



## Bachelor Thesis

# Economics of Thermo-Catalytic Reforming

Thermo-Catalytic Reforming is a novel conversion technology, turning various kinds of biological wastes into hydrogen-rich gas, low water-containing oil, free char, and low oxygen (Fraunhofer Umsicht, 2024). This process provides a technical feasible option to convert waste into sustainable fuels and thus contribute to solving two challenges: Handling solid waste pollution and reducing carbon emissions. Currently, there exist several pilot projects in Chile, Switzerland, Italy, Canada, England, and Germany, testing the functionality of the technology for different in- and outputs. For example, there is the plan to build a TCR-refinery in Bavaria for the conversion of sewage sludge into crude oil used to produce aviation fuels (Fraunhofer Umsicht, 2021).

Although the technical maturity of the TCR advances, there are little comprehensive analyses of its economic potential. The aim of this thesis is to identify and describe the current economic state of TCR. The analysis includes a comprehensive review of the literature and reports about, e.g., cost developments, potential (considering the availability and quality of inputs, and the achievable quantity of outputs), applications, and learning rates.

## Key tasks and objectives of the thesis

- Review literature und reports on the economics of TCR
- Illustrate developments, pilot projects, and key figures
- Identify current economic conditions, potentials, and projections

## Your profile

- Economics major, best with a focus on energy
- Analytical thinking and the ability to carry out independent scientific work

## Literature

- Fraunhofer Umsicht (2024): *TCR Technology: CO<sub>2</sub>-neutral energy sources from biogenic waste*. [https://www.umsicht-suro.fraunhofer.de/en/Our\\_Solution/tcr-technology.html](https://www.umsicht-suro.fraunhofer.de/en/Our_Solution/tcr-technology.html)
- Fraunhofer Umsicht (2021): *Refinery to produce aviation fuels from sewage sludge*. [https://www.umsicht-suro.fraunhofer.de/de/presse/pressemitteilungen/2021/bayernoil\\_kooperation\\_pressemeldung.html](https://www.umsicht-suro.fraunhofer.de/de/presse/pressemitteilungen/2021/bayernoil_kooperation_pressemeldung.html)
- Onyishi, H., Neidel, J., Daschner, R., Apfelbacher, A., & Hornung, A. (2023). Thermo-catalytic reforming of general waste to produce biofuels. *Biomass and Bioenergy*, 177, 106946.
- Schmitt, N., Apfelbacher, A., Jäger, N., Daschner, R., Stenzel, F., & Hornung, A. (2019). Thermo-chemical conversion of biomass and upgrading to biofuel: The Thermo-Catalytic Reforming process—A review. *Biofuels, Bioproducts and Biorefining*, 13(3), 822-837.
- Ouali, M., Jaeger, N., Greenhalf, C., Santos, J., Conti, R., & Hornung, A. (2017). Thermo-Catalytic Reforming of municipal solid waste. *Waste Management*, 68, 198-206.

---

## Contact



**Philipp Theile**

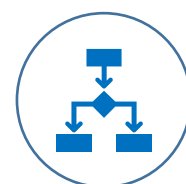
E-Mail: [Philipp.theile@ewi.uni-koeln.de](mailto:Philipp.theile@ewi.uni-koeln.de)

## Topics



- Thermo-Catalytic Reforming
- Economics of emerging technologies

## Methods



- Literature review
  - Economic analysis
-