Diálogo

Decarbonising Trade: Transitioning from Polluting and Growing Clean Industries

The Electric Planet

The role of renewable hydrogen in the decarbonisation pathway

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ABOUT HINICIO

Top 10
H_2 Innovators
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Reuters 2023
Award

Hinicio is a consulting firm specialized in sustainable energy, industry and transport. We are globally recognized as a leading player in the field of hydrogen & derivatives.

Founded in 2006, the company is headquartered in Belgium with offices in Brussels, Paris, Rotterdam, Washington DC, Bogota and Santiago de Chile.

We advise our clients and support the building of successful strategies, investments, projects, and public policies, leading and accelerating the transformation of the energy system globally.

Our vast experience includes +600 projects delivered in +30 countries.

We became part of the Vulcain group in December 2022.

STRATEGIC ADVICE

INVESTMENT SUPPORT

PUBLIC POLICIES

PROJECT DEVELOPMENT ASSISTANCE

+600 studies and projects in more than 30 countries

Hinicio's offices

Hinicio's Commercial agreements

Projects and Studies

Vulcain's offices

OUR CUSTOMERS | GLOBAL LEADERS

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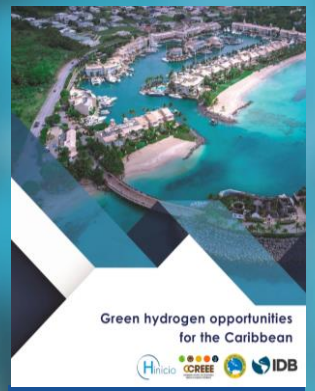
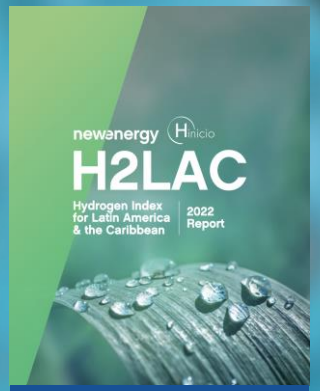
SOME OF OUR **PUBLICATIONS**

