



# GENIUS

DOCTORAL NETWORK ON  
ENERGY GEOSTRUCTURES



Funded by  
the European Union

## GENIUS Doctoral Network on Energy Geostructures Integration : Buildings, Infrastructure and Underground Storage



 **Université  
de Lille**

### PhD Positions at University of Lille

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[www.genius-dn.eu](http://www.genius-dn.eu)

[GENIUS - MSCA Doctoral Network: Overview | LinkedIn](#)



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## Project Overview

GENIUS pioneers a comprehensive approach to address the biggest global challenge the energy sector is facing: the transition to renewable-based, energy-efficient heating and cooling systems. Space heating and cooling currently makes up the world's largest energy sector, accounting for approximately 50% of the final energy consumption. This figure is expected to grow rapidly over the coming decades due to economic and population growth, and inevitable increase in urbanisation. At the same time, the world is experiencing one of the most severe global energy crises in history, impacting the fossil fuels' availability and cost.

More than ever, there is an urgent need for innovative technologies to harvest renewable energy resources, to decrease our dependence on fossil fuels. Energy Geostructures (EGs) represent an effective means to meet the world request of less dependence on unsustainable resources by being designed as dual-purpose elements targeting geothermal heat exchange and structural support for buildings. Yet, their wider use has been hindered by the lack of (i) sustainable expertise pipeline in the field of energy geotechnology, (ii) technical knowledge regarding the integration of energy geostructures to buildings and infrastructure, (iii) scientific knowledge for the integration of energy geostructures with other underground structures. GENIUS will address all three challenges by developing advanced analysis and design tools for energy geostructures (WP-1) and by advancing practical and scientific knowledge for their integration with buildings, infrastructure and other energy resources (WP-2 and WP-3). Furthermore, the holistic approach of GENIUS will train the Doctoral Candidates to become pioneering experts in conceptualization, design and implementation of energy geostructure applications. Networking with their peers, industry and stakeholders will give them highly attractive skills for transforming their ideas to implementation.

## Key Dates

|                                                    |                   |
|----------------------------------------------------|-------------------|
| <b>Deadline for on-line applications:</b>          | 31 November 2025  |
| <b>Compulsory start date for all applications:</b> | 30 September 2026 |

## Key Information

### Eligibility

- Supported researchers **must not already in possession of a doctoral degree** at the date of the recruitment.
- Researchers who have successfully defended their doctoral thesis but **who have not yet formally been awarded the doctoral degree will not be considered eligible**.
- DC's **must be recruited and enrolled in a doctoral programme** leading to the award of a doctoral degree in at least one EU Member State or Horizon Europe Associated Country.
- Recruited **researchers can be of any nationality**.
- Recruited **researchers must comply with the mobility rule**:



*They must not have resided or carried out their main activity (work, studies, etc.) in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date.*

*Compulsory national service, short stays such as holidays and time spent by the researcher as part of a procedure for obtaining refugee status under the Geneva Convention<sup>140</sup> are not taken into account.*

## English Language

Doctoral Candidate (DCs) must demonstrate that their ability to understand and express themselves in both written and spoken English is sufficiently high for them to derive the full benefit from the network training.

## Exclusivity

The candidate must be working exclusively for the action.

## Recruitment procedure

Recruitment will be carefully executed and monitored in accordance with the principles of the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers and in the DN mobility rules. Following an open, transparent, merit-based, impartial and equitable recruitment procedure which are tailored to each DC offering.

The DC positions will be advertised until all positions are filled. All applications proceed through the central on-line recruitment site via the University of Edinburgh. Candidates apply electronically for one to a maximum of two positions and indicate their preference. All candidates must upload the following documentation:

- Degree Certificate(s) (and translations if not English)
- Transcript/interim transcript (and translation if not English)
- Syllabus/Course description (and translation if not English)
- Research Proposal (maximum 2 pages)
- CV
- English Language Certificate
- Reference contact information (references will only be contacted for shortlisted candidates)

During the application candidates must declare that they are eligible and meet the criteria mentioned under '[Eligibility](#)' above.

