Harnessing Innovation: Driving Energy Efficiency in Industrial Manufacturing

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MOTOR OIL

Motor Oil Group | Energy Transition plan

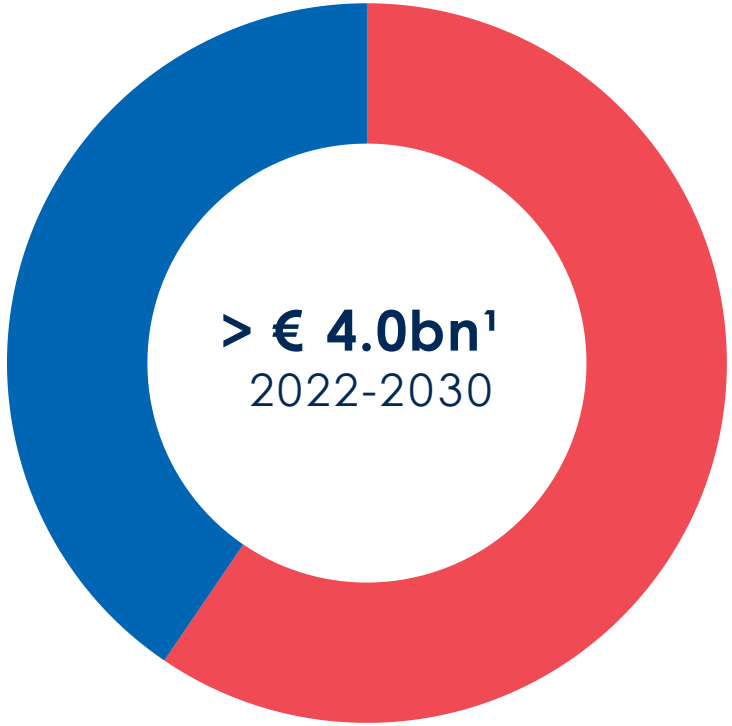
Transforming into a Multi-Energy Leader in Southeastern Europe

...while Delivering one of the Largest Energy Transition Programs in the Region

> € 1.5bn

Maintenance & Resilience

- Facilities Maintenance
- Logistical Improvements
- Digitalisation
- Efficiency and HSSE projects



Growth & Energy Transition

- Renewable Energy Sources
- Petrochemicals
- Natural Gas
- Biofuels
- Hydrogen Decarbonisation

> € 2.5bn

In the last 12 months, we made significant progress towards our energy transition plan, delivering results in advance of the original timeline

Notes: 1. Including mergers, acquisitions and investments.

Group Strategic Plan towards Energy Transition

Resilience

Sustainable Growth

Refining, Supply & Trading

- Operational efficiency & flexibility
- Decarbonisation
- Digitalisation
- Diversification into petrochemicals

Mobility & Retail

- Enhanced customer value proposition
- Electrification & e-mobility
- Lower carbon fuels

Renewable Energy

- Diversified operational RES portfolio
- Strong pipeline for organic growth
- Batteries & storage

Alternative Fuels & Circular Economy

- Natural & renewable gas
- Hydrogen
- Advanced biofuels & e-fuels
- Waste management & recycling
- Lubricants' regeneration
- Biofuels' feedstock

Credible Pathway to Reduce GHG Emissions

Decarbonisation of our Activities

- Secured € 127mn for implementation of CCS on SMR unit (Project IRIS)
- Low-carbon H_2 to reduce Refinery GHG emissions further
- Reduced emissions from power unit efficiencies and recycled H_2
- Ongoing energy conservation initiatives
- 10 MW PVs installed on refinery alongside 6 MW storage. 24 MWh storage system

Under the umbrella of the Blue Med program. Currently under evaluation/ maturation.

