



# CEGH & PwC/strategy& GREEN HYDROGEN WEBINAR

VIENNA, 27 MARCH 2025

- **Welcome & Introduction**
- Go Green Hydrogen on the CEGH GreenGas Platform
- Green Hydrogen Market Update / Dirk Niemeier
- CEGH GreenHydrogen Index
- Q&A



## Natural Gas

Gas trading places in Austria and in CEE:

- CEGH-VTP: benchmark hub for CEE region
- EEX CEGH Gas exchange markets in Austria and in the Czech Republic

## Biomethane

Development of biomethane markets and capture of business opportunities:

- CEGH GreenGas Platform
- EFET CEGH Standard Contract for Biomethane Certificates

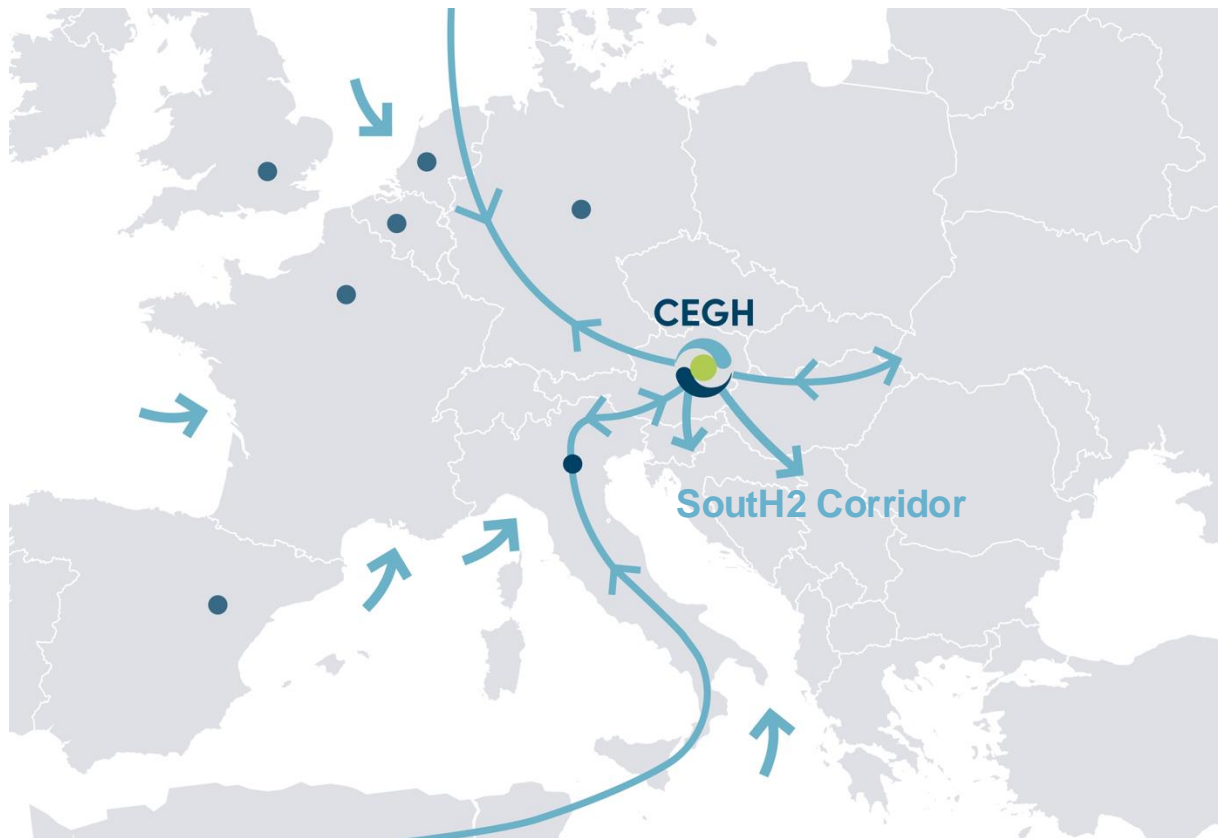
## Green Hydrogen

Development of hydrogen markets and anchoring of CEGH in the emerging hydrogen economy:

- CEGH GreenHydrogen Index
- Build-up of future hydrogen markets

# CEGH: The Gas & H2 gateway between East and West

within Europe's hub landscape

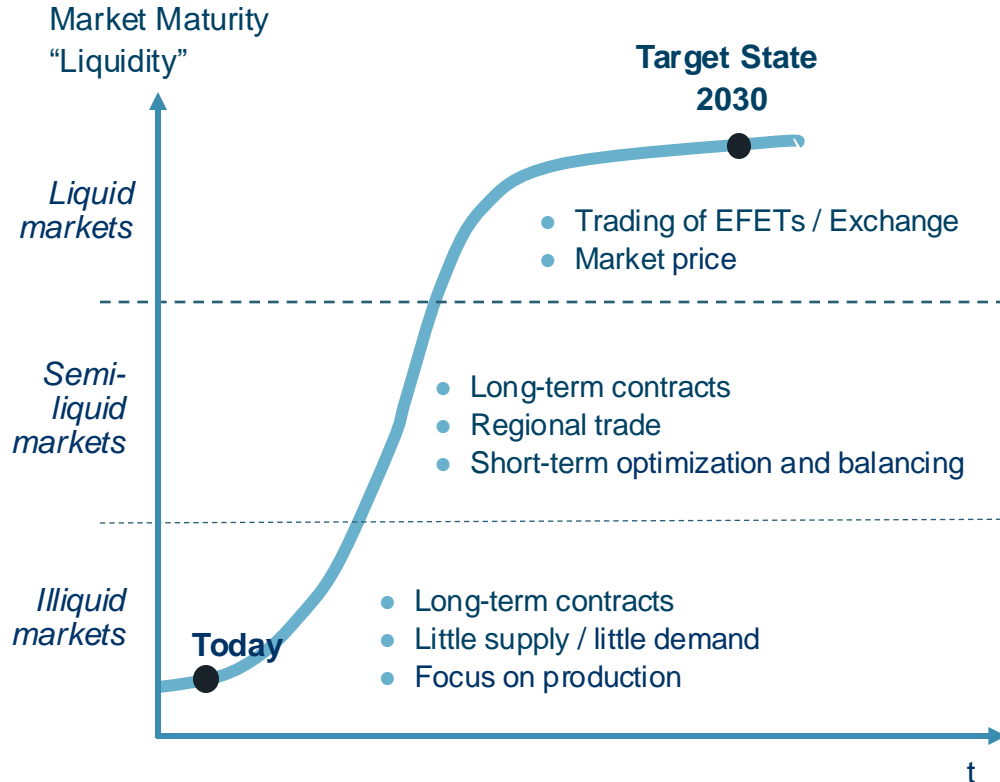


## CEGHs Advantages:

- Strategic location
- Gas transit routes
- Storage facilities

# Development of Liquidity

## Different Instruments in Different Market Maturity Stages



### Green hydrogen / GOs of green hydrogen

#### Useful trading instruments to be offered:

- Exchange (financial Clearing / Clearinghouse)
- Platform based trading (Broker)
- Balancing instruments
- Standardized contracts (EFET)
- Build-up of institutional & regulatory requirements
- Price Information & Transparency
- Auction- / Bulletin-Board / "Physical" Services

