Brazilian Low-Carbon Hydrogen Tax Incentives: *Comparative Analysis*

24 October 2024

K&S Team Meeting With You Today

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Agenda

1. Introductions
2. Brazilian PHBC Tax Incentive – Brief Intro
3. U.S Inflation Reduction Act
4. EU Incentives/ Funding Opportunities – Selection Criteria
5. Asian Funding Opportunities

1. Introductions / Tour de Table

Energy Accolades and Awards

340+
Energy lawyers

1,300+
Lawyers across the world

70+
Lawyers working on green and low-carbon hydrogen projects

80+
Green and low-carbon projects worldwide

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THE AMERICAN LAWYER

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IJGlobal

Advising on the leading green H_2 projects in: U.S., Canada, Australia, Brazil, Chile, Saudi Arabia, the UAE and Egypt

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FT FINANCIAL TIMES
Financial Times Innovative Lawyers North America 2023

"Project Finance Deal of the Year" – NEOM Helios
IFLR MIDDLE EAST AWARDS 2023
IFLR1000 Middle East Awards 2023

Leading Practice in Projects and Energy: International Firms and Joint Ventures
Legal 500 Asia Pacific 2024
The LEGAL 500 ASIA PACIFIC

FOCUSED ON THE INDUSTRY

We make it our business to know the green and low-carbon hydrogen industry; its **players, lenders, regulators, consultants, and leaders**, and its history, driving forces, latest trends and changing frontiers. **We are well-known in the sector** both for our ability to **close complex deals**, our **globally integrated approach** to project development, **regulatory and structuring advice**, and our **thought leadership.** We regularly issue and contribute to impactful publications.

MULTIDISCIPLINARY COUNSEL

We provide **regionally and globally coordinated teams** with comprehensive experience in the areas of project structuring, project development and finance, construction, offtake arrangements, litigation, mergers and acquisitions / joint ventures, tax, international arbitration, international trade, environmental, antitrust, government relations, capital markets, real estate and intellectual property.

EXPERIENCE THAT SPANS THE VALUE CHAIN

Our energy industry group, comprising 300 lawyers worldwide, is **led from the MENA region**. We advise on projects, transactions and disputes across all sectors of the industry, including renewables (wind, solar, geothermal, hydro), green hydrogen production and all relevant derivatives (**ammonia, methanol, e-NG, SAF, lH_2 and LOHC**). The experience covers the **upstream, midstream and downstream all over the world**.

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Chambers Global 2024

"King & Spalding offers a strong team with the full scope of knowledge."
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"King & Spalding does more than provide legal answers to problems, they create solutions to commercial issues."
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"King & Spalding Singapore is a vital part of the best energy law firm in the world […] and enables the firm to serve clients everywhere in the world in a seamless top-quality manner."
Legal 500 Asia-Pacific 2023

Unrivalled Renewable and Low-Carbon Molecules Experience

Advisers from Day 1 on all aspects of the world's first green H_2 / NH_3 export megaproject to take FID, involving 4GW of solar and wind, a 2.2GW electrolyser and a 500MW BESS. This is the first megaproject to sign definitive offtake, EPC and finance documents, with an $8.4 billion non-recourse project financing involving 23 international banks and export credit agencies.

Advisers to Tree Energy Solutions (TES), a well-known renewable energy company led by key European sponsors, on producing e-methane / e-NG using green H_2 and sustainably sourced CO_2 in the US, Middle East, Australia and Asia (for import into its terminal in Wilhelmshaven, Germany) and related EU regulatory work relevant to e-NG and biomethane production and marketing in Europe.

Advisers to Scatec as lead Sponsor and Egypt Green Hydrogen Company on Egypt's first green H_2 / NH_3 export project to sign a binding long-term offtake agreement with Fertiglobe for export into the EU. The project comprises a 100MW electrolyser and 270MW of new renewables, designed to meet EU regulations for green e-fuels. The project will supply Fertiglobe as winning bidder in Germany's H2Global pilot auction for importing g

Advisers to ADNOC on its acquisition of a 35% interest in ExxonMobil's multibillion dollar Baytown low-carbon hydrogen and ammonia facility in Texas, USA, the world's largest. We advised on all aspects of the transaction, including M&A, JV, regulatory (including 45V), CCS and other project agreements, and more.

Advisers to JERA on all aspects of its program to import low-carbon NH_3 for use in co-firing power plants in Japan, one of the highest profile clean fuels transactions in the world and an essential part of Japan's energy policy. We advised JERA on a tender for its procurement of low-carbon NH_3. We are also advising JERA on multiple low-carbon H_2 / NH_3 production and export projects on the U.S. Gulf Coast.

Advisers to Casa dos Ventos, Brazil's largest renewables developer, on all aspects of a >1 million tonne per year green H_2 / NH_3 export project in the Port of Pécem, Brazil, which is the most advanced green H_2 / NH_3 export project, focussed on the EU market and regulatory requirements.

Advisers to Chevron on the structuring, development and regulatory regimes relevant to its low-carbon H_2 / NH_3 projects globally (including in the U.S., Australia, Japan, South Korea, Indonesia and elsewhere in Asia-Pacific), as well as on CO_2 capture and sequestration (CCS) and CO_2 transportation activities, renewables proje

Advisers to Hy Stor Energy on its Mississippi Clean Hydrogen Hub, one of the U.S.'s largest H_2 projects, including its application to the US Department of Energy for billions of US dollars in funding and the signing of offtake arrangements with SSAB for low-carbon steel production in the U.S.

Advisers to EverWind Fuels on all aspects of one of North America's most advanced green H_2 / NH_3 export mega-projects in Nova Scotia, Canada. The $7 billion project is supported by the German and Canadian governments as the first project in a Transatlantic Hydrogen Bridge partnersh

Advisers to Raízen, one of Brazil's largest companies, on its bioenergy (biomethane and biomethanol) and renewables initiatives, e-fuels from green H_2 and sustainably sourced CO_2). We are advising on EU regulatory aspects for biofuels and e-fuels as well as and project development and permitting work in Europe.

Advisers to Nikola on its hydrogen hub project in Phoenix (USA), producing green H_2 to support the deployment of Nikola's heavy duty fuel cell electric vehicles (FCEVs) and H_2 refuelling stations in the U.S. Southwest.

Advisers to New Fortress Energy on the development of a 120MW industrial-scale green H_2 project in Beaumont, Texas.

Advisers to HIF Global on its $5+ billion industrial-scale e-fuels plant in Matagorda, Texas (USA), using green H_2 and sustainably sourced CO_2, as well as the well-known Haru Oni project in Chile alongside Porsche, ENEL, Siemens Energy and ExxonMobil. This includes regulatory work on potential offtake markets for green e-fuels under the EU, UK and IMO regulatory regimes.

Advisers on Australia's most advanced green H_2 / NH_3 export project (Gibson Island in Queensland, a joint venture with Incitec Pivot) and the world's largest green H_2 supply chain transaction, a joint venture with E.ON (Germany) to supply up to 5 million tonnes of green H_2 per year to Europe by 2030.

Advisers to Osaka Gas USA on its joint venture with Tallgrass and Green Plains to produce world-scale quantities of synthetic methane (e-methane) in the U.S. Midwest. The project partners aim to produce synthetic methane from low-carbon H_2 and biogenic CO_2 captured from ethanol biorefineries owned and operated by Green Plains.

