//EU HYDROGEN RESEARCH DAYS 15-16 NOVEMBER

TRIĒRĒS

Towards the development of a hydRogen valley demonstratIng applications in an integrated EcoSystem in Greece

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Project Overview

Call year: 2022

Call topic:
HORIZON-JTI-CLEANH2-2022-06-02 | Hydrogen Valleys (small-scale)

Project dates:
01/07/2023 - 01/05/2028

Total project budget:
10,492,431.25€

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% stage of implementation
01/11/2023: ~6,5%

Maximum grant amount (decision award): 7,995,825.63€

Partners and location of the Hydrogen Valley

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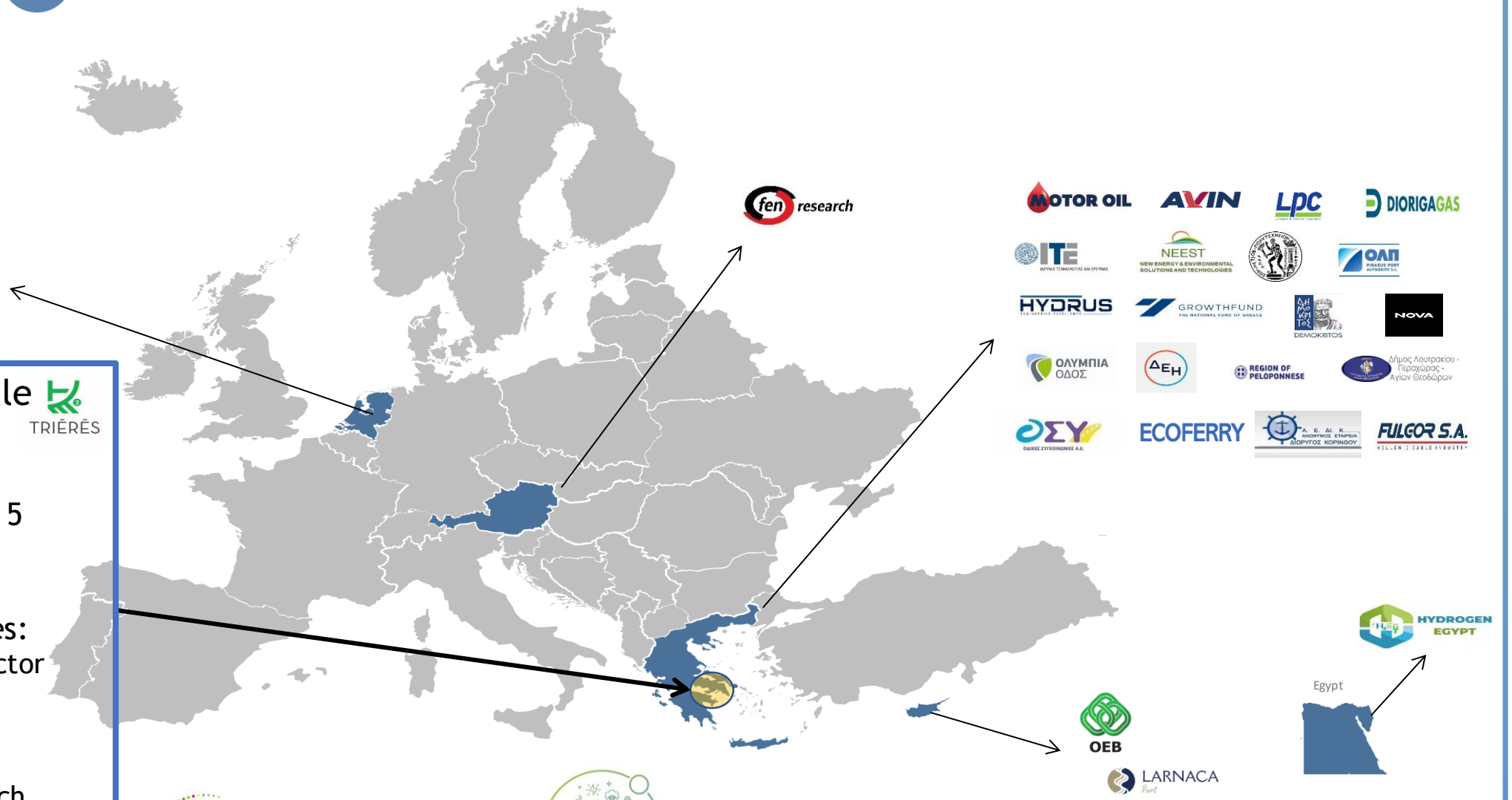