# Agenda

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**GO**

**GREEN**

**HYDROGEN**

**CEGH GREENGAS PLATFORM**



## CEGH GreenGas Platform – Pioneering trading of Biomethane and Green Hydrogen

- **CEGH GreenGas Platform** for marketing of green gases, such as biomethane and green hydrogen, in EU and selected additional countries (Norway, Turkey, Ukraine, Switzerland and United Kingdom)
- Development of the **CEGH GreenGas Platform based on market feedback** in order to meet the current needs and wishes
- Launched in **April 2022** for biomethane and in **January 2025** for green hydrogen
- **Gradual expansion** and further development envisaged
- **Functionalities of CEGH GreenGas Platform will be expanded** alongside the evolving green gas market
- CEGH offers its **CEGH GreenGas Platform free of charge**



# CEGH GreenGas Platform – Biomethane



Easy Access to Trading Biomethane/Certificates/Guarantees of Origin (GOs)

- Platform was developed closely with market participants.
- CEGH GreenGas Platform enables trading of certificates / GOs or bundled certificates / GOs together with biomethane, or biomethane without certificates / GOs
- Connected Registers:
  - Germany: DENA
  - Denmark: Energinet
  - Austria: E-Control, AGCS
- Offers and requests can be posted anonymously (optional) for EU and select countries, with or without registry - information exchange via chat function.
- Create term sheet directly on the platform for easy contract negotiation.
- Launching as "bulletin board" and as "auction".

The screenshot displays two identical bidding opportunity cards. Each card has a green header with a clock icon and the text "OPEN FOR BIDDING UNTIL REVOKED". Below the header, there is a red "Ask" button, a "Minimum price" field with a red "x" icon and the unit "€/MWh", and a "Publication date" of "30.01.2025 14:00" and "Offer ID: 953". A green "Biomethane" button is positioned to the right. Below this, the product details are listed: "Product: Guarantees of origin/Certificate", "Registry / Certificate / Country of Origin: E-Control Guarantees of origin database / Guarantees of origin / Austria", and "Bidding period until revoked". A table below shows the production period and other details:

Production period	Product type	Carbon Intensity	Volume	Transfer date
01.25 - 12.25	GOs Feedstock type: other(s) Subsidy No	gCO <sub>2</sub> eq/MJ	MWh 1,000	

The second card is identical but with a "Publication date" of "30.01.2025 14:00" and "Offer ID: 954". Its table shows a "Volume" of "500" and a "Subsidy" of "Yes".

# CEGH GreenGas Platform – Green Hydrogen



Easy Access to Trading Green Hydrogen/Certificates/Guarantees of Origin (GOs)

- Platform was developed closely with market participants.
- CEGH GreenGas Platform enables trading of certificates / GOs or bundled certificates / GOs together with green hydrogen, or green hydrogen without certificates / GOs
- Offers and requests can be posted anonymously (optional) for EU and select countries, with or without registry - information exchange via chat function.
- Launching as "bulletin board" and as "auction".
- First two platform based H2 offers ever →

18 DAYS, 22 HOURS, 57 MINUTES LEFT TO BID

Ask Minimum price --- € / kg

Publication date: 05.02.2025 08:00  
Offer ID: 972

Hydrogen

Product  
Hydrogen with Guarantees of Origin  
Registry / Certificate / Country of Origin  
no Register / CMS70 Green Hydrogen / Austria  
Bidding period  
05.02.2025 09:00 - 24.02.2025 08:00

Quality  
ISO 14687:2019

Volume  
300 kg

Delivery period  
11.02.25 06:00 - 27.02.25 06:00

Production period  
02.25 - 02.25

Subsidy  
No

Carbon Intensity  
gCO2eq/MJ

Volume  
kg  
300

Transfer date

OPEN FOR BIDDING UNTIL REVOKED

Ask Minimum price --- € / kg

Publication date: 20.02.2025 00:00  
Offer ID: 1012

Hydrogen

Product  
Hydrogen with Guarantees of Origin  
Registry / Certificate / Country of Origin  
no Register / RFNBO / Austria  
Bidding period  
until revoked

Quality  
other

ISO 14687:2019 Grade D for HRS customers and up to 5.0 for trailer customers

Volume  
17,200 kg

Delivery period  
01.03.25 06:00 - 31.12.25 06:00

Production period  
03.25 - 12.25

Subsidy  
No

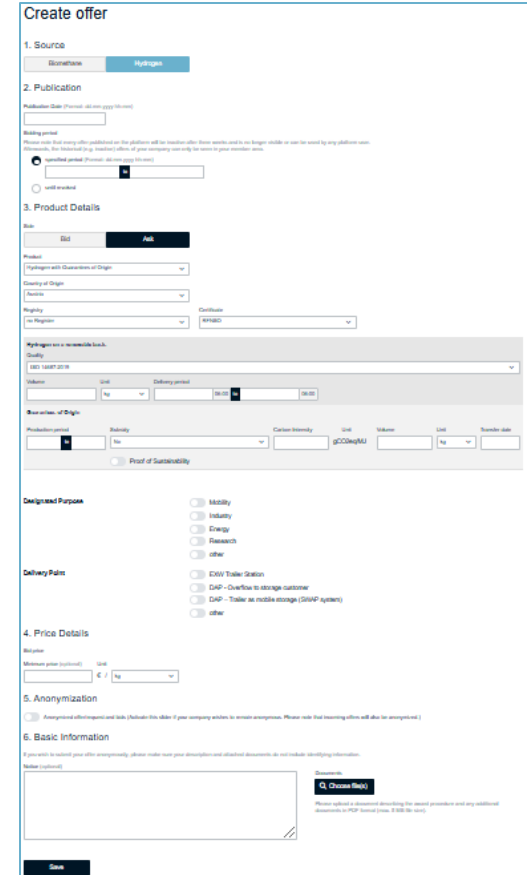
Carbon Intensity  
gCO2eq/MJ  
0

Volume  
kg  
17,200

Transfer date

## Create offer:

- Select Hydrogen
- Publication date
- Bidding period
  - Specified period (auction)
  - Until revoked (bulletin board)
- Product details
  - Specify if certificates / GOs, hydrogen volumes without certificates / GOs or hydrogen volumes with certificate / GOs should be offered or asked
  - Select country and if posting should be with or without registry
  - Specify Quality (e.g. hydrogen quality, volume, unit, delivery and production period, subsidy, carbon intensity, transfer date)
  - Optional information about designated purpose and delivery point
- Price information (optional)
- Anonymization
  - If the offers/inquiries are created anonymously, incoming bids are also anonymous.
- Optional additional notice field and possibility to upload documents