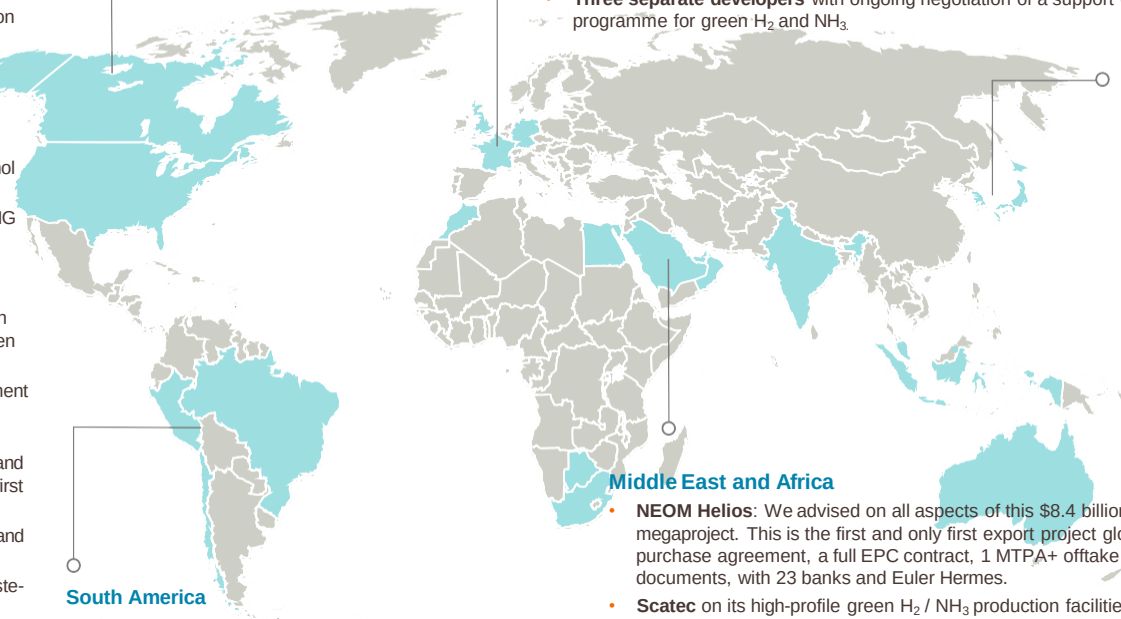
K&S Global Hydrogen Matters

North America

- **EverWind** on its $7 billion green NH_3 export megaproject, the first in the Americas which is fully permitted to proceed, first Canadian project to receive RFNBO certification and first project on the Canada-Germany "Transatlantic Hydrogen Bridge".
- **JERA** on multiple clean H_2 and NH_3 export projects on the U.S. Gulf Coast.
- **Osaka Gas** on a low-carbon methanation project on the U.S. Gulf Coast.
- **Chevron** on a clean H_2 and NH_3 export projects on the U.S. Gulf Coast.
- **Starwood / Lotus** on the Gulf Coast Ammonia project in Texas.
- **Proman** on an ultra-low-carbon methanol facility on the U.S. Gulf Coast.
- **Tree Energy Solutions** on multiple e-NG projects in the U.S. and Canada.
- **HIF** on its $7 billion green H project in Texas.
- **Hy Stor Energy** on its Mississippi Clean Hydrogen Hub, the most advanced green H_2 project in the U.S.
- **New Fortress Energy** on the development of a 120MW industrial-scale green H_2 project in Texas.
- **Nikola** on H_2 production, liquefaction and storage projects, together with a U.S.-first H_2 hub.
- **Phoenix Hydrogen** on H_2 production and storage facilities in Arizona.
- **Arbor Renewable Gas** on a wood waste-to-hydrogen project in Texas.
- **Multiple confidential power producers and gas producers** on H_2 and carbon sequestration developments.
- **Proman** on a ultra-low-carbon ammonia facility on the U.S. Gulf Coast.
- **A NOC** on a JV for a large-scale NH_3 export project in the GoM

Europe

- **Masdar, Engie, EverWind**, **HIF Global, Tree Energy Solutions, Fertiglobe, NEOM** and many more on EU regulatory and certification aspects under RED III / RFNBO rules.
- **Fortescue** on E.ON's purchase of 5M tonnes/year of green H_2, the largest supply transaction in history.
- **Globeleq** on European and Member state subsidy schemes available for proposed projects producing green H_2, NH_3 and/or e-methanol.
- **Chevron** on EU regulatory and policy issues for the establishment of CO_2 capture, export and sequestration projects.
- **JBIC** on global H_2 policy matters and EU green and low-carbon H_2 / NH_3 subsidy and regulatory matters.
- **A global company** on renewables and H_2 development and export projects in Scotland, UK.
- **Ardian** on regulatory matters and H_2 investments.
- **Baker Hughes Energy Partners** on JV for largest clean H_2 infrastructure manager.
- **McPhy Energy** on co-development of zero emission mobility products.
- **Fortescue** on EU regulatory compliance for green fuel projects (incl. H_2 and derivatives) projects.
- **Three separate developers** with ongoing negotiation of a support contract under the German H_2 Global programme for green H_2 and NH_3



Asia-Pacific

- **JERA** on all aspects of its clean ammonia import program for decarbonisation of the Japanese power sector
- **Fortescue** on its Gibson Island project, Australia's first green H_2 / NH_3 export megaproject.
- **A global company** on exporting clean ammonia to Singapore, Japan and Korea.
- **Chevron** on clean H and NH export projects in Australia and Indonesia.

South America

- **Casa Dos Ventos** on its green NH_3 export megaproject in Pecem, the most advanced green hydrogen project in Brazil.
- **HIF Haru Oni** on its Magallanes green H project, the most advanced project in Chile.
- **Raizen** on e-methanol projects importing into Europe.
- **Casa Dos Ventos and Comerc** on a green H project in Brazil.
- **International energy company** on country entry and H_2 projects in Brazil, Chile and Peru.
- **H_2 fuel cells** for a mining industry client in Chile.

Middle East and Africa

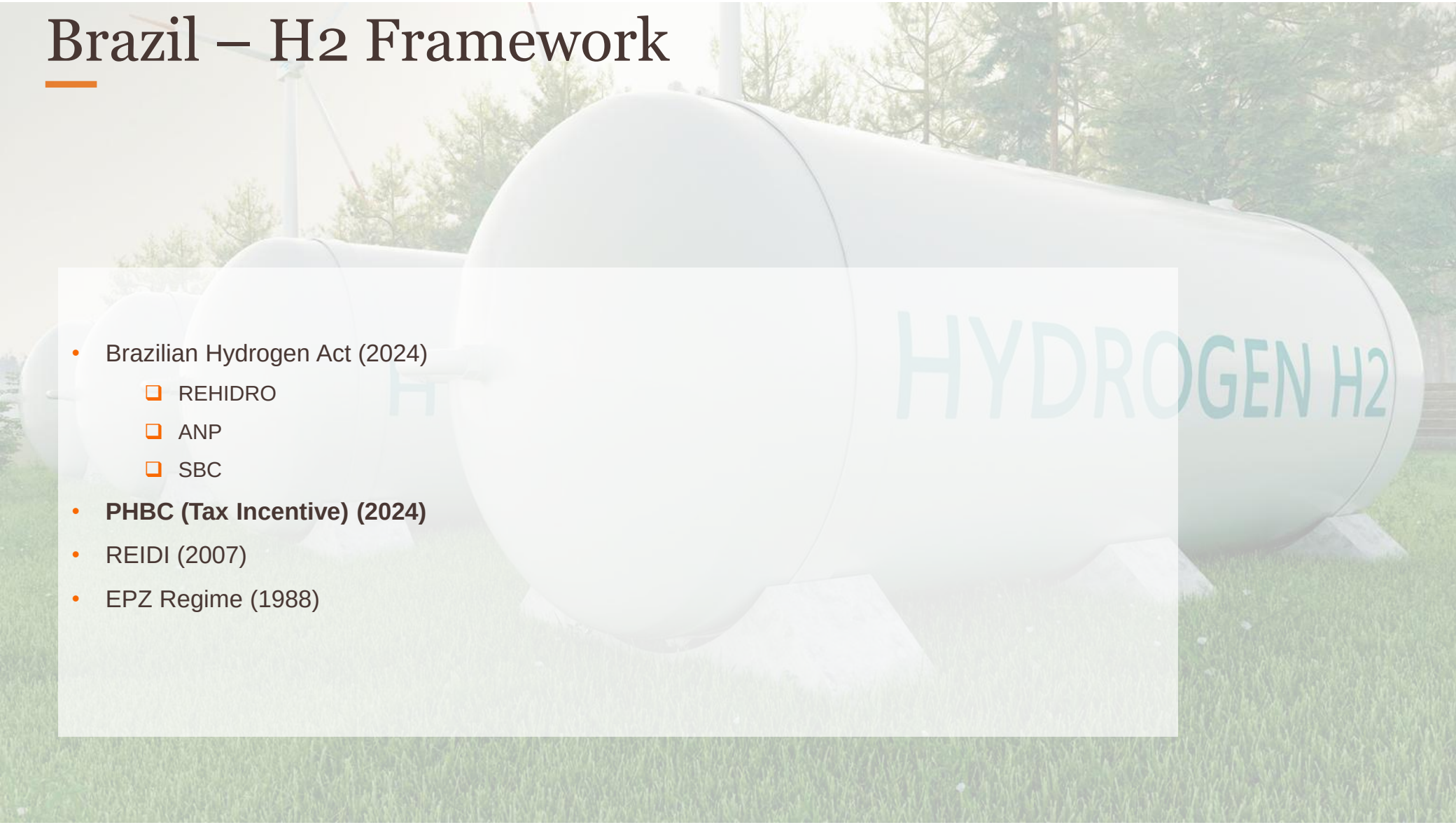
- **NEOM Helios**: We advised on all aspects of this $8.4 billion first-of-kind green H_2 and NH_3 megaproject. This is the first and only first export project globally to sign a GW-scale electrolyser purchase agreement, a full EPC contract, 1 MTPA+ offtake agreement and non-recourse financing documents, with 23 banks and Euler Hermes.
- **Scatec** on its high-profile green H_2 / NH_3 production facilities in Egypt and Oman.
- **Masdar, ENGIE and Fertiglobe** in a JV to develop the UAE's first and most advanced green H_2 production project.
- **Globeleq** on its green H_2 / NH_3 production facilities in Egypt.
- **Tree Energy Solutions** on its e-NG project in the Middle East.
- **International energy company** on country entry and H_2 projects in South Africa and Botswana.
- **Mitsui** and **ADNOC** on one of the world's largest blue H_2 / NH_3 megaprojects.
- **Uniper** on green NH_3 offtake from the Hyport Duqm project in Oman.
- **Jazan IGCC / ASU project**, the largest H_2 project in the world, including its $12.5bn financing which closed in 2021.
- **Mitsui** on a clean NH_3 export project in the UAE.
- **OCP** on a green NH_3 pilot project with Shell in Morocco.

