- Integration of geothermal heating and/or cooling in different industrial sectors, demonstrated at TRL 5 and supported by an open-access Decision Support Toolkit.
- Increased industry, regional, municipal and citizen trust in geothermal energy through stakeholder engagement, transparent communication, LCA/S-LCA analysis and DNSH-compliant impact assessment.

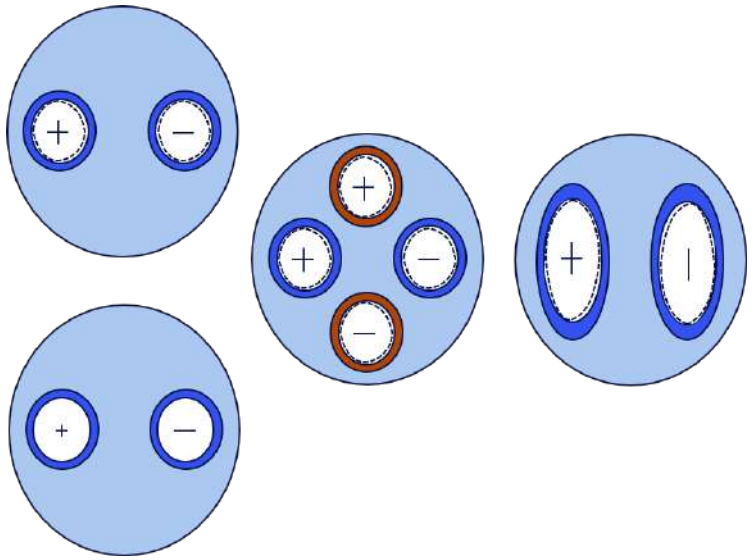


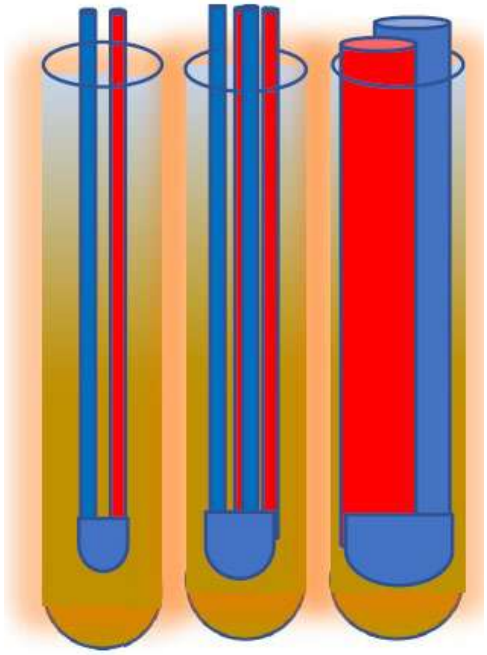
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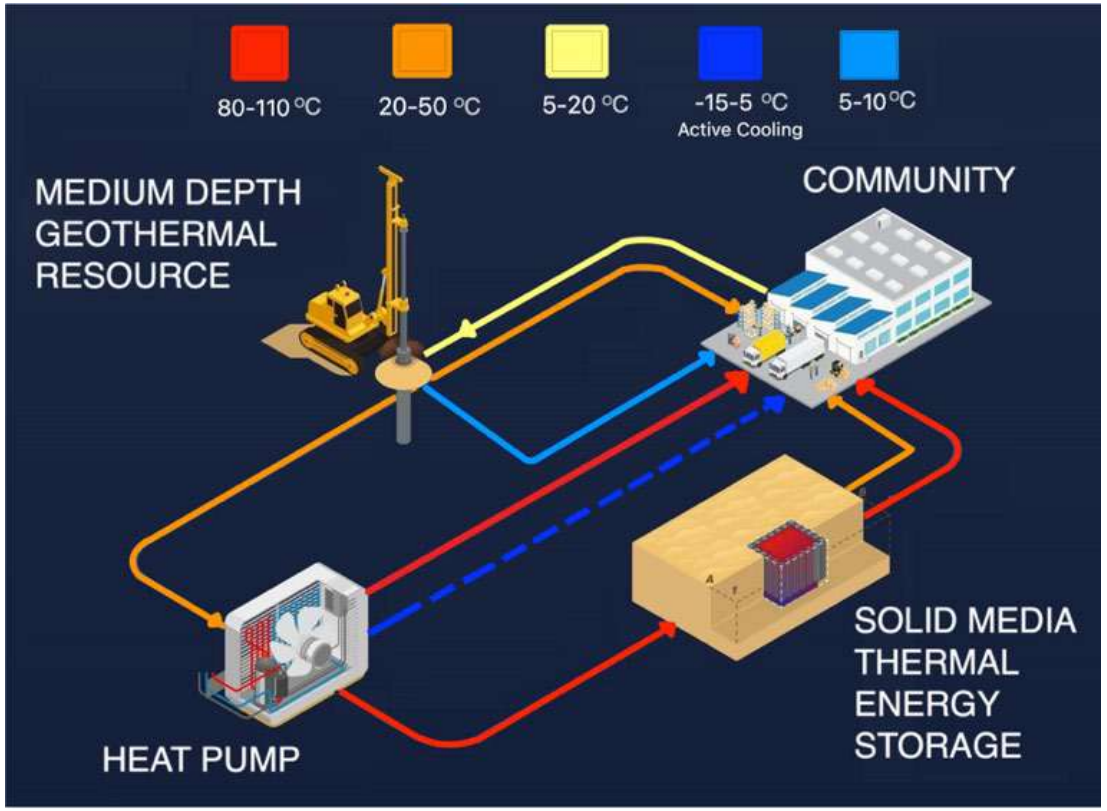
Key Technologies