**Create offer**

1. Source  
 Biomethane  Hydrogen

2. Publication  
Publication date (Format: dd-mm-yyyy hh:mm) [ ]  
Bidding period [ ]  
Please note that any offer published on the platform will be treated after three weeks and it is no longer visible or can be used by any platform user. Also, the platforming treatment of your company can only be seen in your member area.

specified period (Format: dd-mm-yyyy) [ ]  
 until revoked

3. Product Details  
Bio:  Bid  Ask  
Product: [ ]  
Country of Origin: [ ]  
Name: [ ]  
Registry: [ ] Certificate: [ ]  
Quality: [ ]  
Unit: [ ] Delivery period: [ ]  
Quantity of Origin: [ ]  
Production period: [ ] Subsidy: [ ] Carbon intensity: [ ] Unit: [ ] Volume: [ ] Unit: [ ] Transfer date: [ ]  
 Proof of Sustainability

4. Price Details  
Bids per: [ ]  
Minimum price (optional): [ ] Unit: [ ]

5. Anonymization  
 Anonymous offers and bids (Include this offer if your company wishes to remain anonymous. Please note that incoming offers will also be anonymous!)

6. Basic Information  
Notice (optional): [ ]  
   
Please upload a document describing the award procedure and any additional documents in PDF format (max. 10MB file size).

## Place a bid:

- Bids can be placed as registered platform user
- Requested Volume (unit [kg, kWh low heating value (hv) and high hv and MWh low hv and high hv] depending on offer)
- Minimum accepted volume (unit from offer) [optional]
- Price (€/unit from offer)
- Upload optional documents and leave a notice in case needed (e.g. contract relevant details)
- Placed bids of your company can be seen on the CEGH GreenGas Platform or exported to an MS-Excel sheet

### Bids

#### Place a bid

Requested volume  kg      Minimum accepted volume (optional)  kg

Price (>= 100.00 € / kg)  € / kg

Notice (optional)

#### Additional documents

Please upload the document(s) as a PDF-file (max. 5 MB file size).

I have read the [Terms of Use of the Platform](#) and accept them.

#### Bids placed by your company

#	Bidder	Date	Requested volume	Minimum accepted volume	Price	Action
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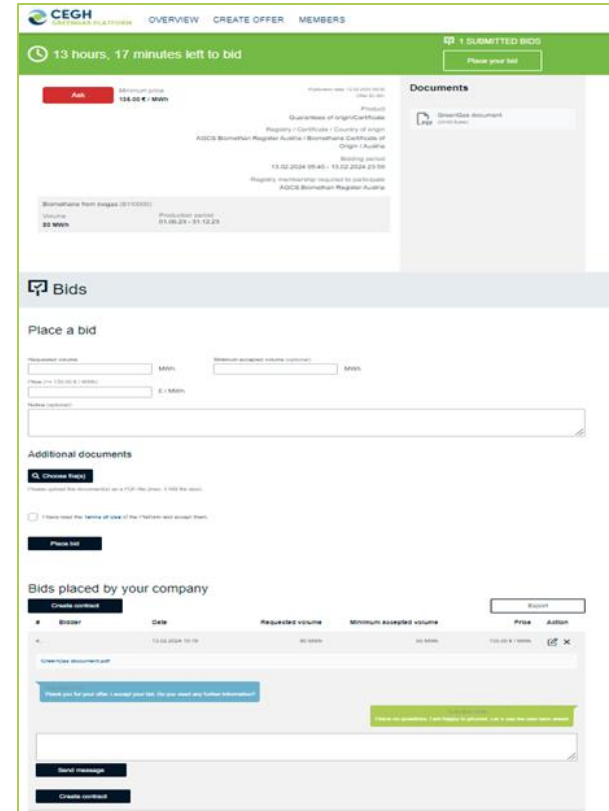
# CEGH GreenGas Platform

For Marketing of Biomethane and Green Hydrogen



## Chat function for offers (especially if anonymous):

- Please use the chat function to contact the “counterparty”.
- You can exchange further details and raise open questions.
- In case you have found an agreement, you can exchange your contact details.
- For biomethane additionally, you can also use the “Create term sheet” functionality to create a summary of the main information points which can be downloaded or printed for signature.



# CEGH GreenGas Platform



## Interested persons or companies

- register for **publication alerts** via E-Mail or
- register as **“Platform Users”** for the possibility to place bids/asks

## Platform Users

- publishing bids / asks
- informing all registered platform users by using the CEGH GreenGas Platform
- collecting bids and signing transaction bilaterally

## CEGH

- operator of the CEGH GreenGas Platform
- providing technical support for customers
- further improving and developing the CEGH GreenGas Platform based on market needs

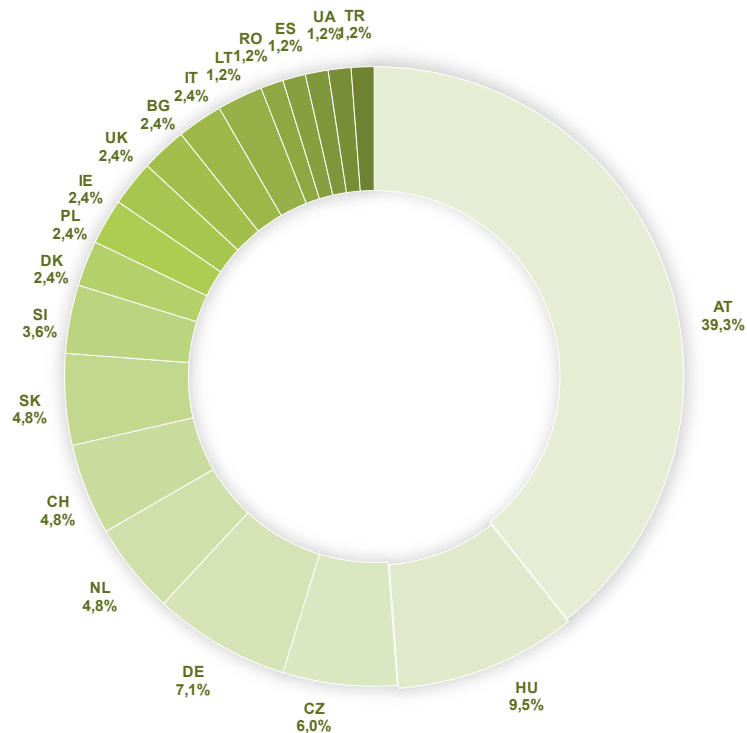


The conclusion of a contract for the offered products is subject to discretion of the company offering or requesting this product.