Decarbonisation of our Products

- ~60,000 t per year of low-carbon H2 to be produced by 2028
- ~10,000 t per year of e-methanol to be produced by 2028
- 220 ktpa biodiesel production capacity from co-processing biogenic feedstock

CO_2 Emissions Reduction Based on Visible Projects

> 500,000 tpa[1]

Scope 1& 2
CO_2 Emission Reduction

> 500,000 tpa

Scope 3
CO_2 Emission Reduction

Notes: 1. Represents ~25% of current Scope 1 & 2 emissions level at MOH

Decarbonisation Targets and Plan Going Forward

30%
CO_2 Emission Reduction
(Scope 1&2)

25%
CO2 Emission Reduction
(Scope 3)

- Energy efficiency initiatives
- Renewable energy production and usage
- On-site RES and battery storage installations
- Innovative processing and digital technologies
- E-mobility
- Lower carbon power generation
- Production of E–fuels and clean hydrogen
- Biofuels production
- Carbon capture and storage
- Market based measures

2030

Net Zero
Emissions (Scope 1, 2, 3)

2050

Increasing Energy efficiency in our operations

Implementing a certified environmental and energy management system

- in accordance with ISO 14001 and ISO 50001 - Motor Oil is certified by the voluntary scheme 2BS, which provides accurate and reliable information regarding the origin of the biomass and biofuel utilized.

Energy Efficiency in the refinery:

- Implementation of AI to optimize energy consumption & preventive maintenance
- 10 MW PVs installed on refinery alongside 6 MW storage. 24 MWh storage system
- Specialized Energy Team towards energy efficient operations
- improvement of 11 % compared to the past energy performance of a study conducted in 2012, saving an equivalent of 67 MW

Research & Investment projects

BLUE MED: The Path Towards a Low Carbon Energy Hub in East Med

Phased development of flexible, scalable and cost advantaged infrastructure for the production and distribution of Renewable & Ultra-low Carbon Hydrogen for use in industry and transport

PRODUCTION

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Green H2 – Electrolysis

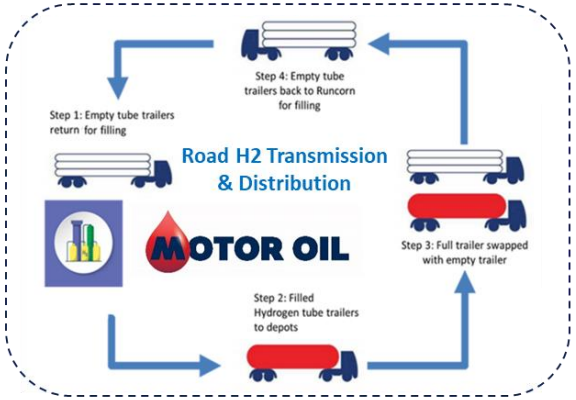
30MW
(expandable to 50MW)

Blue H2 – Refinery CCS

CO2

MOTOR OIL

CONVERSION & DISTRIBUTION



NG Grid & H2 pipeline Injection & Trans-boundary Transport

Injection to Gas Turbine

Alternative & Renewable Fuels

UTILIZATION

Industry
LPC Green Lubricants

Transport Sector
Heavy Duty Vehicles

Short-sea Shipping

Investment*
~ €350 m.

*Production - Supply - Distribution excluding H2 utilization projects

H2 Product
~60,000 t/y

to refinery
~34,000 t/y

to customers
~26,000 t/y

Decarbonization of Industry and Transport

Scope-1*
-460,000
t CO2/y

Scope-3*
-66,000
t CO2/y

*Enabling additional 848,00 in-direct Scope-3 avoidance

Focus on Green Transformation through Innovation

EPHYRA - Establishing European Production of Hydrogen from RenewAble energy and integration into an industrial environment

GA No: 101112220

DURATION 60 MONTHS
Start: 01 June 2023
End: 30 May 2028

EC GRANT
17.757.840€

FUNDED UNDER
Horizon Europe, Clean Hydrogen JU

CONSORTIUM
10 partners from 7 countries

TRIERES - Towards the development of a hydRogen valley demonstratIng applications in an intEgRated EcoSystem in Greece

GA No: 101112056

DURATION 58 MONTHS
Start: 01 July 2023
End: 30 April 2028

EC GRANT
7.995.826€

FUNDED UNDER
Horizon Europe, Clean Hydrogen JU

CONSORTIUM
26 partners from 5 countries

REA - Construction of an HRS for passenger, light-duty and especially long-haul heavy-duty vehicles in Agioi Theodoroi (Corinth, Peloponnese, Greece)

GA No: 101079451

DURATION 28 MONTHS
Start: 01 November 2021
End: 29 February 2024

EC GRANT
1.455.492€

FUNDED UNDER
Connecting Europe Facility

CONSORTIUM
AVINOIL

REAH2 - Construction of a HRS for passenger cars, light-duty and heavy-duty vehicles in Akrata (Achaia, Western Greece)

