GEOS-TECHIS

Sustainable Industrial Heating and Cooling with Geothermal and Digital Solutions

www.geos-techis.eu

GeoS-TECHIS (Geothermal Source Thermal Energy for Cooling and Heating in Industries) is a research initiative focused on enhancing geothermal energy integration into industrial heating and cooling systems. The project investigates medium-depth geothermal resources combined with heat pump technologies to reduce carbon emissions in industrial applications.

Through a multidisciplinary consortium with expertise in energy systems, geoinformatics, thermal engineering, and industrial process simulation, GeoS-TECHIS develops and tests systems combining heat pumps, thermal energy storage (TES), and monitoring solutions for efficient energy use. Industrial processes account for 20-30% of global energy consumption and heavily depend on fossil fuels, contributing significantly to greenhouse gas emissions.

GeoS-TECHIS addresses this by demonstrating geothermal-based heating and cooling solutions, optimizing heat pumps and TES for energy-intensive industries. These efforts support the EU's 2030 climate goals and the transition to a circular, climate-neutral economy.

GeoS-TECHIS tackles key challenges:

- **Reliance on Fossil Fuels:** Transitioning to renewables is hindered by their intermittency and integration complexity.
- **Cost-Effectiveness:** High exploration and drilling costs limit geothermal adoption.
- **Energy Supply Consistency:** Geothermal offers reliable alternatives to variable renewables.
- **Public Awareness Gaps:** Limited public understanding restricts acceptance.
- **Eco-Sustainability:** Synthetic refrigerants in existing systems pose environmental risks.

GeoS-TECHIS advances geothermal integration through sustainable, innovative solutions to decarbonize industries while promoting societal and environmental sustainability, making geothermal energy a cornerstone of Europe's green transition.

GeoS-TECHIS transforms industrial energy by integrating cutting-edge technologies to meet modern sustainability challenges. By utilizing medium-temperature geothermal sources, high-temperature heat pumps with natural refrigerants, Thermal Energy Storage (TES), and AI-driven solutions, GeoS-TECHIS provides scalable systems that lower costs, improve efficiency, and reduce environmental impact.

Key Outcomes:

- **Ambitious CO_2 Emission Reduction:** Targets a 60-75% cut in emissions from industrial thermal processes.
- **Economic Benefits:** Reduces fossil fuel reliance, increases energy efficiency, and lowers operational costs.
- **Public Engagement:** Enhances acceptance of geothermal energy through transparency and community involvement.

Stakeholder Benefits:

- **Industries:** Scalable, cost-effective solutions for manufacturing, food processing, and textiles.
- **Policymakers:** Insights and data to shape energy policies.
- **Communities:** Cleaner air and reduced emissions.
- **Researchers and Innovators:** A platform for advancing sustainable technologies.

Aligned with Europe's green transition, GeoS-TECHIS supports the EU's "Fit for 55" climate goals by integrating renewable energy, improving efficiency, and fostering the circular economy. Adhering to the European Commission's "Do No Significant Harm" principle, the project advances environmental sustainability, innovation, and economic growth.

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