TRIERES small-scale valley (Greece)

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- 26 partners from 5 countries

- Partner categories:
  - Private & public sector companies
  - Local & Regional Authorities
  - Academic & Research Institutions

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TRIERES Small Scale Valley Value Chain

TRIERES valley geographical coverage

* The 30 MW Electrolyser will be developed and demonstrated in the framework of the EU project EPHYRA co-funded by the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research under Grant Agreement No. 101112220

Ephyra *

MOTOR OIL

Electrolyzer

H2 Production

H_2

O_2

Direct H2 & O2 use within MOH Refinery

Refinery decarbonisation & Synthesis of advanced fuels

Digital Twin

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MOTOR OIL

Track loading Compression Terminal

Pipe System Compression Terminal

LPC — Lubricants Refinery

AVIN — HRS Network

ΟΣΥ, OLYMPIA ODOS — Mobility applications

ECOFERRY — Maritime applications

ΟΛΠ — Energy production

DIORIGAGAS — Injection to Natural Gas Grid

MOTOR OIL — Industrial applications

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

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Calendar for project implementation and progress

TRIERES valley component	Responsible partner/ Owner	Funding source	1st Phase Development	2nd Phase Deployment	3rd Phase Operation
			Studies - tenders	EPC	Operation
30 MW Electrolyser	MOH	External to TRIĒRĒS	2022-23	2023-2024	2025
Compression & Trailer Filling Terminal	MOH	External to TRIĒRĒS	2022	2023	2024
NG grid injection compressor	DG	External to TRIĒRĒS	2023-2024	2024-2025	2026
3 Tube Trailers	MOH	In TRIĒRĒS	2022	2023	2024
5 HRS	AVIN	External to TRIĒRĒS	2022-2024	2023-26	2024-2027
Port Bunkering facilities	PPA	Studies in TRIĒRĒS	2023-2026	-	-
Hydrogen purification	MOH	External to TRIĒRĒS	2022	2023	2024
Pipeline to FULGOR	MOH - FUL	Studies in TRIĒRĒS EPC external to TRIĒRĒS	2023-2024	2025	2026
FC short sea ferry	ECO	In TRIĒRĒS	2023-2024	2024-2026	2027
3 Buses	OSY	In TRIĒRĒS	2023-2024	2024-2025	2026
Passenger Car(s)	OLOD	In TRIĒRĒS	2023-2024	2024-2025	2026
Passenger Car(s)	MOL	In TRIĒRĒS	2023-2024	2024-2025	2026

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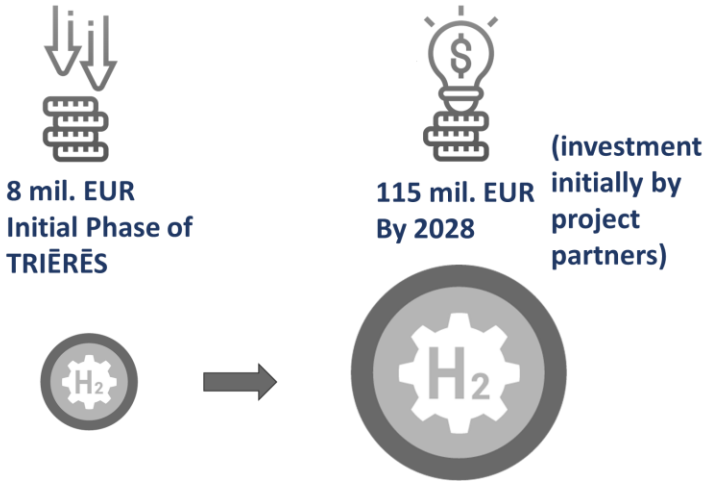
Project financing and funding