2023



2023

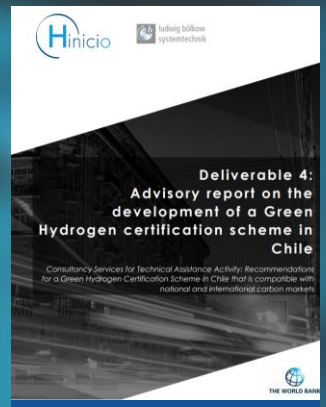


2023

2022

2022

2022

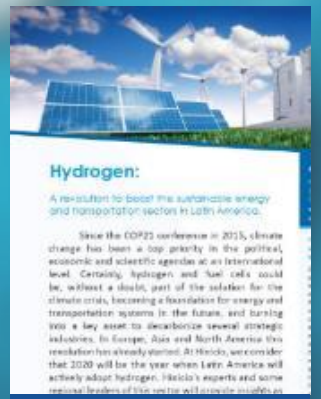


2021

2021

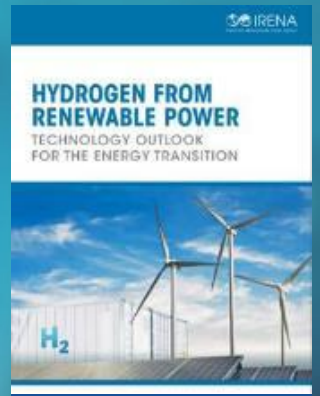
2020

2020



2019

2018



2018

2017

How to build an **Electric Planet**

Some insights from Hinicio's experience

