

# **Imperial College London Participation**

Clean Hydrogen Joint Undertaking

## **Table of contents**

Anionic Exchange Membrane water Electrolysis for highly efficient, sustainable, and clean Hydrogen production

2

## **Introduction**

This booklet comprises the Project under the Clean Hydrogen Joint Undertaking that Imperial participate in as an Associated Partner. Funding from UKRI Horizon Guarantee.

# Anionic Exchange Membrane water Electrolysis for highLY efficientTcy sustAinable, and clean Hydrogen production

## Fact Sheet

### Project Information

#### AEMELIA

Grant agreement ID: 101137912

#### EC signature date

6 December 2023

#### Start date

1 January 2024

#### End date

28 February 2027

#### Funded under

Climate, Energy and Mobility

#### Total cost

€ 2 764 927,00

#### EU contribution

€ 2 764 926,75

#### Coordinated by

COMMISSARIAT A L ENERGIE  
ATOMIQUE ET AUX ENERGIES  
ALTERNATIVES

 France

## Objective

AEMELIA accepts the challenge to design and prototype AEMEL that meets and surpasses Hydrogen Europe's 2030 targets for performance, durability, safety and cost. AEMELIA proposes a clear path to reach high current-density (1.5 A cm<sup>-2</sup>) and low voltage (1.75 V). Energy-efficiency surpasses the 2030 target (46.9 kWh/kg, or 85% of maximum theoretical efficiency), to make 3 times more H<sub>2</sub> with less energy compared to XY. LCOH also outshines 2030 targets at 2.5€/kgH<sub>2</sub> (17% lower than 2030 target). The degradation rate meets the 2030 target, enabling a 10-year

lifetime. These and other KPIs will be validated via the TRL4 prototype of a 5-cell stack at 100 cm<sup>2</sup> that will deliver 7.2 Nm<sup>3</sup>/day of H<sub>2</sub> at a purity of 99.9% at 15 bar. The team will develop and test disruptive materials, such as fluorine-free ionomers ; thin, highly-conducting membranes ; PGM-free recombination catalysts ; and ionomer-free electrodes. These components are based on earth-abundant, safe materials. They would be fully scalable via existing manufacturing processes. They will be combined in innovate cell designs, taking into account novel flow-field design based on CFD models. Innovative operating conditions such as high operating temperature and pulsed current will increase energy-efficiency while reducing balance of plant (BoP) and will be tested in single cells, as will the use of impure water for improved LCA and cost. Lastly, disruptive methods for AI-based ionomer development and the measurement of the catalytically-active surface area of non-PGM catalysts will be developed.

Performance, durability, LCA and cost KPIs will be shared with companies to convince them to invest in upscaling after the project. Partners have many success stories in developing disruptive electrochemical materials and systems and bringing them to market. AEMELIA's market penetration in 2031 is expected to generate 527 M€ in revenues by 2036, and 1172 kt CO<sub>2</sub>/year avoided compared to steam methane reforming.

## Fields of science

[engineering and technology](#) > [mechanical engineering](#) > [manufacturing engineering](#)

[natural sciences](#) > [chemical sciences](#) > [electrochemistry](#) > [electrolysis](#)

[natural sciences](#) > [chemical sciences](#) > [catalysis](#)

[natural sciences](#) > [chemical sciences](#) > [organic chemistry](#) > [aliphatic compounds](#)

[engineering and technology](#) > [environmental engineering](#) > [energy and fuels](#) > [renewable energy](#) > [hydrogen energy](#)

## Keywords

[hydrogen](#)

[anion exchange membrane](#)

[electrolysis](#)

[CRM-free catalyst](#)

[F-free membrane](#)

[stack development](#)

[Material Informatics](#)

[CFD model](#)

[LCA](#)

[electrochemical surface area](#)

[Recombination catalyst](#)

[PTL](#)

## Programme(s)

## Topic(s)

[HORIZON-JTI-CLEANH2-2023-01-01 - Innovative electrolysis cells for hydrogen production](#)

## Call for proposal

[HORIZON-JTI-CLEANH2-2023-1](#)

