



Bachelor/Master Thesis

“Analysis of prospects for hydrogen transportation”

Topic description

Hydrogen is a clean and efficient energy carrier that can be used in various fields such as industrial processes, transportation, heating, and power generation. Hydrogen can play an important role in the decarbonization of the economy. Currently, most H₂ is produced at the site, where it is consumed. When taking transport into account, people need to tradeoff between production costs and transportation costs, e. g. production in North Africa could be much cheaper than in Germany, however there are additional transportation costs. Another reason could be limited technical potential for renewable production in Germany for electrolysis. In this case, the transportation of hydrogen becomes increasingly significant in hydrogen markets. We are glad to have interested and motivated students study internal mechanism of H₂ transport and analyze its potential in the future.

Task

A thesis should involve the following parts:

- Describe the current situation of H₂ transport
 - o Which role H₂ transport currently plays in general (compared to production at the site of consumption)
- Describe H₂ transportation technologies (e. g. pipelines, ships, ...) and related conversion technologies (liquefaction, regasification, ...)
 - o Which transportation technologies have been used and to what extent?
- Research the projected infrastructure and policies related to H₂ transport
- Evaluate the advantages and disadvantages of H₂ transportation
 - o Technical and economical comparison of different transport technologies
 - o To justify transportation of H₂, which cost advantages in H₂ production are necessary?

Further work for a master thesis:

- Create a model to calculate costs and technical efficiency of H₂ transport in different technologies, compare the costs with the price of H₂ final products such as fuel cells, analyze costs and technical efficiency of
 - o H₂ produced in Germany compared to e.g. in North Africa
 - o H₂ compared to the direct use of electricity

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