

Expertise

Research activities

- Determine global production potentials of green hydrogen and other chemical energy carriers (e.g., liquid hydrogen, ammonia, and methanol).
- Compute the costs of production, transportation, and distribution of chemical energy carriers from the production to the demand location.
- Global trade of chemical energy carriers.
- Assessing the effects of uncertainty on the supply of green chemical energy carriers.
- German market expertise.

Our technical expertise

- Techno-economic assessment.
- Well-to-tank analysis.
- Modelling: Investment models, Dispatch models.
- Further, addressing uncertainty through techniques of stochastic, risk-averse, and adaptive-robust modeling.

Publications and Projects

The Department of Energy Economics, headed by Prof. Felix Müsgens, researches the challenges of transforming the energy system at a national and international level. The focus of research covers a wide range of energy topics, including electricity and gas system modeling, market design, climate economics, and energy auctions. The department has extensive expertise and research output in the field of qualitative and quantitative energy system analysis, which is used for energy policy advice. The members of the department have authored more than [80 articles, books, and reports](#). Ongoing (or successfully completed) scientific projects are supported by the European Union, ministries (BMWK, BMBF), and associations (BDI, VGB) and are carried out in cooperation with various German and international companies.

The following scientific publications and projects illustrate the expertise of the department in relation to the objectives of this project:

Forschung	Lucien Genge, Fabian Scheller, Felix Müsgens.(2023). Supply costs of green chemical energy carriers at the European border: A meta-analysis.
2023	Energy Economics 126, 106767, https://doi.org/10.1016/j.eneco.2023.106767

Forschung	Genge, L., Jalbout, E., Riepin, I., & Muesgens, F. What do we know about green hydrogen supply costs?
2022	18th International Conference on the European Energy Market (EEM), 1–7. https://doi.org/10.1109/EEM54602.2022.9921127

Forschung	Jalbout, E., Genge, L., & Muesgens, F. H2Europe: an analysis of long-term hydrogen import-potentials from the MENA region.
2022	18th International Conference on the European Energy Market (EEM), https://doi.org/10.1109/EEM54602.2022.9921055

Forschung	Riepin, I., Schmidt, M., Baringo, L., Müsgens, F., (2022). Adaptive robust optimization for European strategic gas infrastructure planning.
2022	Appl. Energy 324, 119686. https://doi.org/10.1016/j.apenergy.2022.119686

Research project	TransHyDE-Sys [System analysis of transportation solutions for green hydrogen]
Activity	The evaluation of hydrogen import potential available in the medium and long term at the EU border. As a result, the hydrogen supply potential (i.e. expected supply capacities and the associated import costs for hydrogen) at selected European import hubs should be presented. This can be given exogenously to the national or EU-level models (SIMONE/MYNTS/Enertile/Pypsa) as an import option so that production locations and transport options for hydrogen can be optimized.
Duration	01.04.2021 until 31.03.2025
Funding institution	BMBF
Description	https://www.wasserstoff-leitprojekte.de/leitprojekte/transhyde

Research project	Ariadne 2-BTU: Evidence-based assessment through case studies on supply insecurity for green energy sources and Development of green electricity certificates.
Activity	As part of the joint project, a case study is to be carried out to investigate the effects of supply uncertainties on the supply costs for green energy carriers (in particular hydrogen and its derivatives) in Germany. In doing so focus on the identification of relevant parametric assumptions and the assumptions and the implementation of scenarios in a deterministic investment model. Furthermore, BTU contributes to a field of work that focuses on the development and evaluation of the design of green electricity certificates to supply voluntary consumers with climate-neutral electricity.
Duration	01.09.2023 until 31.08.2026
Funding institution	BMBF
Description	https://www.kopernikus-projekte.de/en/projects/ariadne

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