Country overviews: H2 incentives

- Brazil
- USA
- Canada
- EU
- Asia

Brazil

Brazil – H2 Framework



- Brazilian Hydrogen Act (2024)
  - REHIDRO
  - ANP
  - SBC
- **PHBC (Tax Incentive) (2024)**
- REIDI (2007)
- EPZ Regime (1988)

Brazilian Downstream Tax Incentive (PHBC)

1. PHBC Brazil Downstream Tax Incentives

- On September 30, 2024 the Brazilian Government published Law No. 14,990/2024 ("**PHBC Law**"), which establishes the Low Carbon Hydrogen Development Program ("**PHBC**"). In essence, the PHBC provides tax breaks to incentivize the Brazilian low carbon hydrogen industry.

- **Scope.** The PHBC will grant progressive tax credits related to the Social Contribution on Net Income (CSLL) for **sales** of low carbon hydrogen between 2028 and 2032:

  (i) 2028: R$ 1,700,000,000.00;
  (ii) 2029 R$ 2,900,000,000.00;
  (iii) 2030 R$ 4,200,000,000.00;
  (iv) 2031 R$ 4,500,000,000.00; and
  (v) 2032 R$ 5,000,000,000.00.

- **Credit Calculation.** The amount of tax credit will correspond to a percentage of **up to 100%** of the difference between the estimated price of low carbon hydrogen and the estimated price of substitute goods, according to regulations to be developed. The percentage of the tax credit granted may be linked to the intensity of greenhouse gas (GHG) emissions from the hydrogen produced.

- **Eligibility**. To be eligible for the credit, projects must meet two minimum criteria set forth in the law, **without prejudice to others established in further regulation**:

  - beneficiaries must be or have been **beneficiaries** of **Rehidro, in the case of producers**; or acquire low carbon hydrogen produced by a company or consortium of companies **that are beneficiaries of Rehidro, in the case of buyers**;

  - one of the following requirements: (i) contribute to regional development and mitigation measures, as well as adaptation to climate change; or (ii) promote technological development and diffusion or contribute to the diversification of the Brazilian industrial base.

Competitive Process. The PHBC Law provides that the granting of the benefit shall be subject to a competitive process and minimum qualification criteria.it.

- **Competitive criteria.** Minimum selection criteria will be the lowest credit value per unit measure of the product.

- **Additional competitive criteria.** Furthermore, the law stipulates that the regulation may provide for other criteria, including:

  - priority for projects involving lowest intensity of emissions of GHG from the hydrogen produced or consumed; and

  - priority for projects that have the greatest potential to strengthen the national value chain.

2. Issues pending regulation.

- **Selection Criteria.** What are the additional selection criteria that may be adopted to reflect the principles outlined in the PHBC Law (e.g. nationalization indexes, capital investment targets, destination of hydrogen) and how weight will be distributed among these criteria?

- **Sharing of credit volume.** how benefits will be divided among winning projects? The Brazilian Government may opt to grant partial benefits and smaller amounts/percentages of tax relief to multiple projects in order to subsidize more projects (as occurred with BNDES financing, for example).

- **Guarantees**. what kind of guarantees, if any, shall be requested from bidders or winning projects?

- **Timing.** Will tax credits be awarded in a single auction or multiple auctions (perhaps annually)?

Public Consultation Deadline: 22 November 2024.


USA

USA

- Federal income tax credits: Principally provided under the **Inflation Reduction Act (IRA) 2022**, including:
  - Section 45V clean hydrogen PTC;
  - Section 48 clean hydrogen ITC (clean electricity generation ITC);
  - Section 45Q CCS tax credit; and
  - Section 45Z clean fuels (SAF and non-SAF).
- Key details of guidelines for eligibility for the Section 45V PTC are still to be adopted.
- Seven announced DOE-supported Hydrogen Hubs, with US$7 billion funding available.
- US$1 billion allocated to demand-side support for consumers of clean hydrogen located in those Hydrogen Hubs (potentially to be awarded through a Contract for Difference (CfD)).

USA: Federal Tax Credits for Clean Hydrogen (s.45V)

Proposed guidance for "Qualified clean hydrogen": s.45V

- The proposed regulations are not yet finalized.
- Expected by end of 2024.
- Key topics of debate are focused on the details of the methodology for qualifying hydrogen as "clean":
  - Adopting the "three pillars" approach to sourcing clean electricity for electrolysis-based hydrogen production (incrementality, temporal matching and deliverability).
  - No guidance on use of RNG as feedstock.
  - Calculating values for upstream methane emissions leakage for blue hydrogen production.

s.45V – Key Features

- In December 2023, the Department of Treasury and the IRS released proposed regulations defining the methodology for calculating carbon intensity for s.45V.
- **Incentive:** Tax credit of up to $3.00 for each kg of "qualified clean hydrogen".
- **Duration:** 10 years from COD.
- **Eligibility:** Any hydrogen produced at a qualified clean hydrogen production facility that has a lifecycle GHG emissions rate of 4 kg CO2e per kg of hydrogen or less is statutorily defined as 'clean hydrogen'.

Lifecycle GHG emissions rate per kg of produced hydrogen	Tax credit amount	Full credit amount (assuming labor requirements are met)
2.5 - 4kg of CO2e	$0.12	$0.60
1.5 - 2.5 kg of CO2e	$0.15	$0.75
0.45 - 1.5kg of CO2e	$0.20	$1.00
0 - 0.45kg of CO2e	$0.60	$3.00

U.S. Inflation Reduction Act ("IRA") (**The Three Pillars**)

1. **Additionality.** Renewable power used to power electrolysers to produce hydrogen needs to be sourced from projects which entered COD no more than 36 months before the H2/NH3 facility entered COD itself.

2. **Temporal Correlation.** After **2028**, electricity must be generated in the same hour that the taxpayer's hydrogen production facility uses electricity to produce hydrogen.

    - Before 2028, only an annual match applies. However, the rule cannot be grandfathered and projects starting operations prior to 2028 must still adapt to the hourly correlation requirement.

    - Projects relying on a mix of solar and wind power may be able to reduce exposure to temporal matching requirements, while projects relying on only one of them may not.

3. **Geographical Correlation.** Electrolysers must source renewable electricity from within the same market or operating region.

4. **Labour Criteria** (a requirement for accessing the full credit amount).

    - Prevailing wage requirement. Labourers and mechanics employed by the taxpayer, along with contractors and subcontractors in construction, alteration and repair of a facility or project, must be paid at wages not less than prevailing rates as determined by the Secretary of the U.S. Department of Labor (DOL).

