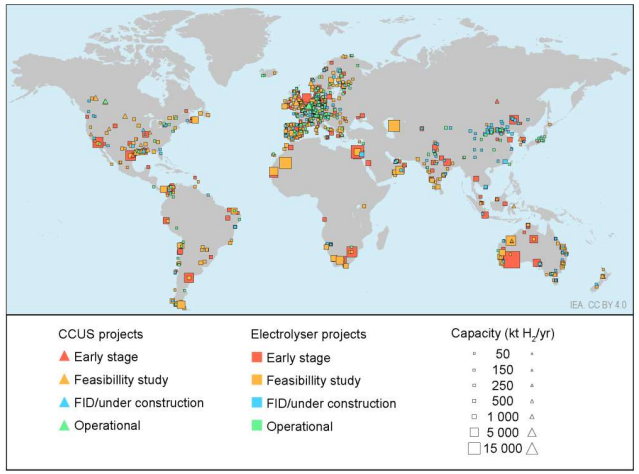
Forecast of end-of-life amounts of electrolysis systems and components for recycling

Figure 3.4 Map of announced low-emission hydrogen production projects



Note: Map also includes announced projects starting after 2030.
Source: IEA Hydrogen Projects, (Database, October 2023 release).

Announced projects are so far concentrated in Europe and Australia, but a growing number are planned in Africa, China, India, Latin America and the United States.

Source: Global Hydrogen Review 2023 – Analysis - IEA

Description:

Hydrogen production represents a crucial step in the complete transition of the energy system to renewable sources. One promising way to produce hydrogen is through PEM (proton exchange membrane) electrolysis, a technology which is currently reaching maturity and is an integral part of reaching the hydrogen production goals in each scenario as released by IEA, IRENA, European Union or others.

It is important to accompany this technology ramp-up already now with adequate end-of-life (EoL) solutions, ranging from collection models, disassembly and recycling technologies to repair and refurbishment concepts.

To identify the best solutions, it is prerequisite to forecast the number, mass and presumed EoL date and amounts of PEM electrolysis systems and components.

The goal of this master's thesis is therefore to determine EoL return rates and dates of PEM electrolysis systems and components derived from the above mentioned hydrogen production ramp-up plans and scenarios as well as announced projects and analyze it as a function of past, current and presumed future state-of-the-art technology applying future waste forecast simulation models (cooperation with Montanuniversität Leoben).

Content / Time table:

- Literature research on hydrogen production ramp-up plans and scenarios as well as past, current and future PEM electrolysis technologies (1 month)
- EoL scenario evaluation and derivation of return rates and dates (2 months, partly at Montanuniversität Leoben)
- Breakdown of returned EoL systems on component and material level (2 months)
- Evaluation of results and thesis writing (1 month)

Start: as of now

Duration: approx. 6 months

Paid Master Thesis

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