[See other projects for this call](#)

## Funding Scheme

[HORIZON-JU-RIA - HORIZON JU Research and Innovation Actions](#)

## Coordinator



**COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES**

Net EU contribution

**€ 596 349,25**

Address

**Rue leblanc 25**

**75015 Paris 15**

 **France** 

Region

**Ile-de-France > Ile-de-France > Paris**

Activity type

**Research Organisations**

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

**€ 0,25**

## Participants (9)

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### FUNDACION TECNALIA RESEARCH & INNOVATION

 Spain

Net EU contribution

**€ 380 053,75**

Address

**Parque científico y tecnologico de gipuzkoa, paseo mikeletegi 2  
20009 Donostia-san sebastian (gipuzkoa)** 

Region

**Noreste > País Vasco > Gipuzkoa**

Activity type

**Research Organisations**

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

**€ 0,00**

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### SINTEF AS

 Norway

Net EU contribution

**€ 409 218,75**

Address

**Strindvegen 4  
7034 Trondheim** 

Region

**Norge > Trøndelag > Trøndelag**

Activity type

**Research Organisations**

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

Other funding

€ 0,00

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## CONSIGLIO NAZIONALE DELLE RICERCHE

 Italy

Net EU contribution

€ 410 000,00

Address

**Piazzale aldo moro 7**  
**00185 Roma** 

Region

**Centro (IT) > Lazio > Roma**

Activity type

**Research Organisations**

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

€ 0,00

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## CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

 France

Net EU contribution

€ 203 366,25

Address

**Rue michel ange 3**  
**75794 Paris** 

Region

**Ile-de-France > Ile-de-France > Paris**

Activity type

**Research Organisations**



Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

€ 0,00

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## SOLVAY SPECIALTY POLYMERS ITALY SPA

 Italy

Net EU contribution

€ 109 035,00

Address

Viale lombardia 20  
20021 Bollate mi 

Region

Nord-Ovest > Lombardia > Milano

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

€ 0,00

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 THIRD-PARTY 

## Rhodia Laboratoire du Futur

 France

Net EU contribution

€ 64 970,00

Address

Avenue du docteur schweitzer 178  
33608 Pessac 

Region

Nouvelle-Aquitaine > Aquitaine > Gironde

Activity type

**Private for-profit entities (excluding Higher or Secondary Education Establishments)**

Links

[Contact the organisation](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

**€ 0,00**

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 **THIRD-PARTY** 


## **SPECIALTY OPERATIONS FRANCE**

 France

Net EU contribution

**€ 173 256,25**

Address

**9 rue des cuirassiers immeuble silex 2 solvay  
69003 Lyon** 

Region

**Auvergne-Rhône-Alpes > Rhône-Alpes > Rhône**

Activity type

**Private for-profit entities (excluding Higher or Secondary Education Establishments)**

Links

[Contact the organisation](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

**€ 0,00**



## **CLAIND SRL**

 Italy

Net EU contribution

**€ 268 677,50**

Address

**Via regina 24  
22016 Como** 

Region

**Nord-Ovest > Lombardia > Como**

Activity type

**Private for-profit entities (excluding Higher or Secondary Education Establishments)**

Links

[Contact the organisation](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

**€ 0,00**



## **MATGENIX**

 Belgium

Net EU contribution

**€ 150 000,00**

Address

**Rue armand bury(goz) 185**

**6534 Thuin** 

SME 

**Yes**

Region

**Région wallonne > Prov. Hainaut > Arr. Thuin**

Activity type

**Private for-profit entities (excluding Higher or Secondary Education Establishments)**

Links

[Contact the organisation](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

**€ 0,00**

## **Partners (1)**



## IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE

 United Kingdom

Net EU contribution

**€ 0,00**

Address

**South kensington campus exhibition road  
SW7 2AZ London** 

Region

**London > Inner London — West > Westminster**

Activity type

**Higher or Secondary Education Establishments**

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Other funding

**No data**

**Last update:** 8 January 2024

**Permalink:** <https://cordis.europa.eu/project/id/101137912>

European Union, 2024