GA No: 101119200

DURATION 31 MONTHS
Start: 01 April 2023
End: 31 October 2025

EC GRANT
1.700.585€

FUNDED UNDER
Connecting Europe Facility

CONSORTIUM
AVINOIL

CLEA - Construction of electricity recharging stations with super chargers along the TEN-T road network in Greece

GA No: 101079449

DURATION 31 MONTHS
Start: 01 November 2021
End: 30 April 2024

EC GRANT
2.790.000€

FUNDED UNDER
Connecting Europe Facility

CONSORTIUM
AVINOIL, CORAL

IRIS - Innovative low caRbon hydrogen and methanol productIon by large Scale carbon capture

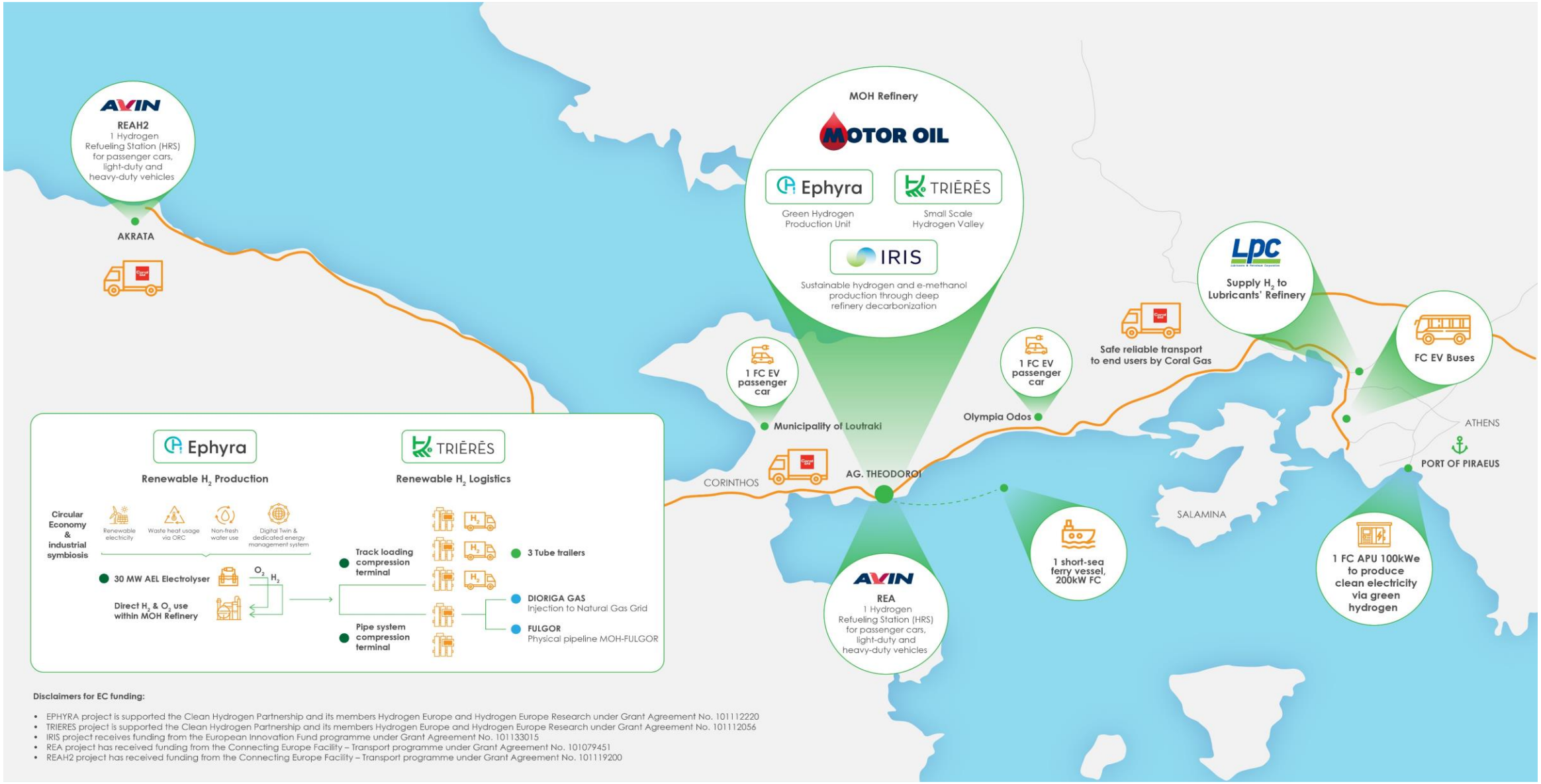
GA No: 101133015

DURATION 168 MONTHS
Start: 01 January 2024
End: 30 June 2037

EC GRANT
126.790.000€

FUNDED UNDER
Innovation Fund / Large scale Projects

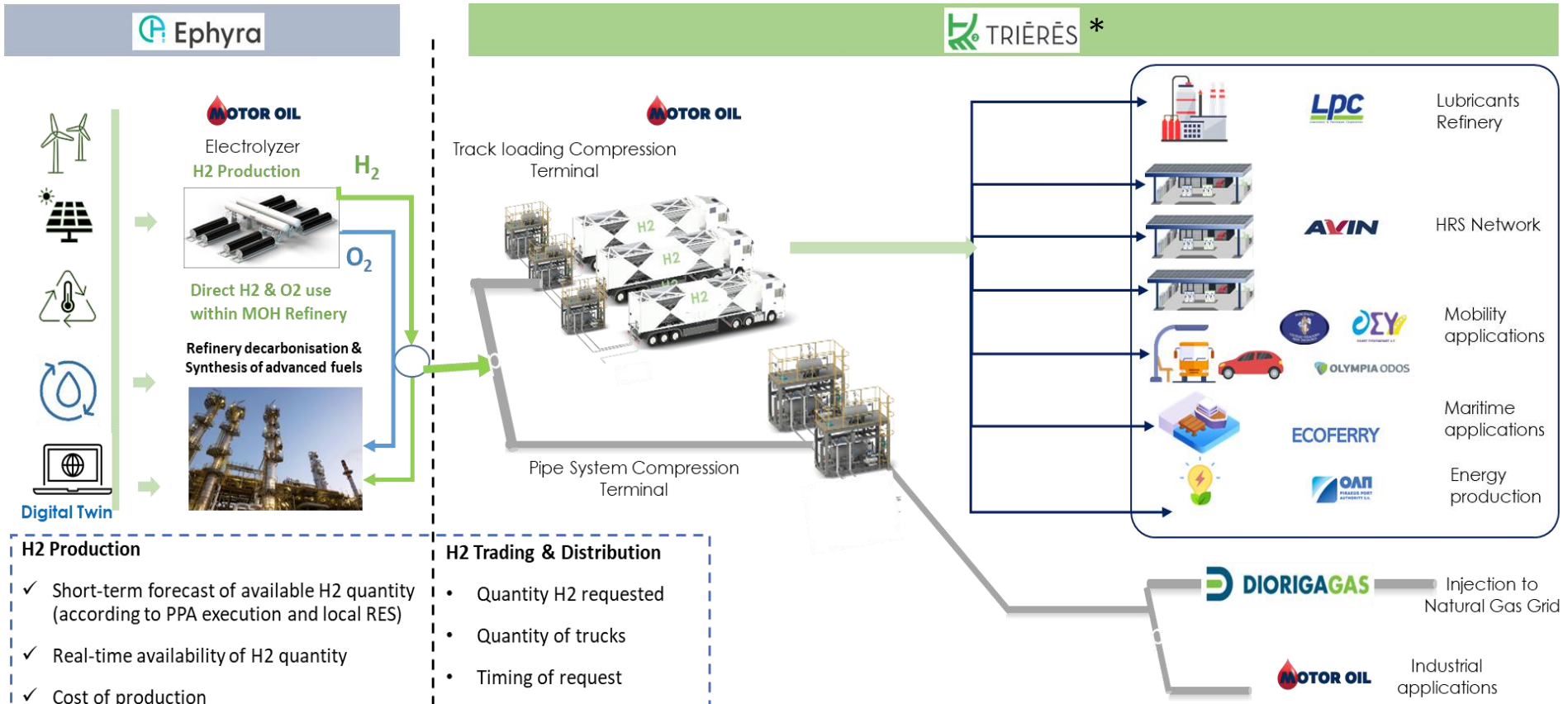
CONSORTIUM
MOTOR OIL



Disclaimers for EC funding:

- EPHYRA project is supported the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research under Grant Agreement No. 101112220
- TRIERES project is supported the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research under Grant Agreement No. 101112056
- IRIS project receives funding from the European Innovation Fund programme under Grant Agreement No. 101133015
- REA project has received funding from the Connecting Europe Facility – Transport programme under Grant Agreement No. 101079451
- REAH2 project has received funding from the Connecting Europe Facility – Transport programme under Grant Agreement No. 101119200

Value chain - from enhanced renewable H2 production to a small-scale valley operations



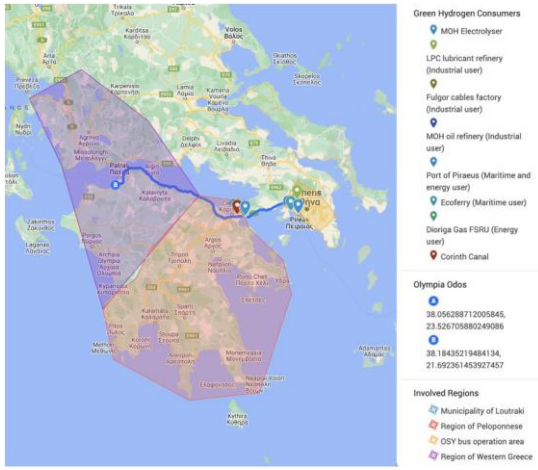
H2 Production

- ✓ Short-term forecast of available H2 quantity (according to PPA execution and local RES)
- ✓ Real-time availability of H2 quantity
- ✓ Cost of production
- ✓ H2 quality parameters

H2 Trading & Distribution

- Quantity H2 requested
- Quantity of trucks
- Timing of request
- Quality of supply
- Retail cost to the customer

TRIERES valley geographical coverage



* The Greek Hydrogen Valley will be developed in the framework of the EU project TRIERES co-funded by the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research under Grant Agreement No. 101112056.

Ephyra in a nutshell

MOTOR OIL HELLAS

Coordinator / Electrolyser Operator

ENERTIME

Beneficiary / ORC technology

CERTH

Beneficiary / Technology assessment, lab scale plasma technology experiments for WWT processing, Modeling, optimization, digital twin

NEW ENERGY COALITION

Beneficiary / Communication, dissemination

ITAINNOVA

Beneficiary / Digital twin of electrical network

RINA CONSULTING

Beneficiary / Life Cycle & Cost Benefit Analysis

DLR

Beneficiary / Modeling, optimization, digital twin

SOLUFORCE

Beneficiary / Transport piping (RTP)

ENVIROMETRICS

Beneficiary / Emission monitoring & GHG footprint

SIEMENS PROCESS SYSTEMS ENGINEERING

Associated Partner / Process modelling, digital twin, Real-time digital operation support

Ephyra

7 countries

10 partners

30MW electrolyser

18M total EU grant in €

60M ~ 5 years

June 2023 – May 2028

The project is supported by the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research under Grant Agreement No. 101112220

Co-funded by the European Union

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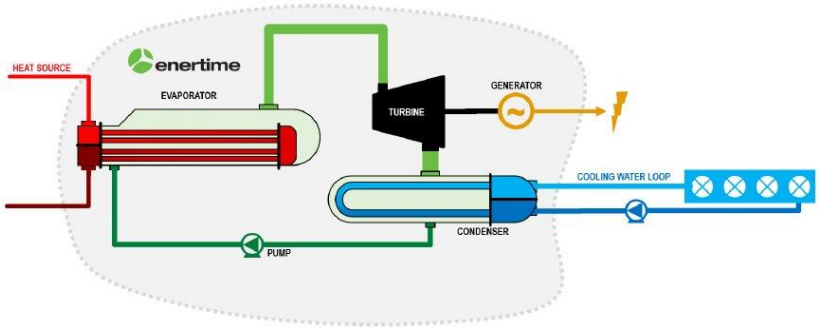
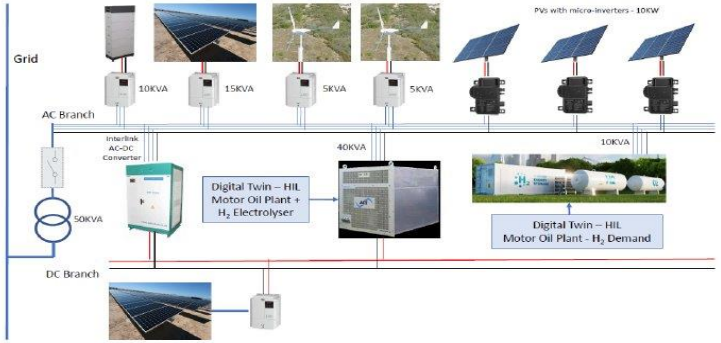
Ephyra: Innovations