TRIĒRĒS uses multiple financing sources

- TRIĒRĒS partners have a clear and structured plan to finance the investment within the Valley in line with state-aid rules.
- TRIĒRĒS grant will provide approximate 1% of the valley investment cost to set up the market and disseminate the results to attract more stakeholders.
- TRIĒRĒS entails an investment of 115 mil EUR (initially by project partners) up to 408 million EUR (potential direct/indirect leverage of investments).
- Partners will exploit additional synergies with other tools and funding mechanisms e.g.:
  - Recovery and Resilience Facility (RRF)
  - Connecting Europe Facility (CEF) programme
  - Horizon Europe
  - Loans and equity

Investment leverage by the TRIĒRĒS project



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Training and Skills

TRIERES Valley development and operation will run in parallel with:

- Focused training activities
  - Over 4 online trainings tutorials
  - 4 webinars and
  - 2 PhD summer schools

- 10 training programs focused on reskilling of personnel

- TRIERES Young Researcher Network (YRN)
  - Provide counsel and training to young researchers and engineers with support from the External Advisory Board to help them excel and develop their careers.

Replication activities

Country based replication - Bridge Hydrogen Valleys' experience (dedicated WP)

- Collaboration with existing HEAVENN, WIVA P&G HyWest Valleys
- Transfer knowledge and knowhow to developing valleys in EU (Cyprus) and third countries (Egypt)
- Connect with international valleys from Mission Innovation countries

Sector based replication – Build upon and multiply activities

- Maritime applications – More ports and vessels
- Road transport applications – More HRSs and vehicles to other regions
- Industrial applications – Additional industries benefit from the supply plan of TRIERES, as well as the retrofit knowhow for the factories

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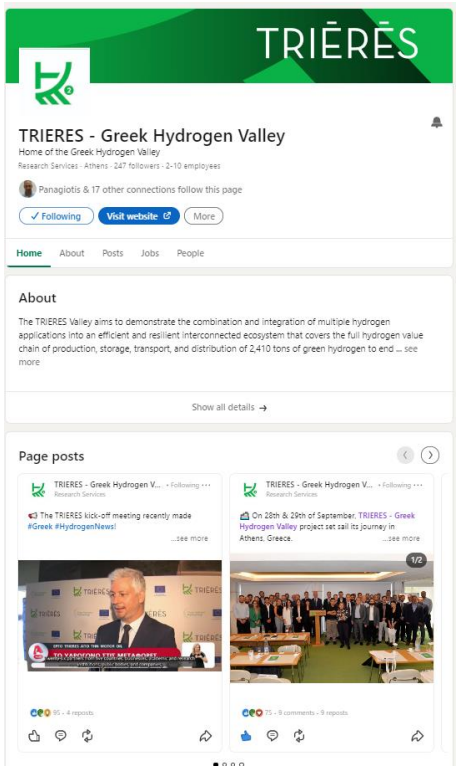
Lessons Learnt