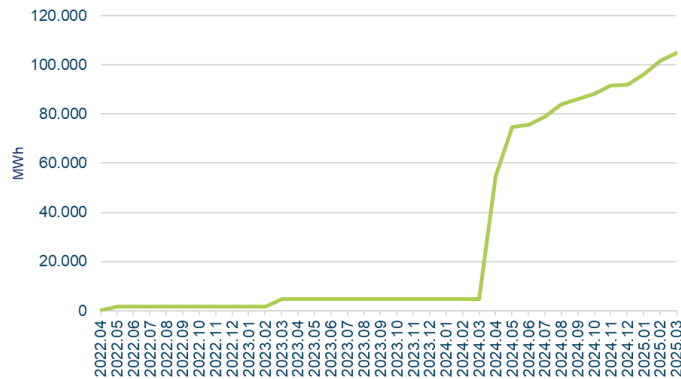
# CEGH GreenGas Platform: Number & Origin of Members



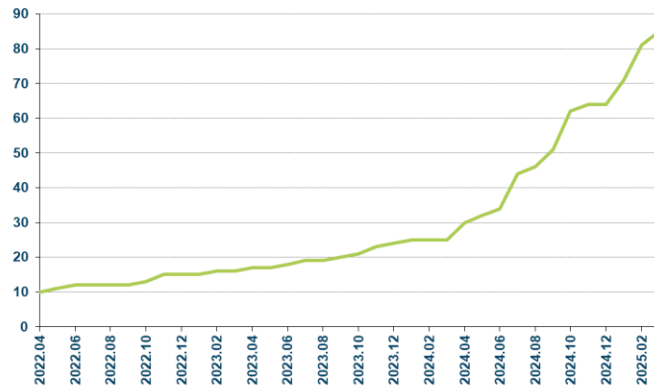
March 2025: 85 Members from 20 countries



Total offered Volume Biomethane + Hydrogen



Number of Member Companies





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# Huge Promises – Little Realization