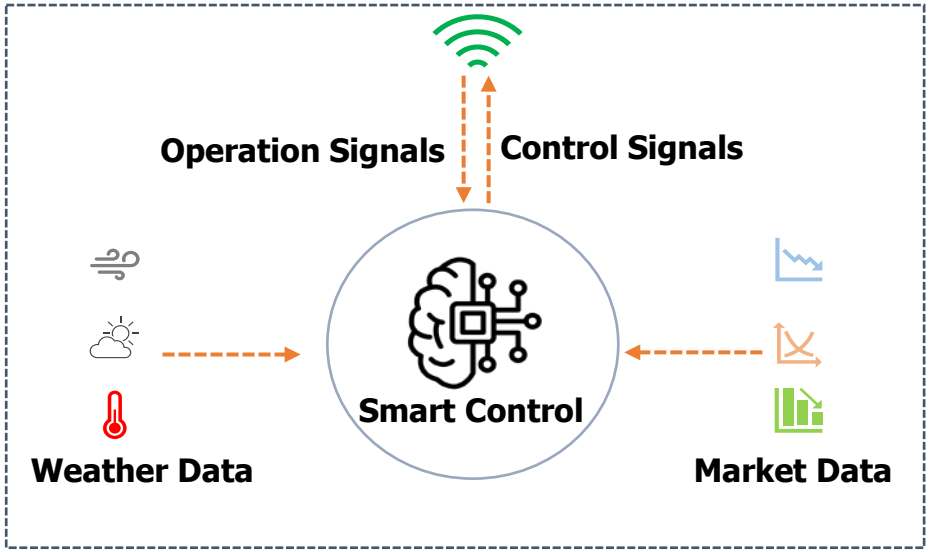
Key Technologies

- Medium-depth geothermal wells (400-1000 m)
- Enhanced Medium Depth Borehole Heat Exchanger (MDBHE) designs
- Solid-media thermal energy storage system (SMTES) using excavation sand and drill cuttings
- AI-enabled digital twin for real-time energy optimization
- An Open Access Decision Support Toolkit









Section 04

Target Groups

Target Groups

Industrial Advisory Board (IAB)

- Industry partners
- The wider research community
- Policymakers and regulators
- The industrial sector, energy distributors
- The wider community and society

Selected EU sister projects and initiatives

The GeoSUSTAIN target stakeholder groups encompass the project's **Industrial Advisory Board (IAB)**, comprising representatives from industry partners, the wider research community, policymakers, and regulators, as well as the industrial sector, energy distributors, and the wider community and society. Furthermore, the project will establish a **formal collaboration framework with selected EU 'sister projects' and initiatives** specialising in geothermal energy, heat pumps, and thermal energy storage.



Thank you ☺

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Co-funded by the European Union

Netherlands Enterprise Agency · Emissions Reduction Alberta · NCBR · FFG · Funded by The Research Council of Norway · Swedish Energy Agency

The Consortium

University of Stavanger · KTH Vetenskap och Konst · AIT · TNO · University of Calgary · WiseEuropa · Bengt Dahlgren · Lyse

Helin · EnerTranS · Norconsult · INTEGRATED SUSTAINABILITY · Euro-Centrum Science and Technology Park · Reve Kompost · STATSBYGG

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