General presentation of the GEO4CIVHIC Project and actual State of Art

Speaker: **Adriana Bernardi**

Affiliation: National Research Council – ISAC

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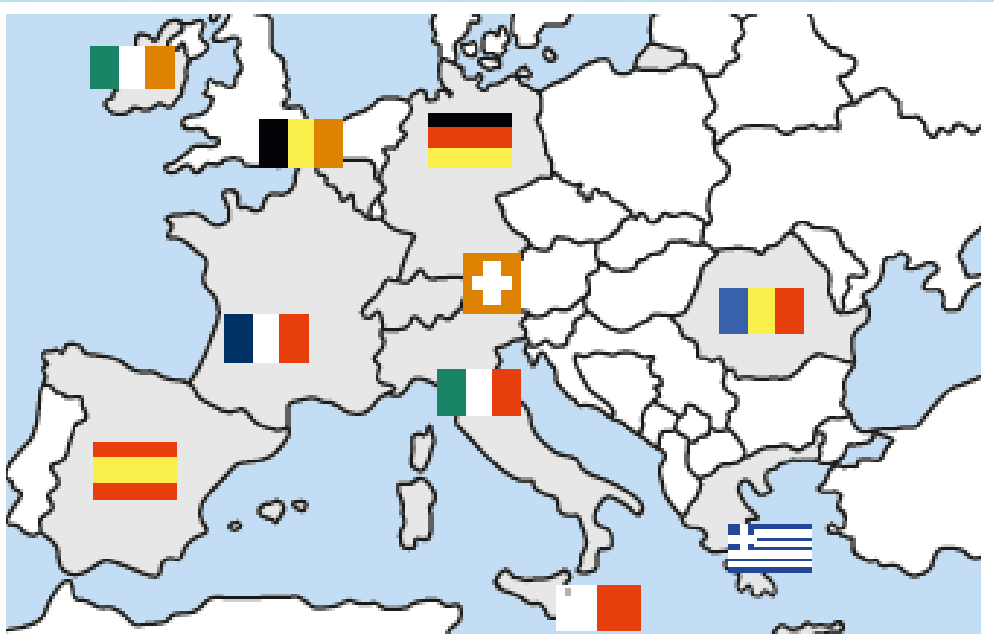
Speakers:

1) Adriana Bernardi (Coordinator) — CNR-ISAC
2) Luc Pockelé — RED
3) Antonio Galgaro/Eloisa Di Scipio — UNIPD
4) Javier Urchueguia — UPV
5) Jacques Vercruysse — GEOGREEN
6) Fabio Poletto — GALLETTI/HIREF
7) Riccardo Pasquali — GEOSERV
8) Sarah Noyé — TECNALIA

MOST EASY AND LOW COST GEOTHERMAL SYSTEMS FOR RETROFITTING CIVIL AND HISTORICAL BUILDINGS (GEO4CIVHIC)

Coordinatore: Consiglio Nazionale delle Ricerche-ISAC
Adriana Bernardi (a.bernardi@isac.cnr.it)



19 partners

Aim of the Project (1/2)

Today the **main barriers** in the application of shallow geothermal installations in the built environment are:

- **higher upfront investments** compared to other conventional solutions;
- difficulties of **cost effective** and **environmentally friendly drilling**;
- need to **change H&C** terminals in order to adequate performance from heat pumps, particularly in historical buildings;
- **low levels of awareness**, reluctance to risks and/or lack of experience amongst the designer and operators.

Aim of the Project (2/2)

The **main goals** of GEO4CIVHIC are

- to develop and demonstrate **more easy to install** and **more efficient GSHEs**,
- To use **drilling machine** innovations tailored for the **narrow space** of built environment (small gardens in historical centers)

- **developing or adapting HPs** and other hybrid solutions in combination with RES for retrofits through a holistic engineering and controls approach improving the return of investments.

