2nd Electrolyser Summit

Keynote speech

Jorgo CHATZIMARKAKIS, Chief Executive Officer, Hydrogen Europe
The Electrolyser Partnership mission and members

A catalyst for advancing EU industrial leadership, creating sustainable value chains and jobs.

ELYP Secretariat

Task Force
Critical Raw Materials

Task Force
Funding and Financing

Logos of participating companies and organizations.
The state of play of Europe’s manufacturing capacity as of today

Electrolyzer manufacturing capacity in Europe by 2030 (MW)

CAGR= 88%

Source: Hydrogen Europe complemented with results of the Electrolyser Partnership survey
Enshrining the Electrolyser Partnership objectives into legislation

We must ensure European OEMs:

a) large share in the European Market
b) Competitive presence in global market

EU Electrolyser manufacturing in 2023

100% of the EU's annual deployment needs in 2023

NZIA target

40% of the EU's annual deployment net-zero techs needs by 2030
Access to EU funding is still a large bottleneck

“It takes to **three of my people three hours** to figure out how much difference the **IRA** makes for us.

*It takes to 25 lawyers, engineers and tax professionals two years* to complete one **IPCEI application**, and in the end I still don’t know how much I will get out of it”

-Elon Musk
We all know the valley of death for bringing new technologies to the market.
Important to put more focus on the commercialization stage if we wish to accelerate the growth of the European manufacturing industry

Valley of death - where EU funds phase out

Source: adapted from VDMA
Europe has a lot more projects in the pipeline but similar amounts that have found Final investment decision.

260 projects announced
Preliminary studies or press announcement stage

172 projects in feasibility studies

83 projects in FEED studies

280 projects committed
FID taken, under construction or operational

795 projects with full or partial commissioning (COD) by 2030

+251 projects without specified COD or COD post-2030 (not shown)

1. For multiphase projects, phase 1 decides the project maturity

Source: Project & Investment tracker, as of Jan 31, 2023
Chinese Manufacturing capacity catching up both on volume and in cost

Electrolyzer manufacturing capacity by location

Benchmark electrolysis system capital expenditure by region and by technology, 2021

Source: BloombergNEF, company filings, industry sources

Source: BloombergNEF
Exporting electrolysis technologies around the globe, potential for a huge market
Electrolyser sector highly dependent on China and South Africa

Structural dependencies in the EU supply of CRMs

The H2 industry uses fluoropolymers all across its value chain

1. H2 production
   - Blue hydrogen
   - Capture CO2
   - Reforming (gasification)
   - Natural gas
   - Biomethane
   - Biomass
   - PTFE, ECTFE, Fluoroelastomers
   - PTFE, ECTFE, Fluoroelastomers
   - PTFE, FEP, PFA, FFKM

2. H2 transport, distribution, and storage (incl. Liquefaction & gasification)
   - Overground/H2 tanks
   - Underground/Salt caverns
   - Gas grids
   - Electrolysis
     - Alkaline water electrolysis
     - Anion exchange membrane (AEM) electrolysis
     - Polymer electrolyte membrane (PEM) electrolysis
     - Solid oxide electrolyser cell (SOEC)
   - PTFE, PFA, PTFE, ECTFE, Fluoroelastomers, ECTFE
   - PTFE, ECTFE, Fluoroelastomers
   - PTFE, ECTFE, Fluoroelastomers
   - PTFE, PFA, FFKM

3. H2 end-uses
   - Mobility
   - Power-to-Power
   - Residential/Buildings
   - Industry
   - PTFE, PFA, PTFE, ECTFE, Fluoroelastomers
   - PEMFC & SOFC: PTFE, PSA, PFA, ECTFE, FEP, FFKM, ECTFE
   - H2 ICE: FFKM, PTFE, PFA, ECTFE, Fluoroelastomers
   - PTFE, PFA, PTFE, ECTFE, Fluoroelastomers
   - Road transport
   - Hydrogen liquefaction plant
   - Gasification plant/Process plant
   - Export terminal
   - Import terminal
   - Liquid Hydrogen
   - Ammonia
   - Methanol
Thank You
Electrolyser Partnership

Session 1 – Europe's state of play: ramping up ELY manufacturing capacities and ambitions
Session 1 – Europe’s state of play: ramping up electrolyser manufacturing capacities

Florence LAMBERT-HOGNON
Genvia

Kim S. HEDEGAARD
Topsoe Power-to-X

Paolo Enrico DELLACHÀ
Industrie De Nora

Jean-Baptiste LUCAS
McPhy
The state of play of Europe’s manufacturing capacity as of today

Electrolyzer manufacturing capacity in Europe by 2030 (MW)

CAGR = 88%

Source: Hydrogen Europe complemented with results of the Electrolyser Partnership survey
Key recommendations on behalf of the ELY Partnership

Align NZIA targets with joint declaration, increasing the ambition of 40%. Make NZIA targets specific for electrolysers (and fuel cells) and consider the technological export potential.

Consider the whole supply chain of electrolyser when developing favourable policies for clean technologies.

EU market and legislation on carbon and carbon footprint should be clear, streamlined and fit-for-purpose to ensure EU standards as the global ones.
Thank You

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Session 2 – Funding and financing: opportunities and challenges for electrolyser manufacturing, and its innovation
Session 2

Funding and financing: opportunities and challenges for ELY manufacturing, and its innovation

Nils ALDAG
Sunfire GmbH

Amy ADAMS
Cummins Inc.