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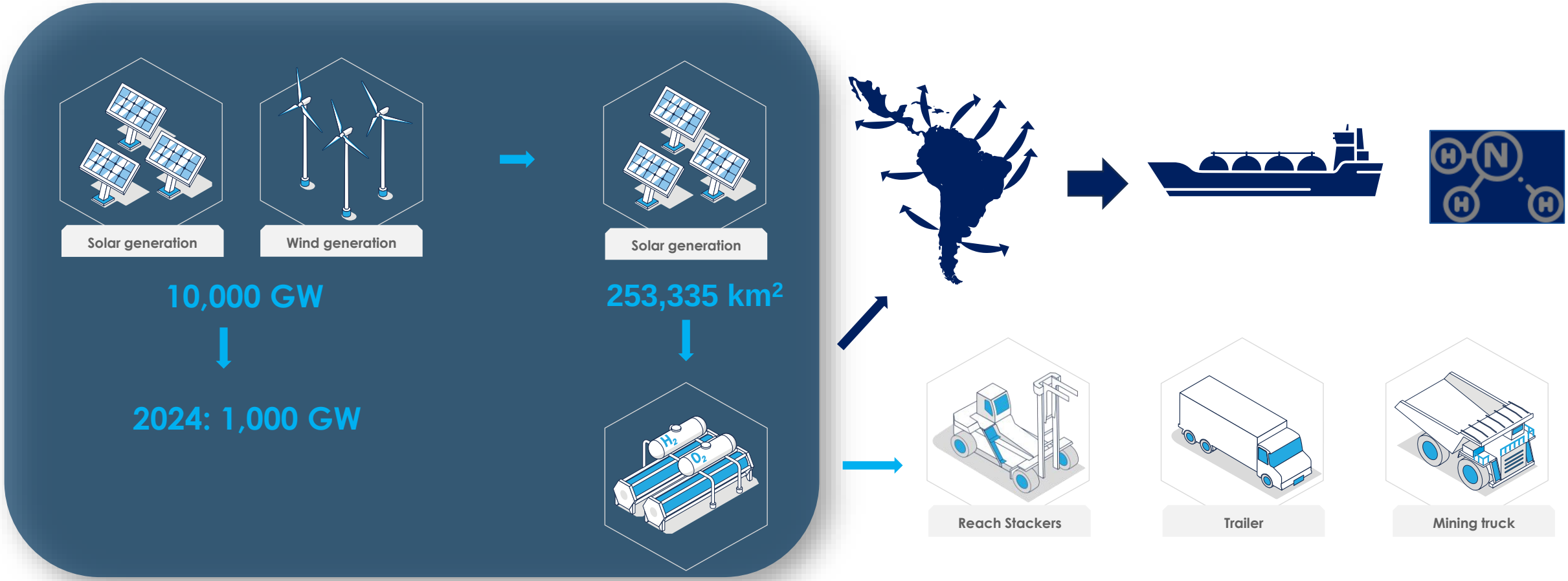
Renewable energy everywhere, for everyone

We need scale-up we need to pilot, innovate, regulate and invest.

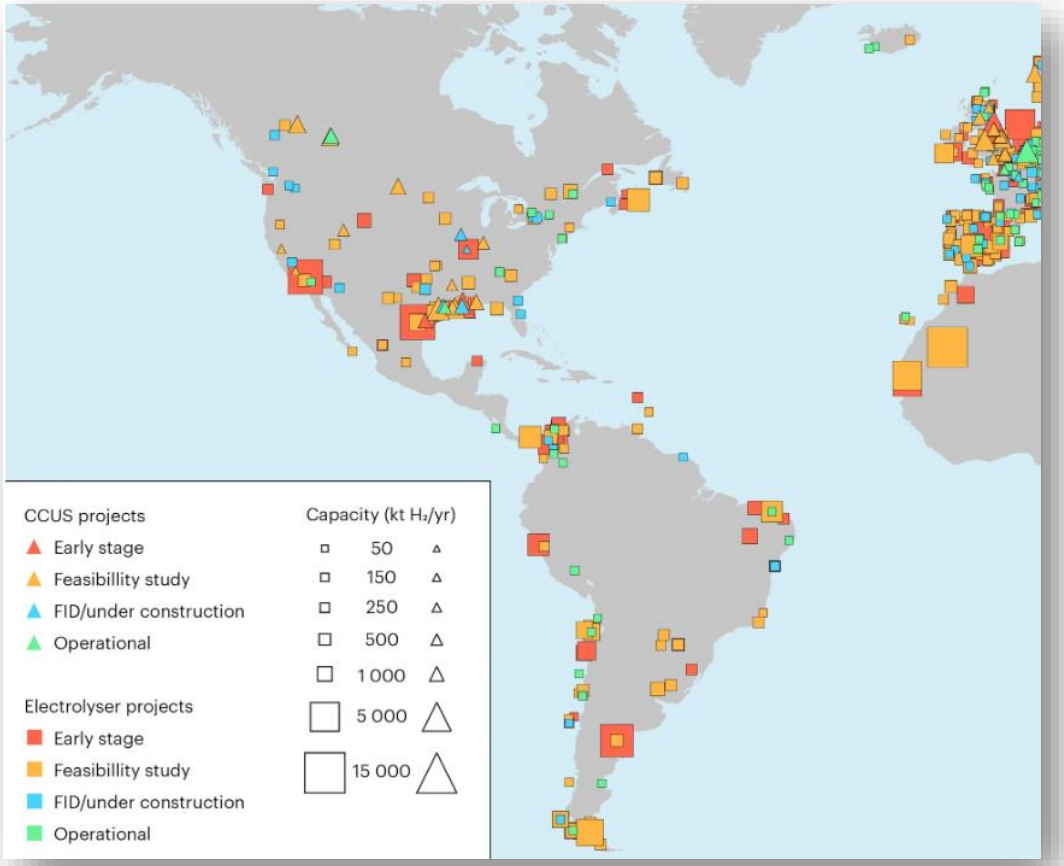
80 exajoule per annum of hydrogen, renewable hydrogen:



Where are we in terms of project development?

We need stronger committments from the demand side, policy makers and investors.

Projects announced and stage of development

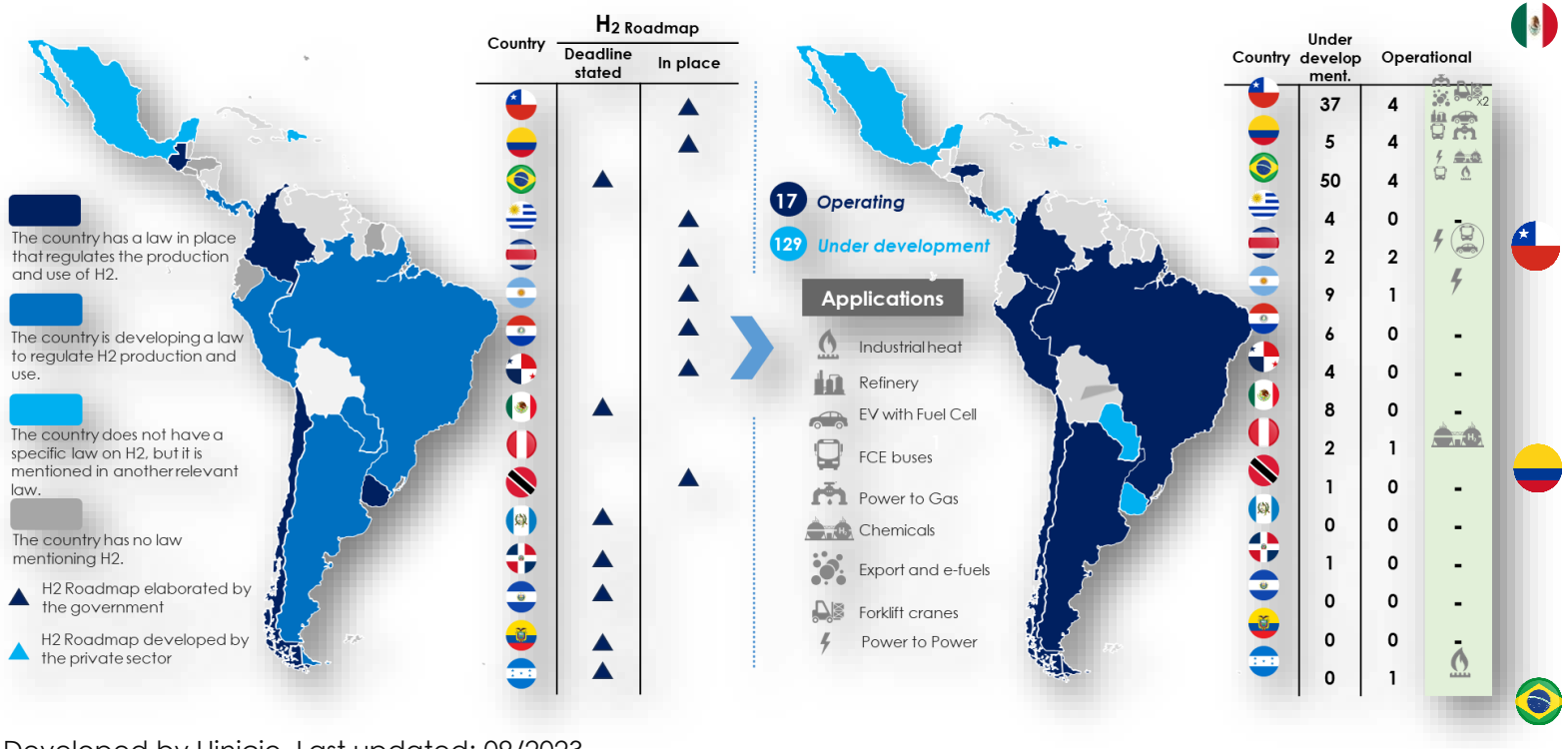


- Only **5% have taken firm investment decisions** due to uncertainties around the future evolution of demand, the lack of clarity about **certification and regulation** and the lack of infrastructure available to deliver hydrogen to end users.
- On the demand side, we need novel applications **in heavy industry and long-distance** transport account for less than 0.1% of hydrogen demand, whereas they account for one-third of global hydrogen demand by 2030 in the Net Zero Emissions by 2050 (NZE) Scenario.
- **Delays in the implementation of country policies** and the lack of policies for demand creation are preventing the scale-up of low-emission hydrogen production and use.
- We also need to **unlock investment** that can accelerate production scale-up and deployment of infrastructure.

https://www.iea.org/energy-system/low-emission-fuels/hydrogen

How is LATAM looking?

LATAM is moving but we need to hurry!



Developed by Hinicio. Last updated: 09/2023.

Notes:

- The projects under development considered for this study are those that count with basic information such as production capacity, location, intended applications/stakeholders and permitting granted.
- R&D projects are excluded, as well as project at very early development stage
- Projects that were publicly announced were considered.

State-owned Pemex already produces hydrogen as a by-product of its fossil fuel production, using it mainly for refining processes and ammonia production as there are only "grey" H2 projects in place.

Several projects are being presented to the Chilean national environmental evaluation system but we are still in the planning stage. We lack an infrastructure plan; information, rules and tools; and offtake.

In Colombia, the main O&G and transport companies are developing several hydrogen pilot projects. Additionally, other developers are advancing big-scale projects in the north Caribbean region, drawn by its exceptional renewable resource potential.

By 2030, Brazil's wind and solar LCOE is expected to reach 20-24USD/MWh and 17-21USD/MWh respectively, while both can be combined at the same location (such as in Ceará, Piauí and Bahia), thus optimizing hydrogen production projects.

Uruguay launched its green H2 roadmap in 2023, which came with deployment of public-private projects. They focus on leveraging Uruguay's high biogenic potential as an energy feedstock and a source of CO2.

What's happening in the shipping industry?

Global shipping industry moves ahead with implementation of zero-emission fuel projects

Port of Rotterdam

- Europe's largest bunkering port and one of the top three globally.
- First European port where LNG bunkering was possible and the first in the world where barge-to-ship methanol bunkering took place.
- Zero emission fuels: ammonia, methanol, biofuels and hydrogen.

Port of Antwerp - Bruges

- Aims to be a zero GHG emission port by 2050
- Aims to be Europe's leading green hydrogen import hub
- A green methanol plant is currently under construction and plans to produce 8,000 t/year.
- Has the world's first hydrogen-powered tug (Hydrotug)