    - Apprenticeship Requirements. If the taxpayer, its contractors or subcontractors employ more than four individuals for construction, then they must employ at least one qualified apprentice, referred to as the "Participation Requirement".

LIFECYCLE GHG EMISSIONS RATE

Taxpayers claiming the 45V Credit must determine the lifecycle GHG emissions of their production facility for each taxable year using the latest version of the 45VH2-GREET ("**GREET**") model that is publicly available on the first day of the taxpayer's taxable year in which the qualified clean hydrogen was produced.[1]

The 45VH2-GREET model includes emissions associated with feedstock growth, gathering, extraction, processing, and delivery to a hydrogen production facility. It also includes the emissions associated with the hydrogen production process, including electricity used by the hydrogen production facility and any capture and sequestration of carbon dioxide generated by the facility.

Importantly, it limits the definition to include only emissions through the point of production ("**well-to-gate emissions"**).

USA: Federal Tax Credits for Clean Hydrogen (s.48 ITC)

Clean hydrogen ITC – s.48

Hydrogen production and storage projects eligible for the ITC can claim additional bonus credits if they meet certain domestic content thresholds in the construction phase or if the project is located in an "energy community" (i.e., a community that historically hosted oil, gas or coal production or processing). The bonus credits each **equal 10 percentage points.** Taken together, the amount of ITC available to hydrogen production/storage projects can be as high as 50%.

Domestic Content Bonus Tax Credit

To be eligible for the domestic content bonus, taxpayers must certify that any steel, iron, or manufactured product which is part of a qualified facility was produced in the United States. For this purpose, manufactured products are deemed to have been manufactured in the United States if the "adjusted percentage" (i.e., 45% for facilities that begin construction in 2024, 50% in 2026,and 55% after 2026) of the total cost of the components of such product are mined, produced, or manufactured in the United States.

"Solely for Energy Use" Requirement

The proposed definition of hydrogen energy storage property would limit eligibility for the credit only to those facilities that store hydrogen that is used solely for energy production purposes. Under this approach, a facility that stores hydrogen for later withdrawal for use in the production of an end product, such as fertilizer, would not be eligible to the tax credit. If this limitation is retained in the final rule, the tax credit will be of limited practical value for large-scale hydrogen storage facilities.

Lifecycle GHG emissions rate (kg CO2/kg H2)	Production Tax Credit (PTC) s.45V - $/kg of H2 (assuming prevailing wage and apprenticeship requirements are met)	Investment Tax Credit (ITC) s.48 - % of cost (with possible additional bonuses)
< 0.45kg	Up to $3	30%
0.45 - <1.5kg	Up to $1	10%
1.5kg - <2.5kg	Up to $0.75	7.5%
2.5kg - <4kg	Up to $0.60	6%

USA: Federal Tax Credits for CC(U)S (**s.45Q**)

Carbon Capture Credit – s.45Q

"Blue" hydrogen may claim a tax credit of up to $180/ton of CO2 that is captured and sequestered. This is an alternative to claiming the clean hydrogen PTC under s.45V.

Credit amount varies depending on how CO2 is captured, purposes for which it is utilized, etc. (ranging from $60 to $180/t of CO2).

Key Features of IRA Tax Credits in General:

"**Stacking**": PTCs and ITCs can be combined ("stacked") in certain cases.

Transferability: Ability to sell tax credits to unrelated parties in a non-taxable transaction (e.g., s. 45V credit with respect to hydrogen production facility and s. 48 ITC with respect to hydrogen storage)

Direct pay: Can elect for direct payment from the government, in lieu of claiming tax credit, for s.45V, s.45Q, s45Z. Available for 5-years.

Carbon Capture Technology	CO_2 used (e.g., for EOR)	Tax Credits ($/metric ton CO_2) (assuming prevailing wage and apprenticeship requirements are met)
Industrial Source	Yes	Up to $60
	No	Up to $85
Direct Air Capture	Yes	Up to $130
	No	Up to $180

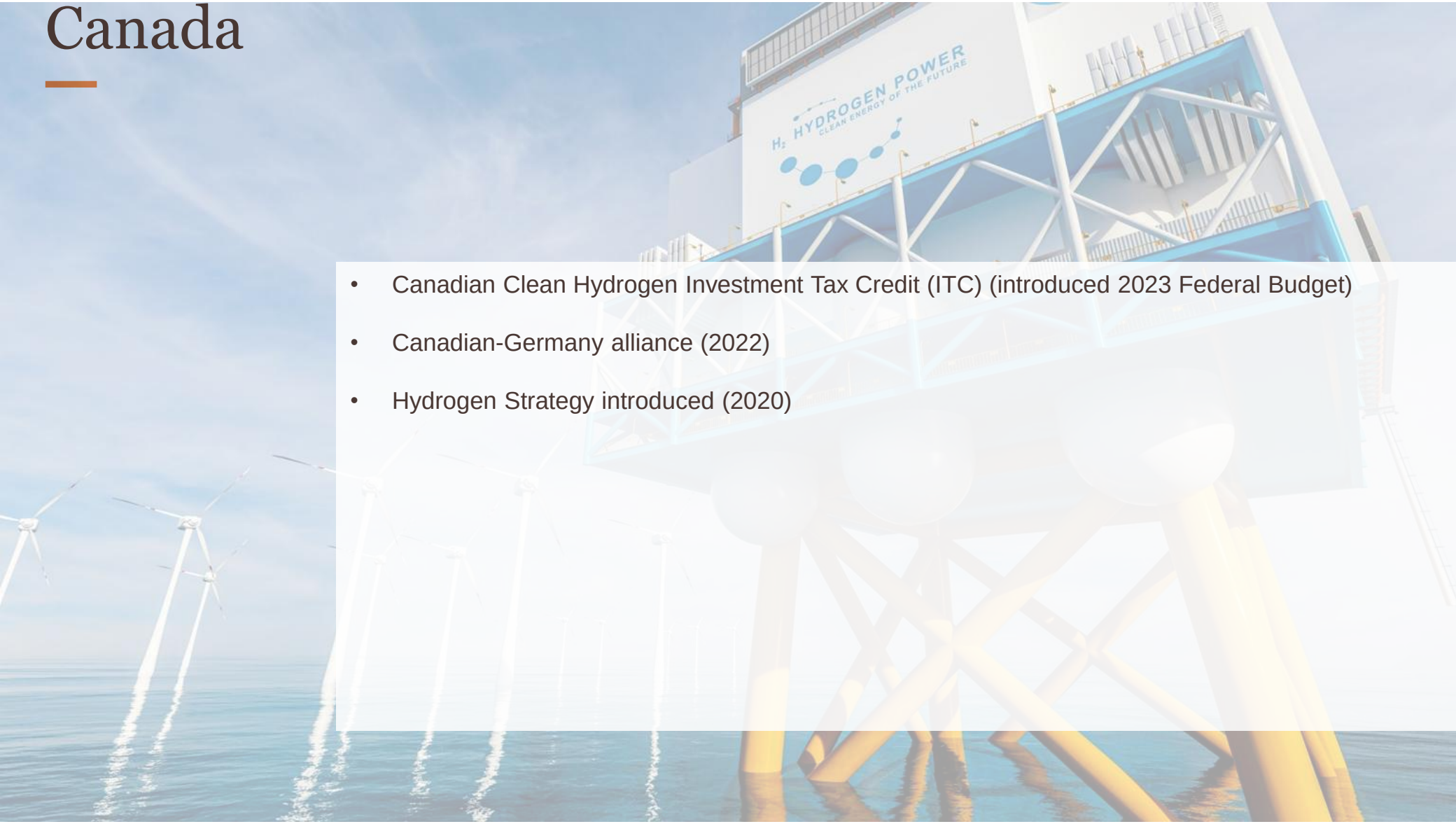
USA: Demand-Side Incentives

Demand Side

- The US government has ear-marked $1 billion for demand-side incentives for clean hydrogen.
- There is growing recognition that policy support is needed on the supply side but that this support will achieve little without complementary demand-side support, including subsidies, to stimulate market demand for product.
- In 2025, up to $1bn of subsidies will be made available for companies buying hydrogen from the **seven Regional Clean Hydrogen Hubs** that are set to receive a **combined $7bn** of federal grants under the 2021 Bipartisan Infrastructure Law.

