



EDUCATIONAL WORKSHOP ON HYDROGEN

EFET Legal Committee Meeting, 1 June 2023, Amsterdam

WORKSHOP AGENDA

13.00 – 13.20 CET	Introduction to hydrogen market	Michel Groeneveld, RWE Generation SE
13.20 – 13.40 CET	Presentation of CertifHy Scheme, the Dutch certification scheme for hydrogen, implementation of an EU wide system	Matthieu Boisson, Hincio/CertifHy
13.40 – 14.00 CET	Presentation of H2Global mechanism	Emanuel Henrich, H2 Global Stiftung
14.00 – 14.20 CET	Certification study and template SPA for renewable hydrogen/ammonia delivery by ship	Daria Nochevnik, Hydrogen Council
14.20 – 14.40 CET	Experience with first hydrogen index HYDRIX	Sirko Beidatsch, EEX
14.40 – 15.00 CET	Q&A and discussion	

Introduction to hydrogen market
by Michel Groeneveld, RWE Generation SE

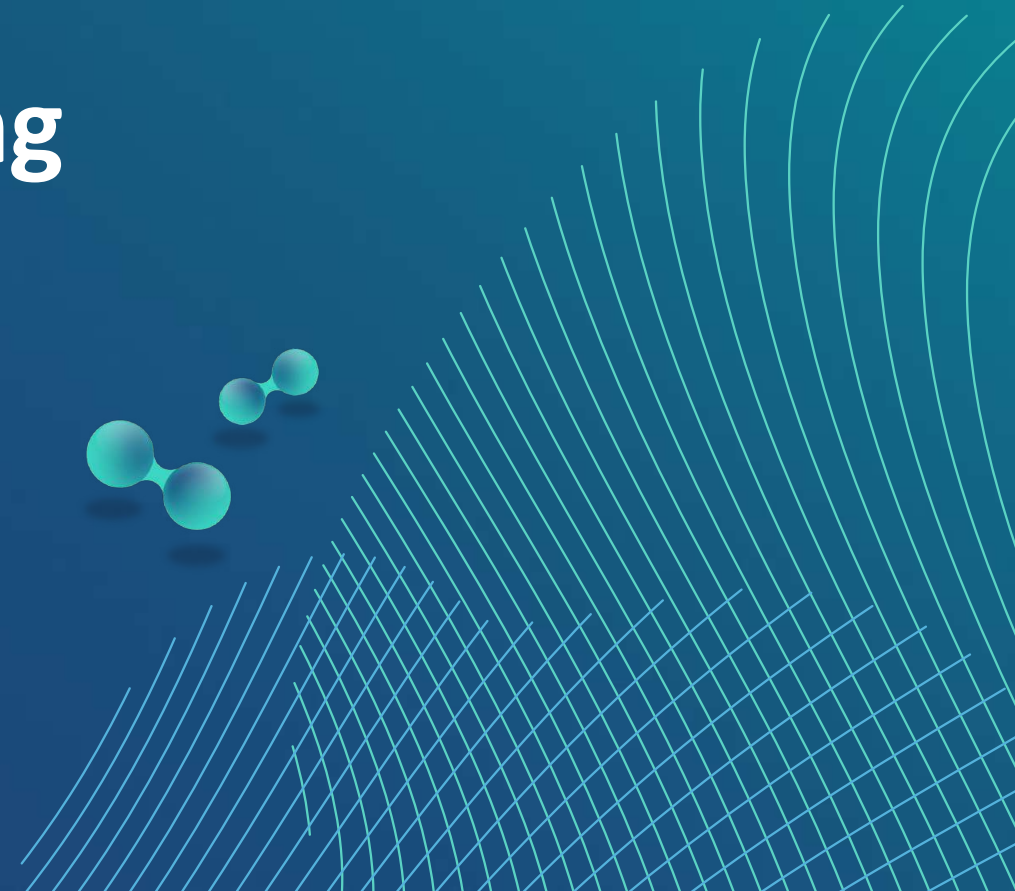
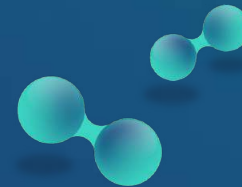
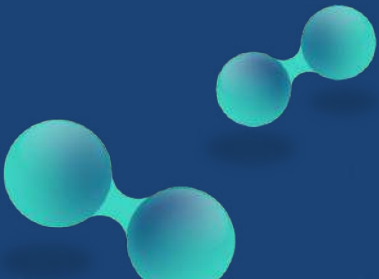
RWE



EFET Legal Committee Meeting

Amsterdam

01.06.2023

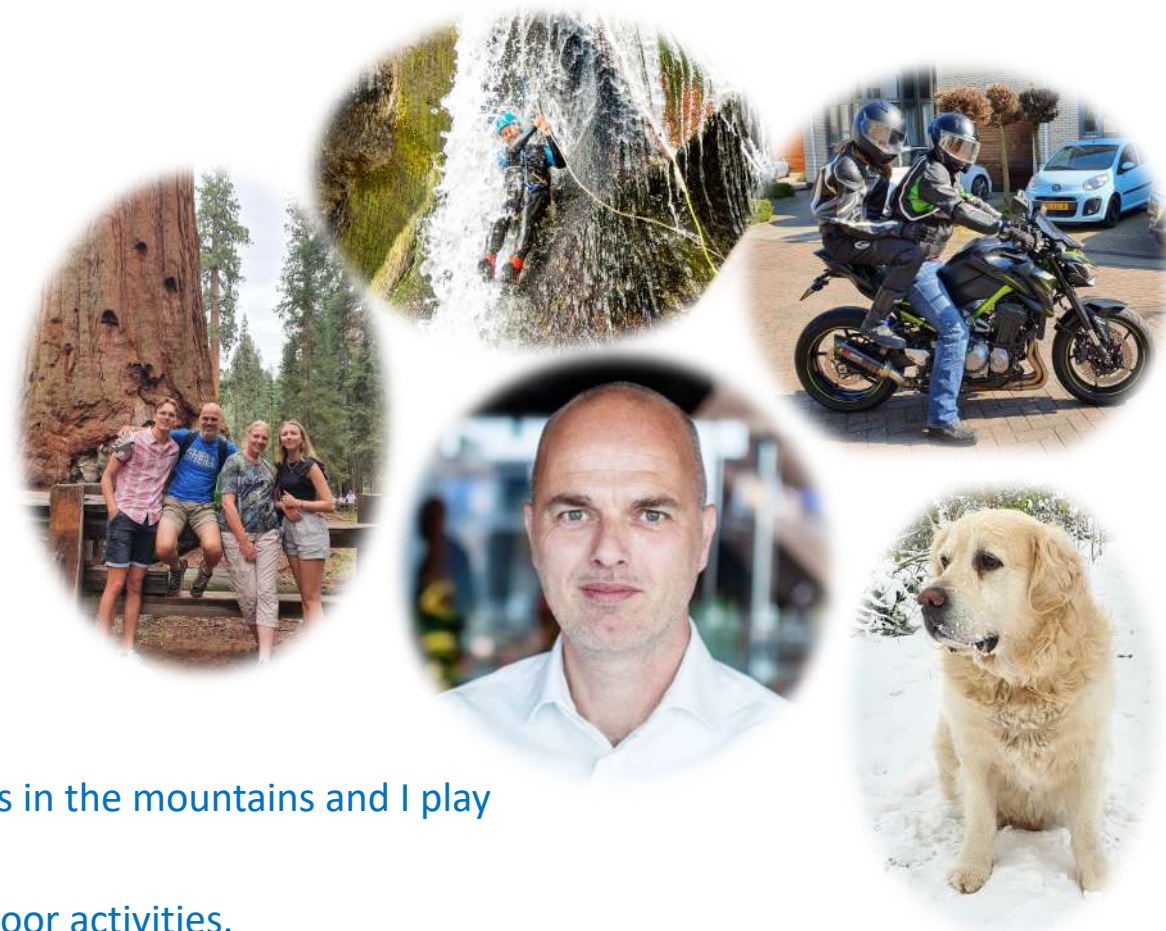


Agenda:

- ❑ Brief introduction
- ❑ Different shades of hydrogen
- ❑ Electrolyser investment case: main challenges
- ❑ Delegated Act methodology RFNBO
- ❑ RED III: RFNBO obligation regime
- ❑ Funding options: NL + EU
- ❑ Q&A

Michel Groeneveld

Regulatory Affairs & Funding Hydrogen NL



My journey

- ✓ 25 years experience in energy (related) industries
- ✓ Public affairs, commercial, project management
- ✓ Education: MSc Economics + MBA



For fun

- ✓ I enjoy running (ultra distances), preferably on trail paths in the mountains and I play veteran football.
- ✓ I like motor cycling, padel, hiking and various other outdoor activities.



I love H₂ because...

- ✓ Sustainable H₂ is the (only) way forward for a wide range of applications for which there are no other credible alternatives

RWE's core business is leading the way to a green energy world



Offshore Wind

Strongest growth in Europe, significant potential in global markets



Onshore Wind/Solar

Biden Plan and European Green Deal accelerate growth momentum in US and Europe



Batteries & Flexible Generation

RWE's European core markets require new, low-carbon flexible capacities



Hydrogen

Hydrogen is quickly gaining traction with Europe at the forefront



Commercial Solutions

Decarbonisation of industry drives demand for tailored solutions

Growth target backed by strong project pipeline

RWE with market leading growth target
in electrolyser capacity

+2_{GW}
RWE by 2030

Requirements for electrolyser investments

- Regulatory and political framework
- Support and funding schemes
- Reliable offtake agreements

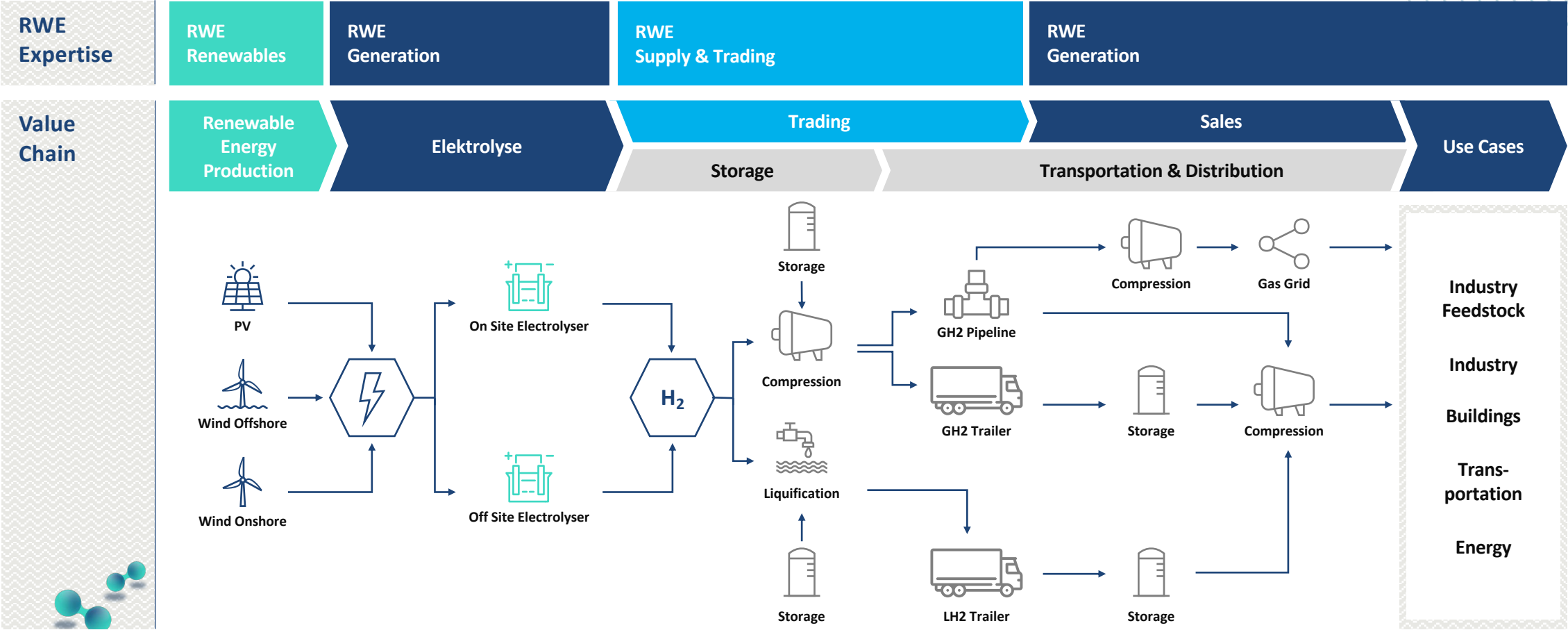
RWE's hydrogen development pipeline



Selected hydrogen development projects:

