JÜLICH
Forschungszentrum

Shaping change: this is what drives us at Forschungszentrum Jülich. As a member of the Helmholtz Association with some 7,600 employees, we conduct interdisciplinary research into a digitalized society, a climate-friendly energy system, and a sustainable economy. We focus on the natural, life, and engineering sciences in the fields of information, energy, and bioeconomy. We combine this with expertise in high-performance computing and artificial intelligence using unique scientific infrastructures.

Do you want to contribute to securing the critical raw materials needed to enable the European energy transition while working with powerful energy system models within an international team of researchers? Then become part of our team at the Institute of Climate and Energy Systems - Jülich Systems Analysis and contribute to

our research with your PhD thesis. Here at our institute, we investigate what a sustainable energy system could look like, providing meaningful analyses and scenarios for policymakers. Within the Marie Skłodowska-Curie project MiningBrines, we use our skillset to help develop a sustainable brine mining whole strategy that extracts and valorizes renewable energy, energetic gases, and critical raw materials from geothermal brines across European geothermal wells. If you are interested, read more about this unique opportunity and the associated tasks in detail below. Can't wait to start? Have a first look of what it's like working at ICE-2: **https://go.fzj.de/ice-2**

We are offering an interesting

PhD Position – Techno-economic assessment of geothermal plants with material co-production in energy systems

Your Job:

Critical Raw Materials (CRM) are those raw materials with unique properties that are economically and strategically important for the European economy and energy transition towards a carbon neutral future. Geothermal wells are located all over Europe and contain various minerals such as Lithium or Boron and energetic gases such as hydrogen and methane. Currently these geothermal wells are mostly used for their heat-energy properties. The MiningBrines project funded by the EU Horizon program aims to develop a strategy to extract CRM and other materials from geothermal brines while at the same time continuing to supply renewable energy. Your goal as one of 19 international PhD candidates within the project is to evaluate the economic viability of geothermal plants that produce power, heat, and critical materials by comparing them to other energy sources and extraction methods, while considering future demand, price trends, and incorporating data on resource productivity, innovative extraction methods, and social acceptance. For this you will work together with project partners to retrieve real world techno-economic data as a foundation for integrating geothermal plants into European energy system models based on the institute's own open-source FINE framework **https://github.com/FZJ-IEK3-VSA/FINE**. Your tasks in detail:

- Implementing geothermal plants with material co-production in energy system optimization models including, e.g., reservoir productivity predictions, novel surface processes for CRM extraction, CO_2 reinjection, and reconversion of decommissioned oil wells
- Economic evaluation of traditional material extraction methods and projection of future demand and price trends of critical materials

- Identification of specific conditions under which geothermal plants are economically viable and cost competitive in energy systems
- Further assessment of the strategic role of geothermal plants with material co-production in future European energy systems

Your Profile:

- Very good results in your Master's degree in the field of energy technologies, engineering, environmental sciences, renewable energies, industrial engineering, materials and geosciences or a related field
- Great interest in energy technology, energy economics and policy issues
- Experience in programming with Python or a comparable programming language
- Experience in energy system modelling is an advantage
- Highly motivated and able to work independently and in an analytical manner
- Reliable and conscientious working style with a high level of self-organization and time management skills
- Fluent command of written and spoken English is required (at least B2 level according to the CEFR: **https://go.fzj.de/languagerequirements**); German language skills are advantageous
- According to the mobility regulations of Marie-Sklodowska-Curie actions you must not have lived or carried out your main activity (work, studies, etc.) in Germany for more than 12 months in the last three years

Our Offer:

Being part of the Marie-Sklodowska-Curie doctoral network MiningBrines we are offering ideal conditions for you to complete your doctoral degree:

- INTERDISCIPLINARY TRAINING: An interdisciplinary training program, including academic research, international mobility, and industrial immersion
- INTERNATIONAL COLLABORATION: Collaboration with 32 international project partners and 18 other PhD candidates
- SECONDMENTS ABROAD: 4 secondments to industrial and academic project partners in France, Croatia, Turkey and Hamburg (Germany)
- NETWORKING & EXCHANGE: Participation in national and international conferences and workshops

Additionally, the Institute of Climate and Energy Systems - Jülich Systems Analysis offers to all its PhD students:

- TEAM & ENVIRONMENT: You will work in a motivated team with an international and interdisciplinary focus – at one of the largest research institutions in Europe
- RESEARCH & INFRASTRUCTURE: You will have access to excellent scientific and technical facilities for your work
- SUPERVISION & SUPPORT: Continuous professional support from your scientific supervisor
- DOCTORAL STRUCTURE: The opportunity to complete a doctoral thesis within 3 years through professional supervision and internal support services
- WORK-LIFE BALANCE: We offer flexible working hours to help you balance your professional and personal life. You also have the option of flexible working (in terms of location), which is generally possible after consultation and in line with upcoming tasks and (on-site) appointments
- VACATION: You will receive 30 days of vacation
- SUPPORT FOR INTERNATIONAL EMPLOYEES: Our International Advisory Service makes it easier for international employees to get started
- KNOWLEDGE & FURTHER TRAINING: Your further development is important to us – we provide targeted and individual support, e.g. through training and networking opportunities specifically for doctoral students (HITEC): **https://www.hitec-graduate-school.de/home**
- FAIR REMUNERATION: Remuneration is part of the EU funding program 'Marie Sklodowska-Curie' and depends on the personal requirements of the applicant
- FIXED-TERM: The position is for a fixed term of 3 years

Further information about the project can be found here:
https://cordis.europa.eu/project/id/101226422
In addition to exciting tasks and a collaborative working atmosphere at Jülich, we have a lot more to offer: **https://go.fzj.de/benefits**

We welcome applications from people with diverse backgrounds, e.g. in terms of age, gender, disability, sexual orientation/identity, and social, ethnic and religious origin. A diverse and inclusive working environment with equal opportunities in which everyone can realize their potential is important to us.

The following links provide further information on diversity and equal opportunities: **https://go.fzj.de/equality** and on the targeted promotion of women: **https://go.fzj.de/womens-job-journey**

The job will be advertised until the position has been successfully filled. You should therefore submit your application as soon as possible. We look forward to receiving your **online application**.

APPLY NOW

If your questions have not yet been answered via our **FAQs**, please send us a message via our **contact form**.

Please note that for technical reasons we cannot accept applications by e-mail.

www.fz-juelich.de