Canada

Canada



- Canadian Clean Hydrogen Investment Tax Credit (ITC) (introduced 2023 Federal Budget)
- Canadian-Germany alliance (2022)
- Hydrogen Strategy introduced (2020)

Canada

- Hydrogen Strategy (2020) targets Canada as global top-3 producer of green hydrogen. Targets: 4 million tonnes/yr by 2030; 20 million tonnes by 2050.
- 2023 Federal Budget introduced Clean Hydrogen Investment Tax Credit as well as Clean Technology (incl. Renewable power) Investment Tax Credit. Like the U.S. IRA, allows 'stacking' of credits - includes varying support levels ranging from 15% to 40% of eligible project expenses, with the highest support levels reserved for the cleanest hydrogen projects.
- The Clean Hydrogen ITC will offer a 15% tax credit for equipment utilised in converting clean hydrogen into ammonia for transportation purposes.
- Credits split across the supply chain (similar to U.S.), as shown opposite.
- Reduction by 10% if producer does not meet certain labour conditions: incentivising projects to create good jobs.
- Canada-Germany Hydrogen Alliance (2022); Canada-Netherlands Hydrogen Cooperation (2021).

RES Power ITC	H2 ITC	Ammonia ITC	H2 refueling infrastructure
30%	**40%***	**15%**	**30%**

*-with CO2e of <0.75kg / kg H2 (lower % for higher carbon intensities) and provided labour requirements met

Expected Carbon intensity[Footnote1]	Acquired and available for use after March 27, 2023 and before 2034	Available for use in 2034
Less than 0.75	40%	20%
0.75 or greater and less than 2	25%	12.5%
2 or greater and less than 4	15%	7.5%

European Union

European Union

- Renewable Energy Directive (RED)
- H2Global
- Contract for Difference (CfD)
- EU Hydrogen Bank
- Important Projects of Common European Interest (IPCEI)

Europe: Overview

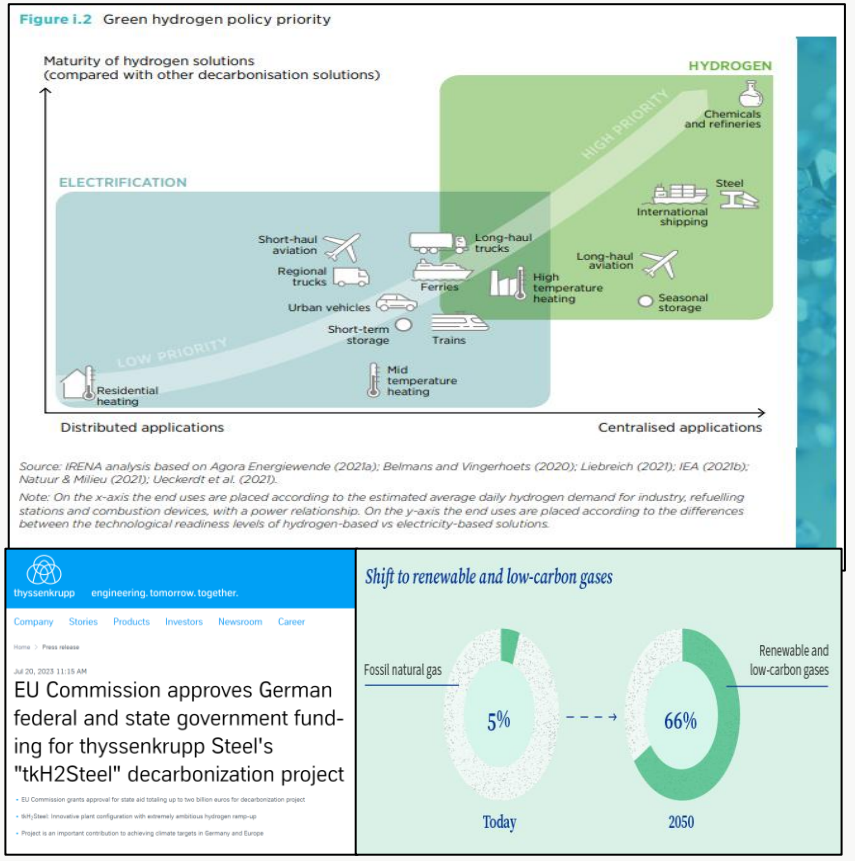
Legislation supporting demand for green and low-carbon hydrogen now finalized. E.g., RED III, REFuelEU, FuelEU Maritime.

Definition of green hydrogen and derivatives (RFNBO) finalised, but some uncertainty of implementation remains.

EU prioritising green molecules (largest quotas and highest premiums expected) but there is increasing focus on low-carbon fuels also.

42% of H_2 used in industry in 2030 must be green.

Several support schemes announced: demand side support and for imports, as well as domestic EU production. For example – European Hydrogen Bank, H2Global.



RED III

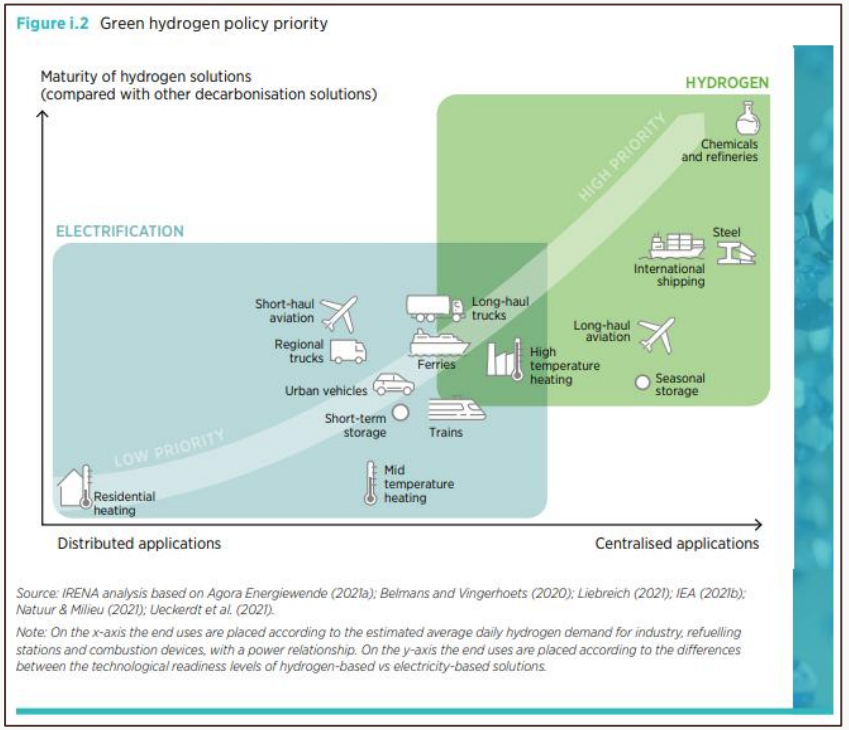
RED III passed into EU law in October 2023.
EU Member States have 18 months to implement in domestic law, some provisions apply earlier. Deadline: May 2025.

Industry quota: **42.5% of H2 used by industry** must be **RFNBO by 2030**; rising to **60% by 2035**.

Transport quota: **5.5% of energy used** in transport sector must be either **RFNBO or advanced biofuels**, by **2030**. With **1% reserved for RFNBO**.

Part of overall decarbonization target for transport sector of 29% renewables, or GHG reduction of 14.5%, by 2030.

Penalties uncertain at this stage (will differ on implementation by each Member State).



EU's definition of green hydrogen and derivatives finalised (2023)

Renewable Energy Directive, as amended from time to time ("RED"), defines:

renewable fuels of non-biological origin (RFNBO) = ***"liquid and gaseous fuels the energy content of which is derived from renewable sources other than biomass"***

Must comply with detailed rules in two Delegated Acts ("**DAs**") which were published by the European Commission on **10 February 2023** and which have now been approved as EU law (published in the Official Journal on 20 June 2023).