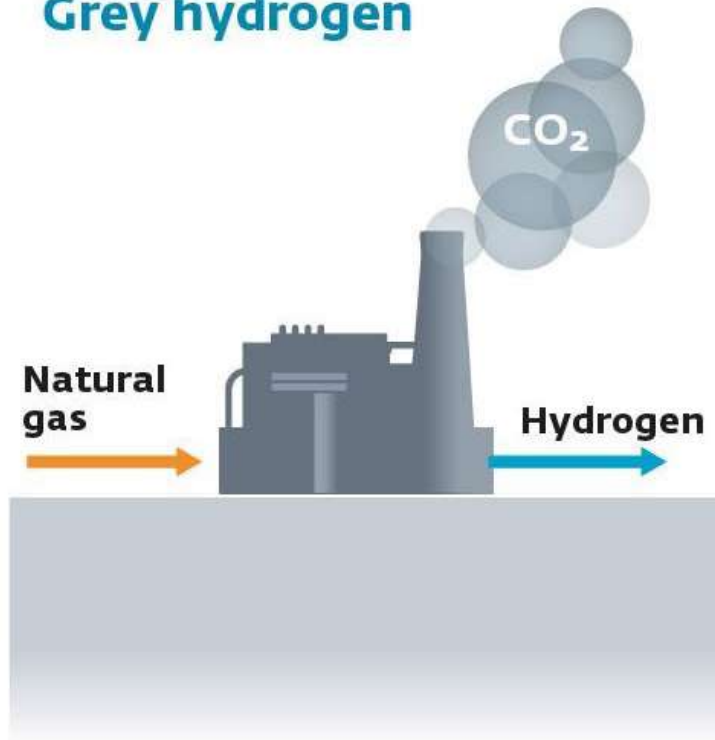
 GET H ₂	IPCEI	 Eemshydrogen
 HyTech Hafen Rostock	IPCEI	 HKW Tender
 H2@Hydro		 SW Industrial Cluster
+ various projects without external communication		

RWE covers the full green hydrogen value chain

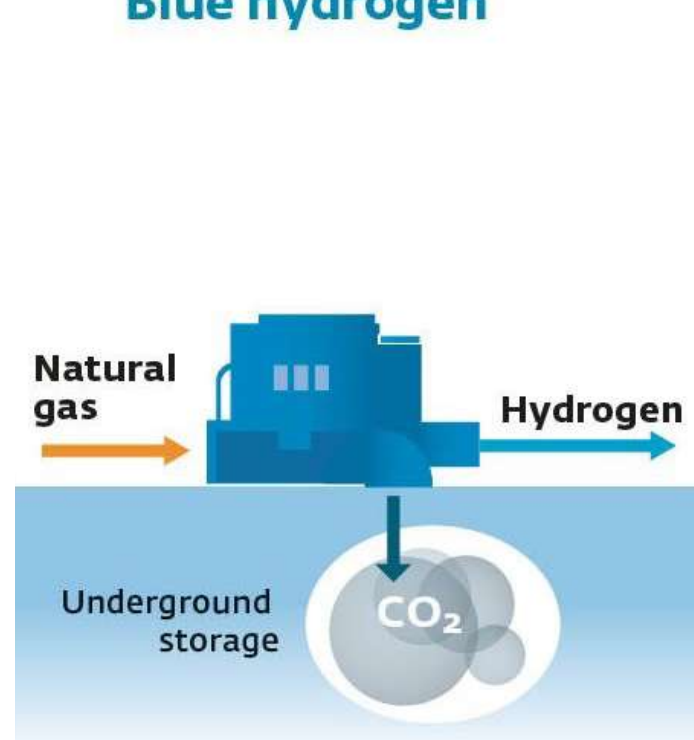


Different shades of hydrogen

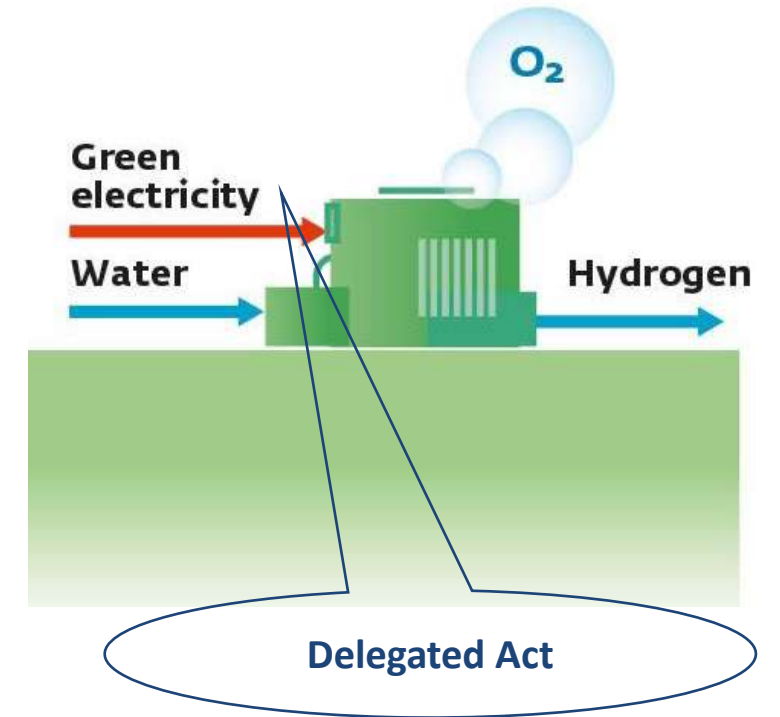
Grey hydrogen



Blue hydrogen



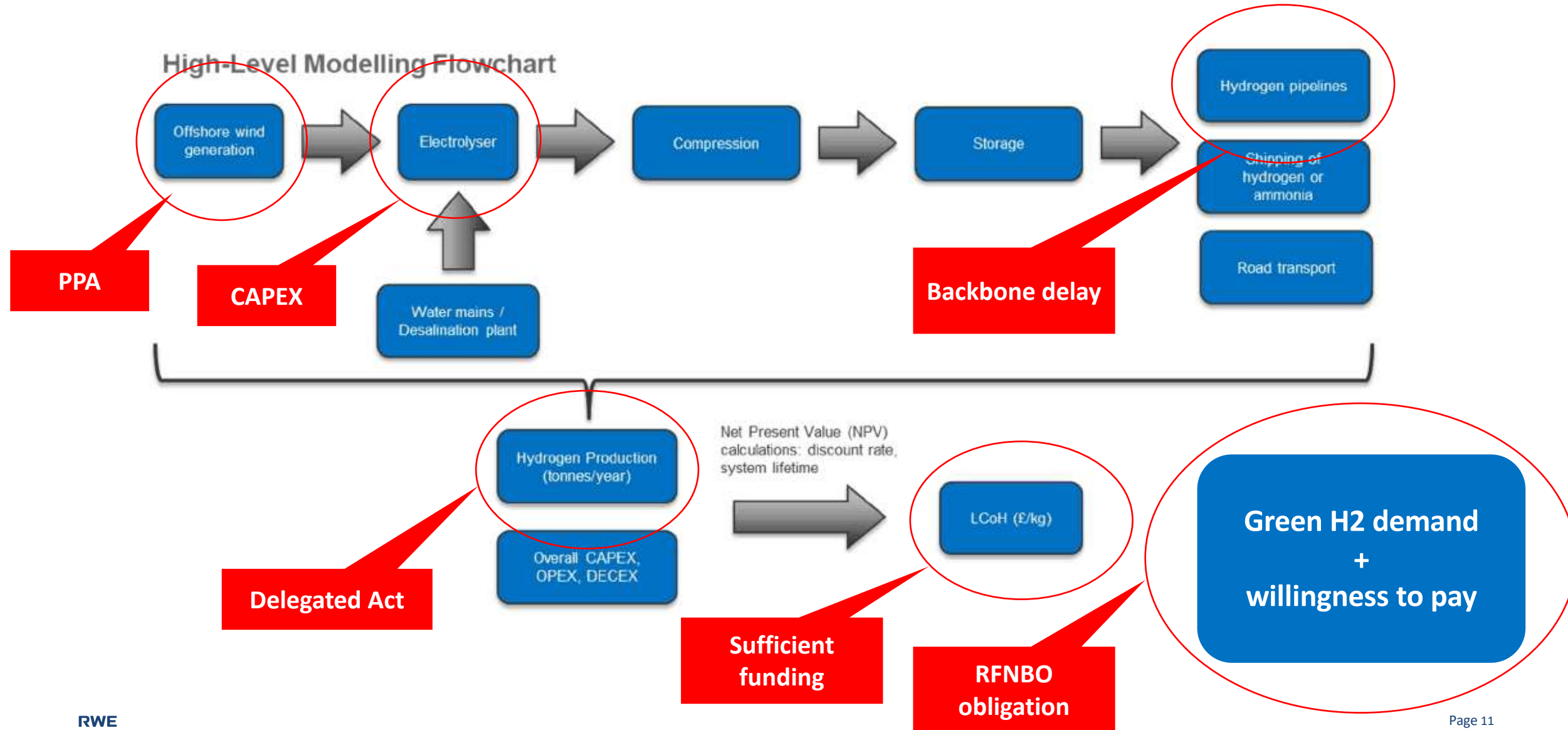
Green hydrogen



Source: www.tno.nl

Electrolyser investment case: **main challenges**

High-Level Modelling Flowchart



Delegated Act methodology for RFNBO

- ✓ Methodology setting out detailed rules for the production of RFNBO
- ✓ pursuant to the seventh subparagraph of Article 27(3) of the Directive, which empowers the Commission to adopt a delegated act establishing a Union methodology, setting out detailed rules by which economic operators are to comply with the requirements laid down in the fifth and sixth subparagraphs of Article 27(3) of the Directive.
- ✓ As a principle, liquid and gaseous fuels of nonbiological origin which are produced from electricity are **considered renewable only when the electricity is renewable**. This renewable electricity may be supplied by an installation that is directly connected to the installation (typically an electrolyser) that produces RFNBO or may come directly from the grid.

Delegated Act methodology for RFNBO

Article 3

Rules for counting electricity obtained from direct connection to an installation generating renewable electricity as fully renewable

For the purpose of demonstrating compliance with the criteria set out in Article 27(3), fifth subparagraph of Directive (EU) 2018/2001 for counting electricity obtained from direct connection to an installation generating renewable electricity as fully renewable, the fuel producer shall provide evidence on the following:

- a) the installations generating renewable electricity are connected to the installation producing RFNBO via a direct line, or (...);
- b) the installations generating renewable electricity came into operation not earlier than 36 months before the installation producing RFNBO; (...);
- c) the installation producing electricity is not connected to the grid, or the installation producing electricity is connected to the grid but a smart metering system that measures all electricity flows from the grid shows that no electricity has been taken from the grid to produce RFNBO.

Delegated Act methodology for RFNBO

Article 4

General rules for counting electricity taken from the grid as fully renewable

- 1) Fuel producers may count electricity taken from the grid as fully renewable if the installation producing the RFNBO's is located in a bidding zone where the average proportion of renewable electricity exceeded 90% in the previous calendar year and the production of RFNBO's does not exceed a maximum number of hours set in relation to the proportion of renewable electricity in the bidding zone. (...).
- 2) Where the conditions set out under paragraph 1 are not met, fuel producers may count electricity taken from the grid as fully renewable if the installation producing the RFNBO's is located in a bidding zone where the emission intensity of electricity is lower than 18 gCO₂eq/MJ, provided that the following criteria are met:
 - a) the fuel producers have concluded (...) one or more renewables PPA's (...) for an amount that is at least equivalent to the amount of electricity that is claimed as fully renewable and the electricity claimed is effectively produced in this or these installations;
 - b) the conditions on temporal and geographical correlation in accordance with Articles 6 and 7 are met;

Delegated Act methodology for RFNBO

Article 4

General rules for counting electricity taken from the grid as fully renewable

- 3) Electricity taken from the grid that is used to produce RFNBO's may also be counted as fully renewable if the electricity used to produce RFNBO's is consumed during an imbalance settlement period during which the fuel producer can demonstrate, based on evidence from the national transmission system operator, that:
 - a) power-generating installations using renewable energy sources were redispatched downwards in accordance with Article 13 of Regulation (EU) 2019/943;
 - b) the electricity consumed for the production of RFNBO reduced the need for redispatching by a corresponding amount.
- 4) Where the conditions in paragraphs 1, 2 and 3 are not met, fuel producers may count electricity taken from the grid as fully renewable if it complies with the conditions on additionality, temporal correlation and geographic correlation in accordance with Articles 5, 6 and 7.