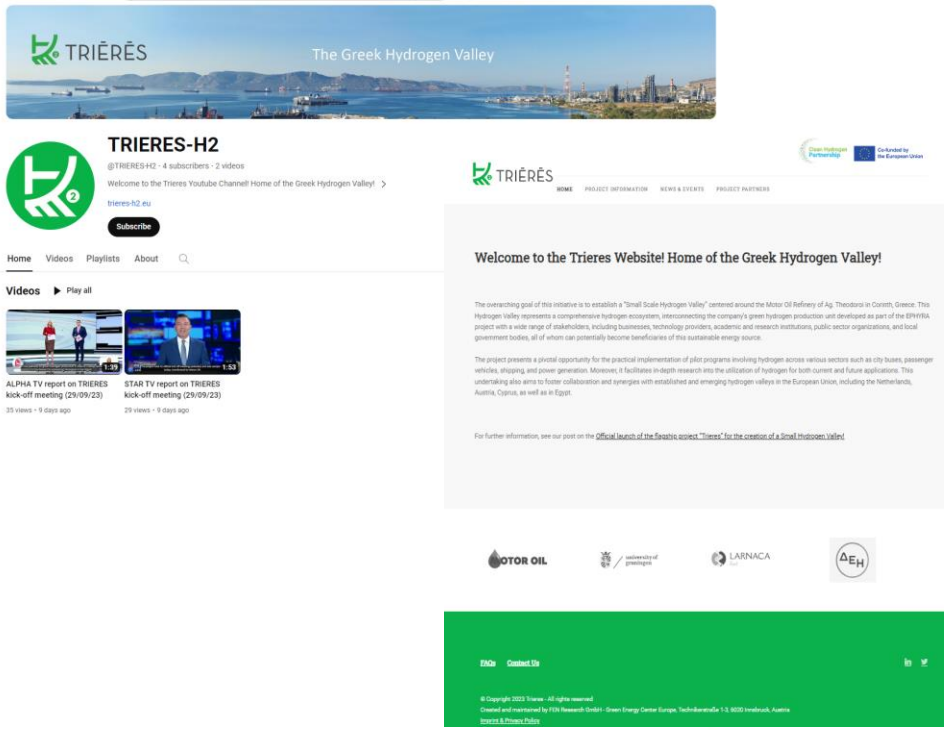
TRIERES is in first steps! «*scio me nihil scire*», Socrates

- Capable partners from industry, research and academia to co-develop innovative applications and de-risk investment
- Must have → Engagement of public authorities to receive feedback for legal and regulatory issues that enable the hydrogen economy
- Strategic plan is a pre-requisite, but goes hand in hand with flexible adaptation of the supply chain
- Utilise all financing sources for optimal mix! Identify best funding tools for each project component

Communication and dissemination

TRIĒRĒS is communicated/disseminated using various channels:





TRIERES KoM, 28-29 September 2023, Athens, Greece

https://www.linkedin.com/company/trieres-h2-valley/

https://www.youtube.com/@TRIERES-H2

https://www.trieres-h2.eu/

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Synergies With Other Projects And Programmes

Project Title	Source of funding/co-funding	Synergies/Interactions/Joint Activities
EPHYRA - Establishing European production of hydrogen from renewable energy and integration into an industrial environment	HORIZON EUROPE | Clean Hydrogen Partnership	Green hydrogen production from a 30MW electrolyser in Motor Oil refinery
REA - Construction of an HRS for passenger, light-duty and especially long-haul heavy-duty vehicles in Agioi Theodoroi (Corinth, Peloponnese, Greece)	CEF Transport | Alternative Fuels Infrastructure Facility	Virtual pipeline, logistical models (Determination of demand nodes, required stock amounts, fluctuations in supply, distribution schedules and frequencies)
REAH2 - Construction of a HRS for passenger cars, light-duty and heavy-duty vehicles in Akrata (Achaia, Western Greece)	CEF Transport| Alternative Fuels Infrastructure Facility	Virtual pipeline, logistical models (Determination of demand nodes, required stock amounts, fluctuations in supply, distribution schedules and frequencies)
IRIS - Innovative low carbon hydrogen and methanol production by large scale carbon capture	Innovation Fund / Large scale Projects	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.

Recommendations looking ahead

What is the future for Hydrogen Valleys?

