

Marengo I: the road to decarbonization with green ammonia

Partnership between GIZ, Hy2Gen and Mexión

The challenge

Green hydrogen and its derivatives are seen as an important element in the decarbonization of hard-to-abate sectors. However, the green hydrogen market is, also from a global perspective, in an early stage of development, i.e. public support schemes for the introduction of the technologies and first projects in countries are required across the globe.

Ammonia is widely used to make agricultural fertilizers and it is most commonly made from steam methane reforming process, which produces around 1.8% of global carbon dioxide emissions.

On the other hand, green ammonia is produced using green hydrogen, making the process 100% renewable and carbon-free. Green hydrogen is produced from water electrolysis using renewable energy as electricity source.

Particularly in developing countries and emerging economies such as Mexico, projects of green hydrogen and its derivatives are likely to arrive at a viable business case if a certain share of the green hydrogen can be exported and sold in markets with premium prices.

Specifically, in Mexico there is a significant potential to produce green hydrogen and green ammonia, due to the favorable conditions for renewable energy, and the opportunities in the national and international market. Therefore, building up a green hydrogen market in Mexico is necessary and would help to decrease import dependencies and increase energy security and at the same time create future-oriented jobs. However, so far, there is no existing production of green hydrogen nor green ammonia in the country.

Hence, ramping up the hydrogen market in Mexico now is required to avoid the risk of falling behind regional competitors and foregoing opportunities for its economic development, as well as improving the technology development and economies of scale.



The solution

Mexico has the potential to become one of the largest producers, exporters and industrial users of green hydrogen and green ammonia due to its top wind and solar resources, availability of land for large projects, international ports and well-developed energy infrastructure.

Based in Wiesbaden, Germany, Hy2gen AG develops, finances, builds and operates plants for the production of green hydrogen and hydrogen-based e-fuels worldwide. These products are used to create climate neutral and competitive fuels and industrial solutions. Mexión Corporation was founded in 2005 in Mexico City and is a leading business and project developer in the renewable energy sector. It has been successfully developing wind farms in Mexico for the past 15 years with over 320 MW spinning. Hy2Gen, Mexión and GIZ have joined forces in a public-private-partnership (PPP) within the International Hydrogen Ramp-Up Programme (H2-Uppp) commissioned by the German Federal Ministry for Economic Affairs and Climate Action (BMWK).

The PPP-Project combines Hy2Gen's technical knowledge in green hydrogen, Mexión's experience and knowledge of the renewable energy sector and GIZ's expertise in stakeholder engagement. "Marengo I", a green ammonia production facility powered by an off-grid hybrid renewable power plant, can develop a blueprint for green

ammonia projects, taking into consideration its social and environmental impacts. The PPP project will help to demonstrate the readiness for its global implementation.

Our Services

To develop the Green Ammonia Blueprint, using the Marengo I Project as an example, different studies will be developed to analyse and determine its feasibility. Plus, the results and lessons from this path will be published and shared with other project developers and interested stakeholders.

Roadmap

First, a techno-economic analysis will be performed. The analysis will optimize the operation of the Ammonia Production Plant on the electrolyser parameters and the hybrid power plant (wind, solar and storage). As a result, the levelized cost of ammonia is expected, with this information the commercial plan will be analysed to determine its feasibility.

Second, a set of analysis will be performed to map the regulatory path needed for an off-grid green ammonia plant. The analysis will include the environmental, land, social, and industrial safety assessments.

Third, the different arrangements for the legal corporate/society structure of the project will be researched. Since the facility will be composed by five different processes (power generation, desalination, electrolysis, ammonia production and transport), advantages and disadvantages of each corporate structure will be examined to find the most suitable one to comply with the Mexican regulation and the purpose of the project itself.

Finally, the findings and learnings will be used to enhance the dialogue with interested stakeholders and to build and strengthen capacities in Mexico.



Impacts and results

- A Green Ammonia Blueprint for feasibility of an integrated off-grid production plant in Mexico
- Regulatory critical path and safeguards
- Capacity development of external actors from the private sector and academia

At a glance

Duration	August 2022 to December 2023
Country	Mexico
Objective	The development and publication of a blueprint for an integrated off-grid project to produce green ammonia
Parceiros	Hy2Gen and Mexión and GIZ
Resultados esperados	<ul style="list-style-type: none"> • Techno-economic análisis • Environmental, social and safety analysis • Map of a regulatory path for off-grid green ammonia plant • Analysis of suitable corporate structure and regulatory path • Dialogue with stakeholders and capacity development

The International Hydrogen Ramp-up Programme (H2Uppp) of the German Federal Ministry for Economic Affairs and Climate Action (BMWK) promotes projects and market development for green hydrogen in selected developing and emerging countries as part of the National Hydrogen Strategy.

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