## Quo Vadis Hydrogen Economy

March 2025

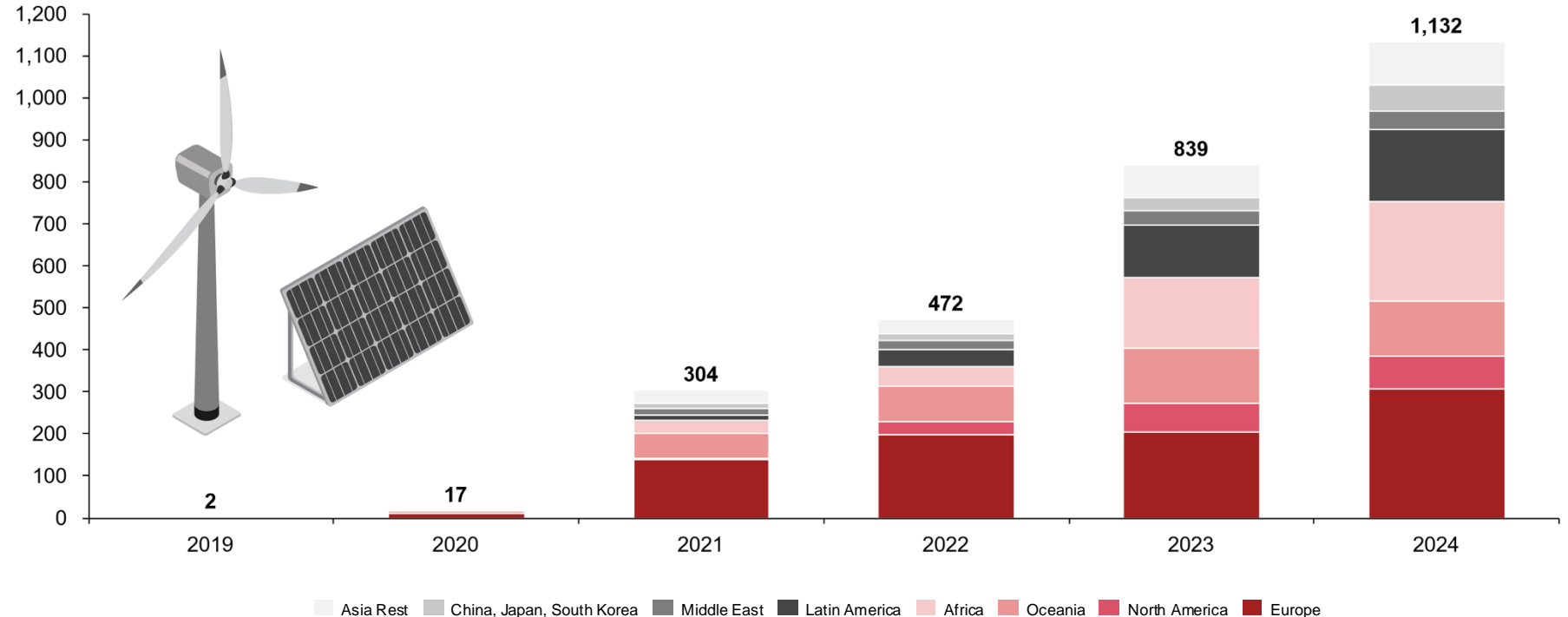


**Dirk Niemeier**

Clean Hydrogen, CCUS and  
Sustainable Fuels Lead  
Strategy&

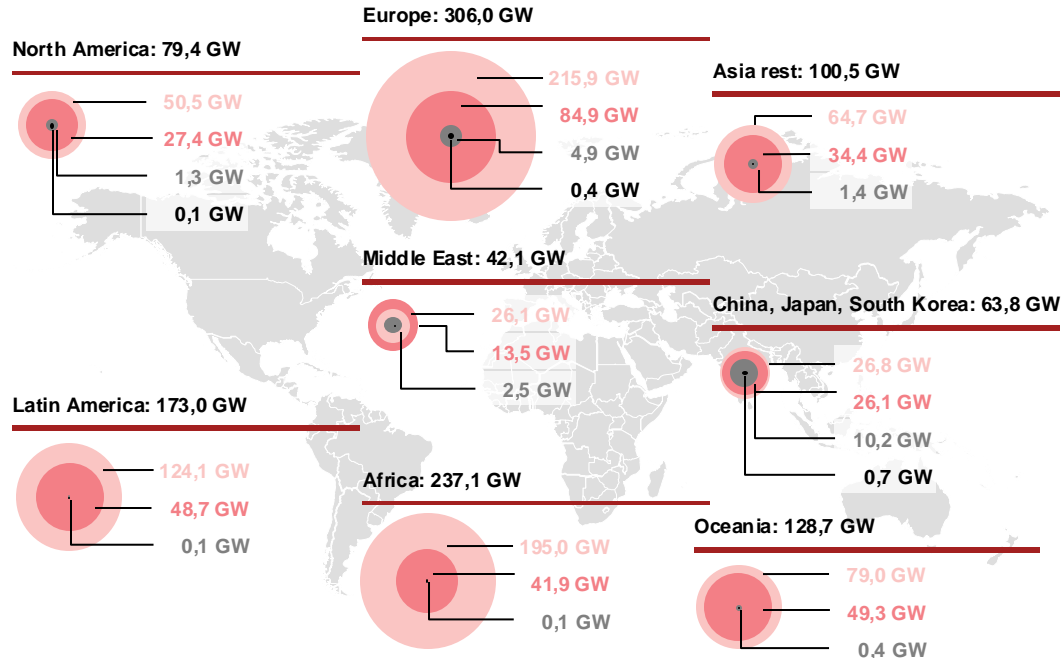
# Hydrogen capacity plans have increased enormously in the last 5 years – led by Europe, Africa, LATAM and Australia

## Capacity and location of renewable hydrogen projects (capacity in GW)



# But despite all these huge plans, only <2% of all projects have reached FID or beyond – the time to start is still ahead

## Project volumina by region and status (GW in 2024)



● Concept   
 ● Feasibility   
 ● FID/ construction   
 ● In operation  
 H2 Konferenz Berlin  
 Strategy&  
 Source: IEA, Strategy&

**Uniper delays 500 MW offshore-wind green hydrogen project to end of decade, hands back EU subsidies**

**Shell cancelled 400 MW H<sub>2</sub>Sines. Rdam** project due to unclear regulation, insufficient maturity of market as well as infrastructure

**'Reality check' | Hydrogen developers walk back large-scale ambitions this decade**  
 Litany of problems hold back final investment decisions on H<sub>2</sub> at scale

**Government-backed green hydrogen-to-methanol pilot in Belgium scrapped due to 'escalating costs'**  
 Consortium admits that no offtakers were willing to lock into long-term contracts at current prices

**Engie delays 4GW green hydrogen target by five years, due to slower-than-expected industry progress**

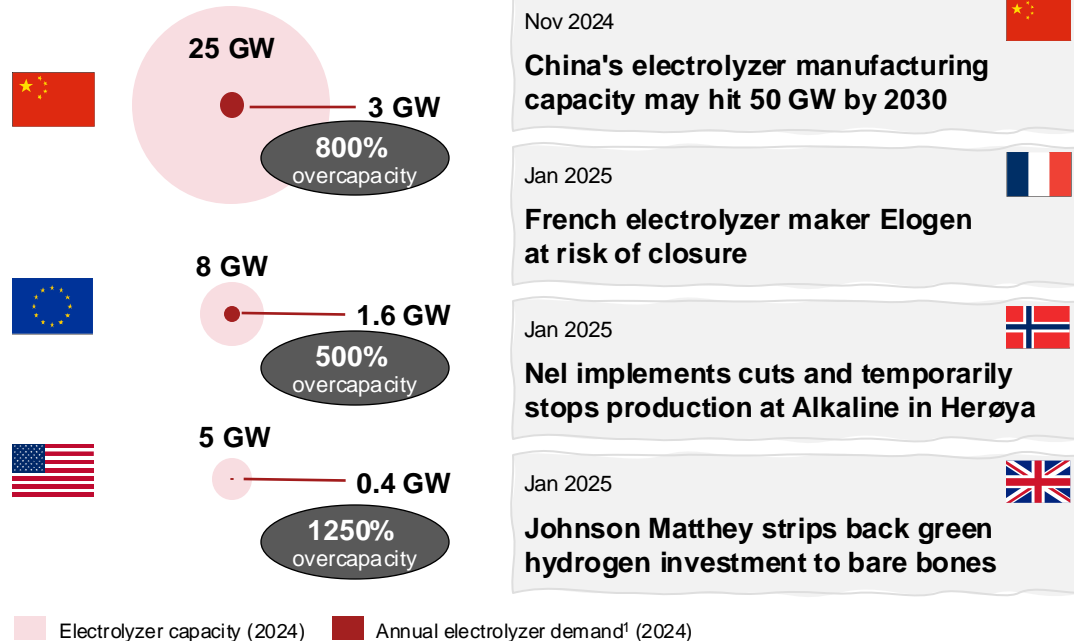
**Shakeout Ahead for Makers of Hydrogen Machines, Analysis Warns**

- Oversupply seen in electrolyzers that take hydrogen from water
- BNEF report warns not all electrolyzer makers will survive

# This imbalance resulted in OEM building significant manufacturing overcapacity, undermining the industry's profitability

## Global electrolyzer manufacturing capacity

### Overcapacity indicators



### Comments

- Electrolyzer manufacturers **have built out production capacities in GW scale to cater for the numerous ambitious announced projects**
- However, only few projects **have reached a current final investment decision (FID) stage and resulted in binding orders, of mainly MW-scale per OEM**
- As this **situation still pertains**, this leads to **significant overcapacity in the market**

# On top of that, Chinese manufacturers are starting to enter the market, winning first projects, building factories and offering lower prices

## China players in the electrolyzer OEM market

Jan 2024

China Hydrogen

**Chinese electrolyser manufacturers are building capacity, at a pace never seen**

Jan 2024

Hydrogen energy

**Beijing's Hygreen Energy partnered with Spanish utility to invest €2bn in hydrogen production capacity**

Dec 2024

LONGI

**Longi invests NOK70m in Norwegian HydrogenPro and becomes a strategic partner**

Jan 2025

Hydrogen Insight

**China to help hydrogen tech firms improve performance of PEM, alkaline, AEM and solid-oxide electrolyser stacks**

Sep 2024

Envision

**China's Envision to invest \$1bn in Spain to produce 5 GW of electrolyzers per year, construction to begin 2026**

March 2024

LONGI

**Longi, announced delivery of two 3,000Nm<sup>3</sup> alkaline electrolyzers after launching product in 2023**

Oct 2023

GH2

**Jiangsu Guofu Hydrogen has revealed plans to build a 1-GW electrolyser factory in Germany**

Dec 2023

Hydrogen Insight

**Eleven Chinese manufacturers won bids for 5MW ALE averaging around \$210 per kW**

Jul 2024 (China Hydrogen Bulletin)

