At the Institute of Energy and Climate Research - Techno-Economic Systems Analysis (IEK-3) we use models and analyses to support decision-makers from science, politics and industry in reducing greenhouse gas emissions in the energy system. The institute uses the FINE framework (https://github.com/FZJ-IEK3-VSA/FINE) to optimise and analyse energy systems. FINE has already been used to implement various models for mapping the German energy system, among others. Content and problem definition: In the energy policy discourse, the focus often lies on the long-term expansion targets of renewable energies and emission reduction targets until 2045/2050 and less on the pathways leading to these targets. This work enables you to contribute to tools for developing transformation pathways between today’s and a climate-neutral energy system.

We offer you an exciting

**Master`s thesis: Expansion paths of the energy transition - myopic vs. greenfield approach**

**Your Job:**
The aim of the work is the implementation of a myopic approach in FINE. Infrastructure and the evaluation of resulting implications. In the myopic approach, the development of an expansion path (e.g. 2020-2050) of an energy system takes place via the system design optimisation of individual base years (e.g. in 5-year intervals). A characteristic of this approach is that built infrastructures are considered in the following time step. This enables a more realistic development of transformation paths.

In contrast, the alternative greenfield approach does not take existing infrastructures into consideration. The energy system is designed from scratch. The question arises how the systems under the two approaches differ from each other in terms of system design and system costs over time. This work builds on two energy system models of the German energy system developed at IEK-3: FINE.NESTOR, a single-node model with high
sectoral resolution, and FINE.Infrastructure, a multi-node model with high regional resolution. The myopic approach is already implemented in FINE.NESTOR. The aim of the work is to extend the coupling between the models to transfer myopia to FINE.Infrastructure. Your tasks in detail:
• Literature research on myopic and greenfield approaches in optimisation models.
• Conceptual design and implementation of the approaches in FINE.Infrastructure (coupling of the time steps of the optimisation models)
• Performing the system design optimisation for selected time steps according to myopic and "green field" approaches
• Exemplary investigation and sensitivity analysis with focus on analysis of differences in system design and with regard to consistency between support years, comparison of costs of different transformation paths as well as identification of no-regret measures

Your Profile:
• Studies in the field of (industrial) engineering or a comparable course of study.
• Interest in energy-related, economic and political issues
• Independent and analytical way of working
• Knowledge of an object-oriented programming language (e.g. Python, Matlab)

Our Offer:
We work on cutting-edge innovative topics and offer you the opportunity to actively shape change! We offer you:
• A diverse and highly motivated working group of international character within one of the largest research institutions in Europe
• Intensive supervision of the work in weekly web meetings, the thesis can be prepared through remote working
• An excellent scientific and technical infrastructure
• The opportunity to actively participate in shaping the energy system of the future
• Flexible working hours as well as a reasonable remuneration

The position is initially for a fixed term of 6 months.

Forschungszentrum Jülich promotes equal opportunities and diversity in its employment relations.
We also welcome applications from disabled persons.