Green maritime corridors - Chile

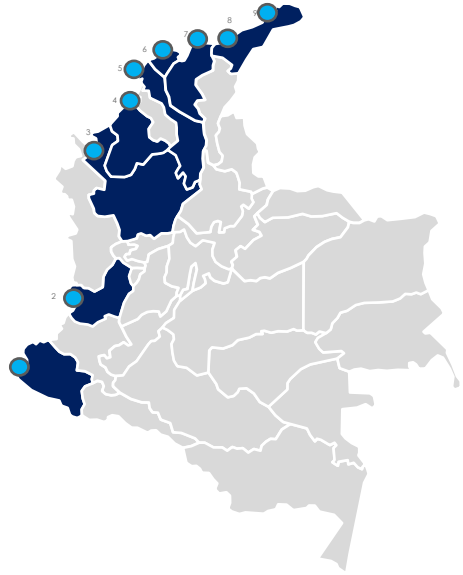
- Current assessment and definition of a series of green corridors in the country, which correspond to shipping routes that promote the use of clean fuels and technologies.
- It includes corridors at national and international level, considering the possibility of exporting and using green hydrogen and derivatives.
- Those involved expect the implementation of the corridors between 2028 and 2030.

How do we unlock investment?

Project example: evaluation of 9 ports in Colombia to understand where to invest.

Criterios	Peso	Sub-criterios
C_1: Infraestructura portuaria	15%	Infraestructura adecuada para atender buques de gran calado Planes de desarrollo o expansión portuaria Disponibilidad de tierra para construir infraestructura en/cerca de la zona portuaria Potencial para el manejo de carga extra dimensionada
C_2: Potencial e infraestructura energética	45%	LCOH H_2 Verde 2030 LCOH H_2 Verde 2050 Recurso hídrico disponible Existencia de poliductos, oleoductos o gasoductos en la cercanía de la zona portuaria Existencia y proyección de líneas de transmisión Sinergia con desarrollo de proyectos de energía renovable
C_3: Seguridad	5%	Experiencia previa en manipulación, manejo, cargue y descargue de sustancias químicas Vulnerabilidad de la infraestructura o exposición al cambio climático Existencia de grupos armados ilegales Distancia a centros poblados/radio de seguridad para manejar sustancias explosivas o tóxicas
C_4: Financiero & Económico	15%	Inversión extranjera directa Offtakers alternativos locales Volumen de tráfico Participación de zona franca Existencia de consumidores y productores de H_2 en inmediaciones de la zona portuaria
C_5: Medioambiental	7,5%	Existencia y tipo de licencia de explotación de recurso químico, petroquímico o convencional Áreas de protección ambiental
C_6: Social	7,5%	Orden social Mano de obra calificada Existencia de grupos étnicos o protegidos
C_7: Político	5%	Desempeño de las instituciones Consultas previas relacionadas a proyectos energéticos Consultas previas relacionadas a proyectos portuarios

- **7 criteria** have been developed to allow a comprehensive assessment of the 9 port locations to be assessed.
- Each of these defined criteria can be assessed on the basis of a series of **qualitative and quantitative sub-criteria** which, on the basis of publicly available information and a weighting defined between the parties, were given a specific rating.



THE WORLD BANK

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How to start large-scale projects in a new industry?

The Pioneer's Dillemma

The "pioneer's dilemma" in the context of infrastructure development refers to the **challenges and risks faced by early adopters or pioneers to collaborate in order to solve the common infrastructure needs**. This concept can be applied to various aspects of infrastructure: Water System, Power System, Hydrogen System, Chemical System, Ports & Roads, etc.

Source: AI generated image by Hinicio's own prompt

Key aspects of the pioneer's dilemma include:

- **High Initial Costs:** Pioneers often face significant upfront investments in research, development, and deployment of new technologies or infrastructure systems.
- **Uncertainty and Risk:** There is inherent uncertainty and risk associated with being the first to implement new technologies. This includes technical feasibility, market acceptance, and regulatory challenges.
- **Lack of Precedent:** Pioneers have no existing models or benchmarks to rely on, which can complicate planning and execution.
- **Potential for High Rewards:** Despite the risks, being a pioneer can lead to significant advantages, such as establishing market leadership and setting industry standards.
- **Influence on Future Development:** Early infrastructure projects can shape the direction of future development in that sector, influencing both technological trends and regulatory frameworks.
- **Need for Collaboration:** Often, pioneering in infrastructure requires collaboration between different stakeholders, including government, private sector, and sometimes international entities.
- **Long-term Impact**: The decisions and outcomes of pioneer projects can have long-lasting impacts, both positive and negative, on communities, economies, and the environment.

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From molecules to products: how can certification help?