Delegated Act methodology for RFNBO

Article 5

Additionality

The additionality condition (...) shall be considered complied with if fuel producers (...) have concluded (...) one or more renewables PPA's (...) for an amount of renewable electricity that is at least equivalent to the amount of electricity that is claimed as fully renewable and the electricity claimed is effectively produced in this or these installations, provided that the following criteria are met:

- a) The installation generating renewable electricity came into operation not earlier than 36 months before the installation producing the RFNBO. (...).*
- b) The installation generating renewable electricity has not received support in the form of operating aid or investment aid, excluding support received by installations before their repowering, financial support for land or for grid connections, support that does not constitute net support, such as support that is fully repaid and support for installations generating renewable electricity that are supplying installations producing RFNBO used for research, testing and demonstration.*

**) Note that Article 11 (Transitional phase) stipulates that Art 5 (a) and (b) shall not apply until 1 Jan 2038 to installations that come into operation before 1 Jan 2028.*

Delegated Act methodology for RFNBO

Article 6

Temporal correlation

Until 31 December 2029 the temporal correlation condition (...) shall be considered complied with if the RFNBO is produced during the same calendar month as the renewable electricity produced under the renewables PPA or from renewable electricity from a new storage asset that is located behind the same network connection point as the electrolyser or the installation generating renewable electricity, that has been charged during the same calendar month in which the electricity under the renewables PPA has been produced.

From 1 January 2030, the temporal correlation condition shall be considered complied with if the RFNBO is produced during the same one-hour period as the renewable electricity produced under the renewables PPA (...).

The temporal correlation condition shall always be considered complied with if the RFNBO is produced during a one-hour period where the clearing price of electricity resulting from single day-ahead market coupling in the bidding zone, as referred to in Article 39 (2), point (a) of Commission Regulation (EU) 2015/12226 , is lower or equal to EUR 20 per MWh or lower than 0,36 times the price of an allowance to emit one tonne of carbon dioxide equivalent during the relevant period for the purpose of meeting the requirements of Directive 2003/87/EC of the European Parliament and of the Council.

Delegated Act methodology for RFNBO

Article 7

Geographical correlation

1. The geographical correlation condition (...) shall be considered complied with if at least one of the following criteria relating to the location of the electrolyser is fulfilled:
 - a) the installation generating renewable electricity under the renewables PPA is located, or was located at the time when it came into operation, in the same bidding zone as the electrolyser;
 - b) the installation generating renewable electricity is located in an interconnected bidding zone, including in another Member State, and electricity prices in the relevant time period on the day-ahead market referred to in Article 6 in the interconnected bidding zone is equal or higher than in the bidding zone where the RFNBO is produced;
 - c) the installation generating renewable electricity under the renewables PPA is located in an offshore bidding zone that is interconnected with the bidding zone where the electrolyser is located.
2. Without prejudice to Articles 14 and 15 of Regulation (EU) 2019/943, Member States may introduce additional criteria concerning the location of electrolysers and the installation producing renewable electricity to the criteria set out in paragraph 1, in order to ensure compatibility of capacity additions with the national planning of the hydrogen and electricity grid. (...).

Delegated Act in summary

Option	Description	Additionality 	Temporal correlation 	Geographical correlation 
 Direct connection	The installations generating renewable electricity are directly connected to the installation producing RFNBOs	36 months	✗	✗
 90% renewable electricity	- Average proportion of renewable electricity exceeds 90% in the bidding zone - The production of RFNBOs does not exceed a maximum number of hours set in relation to the proportion of renewable electricity	✗	✗	✗
 18 gCO ₂ eq/MJ	- Emission intensity of electricity lower than 18 gCO₂eq/MJ in the bidding zone - PPAs in place for the amount that is claimed as fully renewable	✗	1 calendar month (until 31 December 2029) / 1 hour	Bidding zone Interconnected bidding zone Interconnected offshore bidding zone
 Imbalance settlement period	- Electricity consumed during an imbalance settlement period - Power-generating installations <u>redispatched</u> downwards and the production of RFNBOs reduced the need for <u>redispatching</u>	✗	✗	✗
 PPAs	- Compliance with the requirements of additionality and temporal and geographical correlation - PPAs in place for the amount that is claimed as fully renewable	36 months No operating or investment aid (transition period rules applicable to installations that come into operation by 1 January 2028)	1 calendar month (until 31 December 2029) / 1 hour	Bidding zone Interconnected bidding zone Interconnected offshore bidding zone

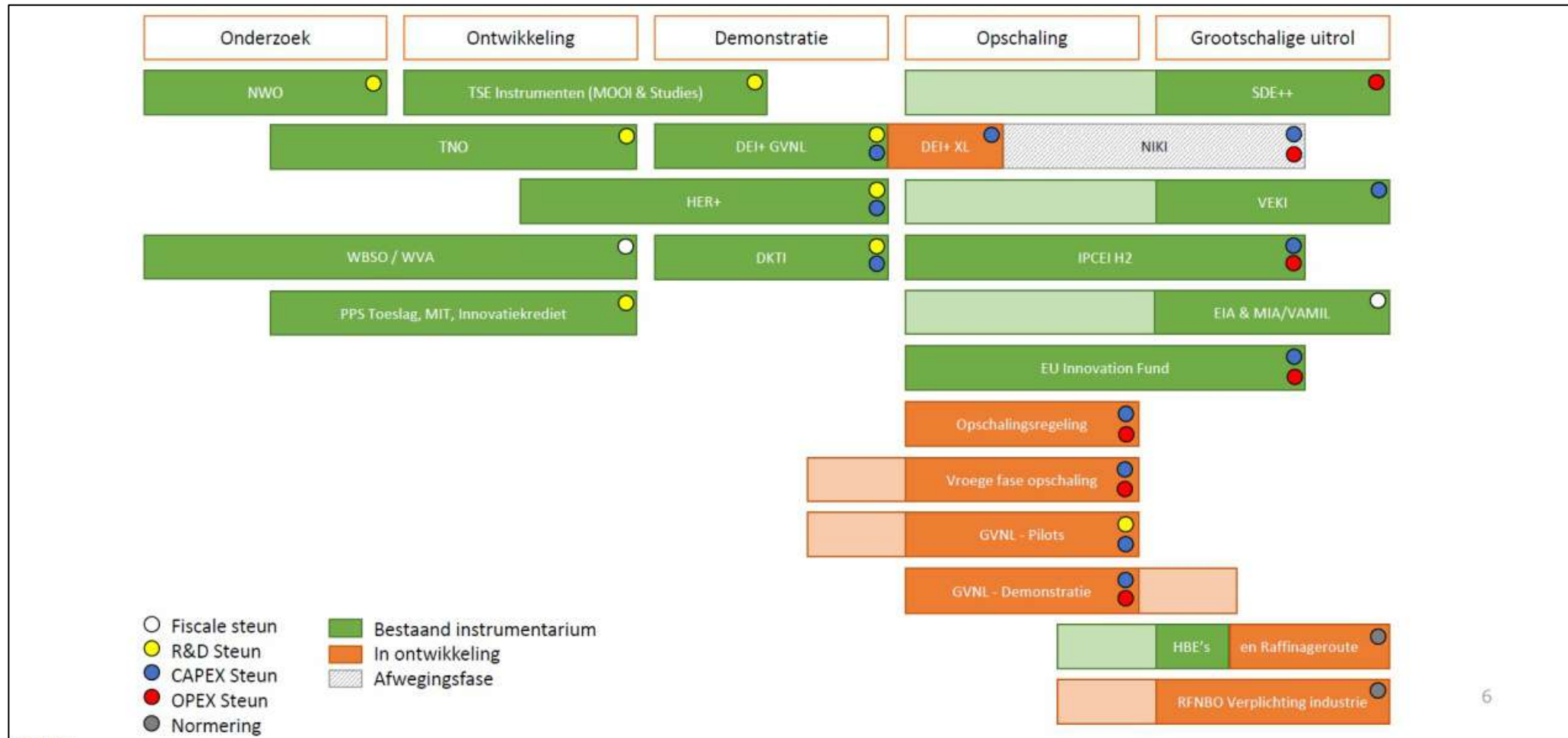
Electricity taken from the grid

Source: Hannes Snellman [New Rules Adopted for Renewable Hydrogen](#), 21 February 2023

RED III: RFNBO obligation

- ✓ On 30th March 2023, the European Parliament, Council and Commission reached a final agreement on the review of the renewable energy directive (RED3), following the reviewed directive presented by the Commissions in July 2021 as part of the FIT for 55 package.
- ✓ Renewable hydrogen will have a central role in meeting the EU binding target of 42.5% renewable energy by 2030. **Industry must procure at least 42% of its hydrogen from renewable fuels of non-biological origin (RFNBOS) by 2030**, though countries that can achieve a fossil-free hydrogen mix of at least 77% by 2030 can see that target reduced by 20%. This provision provides flexibility to countries aiming to develop a strong nuclear hydrogen policy and serves as an incentive to move from fossil-based to clean electrolytic-based hydrogen production.
- ✓ In transport, fuel suppliers must achieve either a 14.5% reduction in greenhouse gas (GHG) emissions associated with their fuels or achieve at least a 29% renewables share in the fuel supply. In addition, at least 5.5% of the fuel mix must be composed of advanced biofuels and RFNBOs (combined binding target). **Fuel suppliers** will be free to choose their preferred fuel, but they **must guarantee at least 1% is sourced from RFNBOs** – which will lead to approximately one million tons of RFNBO demand.

Funding options NL



Funding options EU

Scheme	Amount	Type	Applicability	Evaluation
Innovation Fund	EUR 3 bn for the 3rd round	Grants	Players across the whole H2 value chain	• Low chance of success
CEF-Energy	EUR 5.84 bn (15% allocated for CB RES)	Grants	For PCI or CB RES projects only; demonstration projects, studies, and co-financing of development of energy infrastructure	• Only up to 50% co-funding • Only for PCI/CB-RES status projects (lead-time: 2 years)
European Hydrogen Bank	1 st pilot auctions EUR 800 mn	Competitive auctions for domestic production with a fixed premium per kg of H2 produced	First pilot auctions expected to be launched in autumn 2023;	• TBC

Contact information:



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**Presentation of CertifHy Scheme, the Dutch
certification scheme for hydrogen,
implementation of an EU wide system
by Matthieu Boisson, Hinicio/CertifHy**



An initiative funded by the Clean
Hydrogen Partnership



Co-funded by the
European Union



Certification system for EU RED2 compliant hydrogen and e-fuels

EFET Hydrogen Workshop

June 1st, 2023



Matthieu Boisson
Manager, France

Computer science engineer specialized in energy markets and energy attribute tracking systems with 10 years of experience in the energy sector.

Renewable energy & certification expert.

Project Coordinator for European Commission supported Standard on Green H2 Certification.

