Green Proof for the Hydrogen Value Chain – Digital Solutions for Green Hydrogen Certificates

Collaboration countries: Brazil and Colombia

The challenge

Certification is an essential element for the success of the hydrogen economy. Certificates can be used to prove that the hydrogen or hydrogen derivative produced and later purchased by the end consumer is genuinely 'green', and to demonstrate its actual CO_2 intensity. This provides companies along the hydrogen value chain with the necessary security for national and international trade.

Green hydrogen and PtX products are new to the world market and are not yet traded on an industrial scale. Accordingly, the certification process and the corresponding data gathering and forwarding within the supply chain are also new processes for which few or no long-term empirical values are currently available.

Figure 1 below provides an overview of the many steps for which information and data for certification need to be forwarded within a PtX supply chain.

The solution

There is market experience of processes and procedures for certifying, for example, green electricity or biofuels. The positive solutions from these experiences shall be used for green hydrogen/PtX certification, while procedural weaknesses shall be eliminated. For example, processes and certificates may be susceptible to falsification or fraud (e.g. through double-counting the same certificate) because they are partly based on manual or analogue readings or evaluations. This makes the processes less transparent and traceable, and more costly. Manual and analogue processes hinder the simple and efficient exchange of information along the value chain, as well as corresponding scaling up.

One solution for closing these procedural weaknesses can be the digitalization of the certification process. By providing digital solutions for the certification of green hydrogen, the certification process can be made more transparent, tamper-proof, automated and cost-efficient.

Blockchain technology or other cloud-based business networks can represent an innovative approaches. They can be used to exchange and evaluate data between all participants in a certification system in an automated and tamper-proof manner. By mapping the produced hydrogen in a digital twin, the so-called digital 'tokenization' of hydrogen and its derivatives, a traceable proof of origin can be made possible even in complex PtX value chains.

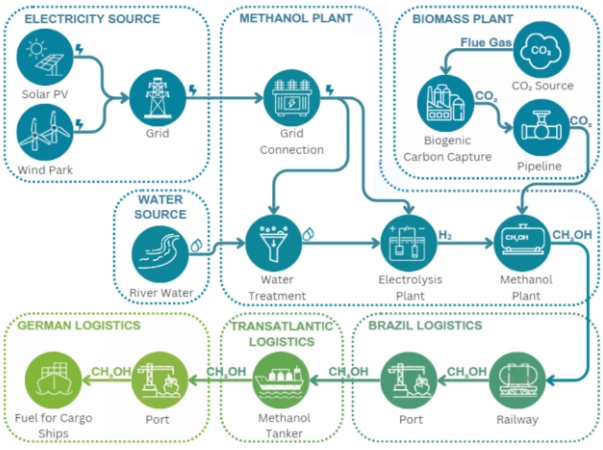


Fig. 1 Elements of the value chain of green methanol
Source: GIZ H2Uppp/Fichtner

Our services

Within the framework of the public-private partnership between SAP and GIZ, the digitalisation potential of certification processes for green hydrogen and PtX is to be investigated along the entire value chain, and a digital pilot solution adapted to national contexts is to be provided and tested. The connection to the national context, supports Brazil's and Colombia's international positioning in the hydrogen market by enhancing transparency and in the certification process.

Roadmap

The project is divided into two phases:

Phase 1: Theoretical phase

Identifictaion of certification requirements and their digitalization potential

- Investigation of the requirements/criteria of various relevant certification schemes from Brazil and the EU, with a focus on schemes commonly used in Germany.
- Investigation of which data from which sources must be available in which form for the certification process, as well as how the various process participants should be able to access this data.
- Investigation of the digitalization potential for certification systems and processes.

Phase 2: Practical phase

Development of solutions for the certification requirements and identification of partners/producers to test and apply the solutions in trials

- Translation of the findings from phase 1 into functional requirements for software solutions.
- Trial application of solutions using real customer data for projects in Brazil and Colombia, involving other relevant stakeholders in the certification context.
- Implementation of capacity development measures to build knowledge and skills, specifically in IT and the certification of green hydrogen and PtX products.
- Dialogue and exchange with relevant stakeholders: e.g., H2/PtX producers, national authorities, certification schemes, etc.

Expected impact

The aim of the project is the theoretical development as well as the practical testing of an interoperable digital solution for certification requirements, which allows for mass balancing and the exchange of certificates and corresponding information along the value chain while taking interfaces with other sustainability reporting data and information into account.

Capacity development measures are carried out, for example, in cooperation with the Brazilian service provider for industrial education and training (SENAI) and Brazilian universities. The target groups are not only IT companies and those involved in the process of a certification system, but also Brazilian students and universities. In the beginning of 2025 two expert workshops, one in Colombia and Brazil, took place for the H2/PtX producers as well as national authorities on the detailed certification requirements for export to Europe.

Findings, learnings and approaches of the projetcwill be made available to other stakeholders.

More information:

- In-Depth Analysis of Green Hydrogen Certification Processes in the EU
- Green Proof for Hydrogen and Derivates
- Digitalization of Green Hydrogen Certification Processes
- Understanding EU RFNBO Certification is high on the agenda

At a glance	
Duration	03/2023 – 06/2026
Countries	Brazil and Colombia
Objective	The project aims at testing digital solutions for mapping the certification of green hydrogen.
Partners	All relevant stakeholders for certification

The German Federal Ministry for Economic Affairs and Energy is supporting entrepreneurial engagement in the ramp-up of hydrogen in the Global South through the International Hydrogen Ramp-up Programme (H2Uppp).

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