ENTRANCE
CENTRE OF EXPERTISE ENERGY

Hydrogen Systems Analysis and Optimisation – Multiple Bachelor Assignments

Client	ENTRANCE
Related project	Just Transition Fund – Hydrogen Train & Learn Hub
Start date	Flexible
Suitable for training course(s)	Engineering, ICT, Physics, Mathematics, or similar
Learning Community	

Assignment context

We aim to model, analyse, design, and optimise hydrogen supply chains and hydrogen power trains for companies in the Northern Netherlands. The objective is an ENTRANCE hydrogen configurator, ENHyCo, developed in Python, which can be used to analyse companies' needs to switch from using fossil fuels to hydrogen. The chain covers green hydrogen from renewables to the conversion of hydrogen in applications. The latter vary from vehicles to industrial processes. An overview is schematically shown in the figure below. Although the focus is on technical feasibility and economic viability, i.e. minimising cost, the environmental impact is also considered. A first version of the configurator was developed, and multiple sub-studies were conducted. Optimisations were performed with the help of linear programming and heuristic methods. Models are validated with empirical data. However, continuous improvement and expansion, e.g. to other state-of-the-art hydrogen applications, addressing current practice-oriented problems, including uncertainties in supply and demand, are needed. Within this context, the student can work with us, corresponding to her/his interest.

Source: DNV, Hydrogen forecast to 2050, 2020

HSCM: Hydrogen Supply Chain Model, incl. hydrogen production
HPTM: Hydrogen Power Train Model, incl. hydrogen consumption
The dashed lines are only illustrative for a possible supply chain and hydrogen use
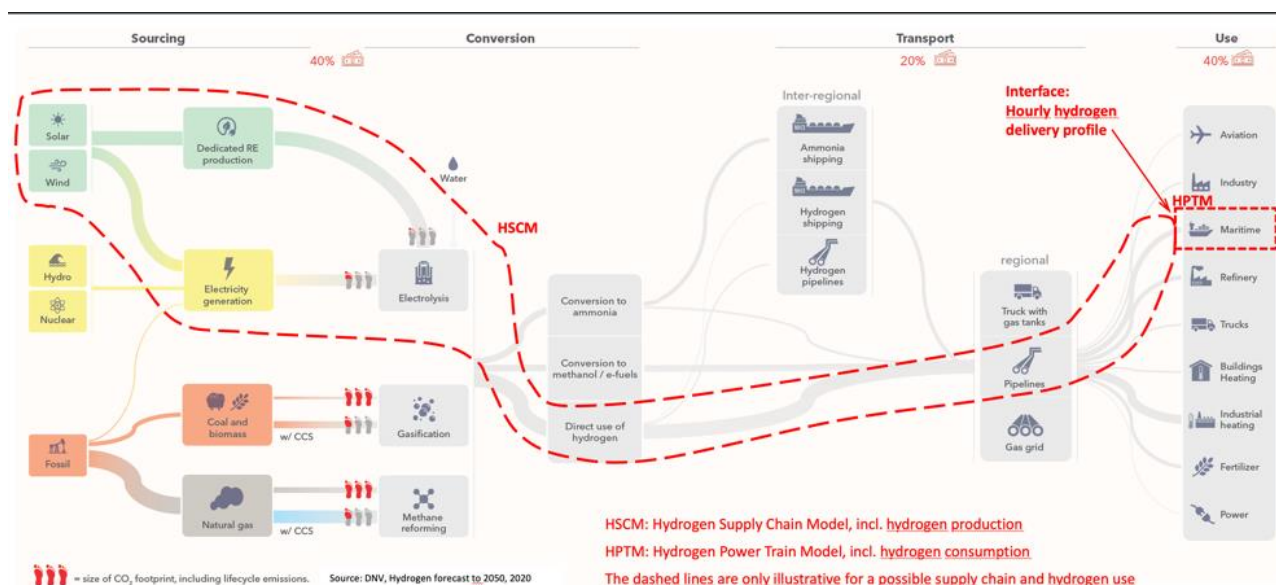
Assignments

Examples of Bachelor thesis/internship/assignment topics:

- Programming in Python, user interface development, layout optimisation, interaction with database.

- Hydrogen configuration analysis for customers by supply chain analysis and/or power train design, e.g. power trains for shipping, possible hydrogen supply chains for aviation, hydrogen refuelling station modes and their up-scaling.

- Analysis of recent developments in hydrogen system components, e.g. redox flow batteries, solid oxide fuel cells, and the potential of these in hydrogen systems.

- Updating and verification of data to ensure high quality. This may include sensitivity analyses.

General information

Final Product	Working and validated models
Location	ENTRANCE
Parties involved	Tbd, depending on the topic
Contact person	Corina Vogt: c.b.vogt@pl.hanze.nl
Supervision	Jan Bekkering (j.bekkering@pl.hanze.nl) or other research group members, depending on the selected topic

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Who are we and where can you find us?

ENTRANCE is a learning community, where students and professors from various programmes cooperate with researchers, companies, governments and civil society organisations to accelerate the energy transition. We do this at the following locations:

- Location Proeftuin, Zernikelaan 17, Groningen

- Location Energy Academy Europe, Nijenborgh 6, Groningen

What do we offer?

ENTRANCE offers a multidisciplinary and inspiring learning, working and research environment where you can develop the competencies needed to shape and accelerate the energy transition. There is room for collaboration with professors, researchers, lecturers and the professional field. In addition, you will be supervised by professionals who are part of the ENTRANCE learning community.

Contact us

Are you interested in the vacancy? Do you have questions or would you like to apply immediately?

- Jacqueline Joosse, Coordinator ENTRANCE Learning Communities.

- T: (050) 595 4708

- E: entrancelc@org.hanze.nl