PERIC

**Peric Hydrogen bidding price for a Chinese public tender reached \$219 per kW**

05.02.2024

Trina Green Hydrogen

**Trina Green Hydrogen has partnered with Spanish consultancy Arbro on developing a 160MW green hydrogen plant in Spain**

29.01.2024 (H2-Tech)

PERIC

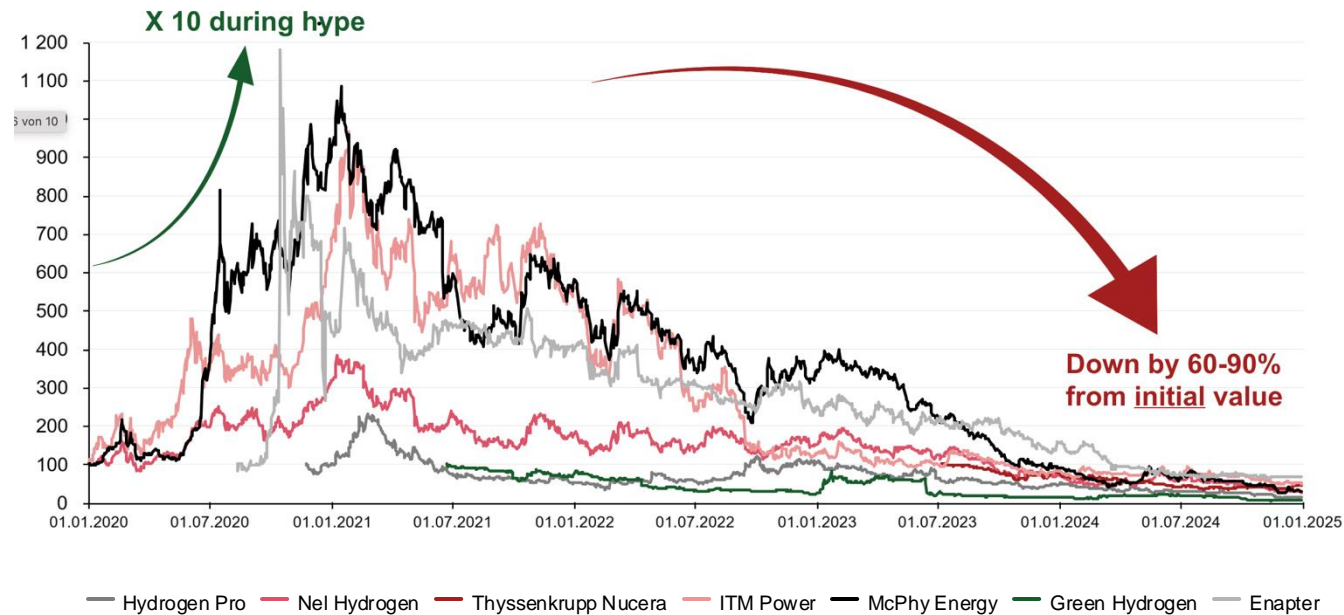
**Swedish Metacon enters into an OEM license and manufacturing license with PERIC Hydrogen**



# As a result, electrolyzer OEM stocks have significantly declined in value since 2021 – losing >90% of value since their all-time-high

## Stock performance of electrolyzer players

Stock performance of public electrolyzer manufacturers (Index = 100)



more than  
**EUR 2 bn**  
of **destroyed**  
shareholder value  
**in 2024**  
alone



# We see four major levers to support the clean hydrogen market uptake

## Major levers

### 1 Targeted and sufficient funding

CAPEX funding important for R&D projects, **OPEX funding** required for scale projects

Funding required to **bridge cost gap to fossil products** (for foreseeable time)

### 2 Investment security

Plant operators need **15+ years of secured takeoff** – offtaker may want to switch earlier

Governmentally backed **Intermediaries** might be a means to bridge this gap

### 3 Infrastructure before projects

Market ramp-up will only happen with large-scale volumes that require **pipelines, storage, terminals and ships**

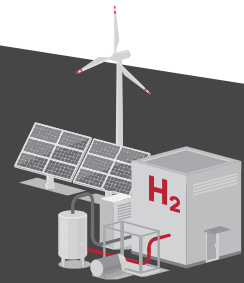
This infrastructure **must be available before projects** materialize

### 4 Requirement to decarbonize

Besides own and customers net zero targets, **quotas** combined with effective penalties can drive the market

**Higher CO<sub>2</sub> prices** also make clean alternative more attractive

# In addition, policymakers are called upon to strengthen European hydrogen OEMs by optimizing the regulatory framework



## Simplify RFNBO<sup>1)</sup> criteria for hydrogen production

- Extend 90% renewable power exception rule not only on a yearly but also on an hourly level to enable usage of redispatch hours for hydrogen production
- Extend timely correlation on a monthly level as a general rule beyond 2029 now, to give investment certainty
- Extend the exemption from grid fees for hydrogen production beyond 2029
- Create Lead Markets with less strict regulation

1) RFNBO: Renewable fuels of non-biological origin



## Provide guarantees

for large-scale hydrogen contracts to increase investment security for producers



## Enhance funding for clean hydrogen

- Establish support schemes similar to the EEG in Germany for clean hydrogen, probably funded with income from ETS
- Establish integrated infrastructure planning and funding tied to meeting planned build-up



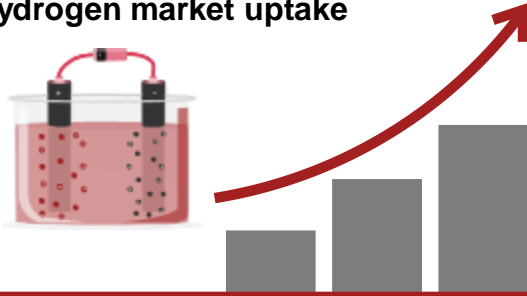
## Simplify administration

- Accelerate the procedures for the award of subsidies
- Reduce administrative and reporting effort
- Build 80/20 regulation with the major objective in mind, instead of deriving all possible exceptions and correct as misuse occurs



# Despite all these difficulties, there are activities already in all required dimensions that now needs to be enhanced

## Hydrogen market uptake



- First hundred MW scale **projects took FID** and will be realized
- H2Global (and EHB) closed **CfD contracts** to support project bankability
- **Core grid** decision has been taken with amortization account defined
- **Large tenders** of industrial offtakers out (still contracts not closed)
- **First H2 offer on CEGH green gas platform**

## Competitiveness of OEM



- **Cooperation** of electrolyzer OEM with **automotive players and Chinese ELY** players to strengthen competitiveness
- Greenfield **factory setups in partnerships** between large industrials
- **Product modularization** efforts of electrolyzer OEM

## Improved regulation



- **European Clean Industrial Deal**
- **European Steel and Metals Action Plan**
- Hydrogen **lead markets** with less restrictive regulations (?)
- **New German government** focusing on pragmatic / economic rather than perfect solutions (?)

