Project Title: Decision Support System for long-term hydrogen scenarios

Motivation and Main Objective

Green hydrogen plays a key role in climate mitigation. Furthermore, a green hydrogen economy is perceived as a way to strengthen energy security, restructure the existing energy infrastructure, and revitalize industries.

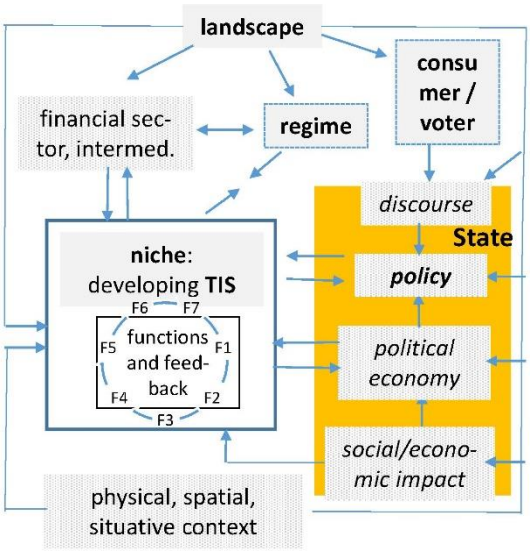
The National Hydrogen Strategy of Germany relies on green hydrogen, but also requires substantial imports of hydrogen to Germany. This puts availability of reasonable priced green hydrogen, but also criteria such as alignment of a green hydrogen strategy with the energy sector in the supplying country, as well as economic, social and political factors into the focus. A more thorough analysis requires to draw on long term scenarios of hydrogen scenarios for the potential supplying countries, which take these factors into account.

The general objective of the cooperation project between the Brazilian Universities UFSC and UFC and Fraunhofer ISI is to put a decision support system into use that helps in the evaluation of growth scenarios for the hydrogen market in Brazil for the 2050 horizon. From a Brazilian perspective, such a decision system should contribute to identify the growth potential of green hydrogen in Brazil, but also the barriers which have to be overcome. From a German perspective, such the decision support system sould support the evaluation of Brazil as a suitable partner to cooperate in a global hydrogen economy in a sustainable manner.

Methodology and Planned Activities

The project relies on the following methods: i) review of literature to construct the endogenous and exogenous variables, which have to be considered in long-term scenarios. This will draw on concepts such as technological innovation systems (TIS) and/or multilevel perspective (MLP), which have been used by Fraunhofer ISI to develop long-term innovation system scenarios for renewable energy. ii) Collection of data to feed the simulation models, which are developed by the Brazilian partners using system dynamics. iii) Interviews with the actors of the whole chain of business models of the Brazilian green hydrogen market.

Feedback-loops in a TIS-MLP approach



Both Fraunhofer ISI and the Brazilian partners UFSC and UFC are already active in various research on green hydrogen. One key activity will be to exchange information about the existing research and modelling going on. Online and personal Workshops (one in Germany, one in Brazil) will enhance the information exchange and benefit mutual learning. The decision support system developed by the Brazilian partners will be based on system dynamics (SD) modelling. Two Brazilian students will stay for three months at Fraunhofer ISI to align with the German experience. At the same time, Fraunhofer ISI will gain insights into how far the modelling approach of SD and the scenarios based on the decision support system will also allow for an improved assessment of Brazil as a potential supplier of green hydrogen to Germany.

Intended Outcome

The project outcome developed for this program will be twofold. As part of the research network, the Brazilian partners UFSC and UFC will improve their competence in hydrogen research by learning from Fraunhofer ISI's expertise in this field. This will benefit the decision support system, which is intended to be used in order to support Brazilian regions in their strategy for green hydrogen. As one of the project partners, Fraunhofer ISI will improve its competence on hydrogen research by adding to its own expertise on hydrogen scenarios insights, which reflect the opportunities and obstacles of hydrogen growth and export scenarios from a Brazilian perspective. Furthermore, the common experience in the project and the insights generated about the partner's specific competences will allow to draw up plans for future cooperation.

Information	
Name of the project	Decision Support System for long-term hydrogen scenarios
Part of	German-Brazilian Research Cooperation in the Energy Sector - NoPa 2.0/ Cooperation in the area of Green Hydrogen/PtX, Direct Electrification and Energy Storage
Project financed by	German Federal Ministry for Economic Cooperation and Development (BMZ)
Project Partners	Fraunhofer Institute for Systems and Innovation Research (ISI); Federal University of Santa Catarina (UFSC); Federal University of Cerea (UFC)
Duration	1st January 2023 to 31st December 2023

German-Brazilian Cooperation

The "German-Brazilian research cooperation in the energy sector - NoPa 2.0" is a Cooperation in the fields of green hydrogen/PtX, direct electrification and energy storage between the German Academic Exchange Service (DAAD) and the projects H2Brasil and E2Brasil. Both projects are part of the German-Brazilian Cooperation for Sustainable Development and are implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Brazilian Ministry of Mines and Energy (MME) with funding from the German Federal Ministry for Economic Cooperation and Development (BMZ).

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