Sustainable innovation policy impact towards hydrogen economy

Centre for Environmental Policy
Supervisor: Dr Zen Makuch and Mrs Karen E. Makuch
Student: Antanas Sabanas

Overview. Background information

The **hydrogen economy** is arguably one of the critical tools to reduce the impact towards **climate change** and simultaneously ensure the transition towards using renewable energy sources (Ueckerdt, et. Al., 2021). At initial stage, hydrogen economy targeted hydrogen in general, without differentiation of production methods, currently **green hydrogen** is the most attractive. From sustainable innovation policy perspective, there is a differentiation between **supply** or **demand** driven approach for evaluating how niche solutions for hydrogen usage could be adopted at a broader scale and become mainstream in existing value chains

Objectives

The research is tailored towards assessing the current status of the hydrogen economy, namely how existing (newly created) pilot solutions, could be scaled up, used for mainstream financial instruments still need to update the existing value chains at scale.

This purpose of this research is to quantitively assess the environmental and economic impact of widespread electrification of road transport in Qatar. It is intended that the research findings will contribute to the development of a framework or toolkit designed to inform about the impacts of electrification

Methods

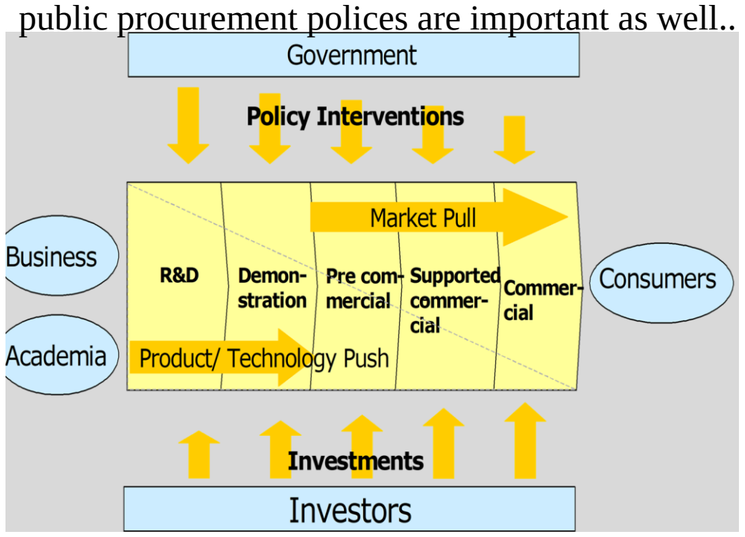
Empirical analysis (case study) through mapping of technologies and clusters

Content analysis- quantitative analysis of primary policy documents will be made to identify institutional and procedural gaps by identifying identify institutional and procedural gaps – in sustainable innovations, renewable energy technologies, and low-carbon transformation sectors.

Opportunities

For **transition to new, cleaner sources** of energy, including hydrogen economy innovation is the critical success factor. There is differentiation between radical and incremental innovations, and both are critical for providing solutions transitions, especially for storage and transportation of hydrogen.

There is a differentiation as well between supply or demand driven approach for evaluating how niche solutions for hydrogen usage could be adopted at a broader scale and become mainstream in existing value chains. In general, it could be assumed that demand for green hydrogen as a green energy source is market-driven, without a need for rigid public policy instruments (Wüstenhagen et al., 2006, 1691). Energy market liberalisation could be a feasible solution while demand for green energy is customer-driven (Wüstenhagen et al., 2006, 1689). Demand for green products and services (energy including) is also one of the critical sources of innovation (Di Stefano et al., 2012). Despite the demand-driven approach (ability of end users prioritise renewable energy), market failure is inevitable due to the specifics of the current energy system. Particularly, security of energy supply, adaptability costs of existing infrastructure, energy justice concerns and interests of locked-in industries, among others. Due to that policy interventions, especially at initial stage- green **technology push** through research and development funding, leading to development of pilot solutions play a crucial role. Even at the next stage, when products are developed based on pilots, subsidies and public procurement polices are important as well..



Challenges

One of the critical bottlenecks identified through preliminary research is to identify legal and institutional barriers for **niche solutions** in the hydrogen economy that need to be mainstreamed into existing value chains. The critical challenge for other niche technologies is to overcome locked-in technologies' interests. It is also necessary to update and adjust existing infrastructure in an efficient and value-for-money way. One of the critical issues of the systematic transition is coordinating different legal settings and policies at the national and regional level (i. e., UK, EU, Sweden, Poland). As a rule, it could overlap some policy elements in time due to different strategic planning, programming cycle.

Furthermore, side effects of implementing hydrogen economy at full scale will be transition costs for industries affected, individual users and societies as a whole. Those costs can be too difficult for industries to bear, or the impact made by public institutions needs to be more effective. Consequently, public policy intervention could address market shortcomings (Foxon et al., 2008, 149). Specifically, it was also noticed that policy measures are crucial for higher hydrogen usage and hydrogen availability (Odenweller et al., 2022).

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