

Verbund

The Energy & Strategy Think Tank (ESTT) at WU's Institute for Strategic Management (ISM) (<https://www.wu.ac.at/en/ism/energy-strategy-think-tank/>) invites applications for a master thesis.

Working Title: *E-Fuels vs. Direct Electrification in Heavy-Duty Transport – Technological Competition and its Consequences for Austrian Electricity Demand*

Scope, Aims, Methods, and Initial Literature: The decarbonization of hard-to-abate sectors, particularly aviation and shipping, is a cornerstone of the European "Fit for 55" package. With the full implementation of regulations such as ReFuelEU Aviation and FuelEU Maritime by 2025/2026, the industry faces a choice between direct electrification for short-range applications and E-fuels (Power-to-Liquid) for long-haul routes (BMIMI, 2022; Ueckerdt et al., 2021; Vakili et al., 2025). This technological competition is characterized by a significant efficiency gap as E-fuel production requires substantially more renewable electricity than direct battery-electric systems (Schreyer et al., 2024). Focusing on the Austrian energy system and its strategic role as a regional aviation hub and inland shipping corridor, this thesis aims to

- conduct a comparative analysis of E-fuels and direct electrification regarding their energy efficiency and economic viability within the shipping and aviation sectors
- evaluate the current regulatory landscape, specifically focusing on EU-wide mandates and their translation into Austrian national strategies
- develop scenario-based models for electricity demand until 2040, considering different adoption rates of E-fuels vs. electrification and their impact on the Austrian power grid and identify implications for Austrian energy providers

To that end, insights from 1) a systematic review of the scientific literature (Denyer & Tranfield, 2009), 2) selected grey literature such as from energy agencies (Adams, Smart, & Huff, 2017), as well as 3) expert interviews with stakeholders from the transport and energy industries (Bogner, Littig, & Menz, 2009) should be combined.

Thesis Language: English or German (only if you are enrolled in a program with German as main language)

Corporate Partner and Certificate: Verbund – *Austria's leading electricity company and one of the largest producers of hydropower electricity in Europe.* Upon thesis completion, you will be awarded a certificate that states your tasks, gained expertise, and the corporate partner.

Expectations and Support: Constant feedback and regular meetings with faculty and, possibly, the above-mentioned corporate partner will facilitate a high-quality thesis with impact on management practice that is completed in a timely fashion. You will be provided with a guideline that details the supervision and writing process, expected deliverables beyond the final thesis, and grading as well as a package to kick off your thesis.

Targeted Students: Excellent and ambitious students of all MSc and MBA programs at WU Vienna University of Economics and Business are eligible and encouraged to apply. In principle, it is possible to write the thesis together with another student.

Interested? Send CV and grade certificates of all your studies to christian.bruck@wu.ac.at

Initial References:

- Adams, R. J., Smart, P., & Huff, A. S. 2017. Shades of grey: Guidelines for working with the grey literature in systematic reviews for management and organizational studies. *International Journal of Management Reviews*, 19(4): 432-454.
- BMIMI, 2022. *Aviation Strategy 2040+. Climate-friendly and future-oriented aviation – An implementation strategy within the framework of the Mobility Master Plan*. Available at: <https://www.bmimi.gv.at/en/topics/transport/aviation/aviation-strategy/aviation-strategy-2040.html>
- Bogner, A., Littig, B., & Menz, W. (Eds.). 2009. *Interviewing experts*. Basingstoke: Palgrave Macmillan.
- Denyer D. & Tranfield, D. 2009. *Producing a systematic review*. In: Buchanan D.A. & Bryman A. (eds) *The Sage handbook of organizational research methods*. Sage Publications Ltd, Thousand Oaks, CA, 671–689.
- Schreyer, F., Ueckerdt, F., Pietzcker, R., Rodrigues, R., Rottoli, M., Madeddu, S., Pehl, M., Hasse, R., & Luderer, G. 2024. Distinct roles of direct and indirect electrification in pathways to a renewables-dominated European energy system. *One Earth*, 7(2), 226-241.
- Ueckerdt, F., Bauer, C., Dirnaichner, A., Everall, J., Sacchi, R., & Luderer, G. (2021). Potential and risks of hydrogen-based e-fuels in climate change mitigation. *Nature Climate Change*, 11(5), 384-393.
- Vakili, S., Insel, M., Singh, S., & Ölçer, A. (2025). Decarbonizing domestic and short-sea shipping: A systematic review and transdisciplinary pathway for emerging maritime regions. *Sustainability*, 17(16), 7294.