I am looking forward to hearing from you



**Dirk Niemeier**

**strategy&**

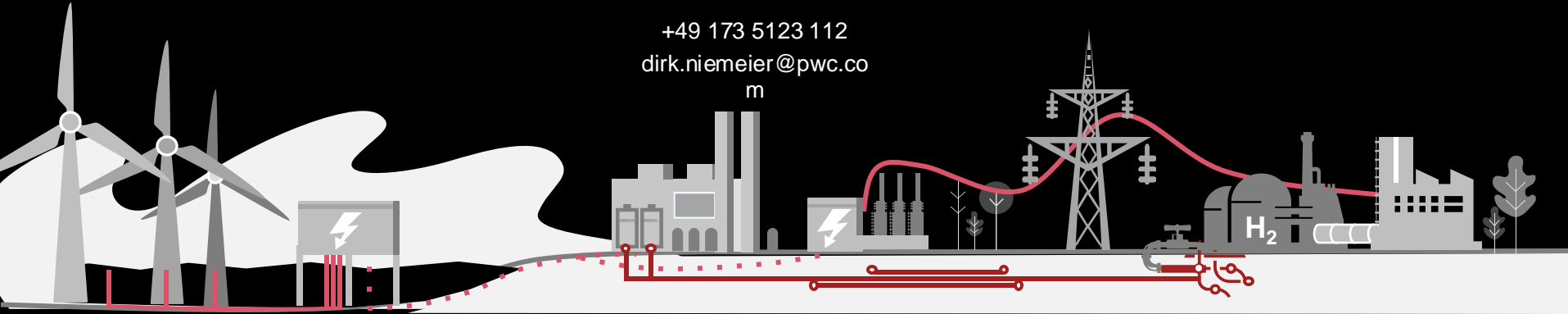
*Part of the PwC network*

**Lead for Clean Hydrogen, CCUS  
and Sustainable Fuels**

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CEGH  
GREEN  
HYDROGEN  
INDEX

# CEGH GreenHydrogen Indices (since Dec 2022)

## Measuring the Value of the Various “Shades” of Green Hydrogen



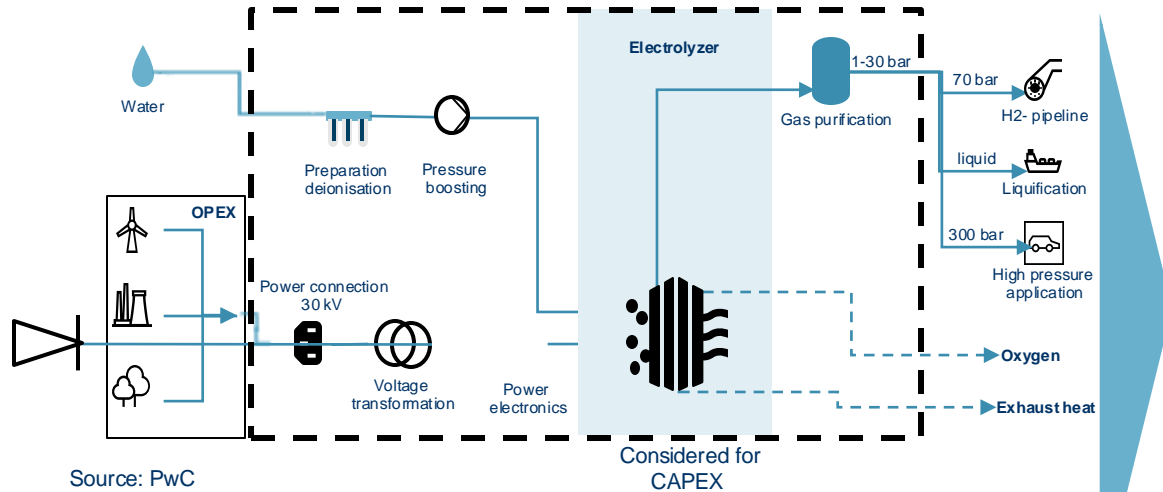
Index	Green Power Supply for Hydrogen Production	Product Definition
<b>CEGH GreenHydrogen Spot Index</b>	<ul style="list-style-type: none"> <li>Sourcing of “grey” power in the day-ahead market</li> <li>Sourcing of guarantees of origin via exchange / platforms</li> </ul>	<ul style="list-style-type: none"> <li>Cheapest Day-ahead power prices optimized with a yearly hPfc</li> </ul>
<b>CEGH GreenHydrogen Forward Index</b>	<ul style="list-style-type: none"> <li>Sourcing of “grey” power in forward markets</li> <li>Sourcing of guarantees of origin via exchange / platforms</li> </ul>	<ul style="list-style-type: none"> <li>Cheapest Monthly, Quarterly, Seasonal and Yearly power prices optimized with yearly hPfc</li> </ul>
<b>CEGH GreenHydrogen PPA 40 Index</b>	<ul style="list-style-type: none"> <li>40% of green power (PPA) and 60% “grey” power (forward)</li> <li>Sourcing of guarantees of origin via exchange / platforms</li> </ul>	<ul style="list-style-type: none"> <li>Combination of 10 Years PPA and Optimized Grid Supply</li> </ul>
<b>CEGH GreenHydrogen Index</b>	<ul style="list-style-type: none"> <li>100% sourcing of green power via power purchase agreements (renewable PPA)</li> </ul>	<ul style="list-style-type: none"> <li>10 Years PPA Pay as Produced</li> </ul>