To submit an application please follow this link: [GENIUS Doctoral Candidate Application Process](#). Each application will be shortlisted by the relevant recruitment committee. The recruitment committees will bring together diverse expertise and competences, have an adequate gender balance, including members from different disciplines and including representatives from industry. All members are adequately trained.

Once shortlisted the selected candidates will be invited to an online interview with the relevant recruitment committee. The assessment will be done by the recruitment committee following a homogeneous assessment criteria based on each DC position.

All shortlisted, DC applicants will be notified regarding the success of their application. The selected DCs are to start their research as quickly as possible in line with the specific requirements of the hiring Institute's Human Resources department and in line with all provisions for VISA etc. All DCs must have started by 30 September 2026. Below you will see a full list of the 15 PhD positions that are open.

## Applications are invited for two PhD positions (“Doctoral Candidates”, DCs) at University of Lille

### MSCA-DN 2024: GENIUS

#### Information relevant to both positions

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Host Institution:</b>                   | University of Lille (France)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Main supervisor:</b>                    | Hussein Mroueh ( <a href="mailto:hussein.mroueh@univ-lille.fr">hussein.mroueh@univ-lille.fr</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Researcher Profile:</b>                 | First Stage Researcher (R1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Type of Contract:</b>                   | Temporary Job                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Status:</b>                             | Full-time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Duration:</b>                           | 36 Months                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Funding:</b>                            | Horizon Europe (HORIZON) Marie Skłodowska-Curie Actions Doctoral Networks (MSCA-DN)                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Marie Curie Grant Agreement Number:</b> | 101226708                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Gross Salary:</b>                       | <p><b>Living allowance:</b> 4735,81 euro/month (see <a href="#">section 1.1. of the MSCA Work Programme</a>). This amount is adjusted via a correction coefficient based on the country in which the researcher is recruited (see <a href="#">Table 1 of the MSCA Work Programme</a>).</p> <p><b>Mobility allowance:</b> 710 euro/month.</p> <p><b>Family allowance:</b> if applicable and depending on the family situation: 495 euro/month.</p> <p><i>Specific regulations of each recruiting institution will also apply.</i></p> |
| <b>Benefits:</b>                           | <p>Fully funded 3-year PhD position</p> <p>Tuition fees covered</p> <p>Travel and conference participation budget</p> <p>Access to state-of-the-art laboratories and computing facilities</p> <p>International and interdisciplinary research environment</p>                                                                                                                                                                                                                                                                        |



|                                                                        |                                                                               |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|                                                                        | Secondment of 3 to 12 months to other network partners or associated partners |
| Is the Job related to staff position within a Research Infrastructure? | No                                                                            |

## The Current PhD (DC) Positions

### DC 1: Thermo-mechanical behaviour of EGs in challenging geological conditions.

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Aim</b>                             | Investigate thermo-mechanical (TM) behaviour of EGs (like piles and EMPs) in challenging geological conditions such as quick clays and carbonates rocks (e.g., Chalk), for optimizing their design for production and storage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Specific Objectives</b>             | <ul style="list-style-type: none"> <li>(1) Conduct detailed geotechnical and thermal characterization of “challenging soil” (like quick clays and chalk)</li> <li>(2) Develop an advanced numerical THM model</li> <li>(3) Design and implement field and laboratory experiments for validation.</li> <li>(4) Assess the performance of EMPs in terms of efficiency, durability, and stability.</li> <li>(5) Develop practical design guidelines for the implementation of EGs in challenging geological conditions.</li> </ul>                                                                                                                                                                       |
| <b>Secondment</b>                      | <ul style="list-style-type: none"> <li>▪ Norwegian University of Science and Technology (Norway)</li> <li>▪ ACESSOL Group (France)</li> <li>▪ Gustave Eiffel University (France)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Knowledge Skills and Experience</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Essential</b>                       | <ul style="list-style-type: none"> <li>▪ If non-native speaker, being able to provide proof of English proficiency at the time of appointment (<a href="https://www.ed.ac.uk/studying/international/english">https://www.ed.ac.uk/studying/international/english</a>)</li> <li>▪ Being able to provide proof of meeting the Mobility Rule (The candidate must not have resided or carried out their main activity—work, studies, etc.—in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date).</li> <li>▪ Must not be in possession of a doctoral degree on the recruitment date</li> </ul>                                  |
| <b>Desirable</b>                       | <ul style="list-style-type: none"> <li>▪ The ideal candidate should possess a robust foundation in geotechnical engineering. Undergraduate/Master students in civil engineering / geotechnical and geological engineering / geothermal engineering are particularly welcome. Experience in numerical modelling (e.g. Finite Element Analysis Comsol, Plaxis, etc.) and foundation design is beneficial, but not mandatory for this position.</li> <li>▪ Other preferred requirements: <ul style="list-style-type: none"> <li>• Proficiency in programming languages such as MATLAB, Python, or similar.</li> <li>• Ability to work both independently and collaboratively in a</li> </ul> </li> </ul> |