It is not just the H2 molecule, but its **environmental attributes** that determine the **market value**

Market	Maritime fuel	Aviation fuel	Renewable transport fuel: RFNBO	Renewable feedstock for industry: RFNBO	Import	ETS: carbon intensive industry, built environment, heavy transport
1 Applicable molecules	NH3, MeOH, e-diesel	e-kerosene	H2, NH3, MeOH, e-diesel	H2	Fertilizers (incl NH3)	Any product that falls under ETS
2 Product classification	low carbon fuel	e-fuel	REDII compliant, renewable transport fuel	REDIII compliant, renewable transport fuel	NH3	Any product that falls under ETS
3 Clients	Ship operators	Fuel suppliers	Transport fuel suppliers	Industrial H2 users (excl. conventional fuel production): - MeOH, NH3 producers - Glass manufacturers - Semiconductor manufacturers - Steel making - Biofuel Refining	Any conventional product off-taker	Any conventional product off-taker
4 Type of market	Incentivized voluntary market	Mandatory market	Mandatory market	Mandatory market	Incentivised voluntary market	Incentivized voluntary market
5 Applicable regulation	EUFuel Maritime, ETS	ReFuel aviation	**(RED II Art. 25-30)**	**(RED III Art. 22a)**	ETS and CBAM interplay	ETS
6 Client business model	Avoid Carbon Penalty	Compliance	Compliance	Compliance	Benefit from carbon penalties in domestic production of ammonia	Benefit from carbon penalties in ETS industries
7 Market size	50% of fuel for int'l shipping: - 2% in 2025 - 6% in 2030 - 13% in 2035 - … - 75% in 2050	eKerosene sub-mandate: - 0,7% in 2030 - 5% in 2035 - 8% in 2040 - … - 28% in 2050	28% of EU (inland) transport fuels by 2030, with sub-quota of 3,5% for RFNBO	50% of EU industrial H2 usage by 2030		
Eligibility Criteria & Project Impact			Detailed discussion in upcoming slides			

Source: Hinicio expertise

Orientation for Project developers

H2Global Sustainability and Eligibility Criteria (aligned with RED II requirements)

H2Global

Electricity	
GHG Balance	The CO2 footprint of the end product must be consistently calculated over the entire value chain up to the point of landing in Germany (Scope 1, Scope 2, Scope 3)
Carbon sources*	**Avoidance of double-credits:** For the carbon used, it must be ensured that avoided emissions are not credited if the capture of this CO2 has already been credited under other funding instruments/regulation.
Water	The sourcing of water for the eligible projects must be sustainable so that over the whole life of the project, it will not contribute to any foreseeable degradation in the quality or scarcity at the site. **In arid regions, the use of fossil water** supplies and potable water is excluded**
Site selection	Exclusion of land use conflicts; Exclusion of project areas in or directly adjacent to areas worthy of protection; Avoidance of ecological consequential damage, among others.
Waste and pollutant management	At least the United Nations environmental standards must be complied with, especially ISO 14001.
Labour and social standards	The local labor standards must at least **comply with the relevant ILO-International Labor Standards (...) including any subcontractors.**
EU Information Data base	The supplier must describe how it will be ensured that the **purchasers of the final products receive all the information and evidence necessary for the registration of the end products in the European Union database** pursuant to Art. 28 of the Renewable Directive.
Local value creation and participation	The **participation of local and civic actors** must be guaranteed.

Source: Funding Guideline for International Hydrogen Projects, BMWI 2021 **As per definition, "fossil water" is understood as "typically groundwater in an aquifer".

Key takeaways

We need to work together

- Carbon pricing on renewable H2 is not enough, we need a wider adoption of carbon prives combined with policy instruments (mandates, quotas, H2 requirements in public Procurement) can help increase the demand and derisk the investment and improve economic feasibility.
- Multiply R&D efforts to ensure that all technologies reach comercial scale quickly, including manufacturing and pilot projects.
- Mobilise investment along the value chain in order to secure technology availability, scale-up and lower LCOH.
- Alliances all along the value chain and common user infrastructure can help surpass the Pioneer's dillema. But we need to share information, learn from other countries and industries, and créate innovative and just business & governance models.
- To have in place appropriate certification schemes can enable a minimum level of interoperability, mutual recognition and minimise market fragmentation.

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Thank you!

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