Coordinator since 2020



Contributor



EXPERIENCE



WORLD BANK GROUP

Development of a green H2 certification scheme in Chile



Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

Design of H2 certification & market framework in Morocco

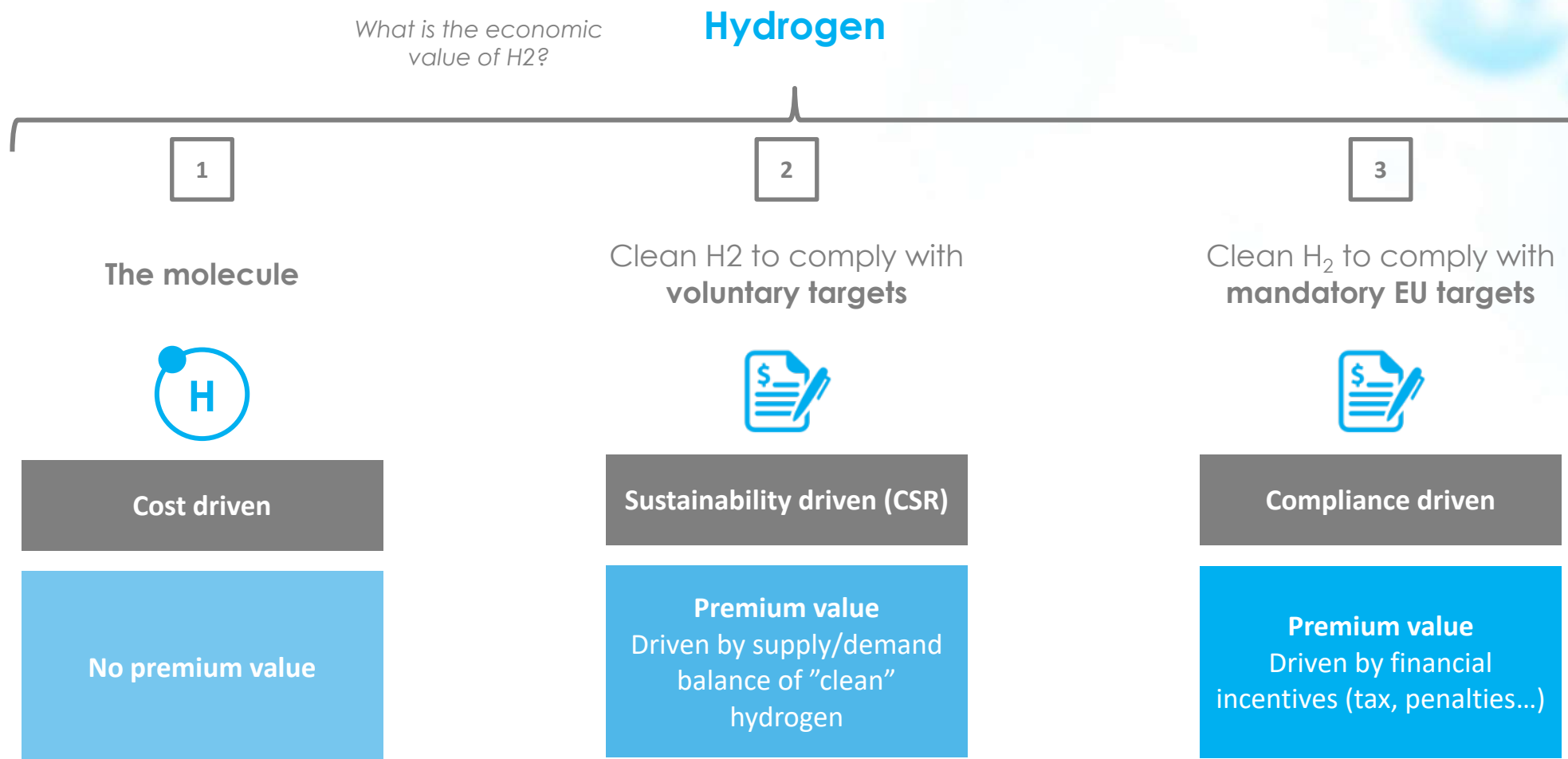


Guarantees of Origin for biomethane in France: Lead Consultant



Vertogas

Future Guarantees of Origin ICT procurement for gas & hydrogen: Lead Consultant



Today ...

Voluntary Market

Hydrogen consumers need a solution to make informed decision with regards to their H₂ procurement, for **CSR and GHG corporate reporting** purposes (RED2* Art. 19).

Hydrogen producers need a **certification system to disclose environmental information** to their customers.



Guarantees of Origin

Compliance market

The European Commission has set binding targets and specific criteria for the development of the renewable hydrogen market (RED2 art. 25 – 30)

Fuel suppliers and industrial players need a **certification system to show compliance with the EU target and criteria.**



RFNBO certificates

... and tomorrow?

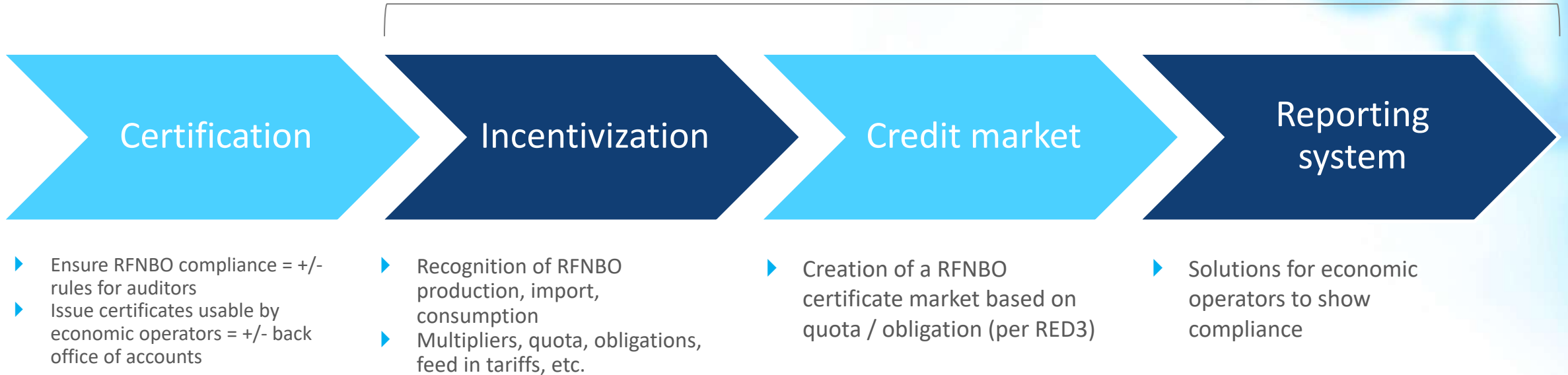
Other use cases?

Hydrogen certification could become the preferred tool for H₂ consumers to claim CO₂ emissions reduction and **mitigate the CO₂ price rise in Europe.**

???

Voluntary schemes

National legislation



- ▶ Interfaces need to be built between H₂ certification and national systems to **avoid administrative burden**
- ▶ The H₂ certification architecture must consider the **new interplay between guarantees of origin and RFNBO certification to avoid double counting**