INNOVATIONS to achieve the high level objectives:

1. Large-scale (5-10MW stacks), pressurized (30bar) systems with next generation electrode technology to optimize performance, cost, footprint and dynamic response
2. Usage of Co-product Oxygen at the refinery (e.g. Claus units)
3. Usage of waste heat for energy generation (1MW) via an Organic Rankine Cycle machine
4. Usage of non-fresh Water (desalination) and assessment of a novel method of reject water re-use via lab-scale plasma wastewater treatment
5. Optimal design of large-scale industrial electrical grids & energy management concept
6. Digital process twin development
7. Transport piping concept via use of Reinforced Thermoplastic Pipes (RTP)





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TRIERES in a nutshell

MOTOR OIL · AVIN · LPC · DIORIGAGAS · ITE · NEEST · ΟΛΠ · HYDRUS · GROWTHFUND · NOVA · ΟΛΥΜΠΙΑ ΟΔΟΣ · ΔΕΗ · REGION OF PELOPONNESE · ΟΣΥ · ECOFERRY · FULGOR S.A.

TRIĒRĒS

5 countries	26 partners
2,410 tons of green H2 supplied per year	9,980 Tons/year CO_2 removed from industry & mobility via fuel substitution with green H2
58M ~ 5 years July 2023 – April 2028	8M total EU grant in €

The project is supported by the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research under Grant Agreement No. 101112056

Clean Hydrogen Partnership · Co-funded by the European Union

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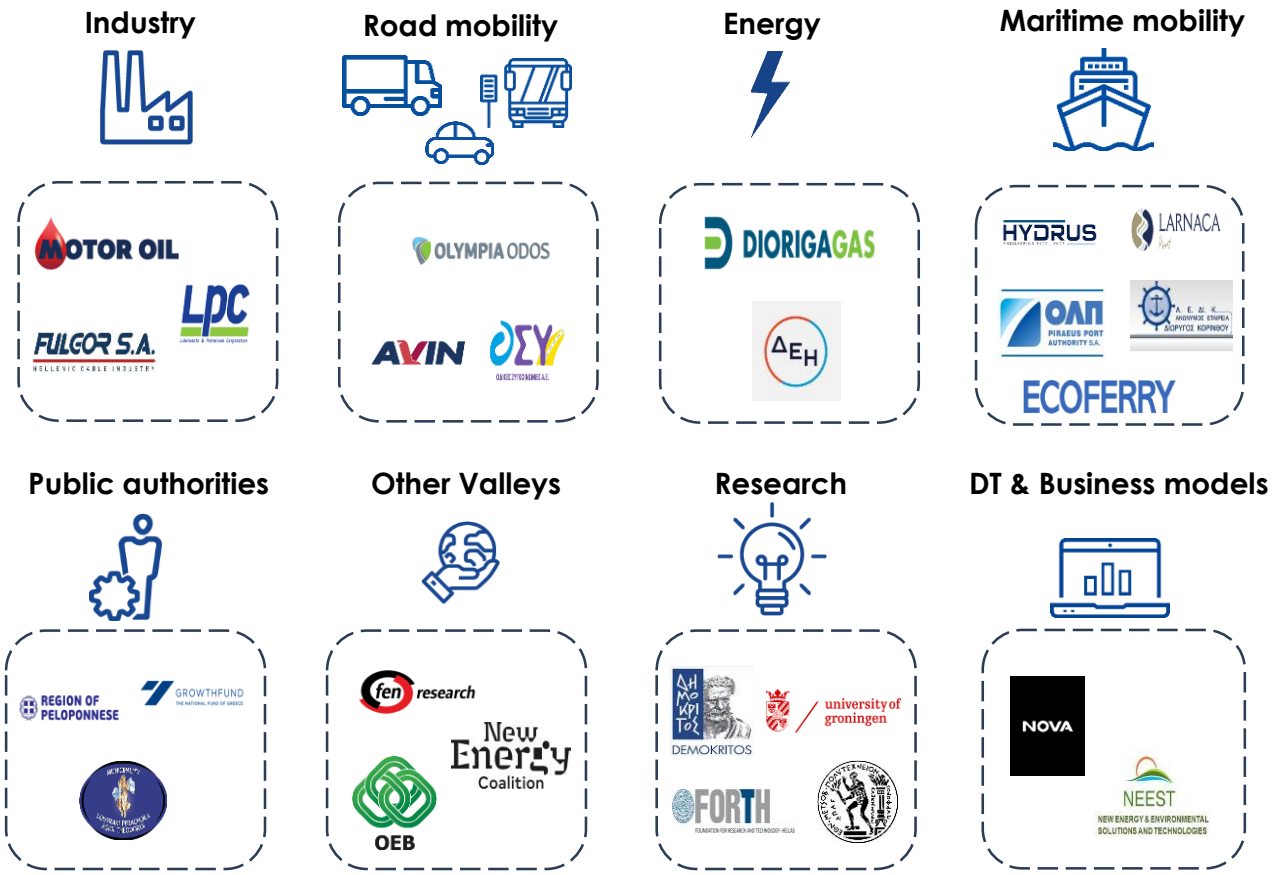
TRIERES: Versatility in end-use applications



