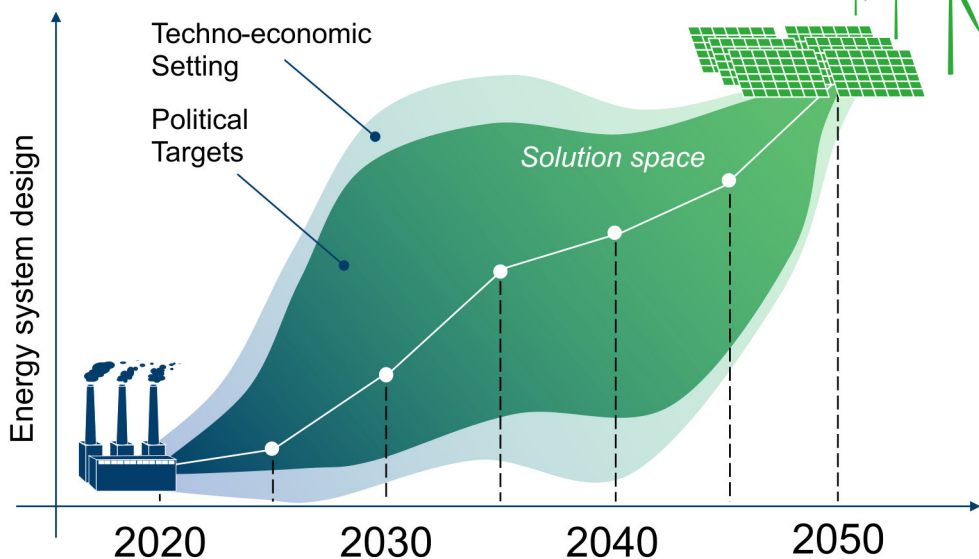


## Energy System Transformation



Conducting research for a changing society: This is what drives us at Forschungszentrum Jülich. As a member of the Helmholtz Association, we aim to tackle the grand societal challenges of our time and conduct research into the possibilities of a digitized society, a climate-friendly energy system, and a resource-efficient economy. Work together with around 7,500 employees in one of Europe's biggest research centres and help us to shape change!

The energy transition is one of the greatest challenges of the 21st century. At the Institute of Energy and Climate Research - Jülich Systems Analysis (ICE-2), we develop strategies for renewable, cost-efficient energy systems. The transition to a greenhouse gas-neutral energy system requires large quantities of critical raw materials. Reliable data on material flows is essential for a realistic representation of this demand in energy system models. Although extensive databases exist, they differ in terms of methodology and depth of detail. The aim of the master's thesis is to systematically compare different data sources and create a combined database. This enables critical resource requirements to be analyzed and potential bottlenecks to be identified to reduce the risk of resource shortages. Exemplary analyses are used to investigate how cross-sectoral material requirements can be examined and integrated into existing modeling frameworks.

**We offer you to the next possible date an exiting**

## Master Thesis - Comparative Assessment and Integration of Cross-Sectoral Material Flow Data for Critical Raw Material Analysis in Energy Transition

### Your Job:

The aim of your work is to identify and compare available data sources on cross-sectoral material flows and critical raw material demand, evaluate their suitability for energy system modeling, and demonstrate their application in exemplary analyses. The focus lies on methodological consistency, coverage of relevant sectors (e.g., industry, energy, mobility), and usability for model-based analyses in the context of the energy transition. For this purpose, you will develop a combined data basis from the most suitable sources (e.g., Exiobase, MFA studies, etc.) and carry out exemplary calculations of

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 application via our

**Online-Recruitment-System!**

**Questions about the vacancy?**

Get in touch with us by using **our contact form**.

Please note that for technical reasons we cannot accept applications via email.

[www.fz-juelich.de](http://www.fz-juelich.de)

cross-sectoral raw material demand. Your analysis will be conducted using the institute's in-house energy system framework FINE: <https://github.com/FZJ-IEK3-VSA/FINE>

Specifically, you will work on the following tasks:

- Research, comparison, and evaluation of several cross-sectoral material flow data sources (e.g., Exiobase, material flow analyses, input-output tables) with regard to data quality, methodological foundations, and model compatibility
- Identification of consistent and combinable datasets for capturing critical raw materials such as lithium, nickel, and rare earths in relevant sectors
- Development and evaluation of strategies for efficient resource use and modeling of alternative pathways to address material constraints in support of a robust and sustainable energy transition

#### **Your Profile:**

- Very good academic records in your master studies in the field of energy technologies, mechanical engineering, industrial engineering, physics, or a comparable field
- Basic knowledge in the fields of energy system analysis, renewable energy systems or thermodynamics or comparable
- First experience in optimization or statistics is advantageous
- Knowledge of an object-oriented programming language (e.g., Python, Matlab) and MS Office
- Analytical and structural thinking
- Interest in energy system analysis and future technologies
- Fluent language skills in written and spoken English or German

#### **Our Offer:**

We work on the very latest issues that impact our society and are offering you the chance to actively help in shaping the change! We support you in your work with:

- **SCIENTIFIC ENVIRONMENT:** You can expect excellent scientific facilities, modern technologies and qualified support from experienced colleagues
- **MEANINGFUL RESEARCH:** Your thesis deals with a future-oriented, socially relevant topic with direct practical relevance
- **INTERNATIONAL TEAM:** A pleasant working environment within an international team at one of the most prestigious research facilities in Europe
- **APPROPRIATE REMUNERATION:** You will receive appropriate remuneration for your work
- **FLEXIBILITY:** Flexible working hours make it easier for you to balance work and study
- **CAMPUS-EXPERIENCE:** Our research campus in the countryside provides ideal conditions for collegial exchange and sporting activities right on site
- **SHAPING THE FUTURE:** You will have the opportunity to collaborate with dedicated researchers from various scientific fields and actively contribute to designing the energy system of the future
- **PERSPECTIVE:** The position is for a fixed term of 6 months

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.

Further information on diversity and equal opportunities: <https://go.fzj.de/equality>