REGULATION



STANDARDIZATION



CERTIFICATION

EU Voluntary Schemes

Implement certification schemes for e-fuels

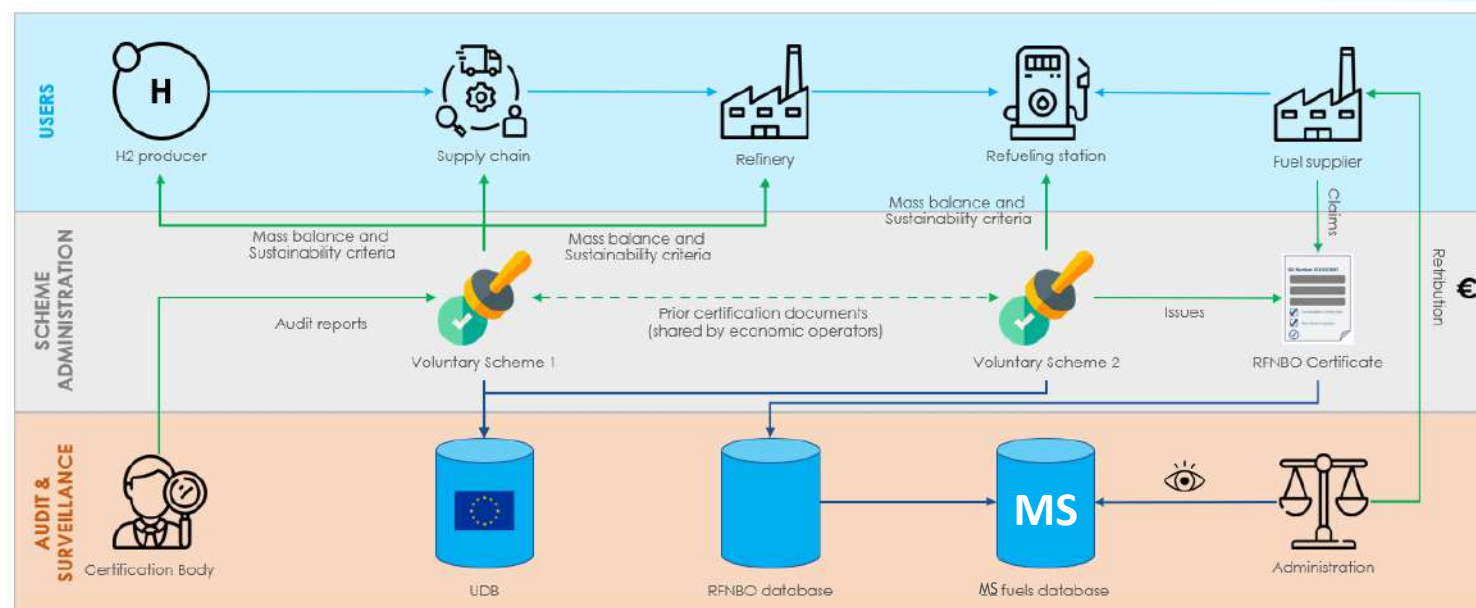
Seek recognition by DG ENER



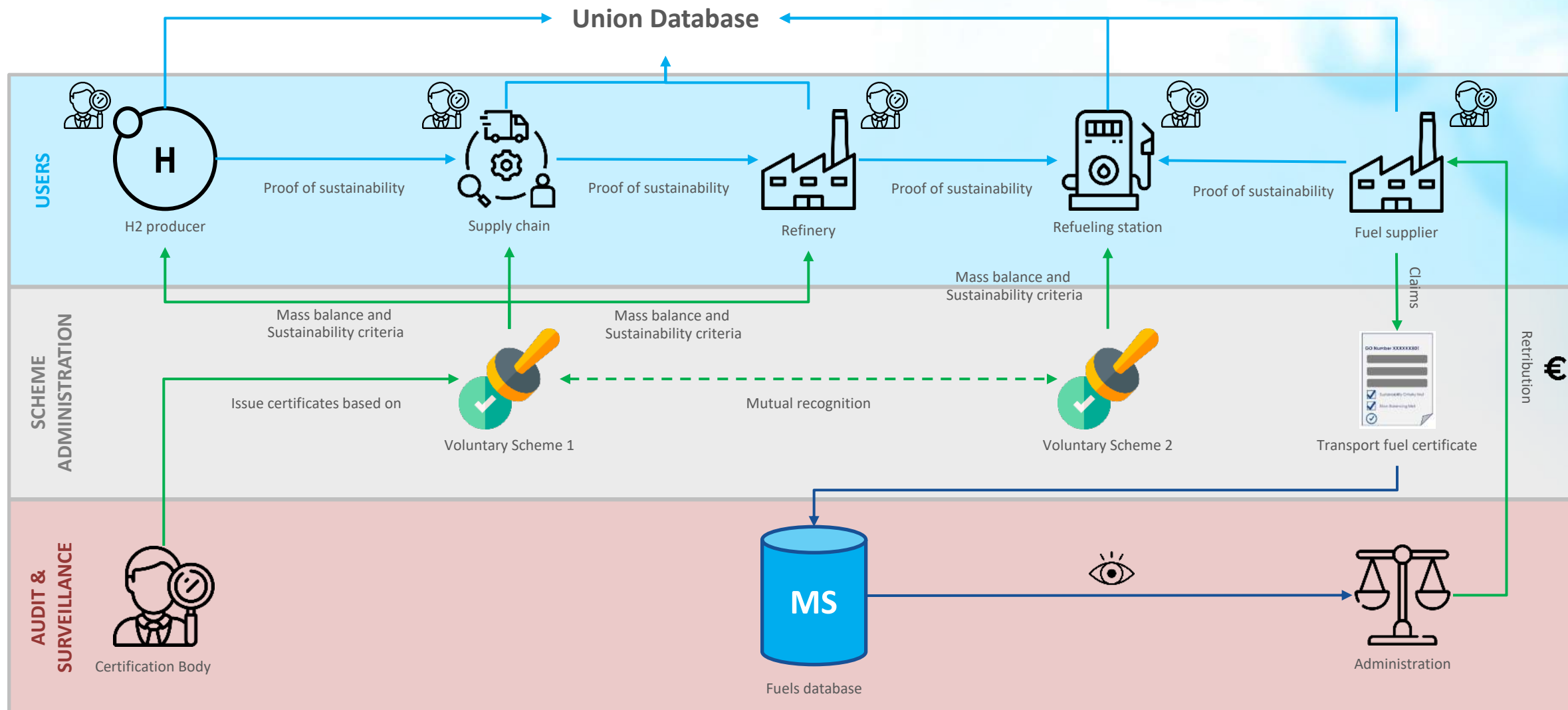
Member States

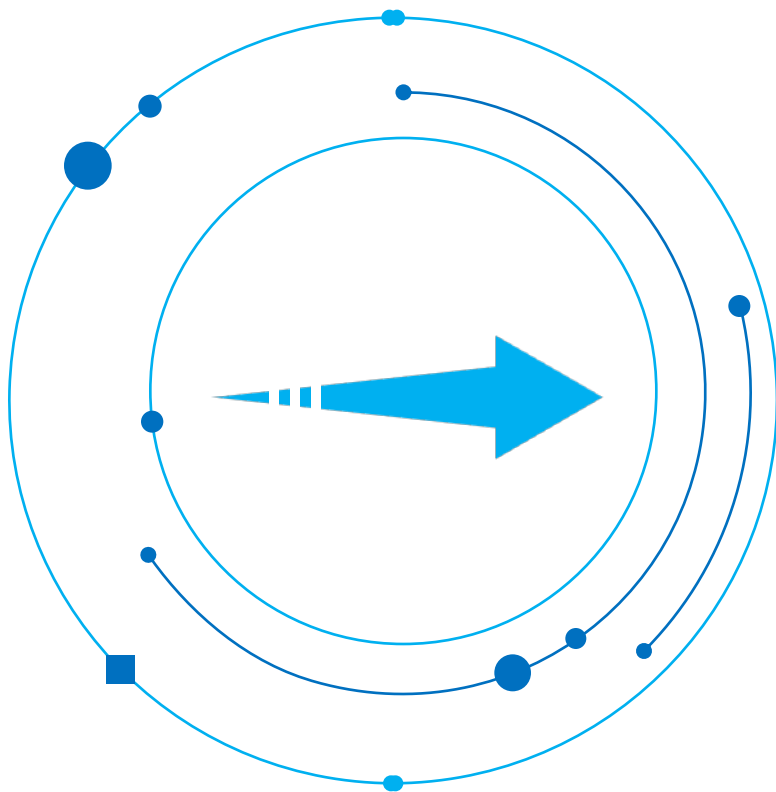


Implements RED2
Creates market uptake (incentivization)
Creates monitoring system
Monitors national statistics



The H2 & e-fuels value chain is complex





H2 & e-fuels certification expertise since 2014

Stakeholder Consultation platform: Working Groups, Training, Conferences

Easy to use platform for all certification matters

1. Register your production devices
2. Find Certification Bodies to perform audits and get certified
3. Trade your products by generating sustainability declarations
4. Claim the premium value of your products through easy and fast regulatory reporting (UDB, National Databases)

2014 2016 2017 2018/9 2020s..

Phase 1

- 1 Define a widely acceptable definition of green hydrogen
- 2 Determine how to design and implement a robust EU wide GO scheme

Affiliated partners:



Phase 2

- 1 Set-up a hydrogen GO Stakeholder platform
- 2 Finalise the scheme design ensuring it can be the main route to guarantee the origin of green & low carbon hydrogen across EU Member States
- 3 Run a pilot scheme to test the proposed design
- 4 Identify actions which need to be undertaken after the completion of the study to achieve an EU wide deployment of the scheme

Phase 3

- 1 Prepare EU wide deployment:
Implement Scheme:
 - Gas Scheme Group of AIB
 - Voluntary Issuing Body
 - Expand Stakeholder Forum with WG on Issuing Bodies
- 2 Expand from GOs to RFNBO certification

Stakeholder platform members



Funded by



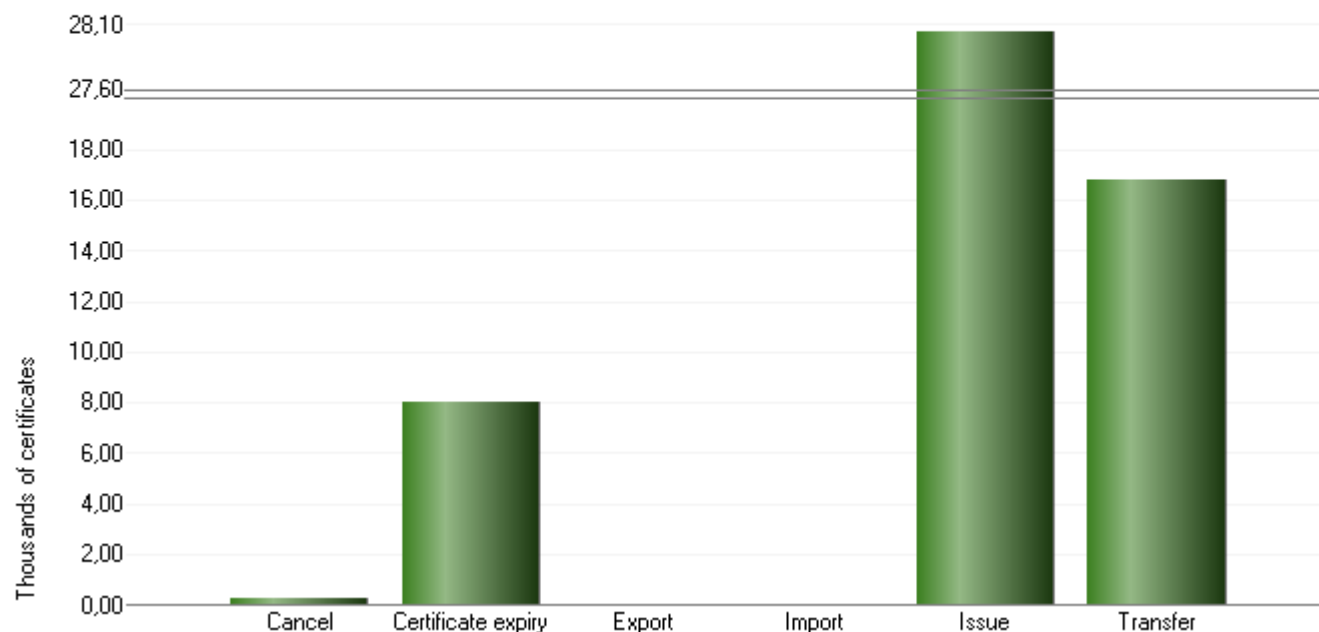
Project Coordinator



Consortium members



CertifHy NGC Transactions in 2022



Source: cmo.grexel

- **CertifHy NGC issuances grew by 231% year to year**
- **CertifHy NGC transfers grew more than 10x year to year**
- **CertifHy NGC cancellation volumes relatively low** in comparison. This will be investigated



It is important that European GOs have a harmonized way of calculating the GHG footprint of H₂, which is a key prerogative for customer trust: the same production techniques/pathway should yield the same “hydrogen passport”

Roelf Tiktak, Managing Director Vertogas

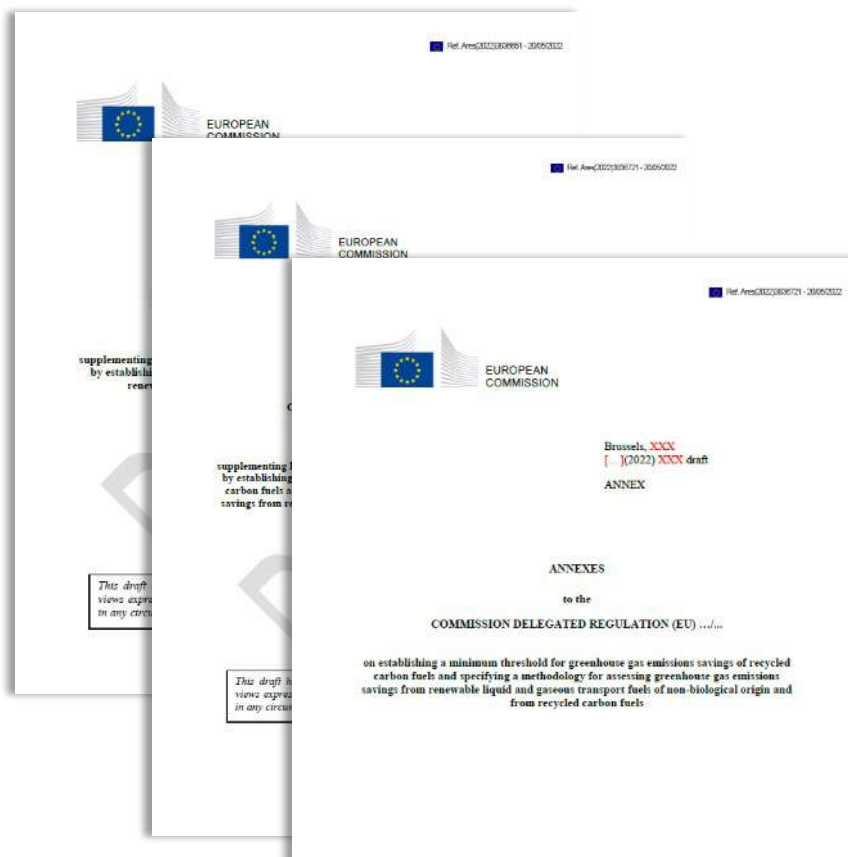
From 2022, Vertogas in the Netherlands will be responsible for issuing GoOs for green hydrogen. For example, all energy carriers receive a kind of "energy passport".

It has been 20 years since Groen Certificate Management (now CertiQ) issued its first green certificate. The green certificate system has since been replaced by the Guarantees of Origin (GoO) system. A GoO is the undisputed link to guarantee the sustainable origin of the energy carrier in question. Vertogas (a subsidiary of Gasunie) was established in 2009 to certify renewable gas. Vertogas has received a legal mandate from the Ministry of Economic Affairs and Climate to also issue GoOs for green hydrogen.

To expand the market for CO₂ Free facilitate hydrogen, is a comprehensive system of guarantees of origin (GoO) and certification required and must be made to definitions agreed. Under the Renewable Energy Directive (RED-II), the development of a GoO system is mandatory and the RED II provides a framework for this. In the FCH project CertifHy, the European rules and measurement methodology are determined. As a CertifHy member, Vertogas is involved in setting up the hydrogen certification scheme and will develop a framework for the Dutch hydrogen GoOs.

