

EPHYRA Project Gathers Momentum at 2nd General Assembly in Cottbus, Germany

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The EPHYRA project consortium gathered in Cottbus, Germany, in 12-13 June 2025 for its 2nd General Assembly, marking a pivotal moment as the project enters its third year. Hosted by the project partner German Aerospace Center (DLR), the meeting brought together all eleven (11) consortium partners from six (6) European countries to align on technical progress, exchange insights, and set the strategic direction for the upcoming implementation phase.

Highlights from the 2nd General Assembly Meeting

Day 1 (12 June) featured a technical knowledge exchange session and an exclusive visit to the DLR laboratory facilities, offering partners a firsthand view of the DLR Institute's CoBra Pilot Plant, which provides heating and cooling for industrial processes on a demonstration scale.

This visit directly aligned with the project's ongoing efforts to assess innovative solutions for waste heat recovery and process optimization within refinery environments.

In particular, the demonstrated heat pump technology at CoBra contributes valuable insights to the project's goal of identifying scalable, renewable-based thermal integration options. This includes the assessment of waste heat reuse from both the refinery and electrolyser systems, a key component in enhancing the energy efficiency of hydrogen production. By exploring the potential of high-temperature heat pumps to provide flexible process heat and cooling using renewable electricity, partners gained practical exposure to a solution that supports the project's broader mission of circularity, decarbonization, and system integration.

The day also included partner updates on ongoing research aligned with the project's goals. SIEMENS presented their Hydrogen Performance Suite (HPS), a digital tool for optimizing hydrogen plant operations. MOH shared progress on TRIÉRÈS, an EU Hydrogen Valley initiative centered around Project EPHYRA at the MOH refinery in Greece—positioned to become a flagship hydrogen hub in Southeastern Europe. DLR highlighted their research on industrial decarbonization, including strategies for electrifying carbon capture units and exploring metal fuels for a circular, carbon-free energy system. These exchanges reinforced the

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consortium's collective focus on innovation and scaling hydrogen technologies across Europe.

Day 2 (13 June) was dedicated to project updates and strategic planning across all work packages. Each partner shared key achievements and outlined the roadmap for Year 3. As project coordinator, MOH presented administrative updates, including the termination of two (2) partners and the accession of three (3) new ones.

ETA Florence, new leader of Work Package 6, outlined its strategy to accelerate communication and dissemination activities in coordination with RINA, who continues to oversee results exploitation and IPR management.

New technical partners ORCAN and NTUA joined MOH and CERTH to present progress on industrial symbiosis— focusing on heat recovery, oxygen utilization, and water management, including seawater and wastewater reuse. MOH also detailed advancements in technology integration and plant commissioning.

CERTH, responsible for the development of the digital twin, control systems, and plant automation, reported steady progress despite delays in vendor selection. To ensure accurate modelling and integration of real operational data, the timeline for finalizing the process model and energy management system has been extended by three months. This adjustment will enable robust validation and optimization of the hydrogen production system.

RINA presented the outcomes of its business modelling and sustainability assessments. The findings confirm the technical feasibility, economic viability (NPV positive, IRR >10%), and market potential of EPHYRA as a scalable model for green hydrogen production. The analysis supports a strategic "GO" for investment, with final decisions pending EPC tender outcomes expected in Q1 2025. RINA also conducted a comprehensive assessment of the project's environmental, economic, and societal sustainability in its operational context.



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EPHYRA – Powering Europe’s Hydrogen Future

EPHYRA is a flagship EU-funded project focused on **establishing a 30 MW green hydrogen production facility at the Motor Oil Hellas refinery in Agioi Theodoroi, Greece**. Over its 60-month timeline, the project aims to produce up to 4,900 tonnes of green hydrogen annually, supporting industrial decarbonisation and Europe’s energy transition goal.

EPHYRA plays a pivotal role in supporting the **Triērēs project - Greece’s first Hydrogen Valley** – by providing clean hydrogen for multiple sectors, including energy, transportation, and industry. Together, these initiatives form a scalable model for the hydrogen economy in the Mediterranean and across Europe.

Meet the Consortium – Strategic Roles and Contributions

Motor Oil Hellas (MOH | Greece), as the project coordinator and site host, leads technical integration, project management, and deployment of enhanced electrolysis technologies. It provides the installation site and ensures the alignment of activities with industrial symbiosis and renewable energy objectives.

