

Environmental Life Cycle Assessment of Hydrogen Production Technologies: A Comparison of Polymer Exchange Water Electrolysis and Anion Exchange Water Electrolysis

Bachelor / Master thesis

Motivation

Hydrogen plays a crucial role in decarbonizing industries, transportation, and the energy sector. As the hydrogen sector continues to grow, Polymer Exchange Water Electrolysis (PEWE) and Anion Exchange Water Electrolysis (AEWE) stand out as promising technologies by supporting a sustainable energy transition through cleaner alternatives compared to traditional hydrogen production methods. However, these advancements are not exempt from challenges during the life cycle of both technologies, and a comprehensive understanding of the environmental impacts is crucial for informed decision-making and further sustainable and technological innovations.

Key Objectives

This thesis aims to explore the environmental impacts of hydrogen production technologies and their potential for contributing to a sustainable energy transition. Your first task is to conduct a literature review to determine which environmental life cycle assessment (E-LCA) studies with a focus on PEWE and AEWE technologies already exist. Following the current state of research, you perform a separate E-LCA to identify and compare the environmental hotspots in the life cycle of PEWE and AEWE technologies (such as greenhouse gas emissions, water consumption, and other relevant impact categories). Additionally, you assess the sensitivity to fluctuations of environmental impacts to variations in input parameters (such as the replacement of fluorinated materials). Based on the assessment results, you identify areas for environmental improvement for future development of hydrogen production technologies.

Requirements

- Specialisation in Environmental Engineering, Mechanical Engineering, Electrical Engineering, Energy Engineering etc.
- Basic understanding of E-LCA methodology is desirable.
- The thesis can be written in **English or German**.

The content and scope of the thesis can be adapted depending on your desired focus and type of thesis.

For further information or any questions please contact

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