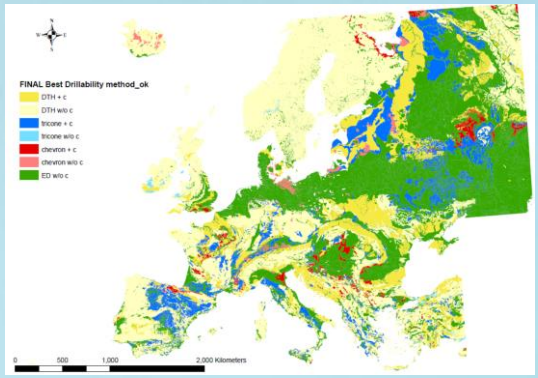
Project Strategy

Dual approach for penetration of shallow geothermal energy

- Reduce cost, increase efficiency and ease of installation of each of the main components of the value chain of the geothermal plant by developing technical innovations
- Develop engineering and decision support tools in a holistic approach to identify the most appropriate solutions, followed by actions raising awareness, increasing credibility and supporting implementation.

Project proposed innovations (1/2)

- European drilling maps *(in progress)*
- Application (APP) for on-site drillability assessment
- Decision support system (DSS) for preliminary feasibility assessment and analysis of different solution *(in progress)*
- Building Energy Management (BEM) control optimization for RES synergies
- Application (APP) to guide user towards energy savings actions



Project proposed innovations (2/2)

Sondes

- Rotary, vibration piling of steel co-axial GSHEs at depths between 50 – 80 m *(done)*
- Improve the Co-axial heat exchangers efficiencies (steel and plastic) *(done)*
- Adaptation of Well point *(done)*

Heat pumps

- Dual source heat pumps *(done)*
- Two stage heat pump for high temperature terminals *(in progress)*
- Low mid-term GWP refrigerant heat pump working at low temperature *(in progress)*

Vibration/rotation drilling head mounted on drilling rig

Demonstration cases and scenario's (1/3)

- 2 field test sites to validate and improve the drilling methodology and machine components. *(done)*
- 3 pilot case studies in existing infrastructure, to check and validate the adapted well point technology, two types of innovative co-axial heat exchangers, two very shallow heat exchanger solutions, a new plug and play heat pump with optimized controls. *(in progress)*

Demonstration cases and scenario's (2/3)

- 4 real demonstration case studies (1 civil and 3 historical) in different built environments, undergrounds and climatic conditions will be used to test the shallow geothermal system with the innovative drilling machine, the improved GSHE's and the novel heat pumps. *(in progress)*

Demonstration cases and scenario's (3/3)

- 12 "virtual" demonstration cases where the DSS and design tools will be applied. *(in progress)*

- Museum of Natural History of Alexandroupolis - Greece Leader: CRES
- Administrative building "Palacete de la Cruz Roja" – Spain; Leader: UPV
- Residential building Avangarde Forest 2 – Romania; Leader: PIETRE
- Residential building in Bucharest – Romania; Leader: RGS
- University building "Ex Ospedale Geriatrico" – Italy; Leader: UNIPD
- Historical building in Split – Croatia; Leader: UNESCO
- University Building in Erlangen – Germany; Leader: FAU
- Historical building "Castle of Attre" – Belgium; Leader: GEOGREEN
- Carnegie Clondalkin Library - Ireland; Leader: GEOSERV
- Administrative building "AIL (Aziende Industriali di Lugano)" – Switzerland; Leader: SUPSI
- Residential Building Mariënheuvel Soest (Soest – Netherlands); Leader: CNR-ISAC
- Residential Building La Vall 09, Bellpuig (Lleida – Spain); Leader: CNR-ISAC

Environment & Standardisation

- To provide transferrable recommendations for the development of **common European standards and regulations** for ground source heat pumps in the retrofitting scenarios and historical buildings. *(in progress)*
- To demonstrate the **potential in the context of the reduced environmental impact** of the GSHE technologies and the smaller scale drilling plant equipment required for installation. *(in progress)*
- To **transfer the knowledge** during dedicated and specific **training events** organized for the local authorities at the case study site locations
- To organise an "**European centers of excellence for shallow geothermal applications in civil and historical buildings**" *(in progress)*

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The project is in progress and partials results will be present in the following lectures....

Many thanks for your kind attention

Adriana Bernardi

http://www.geo4civhic.eu