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.

The transition to renewable energy is reshaping Europe's energy infrastructure. The growing share of fluctuating renewables, coupled with electrification of transport, heating, and industry, is driving stronger sector coupling.

At the Institute of Climate and Energy Systems - Energy Systems Engineering (ICE-1), we develop advanced models and algorithms to simulate and optimize integrated multi-energy systems, capturing complex interdependencies between electricity, gas, and heat networks. The gas sector, including hydrogen technologies, can provide both flexibility and decarbonization potential.

We are offering a

PhD position - Analysis of Transformation Pathways for European Gas and Hydrogen Grids in Integrated Energy Systems

Your Job:
This PhD project focuses on modelling and simulating future gas grids, exploring transformation pathways, and developing cross-sectoral simulation frameworks to support informed decision-making.

Your tasks in detail:

- Investigate the impacts of future transformation pathways on the operational security and resilience of gas and hydrogen infrastructures, considering hydrogen blending, pipeline repurposing, and Power-to-Gas technologies
- Evaluate and compare system operational behaviours under diverse policy and market scenarios (e.g., hydrogen import strategies, regional demand developments) through scenario-based modelling
- Assess the interactions between gas, electricity, and heat sectors, focusing on

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

operational flexibility, cross-sectoral dependencies, and potential bottlenecks
- Enhance and extend our simulation tools and models (GasNetSim) to meet evolving research requirements and support comprehensive system analyses
- Extend our simulation tool (GasNetSim) and grid models to fulfil research needs
- Disseminate your findings through scientific publications, conferences, and collaborations
- Supervise Bachelor's and Master's students and represent the institute in national and international research contexts

Your Profile:
- Excellent Master's degree in mechanical engineering, energy systems, computational engineering, or a related field
- Strong background in numerical methods and applied mathematics
- Proficient in programming (Python and C++)
- Fluent in written and spoken English; knowledge of German is an asset
- Strong analytical and independent working style
- Excellent teamwork and communication skills

Our Offer:
Join a diverse and supportive research group at one of Europe's leading research centers, where you will work on cutting-edge energy system models developing solutions for Europe energy system decarbonization. You will have access world-class infrastructure (including the Jülich Supercomputing Centre), and develop skills to advance your future career in academia or industry.

We offer ideal conditions for you to complete your doctoral degree:
- Pursue a PhD at RWTH Aachen University under the supervision of Prof. Benigni
- Access cutting-edge infrastructure, including the Jülich Supercomputing Centre
- Participate in projects, meetings, and international conferences
- 30 days of annual leave and flexible working arrangements, including partial remote work
- Strong support and mentoring for building a career in academia or industry
- Professional development through JuDocS, including training courses, networking, and structured continuing education (https://www.fz-juelich.de/en/judocs)
- Targeted services for international employees, e.g. through our International Advisory Service

The position is for a fixed term of 3,5 years, where the first 6 months serve as orientation and probation period. Pay is in line with 13 (75%) of pay group 13 of the Collective Agreement for the Public Service (TVöD-Bund) and additionally 60 % of a monthly salary as special payment („Christmas bonus"). The monthly salaries in euro can be found on the BMI website: https://go.fzj.de/bmi.tvoed.entgelt Further information on doctoral degrees at Forschungszentrum Jülich (including its various branch offices) is available at https://www.fz-juelich.de/en/careers/phd

In addition to exciting tasks and the collaborative working atmosphere at Forschungszentrum Jülich, we have a lot more to offer (https://www.fz-juelich.de/en/careers/julich-as-an-employer/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 and on the targeted promotion of women:
https://go.fzj.de/womens-job-journey