RFNBO =

1. H2 (and derivatives) **produced from renewable electricity**

2. **Meeting the GHG emissions reduction** set out in RED (70% less than the fossil fuel comparator of 94g CO_2e/MJ) = 3.38 kg CO2e/ kg H2

Relevant to quotas for use of RFNBO in:

- Transport sector (incl. shipping and aviation)
- Buildings; Heating & cooling
- Industry (under RED)

The Delegated Acts:

1. The so-called **"Additionality" DA** defines requirements for **qualifying electricity used for RFNBO production as fully renewable** (there are multiple possible production pathways). ("**Additionality DA"**)

2. The DA setting out the **detailed GHG emissions calculation methodology** to calculate whether RFNBO achieves the 70% GHG emissions reduction. ("**GHG DA"**)

3. **<u>Unlike the U.S IRA or the Canadian ITC</u>**, the EU RFNBO GHH emissions calculation includes life cycle approach covering:

    - the upstream feedstock supply (electricity and water), through to energy used in the production process; and

    - the downstream transportation to the end customer including the end customer's use of the fuel (including combustion where applicable).

Guidance published by the European Commission, March 2024. Although this leaves many questions still unanswered and creates some new uncertainties.

Electricity used is “renewable” (Additionality DA)

To produce H2 (and derivative products) that qualify as RFNBO, the electricity used for hydrogen production must be produced from renewable energy source (RES) generation installations meeting the test in the Additionality DA to qualify as “renewable”.

Case 1:

Direct connection (Article 3) – fully renewable if:

New RES installation – i.e. RES generation comes into operation **no earlier than 36 months before, or anytime after,** the RFNBO facility.

Expansions – RFNBO facility expansion is considered to come into operation **at same time as original phase 1** operations date, provided expansion is at same site and **within 36 months of phase 1.**

No grid connection – There is no grid connection, or shown through smart metering system that no grid electricity is used to produce RFNBO.

Case 2:

Grid supplied electricity (Article 4) – fully renewable meets one of following options (see also next slide):

Option 1 – **average grid RES mix is >90%** (and RFNBO production to same ratio in the year)

Option 2 – grid electricity with **average carbon intensity of <18gCO2e/MJ** (plus RES PPA, temporal correlation and geographical correlation)

Option 3 – electricity consumed during an **imbalance settlement period** (i.e. use of only RES generation **that would otherwise have been curtailed**).

Option 4 – **PPA** with a RES installation meeting tests on (i) **additionality**, (ii) **temporal correlation** and (iii) **geographical correlation**.

Case 3:

Grid electricity – not fully renewable

Where grid electricity does not comply with one of the Case 2 options, the average share of RES generation 2 years prior to year of production is used to determine share of RES energy used and therefore share of RFNBO that is produced. (Article 27(3), fourth para.)

H2Global Funding (Germany)

- **H2Global** is Germany's flagship market activation policy — designed to support imports of **green H2 derivatives (not blue) into Germany from ex-EU countries**.
- **CfD structure** to ease concerns regarding price differences between green fuels and conventional fuels.
- EUR 900m to be divided between **e-ammonia, e-methanol and e-kerosene**).
- First auction round awarded in 2024 has selected **Fertiglobe**'s bid of EUR 811/tonne FOB for **e-ammonia,** produced with feedstock from the **Scatec / Orascom JV** (Egypt Green Hydrogen Project).
- Further c. EUR 3.6 billion expected for future auction rounds and proposed to include **e-methane** as potential product eligible for support.


CASES & DEALS

July 11, 2024

King & Spalding

King & Spalding Advises Sponsors on a Project Producing Feedstock for Fertiglobe's H2Global Supply

H2Global Windows

- **Concept:** Green hydrogen/ammonia producing country agrees to co-fund H2Global auctions as means to secure offtake demand. In return, H2Global launches exclusive import auctions solely for projects of that country.

Australia, Germany launch joint H2Global auction

By Julian Atchison on September 23, 2024

Canada joins German hydrogen import auction scheme H2Global, but funding details not yet disclosed

Prospective exporter is running out of time to meet promise to supply Germany with green hydrogen as early as next year

Securing market access for early Canadian export projects

By Julian Atchison on April 04, 2024

'Historic deal' | Germany to hold special $444m auction exclusively for Australian green hydrogen imports through H2Global

Agreement will guarantee European buyers for renewable H2 made in Australia

Scatec's Egypt Green Hydrogen Project signed 20-year offtake agreement with Fertiglobe, based on H2Global award

July 11, 2024 | Stock exchange notice

Egypt Green Hydrogen Project

- First supply arrangement supported by the **German government's H2 Global programme**, which is **Europe's flagship public support programme** for importing green molecules and will be replicated for other export countries (including funding already proposed for Canada, Brazil, Australia, KSA and others).

CfDs – Contracts for Difference (Germany)

- **Granting Authority.**
  Federal Ministry for Economic Affairs and Climate Action (BMWK)
- **Dynamics.** Similar approach to risk hedging instruments to bridge the gap in competitive pricing between hydrogen and alternative fuels.
  - As soon as transformative production can be carried out more cheaply than conventional production, the payment relationship established by the CCfD is reversed: Additional revenues of the subsidized companies then flow back to the state, which on balance ensures that state subsidies are in line with demand.
- **Duration:** The term of the Carbon Contracts for Difference is 15 years. The contract term begins with the operational start of the project, at the latest 36 months after the grant notice becomes final.
- **Limited Funding.** Each funding call/round will set the funding volume to be awarded. Last call provided for EUR 4 billion Euros.
  - Funding volume refers to the maximum funding available over the entire term of the Carbon Contracts for Difference concluded as a result of the funding call.

EU approves EUR 4bn for German carbon CFD initiative

(Montel) Germany's goals to promote greener industrial practices got a boost on Friday when the European Commission signed off on a EUR 4bn programme for two-way contracts for difference.

CfDs – Contracts for Difference (Germany)

Competitive Criteria: Bids are evaluated on the basis of:

i. cost efficiency; and

ii. relative reduction in greenhouse gas emissions.

- **Cost efficiency**: is based on the calculation of specific funding costs.
  - Specific funding costs are the sum of the base contract price and the cost efficiency of other funding, provided that the ot her funding has already been approved at the time of application;
  - the discounted sum is divided by the discounted planned absolute greenhouse gas emission reduction during the term of the climate protection contract;
  - the result is compared with the maximum prices set by the granting authority.

- **Relative greenhouse gas emission reduction** is calculated as the sum of the planned greenhouse gas emissions of the project divided by the greenhouse gas emissions of the reference system for the planned production volume, based on the period up to the end of the fifth year, calculated from the operational start of the project.
  - The criterion of relative greenhouse gas emission reduction is transformed by a comparative value and weighting factor s pecified by the granting authority in the funding call.
  - The granting authority works together with the German Emissions Trading Authority (DEHSt) to review applications.

European Hydrogen Bank T&Cs – IF 2024 rules

Total Funding	Total funding of €1 billion for general topic projects and EUR 200 million for maritime off-takers.
Duration	10-year term. Fixed premium model
Ceiling Price	A ceiling price of €4.50/kg of H_2 for the fixed premium.
Basic Restrictions.	Production projects must be located in EEA Only supports production of **H_2 which must qualify as RFNBO**..
Completion Guarantee	8% of the maximum grant amount **in the form of a on-demand bank guarantee**. Completion guarantee will be called on first demand if the project **(i)** does not reach **financial close within 2.5 years**, or **(ii)** does not reach approved entry into operation **within 5 years** after signing the grant agreement.
No stacking	Cannot be stacked with other subsidies (*e.g.*, for H_2 derivatives/uses if H_2 is sold for other industrial processes/other e-fuels).

Upcoming EU Hydrogen Bank pilot auction: European Commission publishes Terms & Conditions

An important step towards scaling up production of renewable hydrogen in the EU.

