

GeoTHERM
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Digital technologies to accelerate GSHP adoption

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Tecnalia Research and Innovation

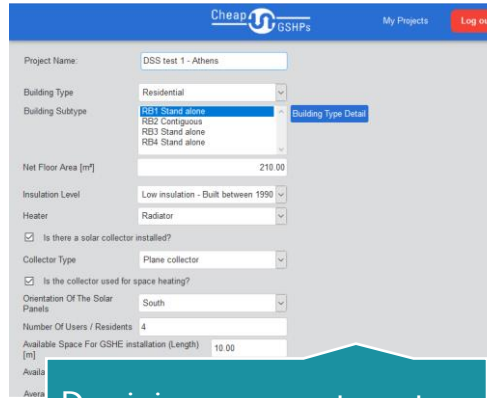
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How can digital tools assist with GSHP adoption

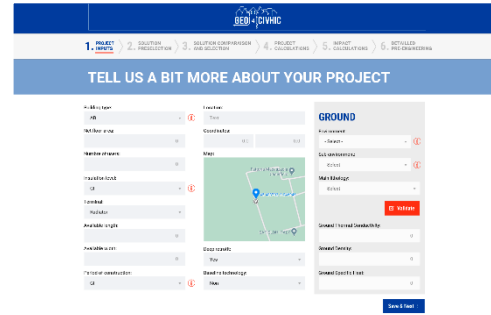


- Reduce barriers and give visibility to geothermal technologies
- Facilitate decisions of interested parties
- Raise awareness of environmental benefits of geothermal energy against other solutions
- Facilitate pre-engineering for technicians
- Bring geothermal technologies closer to designers
- Reduce cost and uncertainties
- Facilitate the integration with other technologies

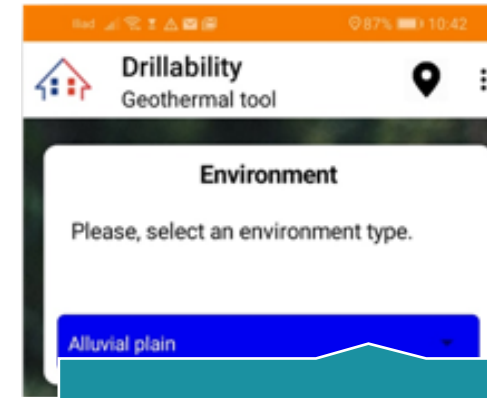
Digital tools can speed geothermal energy deployment



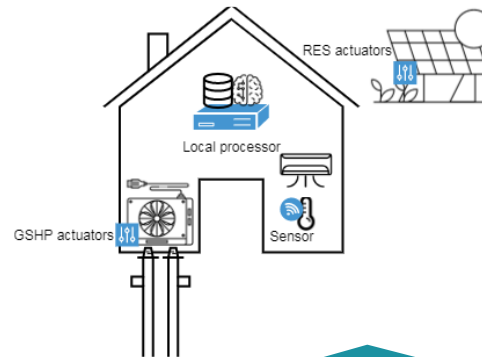
Decision support system for GSHP dissemination



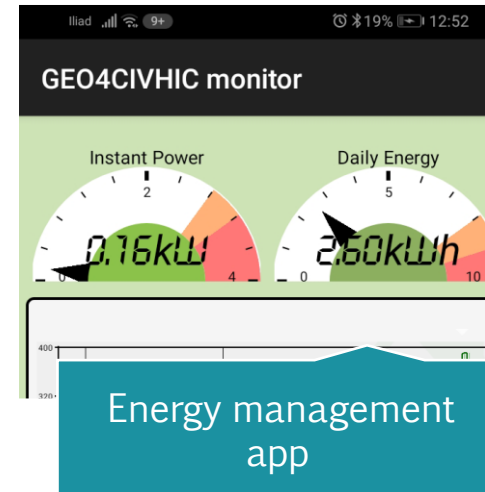
Decision support system for GSHP urban systems



Easy drilling app



BEMS for multi-renewable integration



Energy management app

Two projects, two DSS



CHEAP-GSHPs DSS

GEO4CIVHIC DSS

Target audience	Non professionals (e.g.: home owners)	Professionals, but non expert in geothermal energy (e.g.: decision makers, technical office ...)
Target buildings	Mainly standalone buildings	Urban environment
Objective	Identify the best geothermal system based on the user's criteria	Perform a quick pre-engineering cost and impact analysis
State	Accessible online	Release planed for end of 2021
Partners involved		

CHEAP-GSHPs DSS

DSS Website is available for the public at no cost.

