Master Thesis in Hydrogen Valleys formation

Do you want to take part in developing a sustainable future in collaboration with experienced researchers in a professional and friendly environment? We at CIT Renergy are looking for ambitious and driven students who are interested in sustainable development and bridging the gap between research and innovation and industrial transformation.

Background

To reach the future climate ambitions presented by the European Union there is a need to decarbonize all sectors where electrification including the production and use of green hydrogen is very important. There are multiple areas where hydrogen is expected to play an important role either by direct use or indirectly by production of electrofuels. This includes industrial processes such as production of cement, steel or heavy-duty road transport, maritime transport and aviation.

In order to integrate a decarbonized system based on use of hydrogen it is important to consider the whole value chain including production, storage, distribution and fuel use. If several hydrogen applications are combined and where production and use can be matched in a suitable manner, the economics can be greatly improved and the geographical region where this takes place can be called a hydrogen valley. There are many hydrogen valleys globally and especially in the European union. More recently, several regions in Sweden have been pointed out to be interesting regarding formation of new hydrogen valleys. One such region is the Mid-Sweden Hydrogen Valley where steel & iron producers, harbours, technology providers and transportation system owners collaborate and share knowledge to provide an improved hydrogen infrastructure and improved system efficiency.

This project is carried out as part of a Nordic Energy Research-funded project named “Nordic Hydrogen H2ubs” where hydrogen valleys constitute a core focus[1]. CIT Renergy (a subsidiary of Chalmers Industriteknik) will act as supervisors during the work, Alleima, a stainless steel and special alloys manufacturer (former Sandvik Materials technology) is one of the key actors within the Mid-Sweden Hydrogen Valley and they will provide co-supervision of the work. Maria Grahn (associate professor at Chalmers) will act as examiner of the thesis work.

Scope

This diploma work comprises of:

- Mapping different hydrogen value chains in Mid-Sweden Hydrogen Valley
- Investigate key opportunities and limitations to develop a successful hydrogen valley (technical/socio-economic/legal aspects)
- Presenting possible future estimates for hydrogen demand & supply of hydrogen in the Mid-Sweden Hydrogen Valley.
- Investigate basic characteristics of other hydrogen valleys in the Nordics and how these differ from the Mid-Sweden Hydrogen Valley. Present possible learnings which can be implemented in the Mid-Sweden Hydrogen Valley and vice versa.
- What potential synergies can be found between the actors? How can these be used in the best possible way?
- What is the potential of the identified hydrogen value chains in a broader context?
- Presenting the findings to internal and possibly external audiences

[1] https://www.nordicenergy.org/programme/nordic-hydrogen-valleys-as-energy-hubs/

Your contribution

This work is suitable for students within MSc programmes such as Innovative and Sustainable Chemical Engineering, Sustainable Energy Systems and Innovative Sustainable Energy Engineering and Industrial Ecology but students within other programmes with interest in this topic could also be relevant. We are looking for one/two students. Courses and/or work experience within renewable energy production, hydrogen production technologies and fuel cells is required. Swedish proficiency is preferred since it could simplify the literature review but it is not required.

Want to contribute to a sustainable future? Apply here!

To apply for the thesis project please send us your CV and a short introduction letter (100 -200 words):
Supervisors: viktor.stenberg@chalmersindustriteknik.se & pontus.bokinge@chalmersindustriteknik.se at CIT Renergy

If you have any further questions, don't hesitate to reach out to us!

Time plan

The project is planned to be completed during the spring 2024 for 20 weeks (20 weeks full-time work).

CIT Renergy - Propelling society to a more energy efficient future

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