Hydrogen Bank– Selection Process (IF24 Rules)

Clearing mechanism and marginal bid	Proposals will be first ranked according to their **bid price from lowest to highest, expressed in EUR per Kg of RFNBO hydrogen:** [Those proposals whose **maximum grant amounts fit within the Innovation Fund budget**, and the proposals necessary to fill the reserve list, if any, **will be assessed against the award criteria of 'Relevance' and 'Quality', on a pass/fail basis** Maximum grant is expressed by: $Bid\ price\ in$ €] ∗ kg [$expected\ average\ yearly\ volume\ in\ kg$] ∗ 10 $years$
Tie-breaking rules	For proposals with the same bid price, a priority order will be determined according to the following approach: Proposals with the overall smaller maximum grant amount; proposals located in the country with fewer funds awarded previously under the Innovation Fund; the proposal with a shorter time until entry into operation; decision will be taken by random draw, supervised by the evaluation committee

Hydrogen Bank– Selection Process (IF24 Rules)

Relevance and Quality analysis. Selected proposals will be evaluated on a pass/fail basis on quality and relevance, including their contribution to:

(i) achieving **security of supply** of essential goods;

(ii) Europe's **industrial leadership** and competitiveness,

(iii) **technical, financial, and operational maturity** of the Project assessed based on the documents listed in the application

RELEVANCE SUB-CTRITERION - RESILIENCE STANDARDS

Third Country / Chinese Sourcing Limitations.	**2. Safety and Cyber Security Requirements**	**Additional Sourcing Information on the electrolyser procurement strategy:**	**Foreign Subsidy Regulation**
• avoid building dependency on a single third country which may threaten the security of supply of electrolysers. • Projects have to limit the sourcing of electrolyser stacks which include surface treatment, cell unit production and stack assembly **from China to not more than 25% (in MWe)**	• safety standard ISO 22734:2019; • Cybersecurity plan ensuring the security of the installation, the operational **control of the installation remains** within an entity established **in the EEA**; • **data must be stored** within the EEA	• Intended origin of equipment; • CRM intensity of the equipment; • Recycling strategy of the electrolyser OEM; • What standards does the equipment comply with; • whether **OEM receives foreign financial contribution**	• Internal market distortions caused by foreign subsidies (or incompatible State aid granted by Member States), • **imports being unfairly subsidised or dumped** on the EU market, may be investigated.

IPCEI Funding for Hydrogen Related Projects

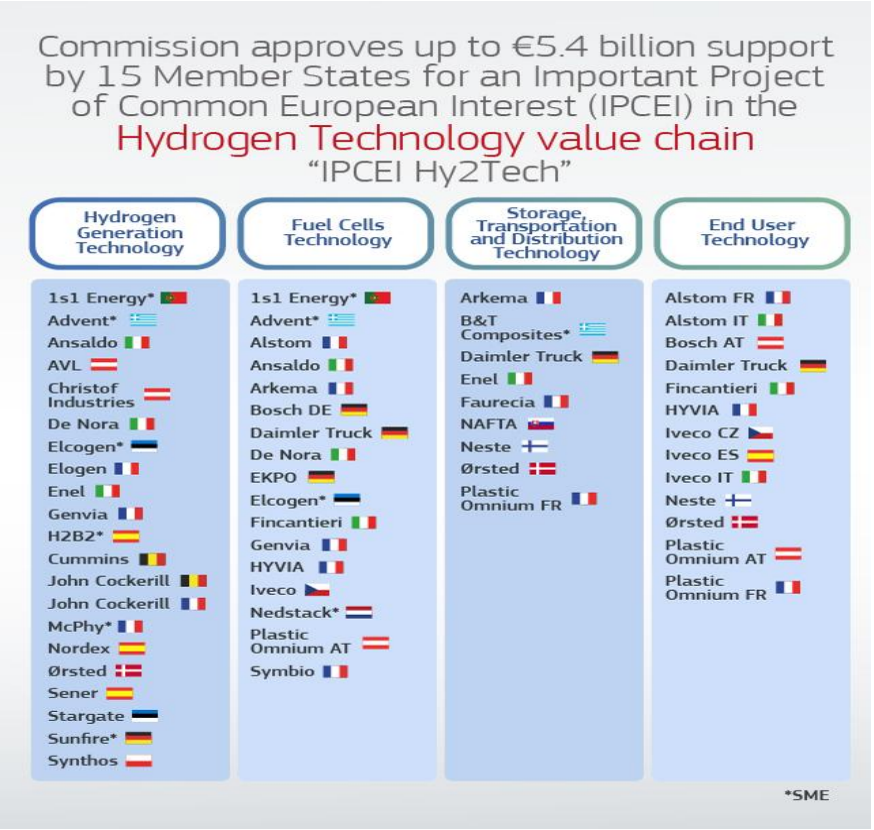
Concept. European Commission's authorized financing of important projects of common European interest (IPCEIs) under Union State aid rules. Member States willing to invest in IPCEIs submit applications to the European Commission.

Types of Project: One of the key features of IPCEI is that it may apply to a wider range of projects and activities within the hydrogen industry, including:

- Technology development projects (R&D);
- Hydrogen/ammonia production facilities;
- Hydrogen infrastructure development in general (storage, transporting);
- Hydrogen application

Funding amount – Necessity and Proportionality Principles: Funding amount should be designed to cover project's funding gaps.

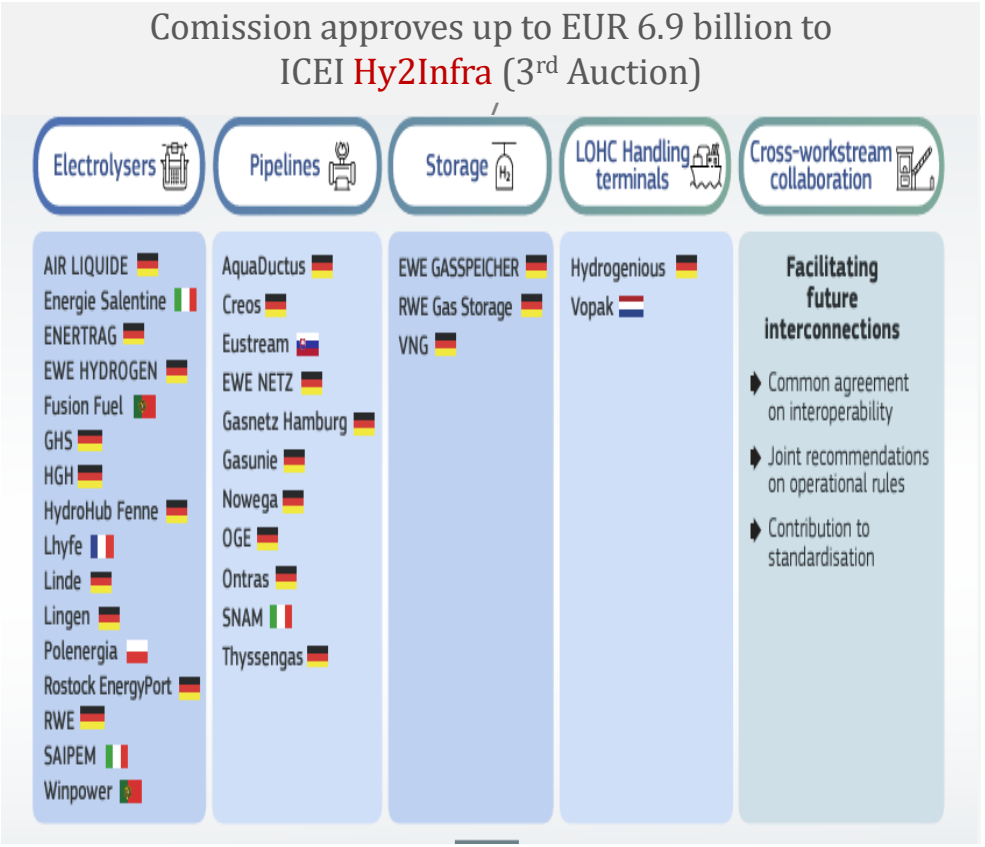
- Without funding, the Project would otherwise not occur or would only be possible at a smaller scale or in a different manner.



IPCEI Funding for Hydrogen Related Projects

Minimum criteria. Some of the minimum eligibility criteria include**:**

- **Relevance.** The project must represent a concrete, clear and identifiable important contribution to the Union's objectives or strategies and must have a significant impact on sustainable growth.
- **Necessity.** The project must demonstrate that it is designed to overcome important market or systemic failures, preventing the project from being carried out to the same extent or in the same manner in the absence of the aid, or societal challenges, which would not otherwise be adequately addressed or remedied.
- **Intra-EU participation.** Unless a smaller number is justified by the nature of the project, the project must ordinarily involve at least four Member States and its benefits must not be confined to the financing Member States, but extend to a wider part of the Union.
- **Wider-impact.** The benefits of the project must not be limited to the undertakings or to the sector concerned but must be of wider relevance and application to the economy or society in the Union through positive spillover effects (such as having systemic effects on multiple levels of the value chain, or up- or downstream markets, or having alternative uses in other sectors or modal shift) which are clearly defined in a concrete and identifiable manner.
- **Beneficiary's commitment.** The project must involve important co-financing by the beneficiary.