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|  | <p>multidisciplinary research environment.</p> <ul style="list-style-type: none"> <li>Physical and practical sense on experimental work, ability to follow an experimental setup and experimental program.</li> </ul> |
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**DC 11: Energy recovery from underground quarries during filling by geothermal energy storage.**

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Aim</b>                             | Numerous underground quarries have exploited the subsoil of Lille metropolitan area, mainly in the Chalk layer, at shallow depths, which threaten the stability of adjacent buildings and infrastructures. These cavities are generally filled by cement grout for stabilization depending on the urban needs. This PhD project aims to redefine the role of these underground spaces, transforming them into dual-purpose structures: safe and stabilised, but also serving as seasonal thermal energy storage (STES) systems. By combining geotechnical backfilling techniques with geothermal energy concepts, the project will explore how chalk quarries can be engineered to function as urban-scale heat reservoirs. |
| <b>Specific Objectives</b>             | <ol style="list-style-type: none"> <li>(1) Assess the thermal capacity of a backfilled quarries/cavities, using prototyping, physical or numerical modelling.</li> <li>(2) Perform short- and long-term risk analysis (backfill stability, environmental impact, influence of/on the water table), including geotechnical stability</li> <li>(3) Design the energy storage system, in particular the ground heat exchanger.</li> <li>(4) Instrument and monitor an in-situ installation in a cavity in terms of thermal exchange process.</li> </ol>                                                                                                                                                                        |
| <b>Secondment</b>                      | <ul style="list-style-type: none"> <li>University of Edinburgh (United Kingdom)</li> <li>Municipality of Lille (France)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Knowledge Skills and Experience</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Essential</b>                       | <ul style="list-style-type: none"> <li>If non-native speaker, being able to provide proof of English proficiency at the time of appointment (<a href="https://www.ed.ac.uk/studying/international/english">https://www.ed.ac.uk/studying/international/english</a>)</li> <li>Being able to provide proof of meeting the Mobility Rule (The candidate must not have resided or carried out their main activity—work, studies, etc.—in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date).</li> <li>Must not be in possession of a doctoral degree on the recruitment date</li> </ul>                                                              |
| <b>Desirable</b>                       | <ul style="list-style-type: none"> <li>The ideal candidate will hold a strong academic background in geotechnical, geological, and civil engineering, with prior training at MSc level (or equivalent). Candidates with expertise in geothermal engineering or related fields are also encouraged to apply.</li> <li>Other preferred requirements:</li> </ul>                                                                                                                                                                                                                                                                                                                                                               |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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|  | <ul style="list-style-type: none"> <li>• Familiarity with numerical modelling tools (e.g., Finite Element Analysis with COMSOL, Plaxis, or similar software).</li> <li>• Knowledge of programming languages such as MATLAB, Python, or equivalent.</li> <li>• Background or interest in foundation design, hydrogeology, or thermo-hydro-mechanical modelling.</li> <li>• Ability to work independently while contributing effectively to a multidisciplinary, international research team.</li> </ul> |
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## Other PhD Positions within GENIUS and contact.

To view the full PhD Positions of GENIUS, please follow the link here: [GENIUS LinkedIn](#)

As mentioned in the '[Recruitment Procedure](#)' all applicants can apply up to a maximum of two positions.

For further information, please either contact the [main supervisor](#) listed above or email our central email: [genius-dn@ed.ac.uk](mailto:genius-dn@ed.ac.uk)

## Disclaimer



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