Industry:

- Consumption of renewable hydrogen by **Motor Oil Hellas refinery** in Ag. Theodoroi and the **lubricant refinery of LPC** in Aspropyrgos during TRIĒRĒS project, aiming to reduce carbon dioxide emissions from their production processes.
- 3 **hydrogen tube trails**

Road Mobility:

- Up to three (3) **urban buses** operated within the metropolitan area of Athens.
- One (1) **light hydrogen-powered vehicle** used for day-to-day operations along the TEN-T network.
- One (1) **passenger car** operated by the Municipality of Loutraki– Perachora – Ag. Theodoroi.

Energy:

- One (1) **small-scale clean energy production unit** (100 kWe FC-APU) to produce electricity via green hydrogen at the Port of Piraeus.

Maritime Mobility:

- One (1) **short sea ferry vessel** retrofitted with a 200kW FC system.

The project is supported by the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research under Grant Agreement No. 101112056

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IRIS in a nutshell

IRIS project **comprises a novel, heavily integrated point-source CCUS technology solution**, applied on its current hydrogen production process and its coupling to a small-scale methanol production unit, which will utilize part of the captured CO2 as feedstock.
MOH's innovative project IRIS, seeks to couple **the production of ultra-low carbon hydrogen and methanol by integrating point-source carbon capture ,** applied on its current Steam Methane Reforming unit, electrolytic H2 production and a catalytic process of high selectivity.

Coordinator: Motor Oil (Hellas) Corinth Refineries S.A.

Location: Greece

Sector: Refineries

Amount of IF grant: €126.790.000

Duration: 168 months

Starting date – Ending date: January 2025 – June 2037

Planned date of entry into operation: June 2028

MOH Refinery, Agioi Theodoroi, Corinth, Greece

The project is funded from the European Innovation Fund programme under Grant Agreement No. 101133015.

Funded by the European Union
Emissions Trading System
Innovation Fund

IRIS | Key project aspects

IRIS constitutes a significant step:

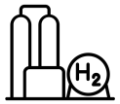
(a) in the decarbonization plan of MOH carbon capture project implemented in Steam Methane Unit of the refinery with post-combustion capture technology scheme which allows maximization of the CO2 captured

- decrease the total carbon footprint of the refinery by 25% (~495,000 t/y of CO2 captured)
- achieves very high energy integration with the existing refinery operations, further reducing its total energy requirement
- will lay the foundation for the future expansion of the CO2 capture technology to two more refinery units, that could further decrease the total refinery carbon footprint by 50%

(b) for the production of low CO2 energy carriers for mobility purposes and other industrial usage

- 55,280 t/y of blue - ~37% lower than the EU Taxonomy threshold hydrogen produced
- 10.000 t/y e- methanol as part of the captured CO2 will be combined with electrolytic H2 produced by a 30MW electrolyzer (EPHYRA), materializing the principles of circular economy

(c) to lever the development of the very few CO2 storage facilities in the Mediterranean Sea



(d) for the creation of a wider ecosystem of projects that promote the development of the hydrogen market, namely the EU-backed projects EPHYRA and TRIERES

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Thank you!