Europa-Universität Flensburg
International Institute of Management
Department of Strategic and International
Management
Prof. Dr. Susanne Rover

University of Lodz
Faculty of Management
Department of Entrepreneurship
and Industrial Policy
Prof. Dr. Pawel Glodek

**University of Applied Sciences
Kempten**
Faculty of Business Administration
International Management:
Marketing & Sales
Prof. Dr. Uwe Stratmann

Radboud University Nijmegen
Nijmegen School of Management
Dpt. of Business Administration
Ass. Prof. Dr. Nanne Migchels

February 02, 2023

DLP 2023 - Topic description - Distance Learning Project [MIM S2 11]: Investigating the potentials and challenges for business models of green hydrogen in the heavy traffic sector

The Distance Learning Project (DLP) is an international cooperative course between i. University of Lodz, Poland, ii. Europa-Universität Flensburg, Schleswig-Holstein, Germany, iii. University of Applied Sciences Kempten, Bavaria, Germany and iv. Radboud University in Nijmegen, The Netherlands. This project is designed to acquaint the participants with theoretical and practical knowledge of the field as specified below. Further, the participants gain experience in cooperating in international teams regarding the related topics.

The general aims and objectives of this project lie in:

- to experience working in an intercultural and interdisciplinary team
- to integrate knowledge from different modules and apply it into a research study
- to learn how to set up a small empirical research
- to learn how to present the research results
- to experience working in a distance learning project

2023 the course deals with potentials and challenges for green hydrogen business models in the heavy traffic sector considering different actors in the green hydrogen ecosystem.

Green hydrogen is called "green" since it is produced with sustainably generated energy (e.g., wind or solar energy). Renewable energy is used for decomposing water into oxygen and hydrogen in a process of electrolysis. From the air or production processes, CO_2 then can be added in order to gain a climate-neutral synthetic fuel or fuel gas (see https://www.bmz.de/en/issues/green-hydrogen for further details).

Many countries world-wide have high hopes with regard to the usage of green hydrogen. Even more, since the Russian war against Ukraine has led to a global energy crisis. The idea sounds convincing: Using renewable energy for the production of fuel or fuel gas for heavy trucks which then could be used without additional emissions respectively no emissions of CO_2 and thereby contributing to achieving the climate goals of the European Union (or regions outside Europe). Even though it would be more efficient to directly use the energy produced by wind turbines or solar stations, in cases where that is not possible (due to a lack of infrastructure or capacity) it potentially makes sense to produce hydrogen to be able to store the energy and exploit it to power heavy trucks transporting goods from A to B. Currently, however, green hydrogen is very expensive so that the development is characterized by hesitating actors that are not sure if it will pay to invest in this technology. Different technologies such as combustion, battery-electric or hydrogen fuel-cells are currently competing, and it is still not clear what technology will succeed in context of a specific customer application (e.g., long distance transportation or last-mile transportation in cities). That makes it an interesting market to investigate.

Relevant questions are if private and/or public actors may initiate business models that make it attractive to use green hydrogen to power heavy vehicles and thereby profit from potential benefits such as the possibility to use the trucks in low emission zones (due to reduced CO_2 emissions), the capacity to cover long distances while carrying heavy weights, the short refuelling time and efficiency and other benefits compared to diesel powered trucks (see https://fuelcelltrucks.eu/about-us/).

In sum, challenges in the market for heavy trucks lie in the currently high production costs for green hydrogen and in the comparatively low efficiency of the technology (for further details see e.g., https://www.dihk.de/resource/blob/24872/fd2c89df9484cf912199041a9587a3d6/dihk-faktenpapier-wasserstoff-data.pdf). In addition, green hydrogen may be used in different ways to power trucks – fuel may be produced to be used with slightly changed current truck technology or it can be directly used for fuel cells in e-trucks. This is even more challenging due to the specific market characteristics in terms of different market sides that have to be initiated before the ball can get rolling: Sufficient renewable energy has to be produced first of all. But in addition, a network of green hydrogen fuelling stations may have to be established. In addition, trucks have to be brought into the market that can use green hydrogen. These vehicles have to be sold, financed and leased, they have to be repaired and maintained. A whole ecosystem around green hydrogen needs to be established.

We want to investigate different levels and actors in the market for green hydrogen so to come to a better understanding of the potentials and challenges of green hydrogen in the heavy traffic sector. The aim for all groups lies in the exploration and investigation of these potentials and challenges from the perspective of one specific actor contributing to the establishment of the ecosystem. The aim of the DLP this year therefore is to come to an in-depth understanding of the following cases:

1. **GP Joule** as a producer of renewable energy (and a strategy to develop an ecosystem for green hydrogen usage in trucks and busses), see: https://www.gp-joule.com/
2. **Everfuel** – as a H_2 fuelling company with projects in the Netherlands and Denmark, see: https://www.everfuel.com/
3. **Quantron AG** as a retrofitter of trucks with hydrogen power, see: https://www.quantron.net/en/q-company/history/
4. **Hyundai Hydrogen Mobility** as a provider of hydrogen fueled trucks that can be rented, see: https://hyundai-hm.com/en/
5. **Clean Logistics SE** as a company developing and selling battery and fuel cell electric drive systems for series production, see: https://www.cleanlogistics.de/en
6. Optional (when group size allows for): **H₂-Mobility** as a player working at the establishment of a fueling station network with Air Liquide, Daimler, Linde, OMV, Shell and TotalEnergies as shareholders of this limited company, see: https://h2-mobility.de/en/about-us/

Relevant aspects to be addressed regarding the different cases lie in the following areas (please set your focus and further specify for the case you are assigned to!):

✓ Understanding different market sides and market characteristics: Green hydrogen provision, fuelling infrastructure, vehicles equipped with the relevant technology. Size, structure and future potential of the focal hydrogen commercial vehicle market and the impact on the market sides are important information in this relationship.
✓ Different distribution models are to be explored to bring the specific product or service (or a bundle out of it) to the targeted customers. Questions about e.g., the overwhelming distribution

strategy, distribution structures, sales channels and their alignment, players involved and how they are embedded in the sales organisation are important to address. E.g., hydrogen powered vehicles can be distributed by short term rental, longer term leasing or basically by the simple purchase of the vehicles. Those mobility solutions require different forms of financing as well. Besides that, vehicles are products with special characteristics in terms of the need to get repaired and maintained. These activities may therefore to be included in the investigation of competitive business models of some actors.

✓ Value proposition (What about cost advantages or disadvantages? How may differentiation advantages be generated by offering logistic solutions without emissions?), value creation (Which actors on different market sides are involved?) and value capture (How can revenue models be designed?) are relevant elements of the business models to be mapped, investigated and evaluated. Here relevant resources and competences of the actors on different market sides have an impact on efficiency-oriented and strategic advantages. In addition, locational specificities may have to be included in the business model analysis and may lead to different value propositions and business models in the context of the conditions (technical, environmental, economic, etc.) of the markets in the respective (1) countries and (2) regions.

Thus, the idea is that in your papers you may go into different directions along the elements sketched above and lay the focus on market structure, product market fit [or strategy], value proposition and capture or regional differences as starting points for positing relevant questions and answering these for the case you explore in your team.

The final goal of this course is the production of a paper dealing with one of the cases in a team of students from the different locations (please see the DLP guidelines for the research papers for relevant specifications). The student groups are also required to give presentations about their research online and in-person. Next to the Credit Points given for the course at the different Universities, the students get a joint certificate signed by the partners about their participation in the project.