Source: Vertogas

<https://allesoverwaterstof.nl/certificaat-garanties-van-oorsprong-groene-waterstof/>



**Submitted to European Commission on
March 1st 2023**

CertifHy EU RFNBO Scheme

CertifHy Scheme Documents

- Governance
- Risk Management
- Traceability & Chain of Custody
- GHG emissions & Renewability
- Logos & Claims
- Certification Body Requirements
- Grievance, Complaint & Appeal
- Registration & Certification Procedures

GHG Emissions & Renewability

Traceability and Chain of Custody

Certification Bodies Requirements

- Auditor competencies
- Accreditation of certification bodies
- Adequate standards
- Duties and responsibilities of CBs
- Quality management

Governance

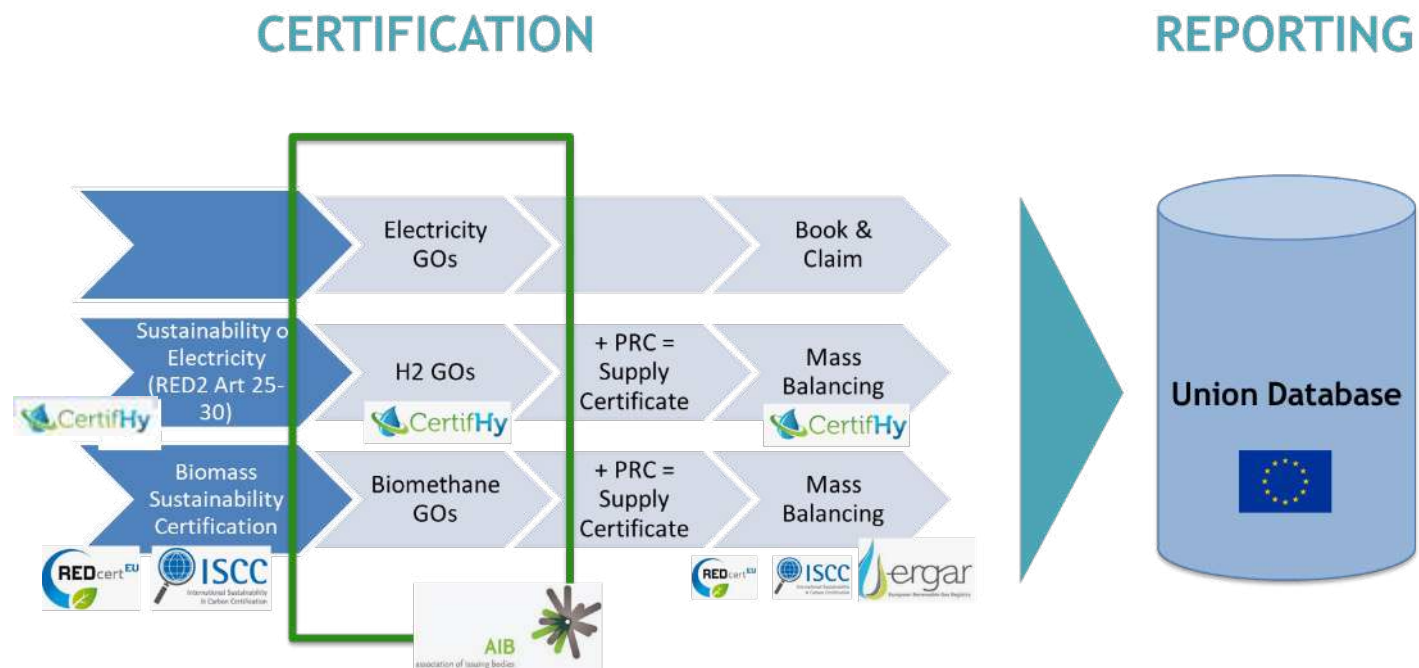
Registration and Certification procedure

- Document management
- Transparency

Risk Management

- Risk management when conducting audits
- Level of assurance in conducting audits

Grievance, Complaint & Appeal procedure Logos, Labels & Claims



CertifHy proposes a certification architecture where sectoral experts (EU Voluntary Schemes) facilitate reporting in the Union Database

- The Energy Attribute Tracking System (EATS) architecture designed by CertifHy 3 allows for the combination of book & claim (GOs) and mass balance (RFNBOs)
- Guarantees of Origin should participate to the improvement of RFNBO certification by providing further evidence to Voluntary Schemes
- Maximum flexibility should be provided to economic operators by keeping GOs « alive » until the consumption of the H2 molecule



An initiative funded by the Clean
Hydrogen Partnership

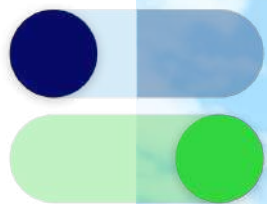


Co-funded by the
European Union



Join the CertifHy Stakeholder Platform
certifhy@hinicio.com

Presentation of H2Global mechanism
by Emanuel Henrich, H2 Global Stiftung



Shaping the global energy transition.

H2Global | Idea, Instrument and Intention
June 2023

H2Global – an innovative instrument to promote a timely and effective technology and market ramp-up of green hydrogen and its derivatives

Key elements

Bridging



Creating business cases and investment security.

Shifting the timing of market creation by promoting the market ramp-up until a viable green market has developed.

Defined System



Long-term purchase agreements over 10 years.

Clear definition of max. funding volume, products, geography and (sustainability) criteria by funding body.

Contracts for Difference



Financial compensation in analogy to CfD mechanism.

Set up of an intermediary – the **Hydrogen Intermediary Company**.



Competition-based



Double-auction: Market-based bidding procedures on the supply and demand side.

Minimization of the price difference to be compensated by funds.

H2Global's catalytic effect shifts market creation forward allowing early market opening

H2Global bridges the gap between supply and demand

Immediate creation of simulated market on supply and demand side



Competition-based auctions for the purchase and resale of green hydrogen and its derivatives through the intermediary Hintco



Unlocking the economic puzzle of green hydrogen with the H2Global market-driven compensation mechanism

H2Global auctions **uncover** **supplier** and **offtake** pricing dynamics

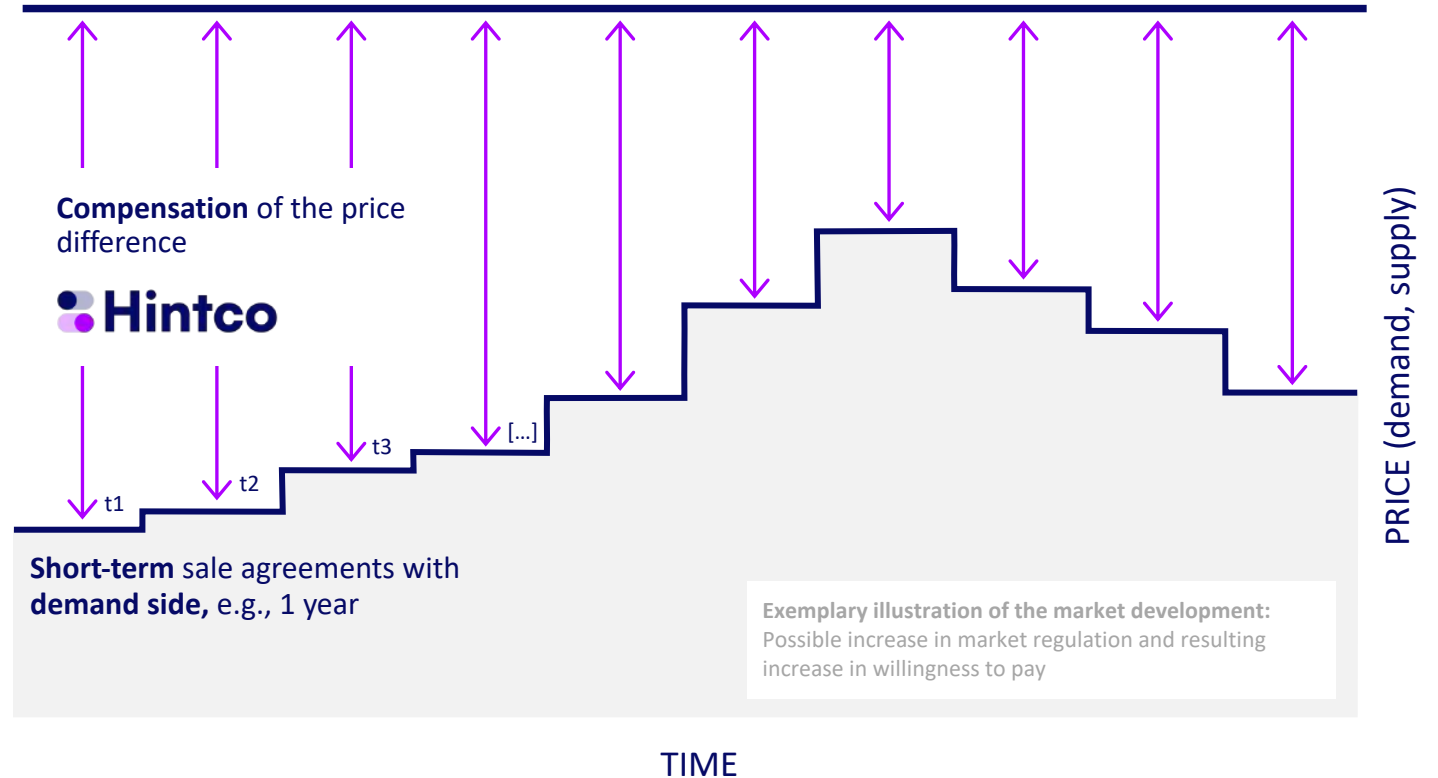
Short-term and broad-based **price signals** are crucial to create **liquidity** and support market development.

Long-term purchase agreement with **supply side**, 10-year fixed price and terms

Compensation of the price difference



Short-term sale agreements with **demand side**, e.g., 1 year



Unlocking the economic puzzle of green hydrogen with the H2Global market-driven compensation mechanism

H2Global auctions **uncover supplier and offtake pricing dynamics**

Short-term auctions **reduce** the amount of **public compensation payments** to the **minimum** required

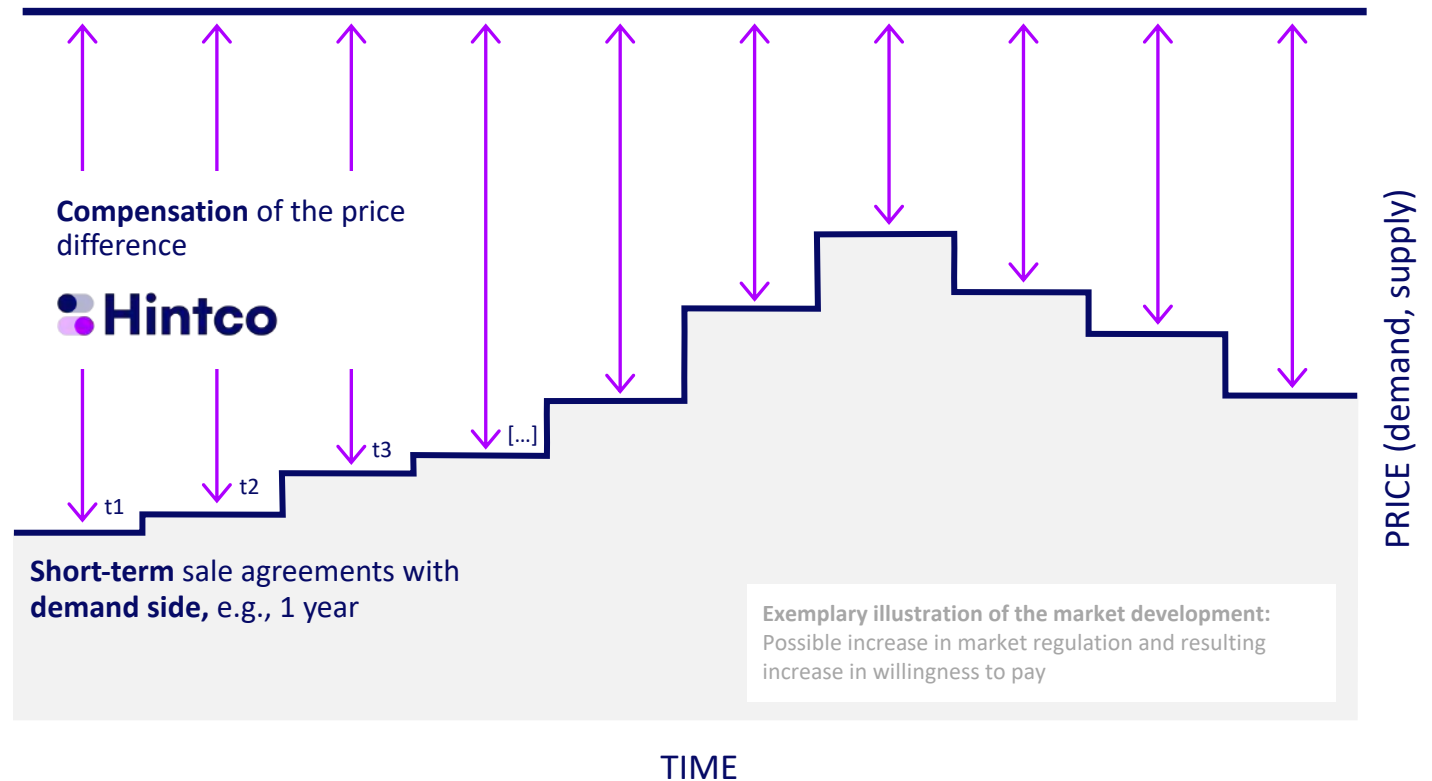
Short-term and broad-based **price signals** are crucial to create **liquidity** and support market development.

