

# PRESS RELEASE

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## New Fraunhofer ISE Study: Exploring Colombia's Potential for Large-Scale Green Hydrogen Production

Large amounts of green hydrogen and power-to-X (PtX) products are indispensable for the industry's transformation to climate-neutral processes. To guarantee the competitiveness of these industries in Germany, not only is hydrogen production within Germany necessary but also the cost-efficient import of PtX products. On behalf of the Federation of German Industries (BDI) and the World Energy Council (WEC), the Fraunhofer Institute for Solar Energy Systems ISE has investigated the production and supply costs of hydrogen in and from Colombia. The study that was published today focuses on three promising regions: Cartagena/Barranquilla, La Guajira, Valle del Cauca. Besides the technological conditions, environmentally and socially relevant criteria such as protected areas or indigenous communities were also considered.

The study is a key part of a dialog project between Colombian and German industry, which was funded by the German government via the development organization Sequa. "Germany can only meet its demand for CO<sub>2</sub>-free molecules with international partners. Colombia offers excellent potential for this. Conversely, the Colombian government is very interested in supporting industrial partnerships with Germany on energy transition technologies. The conditions for closer industrial cooperation are therefore very good," explains Carsten Rolle, Managing Director of the World Energy Council Germany and Head of the BDI's Energy and Climate Policy Department.

Colombia has enormous potential for renewable electricity generation: hydropower, biomass, solar and wind power on the mainland as well as offshore. In an initial techno-economic [study](#) commissioned by the H2Global Foundation, Fraunhofer ISE examined the production and transportation costs of power-to-X products in 39 regions worldwide for 2030. The results showed that areas in northern Colombia, among others, stood out due to the extremely promising potential they exhibited for renewable energy generation and hydrogen production.

The newly published study "Power-to-X Colombia", commissioned by the BDI and WEC, builds on this study, using a proven methodology developed by Fraunhofer ISE to identify potential sites for renewable energies and large-scale Power-to-X production: Areas suitable for large-scale wind and solar parks were identified and then compared with locations suitable as potential hydrogen and PtX hubs, characterized, for example, by the availability of CO<sub>2</sub> sources, water and the necessary infrastructure like power grids, roads and ports. Besides the technological conditions, environmentally and socially relevant criteria such as protected areas or indigenous communities were also

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considered. The results of these comprehensive analyses were used to select three locations in Colombia as potential Power-to-X hubs where green electricity can be used to produce hydrogen and its derivatives particularly efficiently. The study provides a detailed cost analysis for the three regions of Cartagena/Barranquilla, Cali and La Guajira. The results of the study will be used for the Colombian-German Hydrogen Dialog as well as to assess the export potential of the Colombian hydrogen industry.

### Considering the local features

"Each of these regions offers its own advantages and requires a specific approach to setting up a local hydrogen infrastructure," explains Dr. Christoph Hank, one of the authors of the study. "Our techno-economic study provides a comprehensive hydrogen cost analysis for the three regions identified as potential Power-to-X hubs and will make an important contribution to the further development of sustainable hydrogen projects in Colombia. In addition to purely techno-economic criteria, the study also takes socio-economic aspects into account and involves the local population in this forward-looking, sustainable value chain."

The regions around Cartagena and Barranquilla show a good infrastructure and offer potential synergies with the existing industries, making it suitable for the production of green methanol, according to the study. The availability of carbon dioxide, which can be sourced through direct air separation and by capturing carbon dioxide from, for example, an existing cement plant, serves as a foundation for this.

The La Guajira region evidences excellent potential for both wind and solar energy plants, which has a direct positive effect on production costs. In this case the production routes for green ammonia and liquid hydrogen are emerging as the most favorable. However, currently the necessary infrastructure is lacking in this partly remote region in addition to periods of drought and delayed renewable energy projects. Despite this, the authors of the study believe that the region's exceptional potential for renewable electricity generation can enable a socially acceptable green transition, in which, for example, neighboring settlements could be supplied with affordable fresh water with a seawater desalination plant, a resource which is also necessary for hydrogen generation by electrolysis. It is important to involve the local population from the beginning on in

comprehensive energy and PtX projects and, ideally through training and further education integrate them into the future-oriented value chain.

The third region of Valle del Cauca near Cali has good photovoltaic potential and locally available CO<sub>2</sub> sources so that the production of green methanol and other hydrocarbons such as dimethyl ether or sustainable aviation fuels would be feasible here. However, advanced production concepts are required to achieve competitive production costs, such as implementing hydropower to increase the plant's full load hours and making use of the sustainable biomass potential for synthesis gas production and subsequently hydrocarbon synthesis.

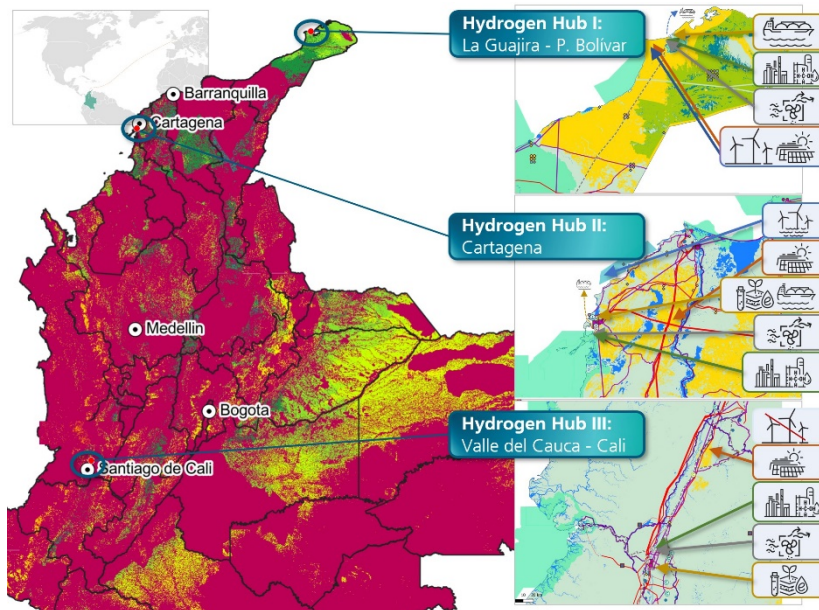
Overall, in the medium to long term, large Power-to-X hubs can be realized that run on 100 percent renewable electricity, especially if the offshore wind potential is consistently expanded. "Colombia has already presented a hydrogen roadmap: Following the path described therein, establishing the necessary framework conditions, attracting venture capital and implementing the measures in a socially responsible manner are now the key milestones for further success," summarizes Hank.

### Techno-economic analysis of hydrogen imports and regions

Fraunhofer ISE identifies the generation potential for renewable energies as well as green hydrogen and its derivatives for selected regions or entire countries. The institute carries out location-based cost and environmental analyses along the entire hydrogen and Power-to-X value chain.

More information: <https://www.ise.fraunhofer.de/en/business-areas/hydrogen-technologies/electrolysis-and-hydrogen-infrastructure.html>

Link to study: <https://www.ise.fraunhofer.de/en/publications/studies/power-to-x->



The “Power-to-X Colombia” study identifies potential locations for large-scale Power-to-X production: wind and solar parks, CO2 sources, water and infrastructure (power grids, roads, ports) are required. © Fraunhofer ISE

