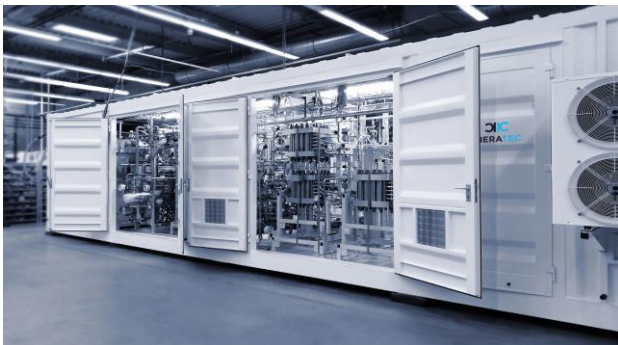


Lighthouse e-fuel Project Chile: Front-End Engineering Design (FEED) Study for a Power-to-Liquid (PtL) plant

Background

The effort to limit global warming calls for decarbonization and new technologies in many sectors. While some industry sectors can be easily electrified with renewable power, other sectors like the mining, maritime, aviation and heavy-duty transport sectors are facing big challenges when it comes to reduce their CO₂ emissions and de-fossilize their fleets. For these applications, so-called electrofuels (e-fuels), produced from renewable electricity and unavoidable CO₂, may be a promising option, especially in countries with high wind and solar energy potentials, such as Chile.

At the end of 2020, the Chilean Government through the Ministry of Energy launched Chile's Green Hydrogen Strategy, focusing on the development and use of green hydrogen to phase-out all fossil fuels consumed by the country by 2050. This strategy is one of the keys to reach net zero in accordance with the energy plans of the Chilean Government.



Power-to-Liquid plant by INERATEC. © INERATEC

In the short term, one of the main objectives of this strategy is to promote the local demand of green hydrogen and derivatives in Chile. This will help to ramp-up the domestic hydrogen market, as well as to prepare the base conditions and specialized local capacities needed for the development of the large export projects planned for 2030.

The solution

In this context, this public-private collaboration seeks to assess the potential and possible constraints of a Power-to-Liquid (PtL) plant in Chile.

Taking into account the Chilean Green Hydrogen Strategy, this project takes and works under some important aspects related to the first wave of green hydrogen applications, focused on domestic use for the ramp-up of the local hydrogen market, specifically promoting the production and utilization of e-fuels from green hydrogen. Additionally, supporting PtL projects in Chile allows the country to reduce its carbon emissions and thus reach its targets, since the CO₂ is being recycled into CO₂ neutral hydrocarbons; the CO₂ being used in the production process of the hydrocarbons is the same amount rejected while burning the fuels in a car, a plane, or a ship.

Using green hydrogen as feedstock for the production enables the country to implement its hydrogen strategy and thus develop impactful business cases for the exploitation of green hydrogen projects. It also supports the expansion of renewable energy sources which are needed to provide the renewable power to produce the green hydrogen. Furthermore, it is worth mentioning that Chile has a good potential to produce e-fuels using green hydrogen due to its abundant renewable energy resources, as well as its existing energy infrastructure and the presence of various industries in the country. On the other side, the country has the advantage of having possible sources of unavoidable CO₂, such as the cement industry, as well as biogenic sources, like forest residues and agricultural waste.

How it will be done

To guaranty a successful implementation and operation of a PtL plant, different requirements need to be fulfilled, such as availability and low costs of generating renewable energy, minimum size of the surface area to welcome all the components of the PtL plant, availability of water for the electrolysis, availability/recoverability of CO₂ from unavoidable CO₂ sources, potential of transport options, among others.

To address these requirements, the current project will focus on delivering a technical and commercial analysis to evaluate the exploitation potential of a PtL plant in Chile, and thus, develop a viable business to motivate investors to invest in large-scaled PtL plants in Chile. Furthermore, the study will benefit the public and private sector by promoting and making visible the sustainable pathway for the development of this kind of projects in Chile by:

- Defining and explaining the basic principles, components, and processes of a PtL plant based on green hydrogen and unavoidable CO₂ sources.
- Identifying synergies and possible local stakeholders for the supply of the required feedstock, as well as relevant stakeholders like permit authorities, possible offtakers, local procurement, certification bodies, among others.
- Showing the enabling conditions for the development of a PtL production plant, both in terms of technical requirements as well as in terms of economic parameters.

Impacts and results.

As main project result INERATEC will produce a comprehensive FEED study of a PtL plant in Chile, which will include:

- Techno-economic analysis of the PtL plant.
- Facility plot plan and process flow diagram.
- Mapping and description of potential sites in Chile for PtL plant realization, and local stakeholders along the value chain.
- Sustainability reporting and logistic concept for PtL plant.

In addition, a stakeholders' engagement and awareness & educational campaign are also considered within the project, to get relevant feedback, evaluate a sustainable value chain for e-fuels and to define a possible business case for the implementation of this kind of projects in the region.

At a glance	
Duration	June 2023 to December 2023
Country	Chile
Objective	Assess the potential and possible constraints of a Power-to-Liquid plant in Chile.
Partners	GIZ, INERATEC GmbH
Expected Results	<ul style="list-style-type: none">• Conceptual Process and Module Design of a PtL plant.• Mapping of local enablers in Chile.• Technical and economic analysis of PtL plant efficiency.• Public relations, capacity development and stakeholder engagement.



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