IPCEI Funding for Hydrogen Related Projects

Positive Factors. Some of the scoring criteria for IPCEI funding (referred to as Positive Factors) include:

- **European Commission participation.** The design, selection and governance of the project involves the Commission or legal bodies to which the Commission has delegated powers, such as the European Investment Bank and the European Investment Fund;
- **Diversity of stakeholders.** Collaborative interactions in terms of number of partners, involvement of organisations from different sectors, or the involvement of undertakings of different sizes and, in particular, cooperation between large enterprises and SMEs, including start-ups, in different Member States and supports the development of more disadvantaged regions;
- **Co-funding.** the project involves co-funding or co-financing from an Union fund in direct, indirect or shared management;
- **Commitment.** the project involves a significant contribution by independent private investors;
- **Strategic dependency.** the project addresses a clearly identified and significant strategic dependency.

Criticism. Both, the minimum IPCEI eligibility criteria and scoring criteria, require the Project to provide extensive information and involve highly complex economic impact analysis by the European Commission. At the end, the result may not necessarily be the most objective.

EU – U.S – Brazil Comparison

Topic	BR	H2Global	German BMMK CfDs	EU - Hydrogen Bank	EU - IPCEI	USA - IRA
Price support	Fixed Premium	CfD	CfD	Fixed Premium	Fixed Premium	Fixed premium
Capped support	Yes	Yes	Yes	Yes	Yes	Uncapped
Eligibility conditions	Yes	Yes	Yes	Yes	Yes	Yes
Hydrogen Supported	Low carbon	RFNBO	Low Carbon	RFNBO	Low Carbon	Low Carbon
Award method	Competitive auction	Competitive auction	Competitive double-auction	Competitive Auction	Competitive auction	Application only
Selection criteria	Lowest cost of tax credit per unit + TBC	Lowest EUR for production and highest EUR amount consumption	Lowest cost of emission reduction.	Lowest EUR for production + Relevance and Quality Analysis	Global economical /strategical impact analysis.	Satisfy the eligibility criteria only
Duration	Unclear	10 years	15 years	10 years	15 years	10 years

FuelEU Maritime

- Adopted in July 2023.
- FuelEU Maritime sets maximum limits for the yearly average greenhouse gas (GHG) intensity of the energy used by ships above 5,000 gross tonnage calling at European ports, regardless of their flag.
- GHG intensity targets of the energy used on board by a ship:
    - 2 % from 1 January 2025;
    - 6 % from 1 January 2030;
    - 14.5 % from 1 January 2035;
    - 31 % from 1 January 2040;
    - 62 % from 1 January 2045;
- 80 % from 1 January 2050.FuelEU Maritime will enter into force from 1 January 2025 (except for Articles 8 and 9 on monitoring plans which shall apply from 31 August 2024).

ReFuel Aviation

- Promotes the increased use of sustainable aviation fuels (SAF).
- SAF includes synthetic aviation fuels, advanced and other aviation biofuels, as well as recycled carbon aviation-fuels.
- SAF are defined as:
    - **Synthetic aviation fuels** from renewable hydrogen and captured carbon (in the meaning of Article 2(36) of RED and limited to liquid drop-in fuels only);
    - **Advanced biofuels** from waste and residues notably (produced from feedstock listed in Part A of Annex IX, in the meaning of Article 2(34) of RED);
    - **Biofuels** produced from oils and fats notably (such as from feedstock listed in Part B of Annex IX, in the meaning of Article 2(33) of RED);
    - **Recycled carbon aviation fuels** in the meaning of Article 2(33) of RED.

Middle East and Asia

Including:

- Oman
- Morocco
- Japan

Japan

Japan is heavily dependent on imports and has targeted low carbon hydrogen (as H2 and NH3) and, increasingly, eNG as a key decarbonisation tool.

The Basic Hydrogen Strategy: first published in 2017 and revised in June 2023.

In August 2024, METI started gathering public comments on laws / regulations to define / provide for certification of low carbon H2 fuels (including e-NG). Proposes

In 2024, Agency for Natural Resources and Energy ("ANRE") proposed mandating Japanese gas utilities to raise the share of renewable gas supplies to 5% by 2030 (including biogas and e-NG).

Japan has proposed a new price-gap subsidy for H2 and derivatives to incentivise the use of low-carbon H2 and derivatives. Thresholds proposed in the consultation stage are:

This is intended to function as a contract for difference, with the subsidy covering the cost gap between low-carbon H2 / derivative fuel (eNG) and fossil fuel-based equivalent (grey H2 or natural gas).

In September 204, Japan launched the Japan Hydrogen Fund, to subsidize the hydrogen supply chain, including demand. Private foreign entities have also joined with substantial contributions.

Decarbonization: TotalEnergies joins the first Japanese fund dedicated to the development of low-carbon hydrogen

Japan's brand-new hydrogen fund makes a smashing debut with $400M already in hand

BUSINESS & FINANCE

September 16, 2024, by Naida Hakirevic Prevljak

The Japan Hydrogen Fund — the first Japanese fund dedicated to the development of low-carbon hydrogen — has been officially launched, with more than $400 million raised from multiple investors.

Oman

Oman has excellent sun and wind resources. It published its national hydrogen plan in October 2022. It aims to produce at least 1 MMT of renewable hydrogen by 2030, 3.75 MMT by 2040 and up to 8.5 MMT by 2050. 100 GW and 185 GW of electrolyser capacity and additional renewable power generation respectively would be needed by 2050.

In 2022, the government established an independent entity, Hydrogen Oman (Hydrom), to lead and manage the implementation of its hydrogen strategy.

HYDROM's procurement framework has stipulated that any consortium must offer at least €0.04 per square metre for the land lease, 5 per cent of the hydrogen produced as a royalty in-kind, and profit royalties. OQ will also take a minimum of 20% of each project.

In April 2023, HYDROM announced the result of the first auction for land allocation to renewable hydrogen projects, with six projects worth a total of $20b, including from BP, Uniper, Linde, Shell and ICE.

There has been increasing attention on green steel potential in Oman, considering its extensive green hydrogen projects pipeline.

Oman signs pacts worth $11 billion for two new green hydrogen projects

PUBLISHED: 9:01 PM, APR 29, 2024

Jindal Shadeed to set up $3 billion plant in Oman to produce green steel

▶ The company also signed an initial agreement with Saudi Arabia's utility provider Marafiq

Construction begins on Oman's first green hydrogen-ready steel plant

Oman targets $140bln investment in green hydrogen industry

ZAWYA BY LSEG

Oman has set an ambition to become one of the largest green hydrogen producers and exporters globally, targeting production of one million tonnes by 2030

Amnah Consortium Pivots To Green Steel, Harnessing Oman's Green Hydrogen For Industrial Decarbonization

Morocco

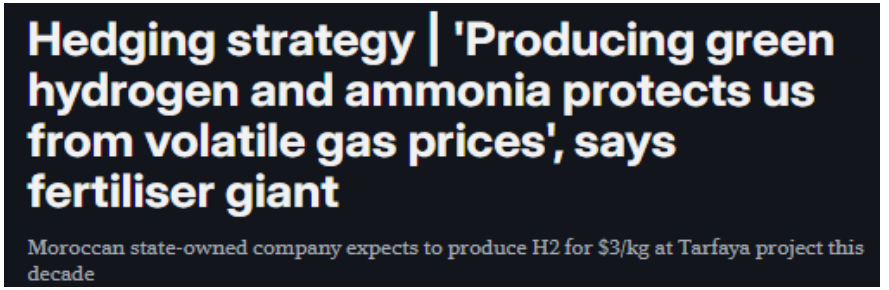
Morocco is focused on building out a green hydrogen ecosystem by leveraging its natural advantages (sun, wind, proximity to Europe).

The “Morocco Offer” (*l'Offre Maroc*) was launched in March 2024. It provides a pathway towards development of the green hydrogen sector by addressing critical factors like land, infrastructure, selection of investors, incentives and a governance framework.

The government has set aside c. 1 million hectares of land for green hydrogen production. Incentives include tax and customs benefits such as import duty and VAT exemptions. Industrial acceleration zones are envisaged and may come with their own set of tax benefits.

This follows several promising green hydrogen project plans, including from Abu Dhabi National Energy Company (TAQA), Total Eren, CWP Global, Fortescue and among others.

These put Morocco in a strong position for green steel development with the aim to export to Europe in the future.



Any Questions

Thank you

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