

Reliability and resilience analysis of green hydrogen production process

Introduction

Hydrogen produced by water electrolysis using renewable energy sources is defined as green hydrogen. It's a carbon neutral way of producing H₂ and it can assist in dealing with the variability of renewable energy. Reliability analysis of such production process can help to extend functioning time of the equipment and thus improve efficiency, reduce production cost etc. However, studies focusing on the reliability analysis of water electrolysis plant for producing green H₂ is very limited to date.

This PhD work aims at performing reliability analysis for such system as well as identifying the challenges of applying the reliability analysis methods in the field of green hydrogen production technologies. In addition, this PhD work will also include studying the green H₂ production process from a new perspective, resilience engineering to improve the reliability of the whole process.

Primary objective

- Provide an effective tool for analyzing the reliability of green H₂ production process and how to make the system resilient.

Secondary objectives

- Identifying the challenges of applying reliability analysis methods for green hydrogen production process.
- Identifying research opportunities that can be explored in order to improve reliability and resilience of such system.

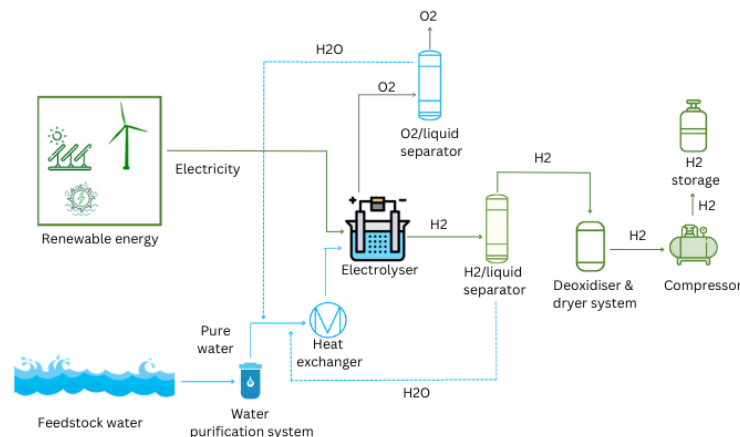


Fig: Green hydrogen production plant

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Related projects: HYDROGENi - HYDROGENi will spearhead research and innovations needed to fulfil the 2030 and 2050 visions of the Norwegian hydrogen roadmap.

- PhD candidate (Started in April 2023)
- Master's degree in RAMS engineering from NTNU (2020 - 2022)
- Bachelor's degree in Mechanical engineering from Bangladesh (2015 - 2019)



Estimated progress of the PhD project:



Publications

- Tuhi, F. Y., Fredriksen, M., Jäschke, J., & Bucelli, M. (2024). Accidents Review And Control Assessment For Reliable Operation Of PEM Water Electrolyzer Stacks. (Submitted in *ESREL conference*, Krakow, Poland.)
- Tuhi, F. Y., Bucelli, M., Liu, Y., (2024). Hazop study of a water electrolysis plant used in green hydrogen production. (Abstract submitted in *H2Science conference*, 2024)
- Tuhi, F. Y., Bucelli, M., Liu, Y., (2024). Reliability analysis of green hydrogen production: literature review, challenges and opportunities. (Ongoing work)

