Technische Universität Dresden (TUD), as a University of Excellence, is one of the leading and most dynamic research institutions in the country. Founded in 1828, today it is a globally oriented, regionally anchored top university as it focuses on the grand challenges of the 21st century. It develops innovative solutions for the world's most pressing issues. In research and academic programs, the university unites the natural and engineering sciences with the humanities, social sciences, and medicine. This wide range of disciplines is a special feature, facilitating interdisciplinarity and transfer of science to society. As a modern employer, it offers attractive working conditions to all employees in teaching, research, technology, and administration. The goal is to promote and develop their individual abilities while empowering everyone to reach their full potential. TUD embodies a university culture that is characterized by cosmopolitanism, mutual appreciation, thriving innovation and active participation. For TUD, diversity is an essential feature and a quality criterion of an excellent university. Accordingly, we welcome all applicants who would like to commit themselves, their achievements, and productivity to the success of the whole institution.

The Boysen-TU Dresden Research Training Group for young researchers from Engineering, Social Sciences, Arts, and Humanities, co-financed by the Friedrich and Elisabeth Boysen Foundation and the Technische Universität Dresden, is offering a doctoral scholarship\(^1\) from January 1, 2023, for a maximum of 3 years, subject to available funding. The interdisciplinary Research Training Group, in what is its fourth generation, is conducting research on the overarching topic Hydrogen Economy – Strategic element of a future GreenGas deal. It consists of four clusters. Cluster H: Techno-economic modeling of hydrogen value-added networks combines four sub-projects (SP).

A suitable person (m/f/x) is being sought to work on the topic **SP H3: Optimization of hydrogen value-added networks: A systems process engineering analysis.** The Institute of Process Engineering and Environmental Technology, Process Systems Engineering Group at the Faculty of Mechanical Science and Engineering at TU Dresden (within the framework of the Process-to-Order Lab) is responsible for the supervision. The interdisciplinary supervision takes place in the common rooms of the Research Training Group.

**Abstract:** The subproject models the industrial material use of green hydrogen as a raw material in the value creation networks of the European process industry. The modeling is based on process engineering relationships such as steady-state material, component, and energy balances with operating point-dependent efficiencies and technological boundary conditions. Statistical approaches are used to map the resilience of the chemical processes to the volatility of the green hydrogen and energy supply. For the aforementioned value creation networks, plants for the provision of renewable energy, electrolysis plants, water treatment plants, hydrogen storage facilities, hydrogen transport means, and plants for the material utilization of hydrogen are taken into account. In addition, water cycle aspects are considered. In the mathematical optimization problem, utilization pathways and technology variants are mapped as integer variables, while constraints capture the capability limits of the technologies. Continuous characteristics such as CO\(_2\) reduction potential, resource consumption, and resilience to hydrogen supply fluctuations are included in the objective function. Integer optimization problems arise, allowing the search for optimal distribution and technology mix. The aim of the investigations is to clarify the effects of the distribution of (limited) green hydrogen on different process chains and to derive best practices for the technology mix by means of optimization. In addition, findings regarding production-relevant sustainability development goals are to be derived.

Applicants are expected to have an above-average academic degree in systems process engineering, renewable energy systems, or information systems engineering, especially modeling or model-based

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\(^1\) The amount of the scholarship is based on the basic amount according to DFG criteria: [https://www.dfg.de/foerderung/programme/einzelfoerderung/forschungsstipendien/stipendienrechner/](https://www.dfg.de/foerderung/programme/einzelfoerderung/forschungsstipendien/stipendienrechner/)
optimization, and a high degree of willingness to engage in interdisciplinary work and research. Accepting the scholarship obliges your presence in the research group's offices in Dresden on three fixed core days per week. Participation in the college's teaching program is compulsory (24 ETCS in 3 years).

TUD strives to employ more women in academia and research. We therefore expressly encourage women to apply. The University is a certified family-friendly university and offers a Dual Career Service. We welcome applications from candidates with disabilities. If multiple candidates prove to be equally qualified, those with disabilities or with equivalent status pursuant to the German Social Code IX (SGB IX) will receive priority for employment.

Please send your compelling application including a letter of motivation, curriculum vitae, copies of academic certificates or other relevant qualifications (language certificates, further training), and a max. 10-page sample text (e.g. final thesis, term paper, or publication) until November 21, 2022 (stamped arrival date of the university central mail service applies) with the subject “SP H3: Optimization of hydrogen value-added networks”, preferably via the SecureMail Portal of the TU Dresden https://securemail.tu-dresden.de as one PDF document to anna.martius@tu-dresden.de. Alternatively, applications can also be sent to the following address: TU Dresden, Boysen-TU Dresden-Graduiertenkolleg, Frau Dr. Anna Martius, Helmholtzstr. 10, 01069 Dresden, Germany. Please submit copies only, as your application will not be returned to you. Expenses incurred in attending interviews cannot be reimbursed.

Reference to data protection: Your data protection rights, the purpose for which your data will be processed, as well as further information about data protection is available to you on the website: https://tu-dresden.de/karriere/datenschutzhinweis