Nuno SILVA
EFACEC Power Solutions SGPS

Africa CASTRO
H2B2 Electrolysis Technologies
Draft Session 2 – The Big Picture: Funding Streams for the Electrolyser Industry

R&D and Innovation
Asserting technology leadership

Demonstration
Showing that it works

Scale-Up
Securing sufficient capacity

OPEX funding
Creating demand

Continuous support is needed across all three dimensions, with an increased focus on scaling manufacturing to reach EU targets.

Scaling risks are not yet sufficiently addressed (role for EIB in de-risking).

Getting us close to 10 Mt/y of green hydrogen requires a considerable increase in funding for years ahead.
Key recommendations on behalf of the ELY Partnership

Continuous funding is needed for all electrolyser manufacturing dimensions, from R&I to industrialisation. The latter needs to be enhanced to reach EU's targets.

Not only cash support for electrolyser industrialisation, but also strong backing from guarantees and de-risking measures are a must.

More support is needed for tier 2 suppliers, to scale up manufacturing capacities for components contended across all clean technologies.

Application procedures for EU funding instruments should be accelerated and streamlined.
Thank You

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Session 3 – International Competition: lessons from partners and competitors, the EU response
Matthias ZIEBELL
Robert Bosch GmbH

Raphael TILOT
John Cockerill

Håkon VOLLDAL
Nel Hydrogen

Alexander Habeder
Siemens Energy
# International competition for hydrogen – the EU perspective

<table>
<thead>
<tr>
<th>Country</th>
<th>Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>Hydrogen exporter, High standards commitment</td>
</tr>
<tr>
<td>EU</td>
<td>Highest manufacturing and production standards, Biggest market in the world</td>
</tr>
<tr>
<td>China</td>
<td>Complementary supply of hydrogen components, Huge market for EU hydrogen technologies</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tech competition</td>
<td>Tech competition with EU, full value chain risk</td>
</tr>
<tr>
<td>Regulatory burdens</td>
<td>Regulatory burdens &amp; uncertainties</td>
</tr>
<tr>
<td>Market attractiveness</td>
<td>Market attractiveness, US IRA</td>
</tr>
<tr>
<td>High CAPEX and OPEX</td>
<td>High CAPEX and OPEX</td>
</tr>
<tr>
<td>Less environmental/labour constraints</td>
<td>Less environmental/labour constraints</td>
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<tr>
<td>CRMs main player</td>
<td>CRMs main player</td>
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Key recommendations on behalf of the ELY Partnership

- A specific target for electrolysers should be established in NZIA, to maintain high expectations and to encourage EU manufacturing capacity to lead on a global scale.

- Expansion of international platforms for dialogues with like-minded partners.

- Streamlined funding opportunities in the EU, to be clearer and quicker in allocating resources.

- EU standards and qualitative requirements to be promoted on a global scale, while limiting unfair competition on imports through coherent mechanisms (e.g., CBAM).
Thank You

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Session 4 – CRMs and advanced materials for a coherent EU’s ELY expansion
Dependency on raw materials (extraction and processing) for electrolyser and fuel cells

Source: JRC Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU – A foresight study (2023)

Critical Raw Materials Act proposal

The EU wants to lower its supply chain risks and dependencies of less than 65% on a single material, on a single country

<table>
<thead>
<tr>
<th>Metal</th>
<th>Required Production (tons)</th>
<th>Known Reserves (tons)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>4,575,523,674</td>
<td>880,000,000</td>
<td>Reserves cover 20% of requirements</td>
</tr>
<tr>
<td>Cobalt</td>
<td>218,396,990</td>
<td>7,600,000</td>
<td>Reserves cover 3.48% of requirements</td>
</tr>
<tr>
<td>Graphite</td>
<td>8,973,640,257</td>
<td>320,000,000</td>
<td>Reserves cover 3.57% of requirements</td>
</tr>
<tr>
<td>Lithium</td>
<td>944,150,293</td>
<td>95,000,000</td>
<td>Reserves cover 10% of requirements</td>
</tr>
<tr>
<td>Manganese</td>
<td>227,889,504</td>
<td>15,000,000,000</td>
<td>Adequate reserves</td>
</tr>
<tr>
<td>Nickel</td>
<td>940,578,114</td>
<td>95,000,000</td>
<td>Reserves cover 10% of requirements</td>
</tr>
<tr>
<td>Silicon (metal)</td>
<td>49,571,460</td>
<td></td>
<td>Adequate reserves</td>
</tr>
<tr>
<td>Silver</td>
<td>145,579</td>
<td>530,000</td>
<td>Adequate reserves</td>
</tr>
<tr>
<td>Vanadium</td>
<td>681,865,986</td>
<td>24,000,000</td>
<td>Reserves cover 3.52% of requirements</td>
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<tr>
<td>Zinc</td>
<td>35,704,918</td>
<td>250,000,000</td>
<td>Adequate reserves</td>
</tr>
<tr>
<td>Zirconium</td>
<td>2,614,126</td>
<td>70,000,000</td>
<td>Adequate reserves</td>
</tr>
</tbody>
</table>


* Of total global supply (2021)
The hydrogen industry uses fluoropolymers across its whole value chain.
Key recommendations on behalf of the ELY Partnership

Define CRMA targets accordingly to each materials/family of materials, otherwise measures on PGMs will be overlooked. On the 65% import dependency on a single country, re-consider it for PGMs as there are no alternatives.

Consider material scarcity/competition with other clean sectors in the long-term.

Increase and accelerate R&I capacities on strategic material performance and their circularity by connecting interdisciplinary pillars.

Commission to consider an exclusion for the manufacturing and the use of fluoropolymers in electrolyser and fuel cell components from a potential general PFAS ban.
Thank You

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