- Expansion – Provide support in line with GBER to replicate and multiply end-use case applications
- Inclusion – Provide incentives for supply chain vendors to participate and increase readiness, resilience and transparency for the procurement of components critical to the hydrogen economy
- Synergies – Work with CINEA to explicitly promote synergies between hydrogen valleys and CINEA programmes
- Connection – Promote formal hydrogen corridors connecting hydrogen valleys to delimit the geographical deployment of future hydrogen projects

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Thank you for your attention!

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Supplementary material

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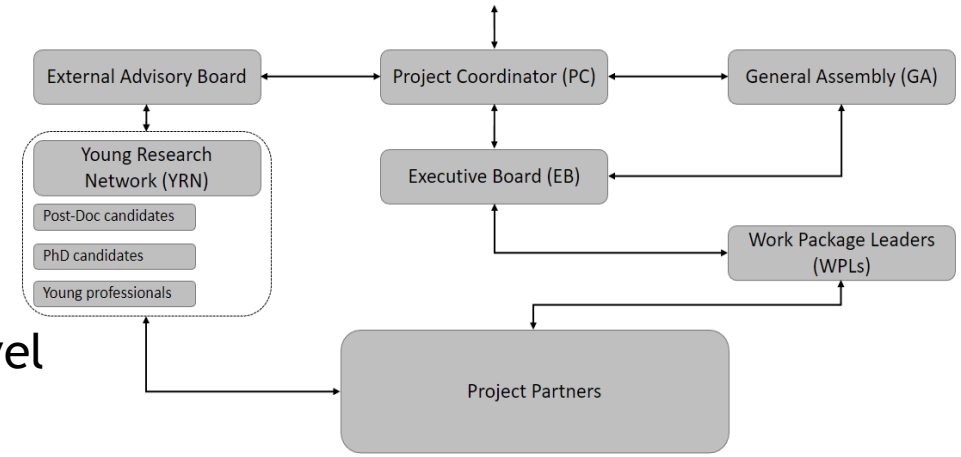
Project governance



The organizational structures of TRIERES are the following:

- On behalf of **EC and CH JU** appointed:
- PO, FO and 2 external experts to monitor the project
- A Communication Officer to leverage visibility at EU/global level
- **General Assembly** (ultimate decision-making body)
- 1 representative per project partner
- **Executive Board** (supervisory consortium body for the project implementation and daily management)
- All Work Package Leaders led by Project Coordinator
- **External Advisory Board** (high-esteemed experts to provide guidance & advice to the project; enhance visibility of results; connect with networks)
- **Young Research Network (YRN)** (mentor and train young researchers and engineers, through the guidance of the External Advisory Board)

Risks & Challenges

	Description of risk (likelihood/severity)	Proposed mitigation measures
1	Slow responsiveness of public bodies/ limited resources in managing allocated tasks	• Public governance awareness - Dedicated communication and dissemination strategy/ early engagement and identification of competent divisions, close collaboration and guidance by national and international partners on technical and best practices aspects
2	Delays on safety planning and regulatory issues caused by external factors i.e., public authorities (low/low)	• The consortium is in close contact with the ministries of "Transport and Infrastructure" and "Energy and Environment" which are responsible of the relevant legal framework development. Members of consortium support ministries for updating the legal framework.
3	Digital twins and artificial intelligence misuse (low/ high)	• GDPR compliance, in lined with AI Act, ethical AI systems
4	Insufficient staff competences (low/high)	• High skilled employees selected for core project teams, additional external expertise if needed • Good complementarity of consortium competencies
5	Delays in the purchasing of the equipment critical to hydrogen supply (low/medium) FCEV Vehicles not available for purchase or leasing (low/medium)	• Early receipt of RFQs for the equipment so as to be are ready to order the equipment from early stages of the project to ensure timely delivery/ To mitigate the impact of potential delays, the missing vehicles will be leased • Early communications in place with multiple manufacturers to ensure the availability of FCEV vehicles according to the detailed calendar of the project