It is accessible from the CHEAP-GSHPs project's website or directly through the following address:
<http://dss.cheap-gshp.eu/App>

The screenshot shows the homepage of the Cheap-GSHPs Decision Support Tool. At the top, there is a blue navigation bar with the 'Cheap-GSHPs' logo on the left and a 'Log in' button on the right. The main content area features a large 'DSS' title in green, with the words 'DECISION SUPPORT SYSTEM' repeated in a lighter green font in the background. Below the title, there is a video player. The video player has a white title box that reads 'CHEAP AND EFFICIENT APPLICATION OF RELIABLE GROUND SOURCE HEAT EXCHANGERS AND PUMPS'. Above the video player, there are logos for 'Cheap-GSHPs' and the European Union flag, with the text 'Horizon 2020 European Union Funding for Research & Innovation'. To the right of the video player, there is a welcome message: 'Welcome to the Cheap-GSHPs Decision Support Tool. This tool will help you to identify the most suitable shallow geothermal system according to your needs and preferences. Please visit the Cheap-GSHPs website for more information on these technologies.' Below the video player, there is a video control bar showing '0:00 / 5:25' and a play button. At the bottom right of the page, there is a call to action: 'See the video for information on how to use the tool or click on log in to start!'. The 'tecnalia' logo is visible in the bottom right corner of the slide.

GEO4CIVHIC DSS

- Building on the CHEAP-GSHPs DSS, we are developing a DSS dedicated to geothermal systems for **urban environment** to do **rapid pre-project assessment**.
- Objective: **Pre-engineering cost and impact analysis** to convince building owners to install GSHP systems. The purpose of the DSS will be to **facilitate pre-design discussion** around the installation of a GSHP in a **retrofit project in an urban environment**.
- It will serve, on one side, for decision makers to understand the **benefit of investing in GSHP** and, on the other hand, for GSHP expert to **contract** project with this technology. The DSS will also have an educative value for other stakeholders of energy renovation.
- The user is not expected to have geothermal expert knowledge.

The screenshot displays the GEO4CIVHIC DSS web interface. At the top, the GEO4CIVHIC logo is centered. Below it, a progress bar shows six steps: 1. PROJECT INPUTS (highlighted), 2. SOLUTION PRESELECTION, 3. SOLUTION COMPARISON AND SELECTION, 4. PROJECT CALCULATIONS, 5. IMPACT CALCULATIONS, and 6. DETAILED PRE-ENGINEERING. The main heading reads "TELL US A BIT MORE ABOUT YOUR PROJECT".

The form is divided into several sections:

- Building type:** A dropdown menu with "AB" selected.
- Net floor area:** A text input field with "0" entered.
- Number of users:** A text input field with "0" entered.
- Insulation level:** A dropdown menu with "G1" selected.
- Terminal:** A dropdown menu with "Radiator" selected.
- Available length:** A text input field with "0" entered.
- Available width:** A text input field with "0" entered.
- Period of construction:** A dropdown menu with "G1" selected.
- Location:** A text input field.
- Coordinates:** Two text input fields, both with "0.0" entered.
- Map:** A map showing a location in Fattoria Maccazzola, Caserificio, with a blue pin and the address "554287035124040".
- Deep retrofit:** A dropdown menu with "Yes" selected.
- Baseline technology:** A dropdown menu with "Non" selected.
- GROUND section:** A panel with the following fields:
 - Environment:** A dropdown menu with "- Select -" selected.
 - Sub-environment:** A dropdown menu with "- Select -" selected.
 - Main lithology:** A dropdown menu with "- Select -" selected.
 - Ground Thermal Conductivity:** A text input field with "0" entered.
 - Ground Density:** A text input field with "0" entered.
 - Ground Specific Heat:** A text input field with "0" entered.

A red "Validate" button is located below the GROUND section. At the bottom right, there is a blue "Save & Next" button.

At the bottom of the interface, there is a footer with the European Union flag and text: "GEO4CIVHIC Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 792335". To the right is the GEO4CIVHIC logo and tagline: "Most easy, efficient and low cost geothermal systems for retrofitting civil and historical buildings." Below that is the hashtag "#GEO4CIVHIC".

GEO4CIVHIC DSS

What is new in the GEO4CIVHIC DSS ?



Building types correspond to urban archetypes



Drillability of the soil is considered



New innovative HP solutions are included



Possibility for the user to input their own intermediary calculations (e.g. energy demand)



Detailed technical, environmental and economical results will be available as well as qualitative recommendations



Comparison between different levels of retrofit

Conclusion

- Accessible and simple Decision Support System tools can increase the **acceptance** of geothermal technologies over all stakeholders, professional and non-professionals. The DSS tools are important for bringing geothermal technologies closer to the public, serving as a **marketing** and **dissemination** tool.
- Taking advantage of the marketing capabilities of the tools, they shall increase the use of geothermal technology, also in the **building retrofit market**, one of the largest market segments and currently with low percentages of geothermal applications.

Software tools are key elements to **raise** the **awareness** of and **facilitate** the **access to shallow geothermal solutions**.

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