Long-term purchase agreement with **supply side**, 10-year fixed price and terms

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Short-term sale agreements with **demand side**, e.g., 1 year



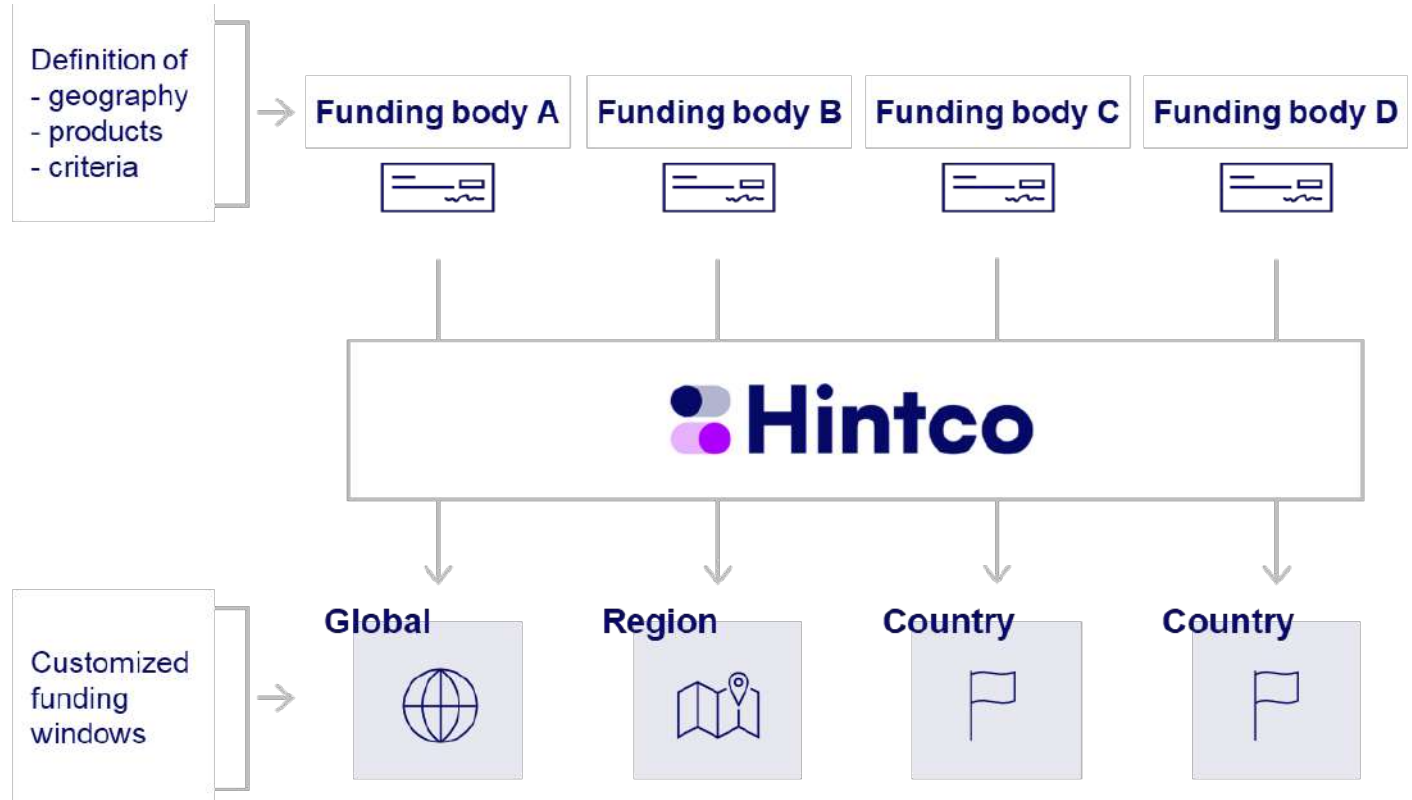
The flexible instrument empowers governments to shape the global hydrogen market through customized funding windows

Customized regarding:

- Geography (global, regions, countries)
- H2 product selection
- Product and sustainability criteria

Adaptable to targets:

- Price optimization
- Promotion of green technology
- Energy policy
- Decarbonization of specific sectors
- Development policy



The first BMWK grant of 900 million euros showcases the modular system for tailored financing

Geography*

- Competition-based purchasing beyond EU and EFTA; delivery to Belgium, Netherlands or Germany.
- Competition-based sale to German and European companies; awarded to the highest bidder.

Products produced based on green H2*

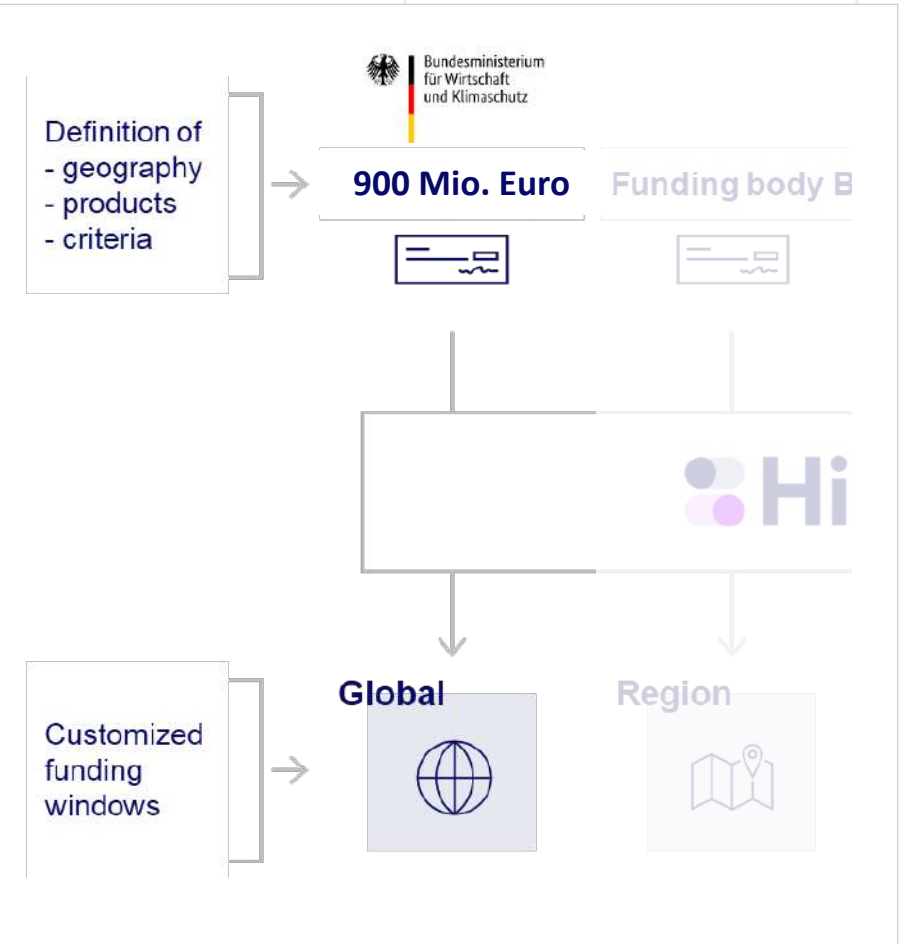
- Ammonia
- Methanol
- e-SAF

Criteria*

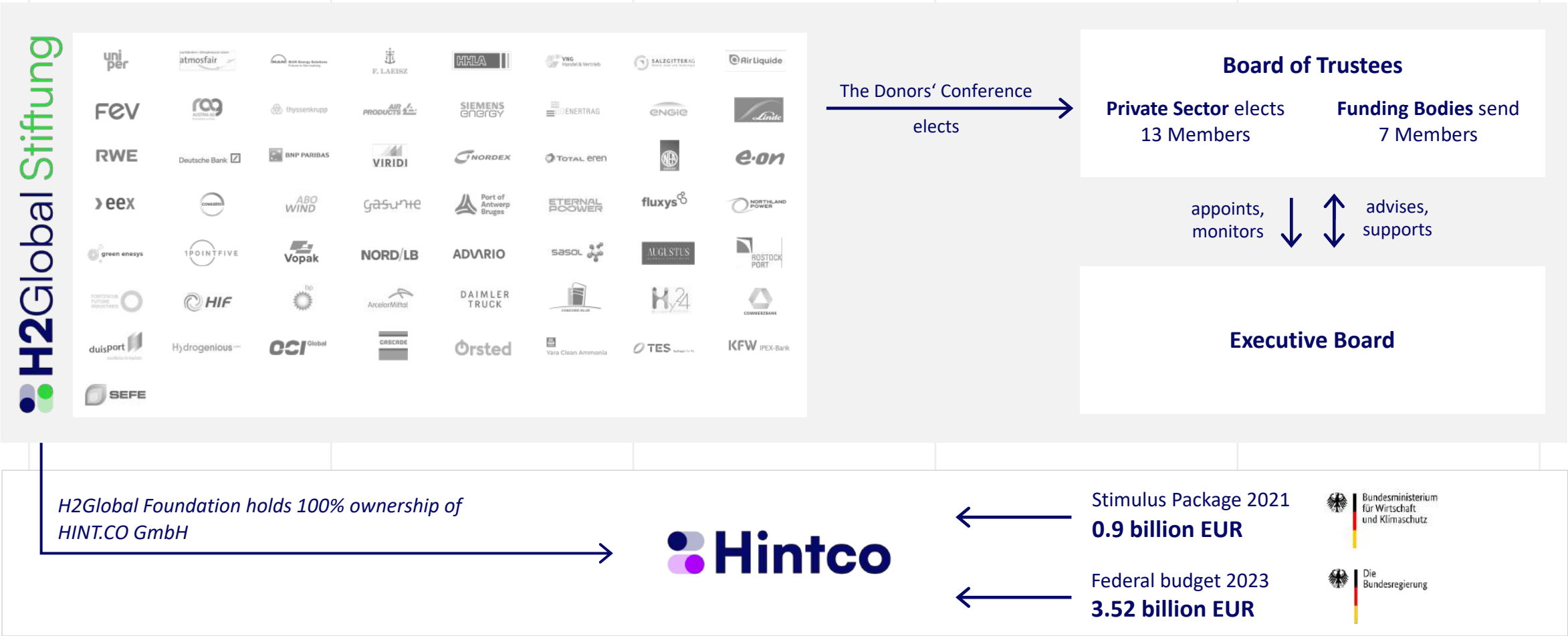
- Electricity from renewable sources must be used for production.
- Criteria for renewability of electricity and greenhouse gas balancing are oriented towards REDII, resp. DAs.

*Incomplete information. All details are without guarantee. Details, see:

- a) Zuwendung aus dem Bundeshaushalt, Einzelplan 09, Kapitel 0904, Titel 896 02
- b) Anlage 2: Weitere Nebenbestimmungen und Hinweise



The non-profit foundation effectively enables this public-private initiative, which is constantly evolving and adapting to market developments





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Markus Exenberger

**H2Global Stiftung
Executive Board**

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**Certification study and template SPA for
renewable hydrogen/ammonia delivery by ship**
by Daria Nochevnik, Hydrogen Council