# Cost-Plus-Approach for Hydrogen Indices

Due to current market stage

## Battery Limits applied for Capex Calculation

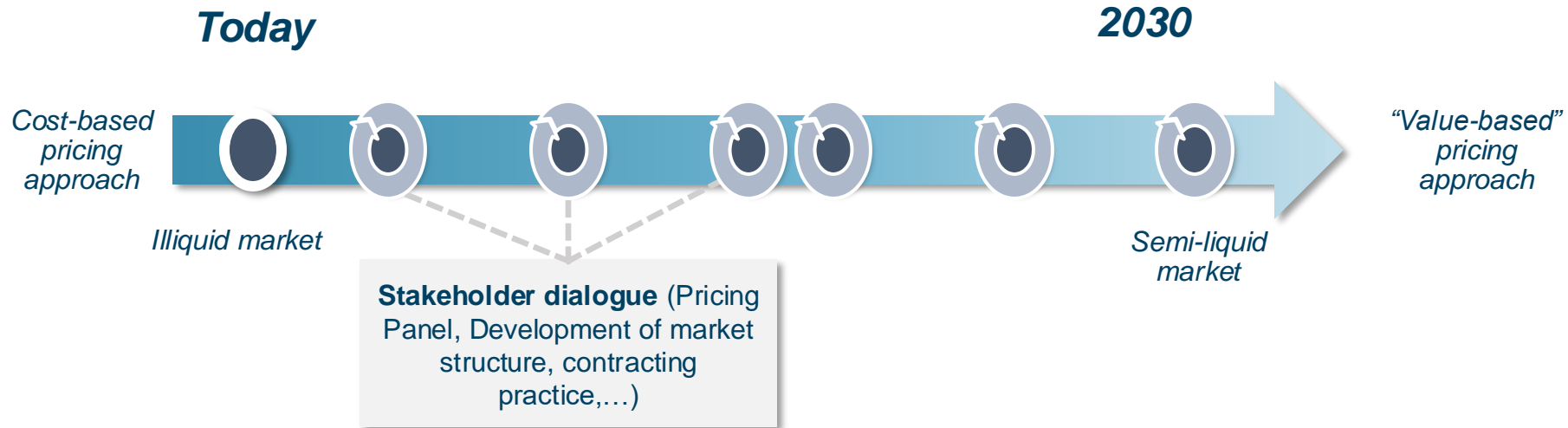


Cost of green power supply  
+ Capex  
= **“Cost-Plus”-Value of Green Hydrogen**

- Estimated Capex for electrolyzer is re-assessed on a regular basis
- Consideration of learning curve effects for „forward“ hydrogen price assessments

# Continuous Alignment of Index Design

- Ongoing Stakeholder Dialogue ensures continuous Alignment of Index Design to evolving Hydrogen Market



# Index Update

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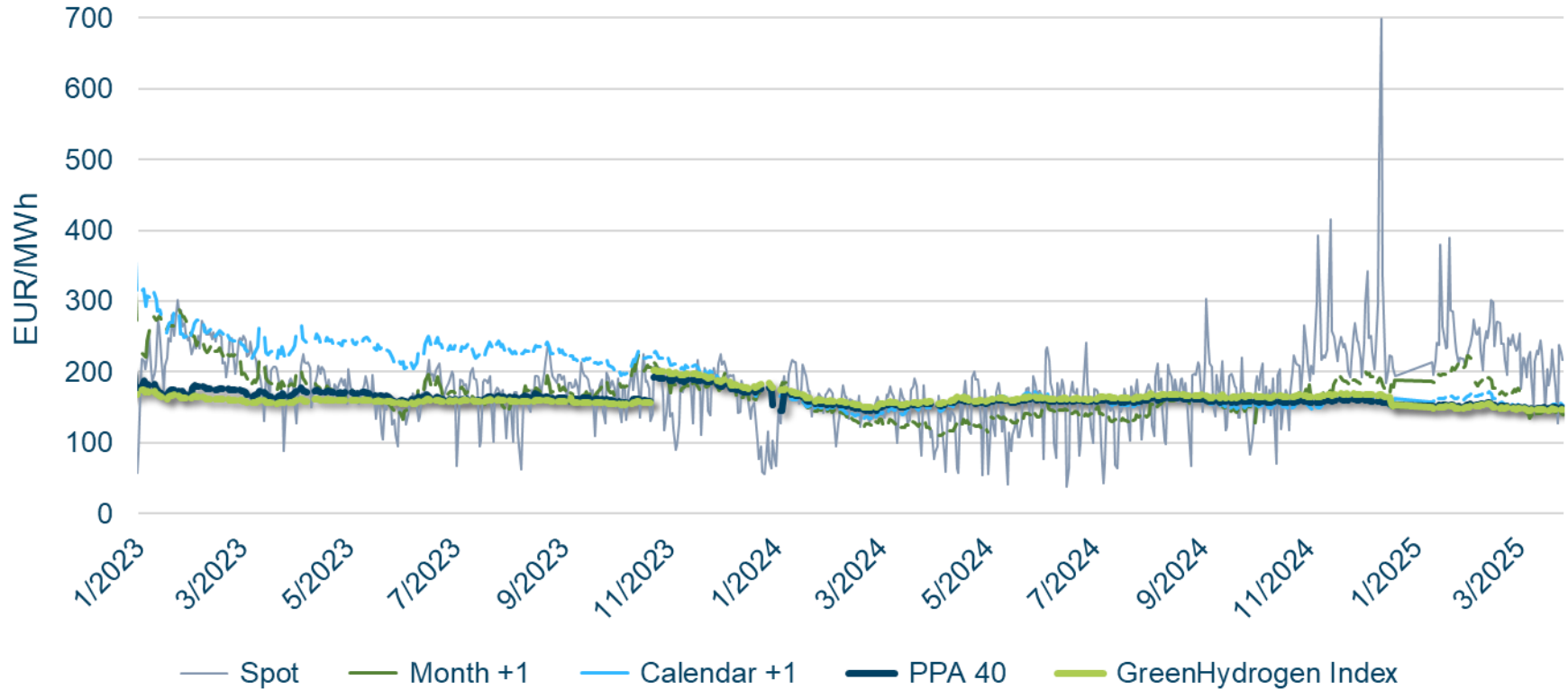
## December 2024 Update:

- ✓ No change of existing Index concept
- ✓ No major changes of the assumptions
- ✓ Noticeable changes:
  - Slight extension of ELY lifetime and increase of efficiency
  - Introduction of ELY degradation
  - Lower WACC for Renewable Hydrogen

## March 2025 Update:

- ✓ PPA pricing model update

# CEGH Green Hydrogen Indices Price History



# CEGH GreenHydrogen Indices on CEGH's Website



➤ New **slide button** to switch from **EUR/MWh(hhv)** to **EUR/kg**



➤ **Access** to CEGH GreenHydrogen Index and Specification:

<https://www.cegh.at/en/greengas/cegh-greenhydrogen-index/>

## CEGH GreenHydrogen Index

Delivery Period	EUR/MWh
10-Year PPA Pay-as-Produced	151.107

Based on 100% power purchase agreement (PPA) supply, compliant with the Delegated Act, RED II.  
MWh High Heating Value

## CEGH GreenHydrogen PPA 40 Index

Delivery Period	EUR/MWh
10-Year Pay-as-Produced	153.044

Based on power supply, not compliant with the Delegated Act, RED II.  
MWh High Heating Value

## CEGH GreenHydrogen Spot Index

Delivery Period	EUR/MWh
4-Feb-2025	254.411

Based on power supply, not compliant with the Delegated Act, RED II.  
MWh High Heating Value



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**THANK  
YOU FOR  
YOUR  
ATTENTION**