At the Institute of Energy and Climate Research - Energy Systems Engineering (IEK-10) we focus on the development of models and algorithms for simulation and optimization of decentralized, integrated energy systems. Such systems are characterized by high shares of renewable energies and increasing sector coupling, which leads to high spatial and temporal variability of energy supply and demand as well as a high degree of interdependence of material and energy flows. Our research at the IEK-10 aims to provide scalable and faster-than-real-time capable methods and tools that enable the energy-optimal, cost-efficient and safe design and operation of future energy systems.

We are looking to recruit a

PhD position - Stochastic Predictive Optimization for the Electrical Grid

Your Job:
In response to the urgent demands posed by climate change in an increasingly global economy and in addition to the goal of reducing dependence on imported energy sources and raw materials, the European energy system is considering a shift from an energy system based on fossil fuels that relies on large power plants, to a dynamic, supply- and demand-driven approach, often organized in local energy communities where renewable energy is the main source.

The envisioned system exhibits a level of complexity related to the coordination of distributed renewable resources connected to the electrical grid and the stochastic behavior of consumption and generations, which introduce a high level of uncertainty. To counteract it, optimization methods that can make accurate predictions by compensating for stochastic effects are needed to achieve the goal of sustainability and maintain the stability of the energy system.

We are currently seeking a PhD student for the following research topics:
• Development of stochastic optimization methods for the control of distributed
resources in the electrical grid
• Accurate modelling of the different source of uncertainties
• Integration of the developed control algorithms in the digital platform
• Real-time implementation and hardware-in-the-loop validation of the methods and tools
• Development of the interfaces with measurement devices and additional software tools
• ... and more

Your Profile:
• Excellent university degree (Masters) in Electrical Engineering, Electronic Engineering, Mechanical Engineering, Physics or a comparable field
• Strong mathematical background
• Excellent knowledge and experience in programming (e.g. Python, Matlab, C, C++)
• Knowledge of optimization theory
• Knowledge of control of energy systems
• Knowledge of modelling, preferably of energy systems
• Interest in energy systems and energy infrastructures, especially regarding power and gas grids
• Experience with real-time simulations are welcome
• Excellent ability for cooperative collaboration
• Very good communication skills in English

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 offer ideal conditions for you to complete your doctoral degree:
• Possibility of pursuing a PhD at RWTH Aachen University supervised by Prof. Benigni
• A highly motivated research group in one of the biggest research centers in Europe
• An excellent scientific and technical infrastructure: both necessary conditions for a successful PhD thesis at RWTH Aachen within three and a half years
• Participation in project meetings and conferences
• Strong support and mentoring for setting up a future career in science and/or the industry
• Further development of your personal strengths, e.g. through an extensive range of training courses; a structured program of continuing education and networking opportunities specifically for doctoral researchers via JuDocS, the Jülich Center for Doctoral Researchers and Supervisors: https://www.fz-juelich.de/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 half year serves as orientation and probation period. Pay in line with 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“). Further information on doctoral degrees at Forschungszentrum Jülich including our other locations is available at: www.fz-juelich.de/gp/Careers_Docs

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.