Experience with first hydrogen index HYDRIX
by Sirko Beidatsch, EEX

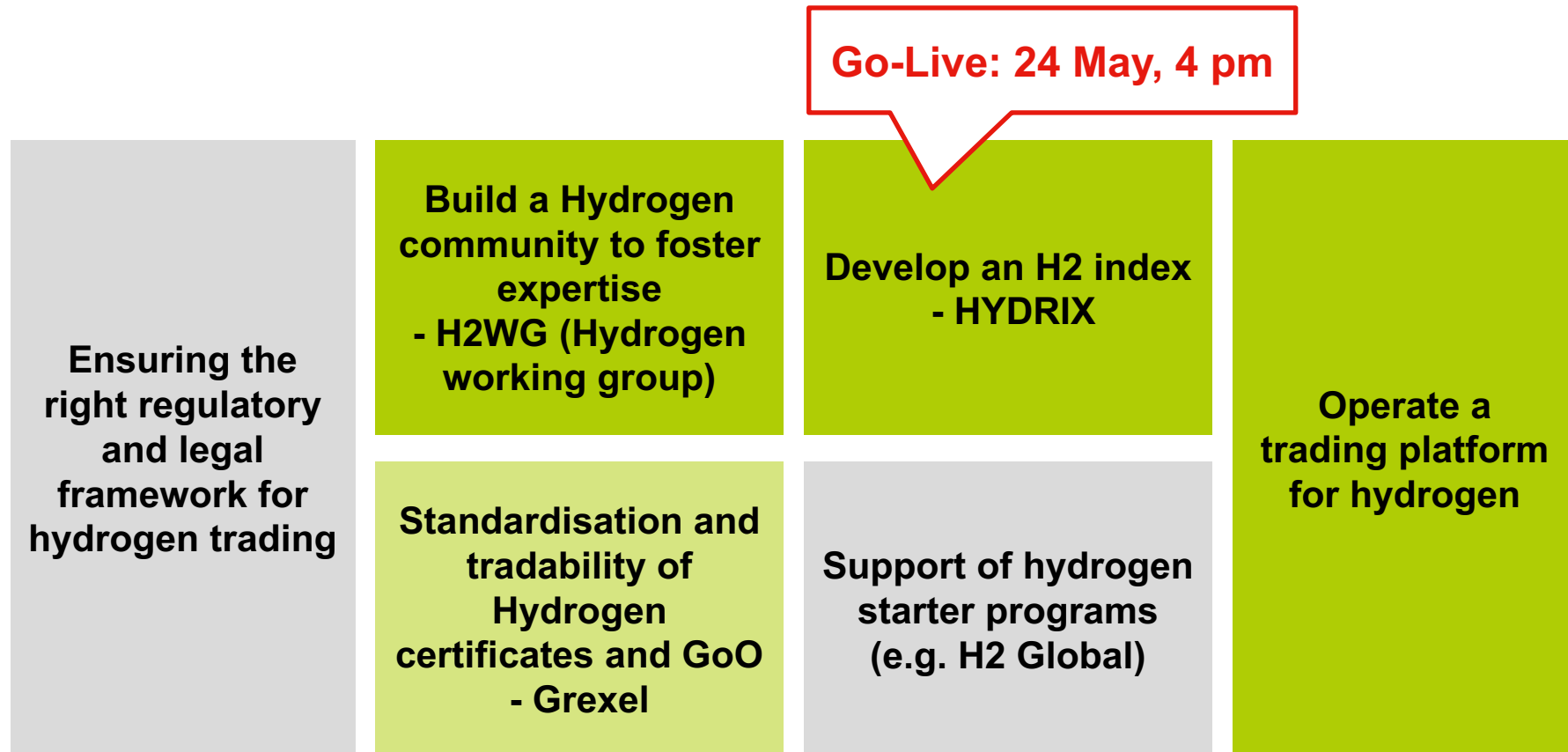
HYDRIX – first market based H2-Index

Experiences with first hydrogen index

Workshop on H2, EFET Legal Committee, Amsterdam, 1 June 2023

Sirko Beidatsch (EEX AG)

EEX Group is engaged in standardising and commoditising the young hydrogen market



HYDRIX - first market based hydrogen index

Need for price transparency in the hydrogen industry

- Price signals, to optimize/hedge market-based new or existing investments in hydrogen
- Direct price signals for H2 instead imprecise backward-calculation from H2 substitutes (gas, power, ...)
- Direct comparability of hydrogen prices in €/MWh to quoted gas and electricity prices in €/MWh
- Transparency on current and historical price developments for hydrogen

How will HYDRIX be calculated?

- Market participants/supporter provides price indications for the supply and/or demand side
- EEX calculates HYDRIX based on those price indications once the week
- First HYDRIX calculation for green H2 in Germany
- $HYDRIX = \frac{\emptyset Bid + \emptyset Ask}{2}$

Where and when is HYDRIX published?

- For free on EEX transparency website under www.eex-transparency.com
- Every Wednesday at 4 pm CET

Why is HYDRIX the better reference for H2?

- More than a production cost-based H2 index
- Consider supply and demand prices and thereby customer willingness to pay
- Comparable with natural gas or power prices

How can you support HYDRIX?

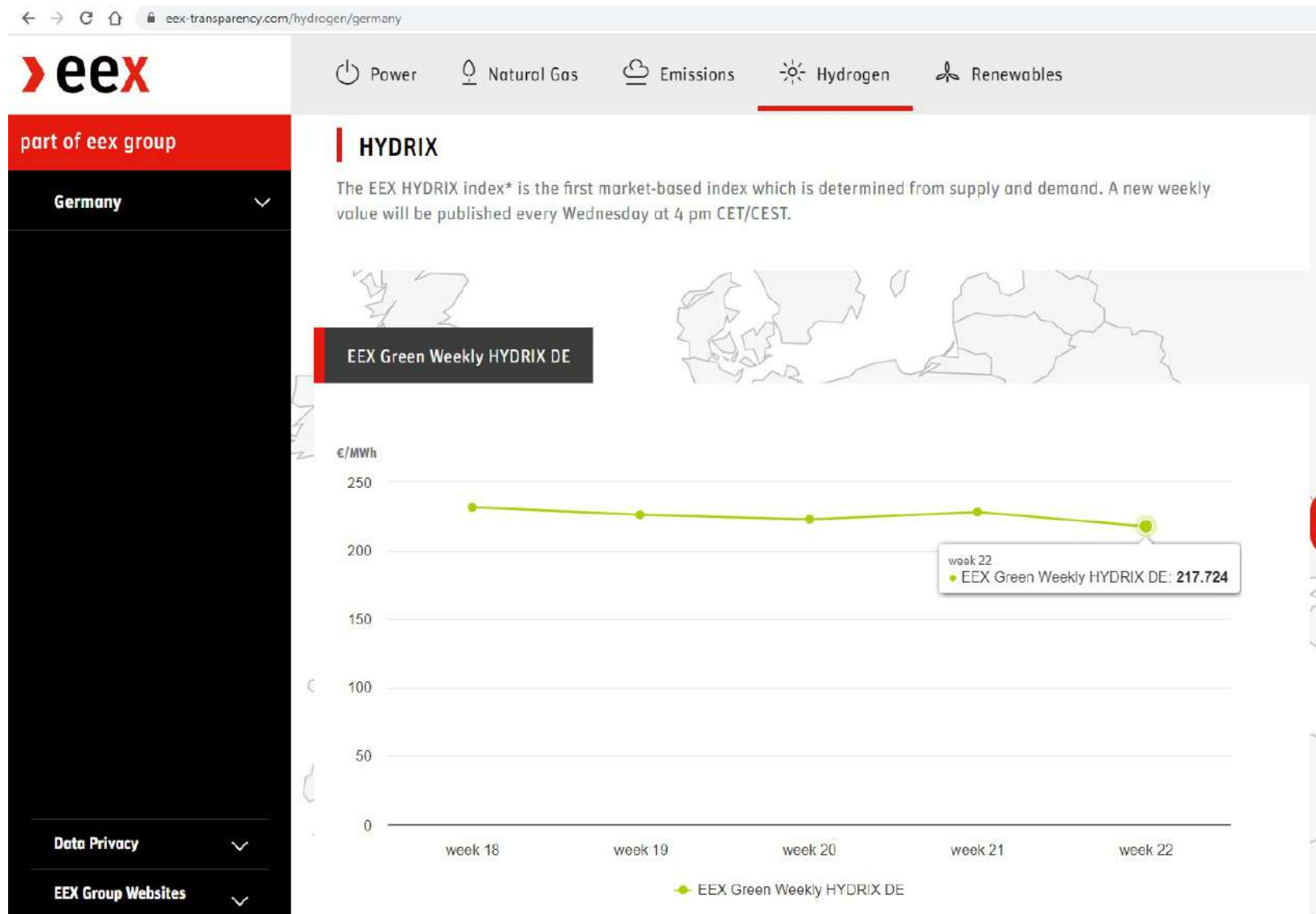
- Contact us: support@eex-transparency.com
- Register for online price assessing tool
- Submit your price estimation

Go-Live
24 May, 4 pm

HYDRIX – display on EEX transparency page 1/2

The screenshot displays the EEX Hydrogen Index page. The top navigation bar includes links for Power, Natural Gas, Emissions, Hydrogen (selected), and Renewables. The left sidebar shows the EEX logo and a 'Select Country' dropdown. The main content area features a map of Europe with Germany highlighted in green. The title 'EEX Hydrogen Index' is prominently displayed, followed by the subtitle 'The HYDRIX is the first market based price assessment for green hydrogen.' Below the map, there are six informational boxes: 'HYDRIX data', 'Why HYDRIX', 'HYDRIX Concept and Methodology', 'FAQ', 'Contribute', and 'Contact'. Each box contains a brief description and a link to more information.

HYDRIX – display on EEX transparency page 2/2



HYDRIX – first market feedback/experiences

- General feedback
 - Very positive feedback from the industry – overcoming chicken/egg problem
 - Especially on management level now very high awareness
 - Respect to EEX, to act as real pioneer in an immature market
 - Strong interest from Iberian, Scandinavian and American companies
- Detailed feedback - FAQ:
 - Where to find the HYDRIX and information material (methodology, FAQ, contacts)
 - Origin of prices, volumes, # of supporter, calculation scheme
 - Conversion from €/kg to €/MWh
 - How to buy/sell hydrogen to this price level
 - About consideration of RED II DA, transportation costs,...
 - How to contribute to HYDRIX calculation
 - How and when to develop to other countries, derivatives of H2 and other colours

HYDRIX – business concept

- Hydrogen market urgently needs price transparency for proper development
 - Existing hydrogen indices offered by info vendors are solely production cost based and published in €/kg, \$/kg or \$/MMBTU
 - HYDRIX is the first market based H2 index, by including supply and demand prices
 - HYDRIX provides price transparency in €/MWh, but is not yet a tradable price
- No exchange trading or lively trading of other kinds in hydrogen yet, but
 - Price indications based on existing bilateral contracts and offers for H2
 - HYDRIX is built on those price indication delivered by market participants
- HYDRIX is only the starting point for hydrogen price transparency
 - Further developments over the years to come
 - Step by step according market maturity and demand
 - Consideration of trades/transactions in standardised H2 products, once available
 - Target: HYDRIX is solely based on exchange transactions
 - Extension to other derivatives of hydrogen (ammonia, methanol, ..) possible

HYDRIX – technical concept

- HYDRIX will be determined on a weekly basis, each Wednesday
 - based on price assessments provided by supporting companies
 - Publication of HYDRIX each Wednesday, 4 pm in €/MWh
- HYDRIX determination is based on market areas defined by national borders
 - This might change over the course of the years
 - New market areas might be created, existing ones be merged
- Starting point will be a green hydrogen index for German: HYDRIX Germany
 - Green: produced with renewable energies (e.g. wind, solar)
 - Purity: $\geq 98\%$ hydrogen concentration
 - Dependent on market support, further market areas (e.g. NL, Italy), further colours (e.g. grey H₂) and further derivatives of hydrogen (e.g. ammonia) are possible
- HYDRIX values could initially contain transport and some other costs
 - Reflection of heterogeneity/fragmentation/immaturity of existing hydrogen market
 - HYDRIX values by EEX could differ from customised hydrogen prices

HYDRIX – assessment and calculation

- Assessment/contribution data from supporting companies
 - Countries for HYDRIX: Germany
 - Delivery period: current calendar week
 - Timeframe for assessment: Tuesday until Wednesday, 3 pm CE(S)T, of the recent week
 - Price notation: €/MWh with 3 decimals, without consideration of taxes
 - Assessment tool: EEX Index Messenger; <https://indices.eex.com/>
- Derivation/origin of hydrogen prices
 - Buy price: enter, once a buy price for H2 is offered for the respective delivery week
 - Sell price: enter, once a sell price for H2 is offered for the respective delivery week
 - Buy and sell price (both): enter, if H2 price is taken from existing contracts for resp. deliv. week
 - Average national buy/sell price per company H2 portfolio, if $\geq$ one delivery point per market
- Calculation
 - All received price assessments do have the same weight for either buy or sell side
 - Highest sell and lowest buy price assessments will not be considered
 - Arithmetic average of average buy and sell price assessments on national level
 - $HYDRIX = \frac{\emptyset Bid + \emptyset Ask}{2}$
 - Backup: if less than 4 assessments on buy or sell side, average of the last 3 HYDRIX values
 - $Backup\ HYDRIX = \frac{HYDRIX(CW-1) + HYDRIX(CW-2) + HYDRIX(CW-3)}{3}$

Questions?

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The background of the slide features a low-angle shot of a large array of blue solar panels on the left, and a white wind turbine on the right, set against a clear blue sky with some light clouds. A semi-transparent white rectangular box is centered over the image, containing the text.

**Q&A
discussion**