The Chemical Process and Energy Resources Institute (CPERI, CERTH | Greece) is responsible for process modelling, Digital Twin development, electrolyser technology evaluation, and advanced plasma technologies for wastewater treatment. CERTH also contributes to sustainability assessments.

Aragon Institute of Technology (ITA | Spain) develops the digital model for the electrolyser’s electrical behaviour, tests it in a zero-emissions lab, and supports system refinement ahead of real-plant commissioning.

Siemens (UK) supplies and supports the use of gPROMS Process platform to build a digital twin of the EPHYRA system. Siemens brings extensive expertise in model-based operational decision support tools for hydrogen technologies.

RINA Consulting S.p.A (RINA-C | Italy) leads market assessment, business planning, socio-economic and environmental impact analysis, standardisation, and exploitation strategies.

DLR (Germany) focuses on optimisation algorithms, process integration, and the design of energy-efficient hydrogen production within the digital twin framework.

SoluForce (Netherlands) delivers certified, maintenance-free RTP pipeline systems for hydrogen transport. SoluForce also supports certification, regulatory compliance, and integration of its technology into the project.

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ENVIROMETRICS (Greece) provides sustainability consulting and integrates circular economy principles, ensuring EPHYRA's long-term environmental and social impact.

New Partners Reinforcing the Mission

As EPHYRA shifts toward a more public-facing phase, **ETA Florence** (Italy) has been in the accession process to join the consortium as the new communication and dissemination lead, continuing and accelerating communication and dissemination strategies outlined by the original partner Stichting New Energy Coalition (NEC). With over 30 years of experience in EU-funded projects, ETA Florence brings deep expertise in clean energy communication and stakeholder engagement.

In parallel (also in accession), **ORCAN** (Germany) will design and provide the ORC technology for the valorisation of the waste heat streams, producing carbon-neutral electricity to feed virtually the electrolyser through the advanced energy management system of the Refinery.

NTUA (Greece) (also in accession) will consolidate and evaluate the data generated from the ORC operation and conduct a study to assess the benefits and challenges of integrating the ORC with the electrolyser as an alternative cooling strategy that also recovers waste heat. In collaboration with MOH, NTUA will also conduct a comparative analysis against the alternative scenario of electrolyser cooling strategy by thermal desalination.

Project Consortium



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Building on the 2-year Momentum – Progress to Date

Since its launch in June 2023, the EPHYRA project has gained steady momentum toward establishing one of Europe's flagship green hydrogen production initiatives. The 2nd General Assembly provided a platform for partners to reflect on the substantial technical and strategic progress achieved to date, with focus on the 2nd year. The following key milestones and developments highlight the project's trajectory:

- With technology validation and material procurement completed, safety planning is underway to enable the **delivery of 30 MW of electrolysis capacity by Q4 2025**, followed by **an additional 20 MW by Q1 2026**.
- **Two waste heat recovery solutions were assessed:** an **Organic Rankine Cycle (ORC) system** for recovering the heat from the refinery and a **thermal seawater desalination unit** for utilizing the electrolyzer's waste heat. The ORC technology, suited for low-to-medium temperature streams, was selected for implementation.
- **A cost-benefit analysis** was conducted for utilizing **co-produced oxygen** in the refinery's Claus unit, alongside a desktop study on potential use in the FCC unit.
- **Circular water strategies**, including seawater desalination and industrial wastewater reuse, were evaluated to support hydrogen production.
- **An innovative plasma-based wastewater treatment** solution has been designed and tested at CERTH.
- A preliminary process model for the electrolyser system and BoP, including subsystems like ORC, heat exchangers, and renewable energy integration scenarios, has been developed. This model forms the basis for the **digital twin of the 50 MW plant** and will be refined using real vendor data.
- **A first-stage assessment of market viability, business models** for the 30 MW system, replication potential, and environmental and socio-economic sustainability has been completed.

Looking ahead: Next Steps and Engagement Opportunities

As EPHYRA enters its third year, the coming months will see increased visibility for the project as it shares key findings, engages with policymakers and industry leaders, and contributes to a robust hydrogen ecosystem in Greece and beyond. Upcoming activities include:

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- **Electrolyser Deployment & Safety Planning (WP1):** The environmental study and licensing process for the electrolyser installation is advancing, alongside the procurement of BoP equipment. The first 30 MW electrolyser module is scheduled for delivery in Q4 2025, with the remaining 20 MW in Q1 2026.
- **Waste Heat Recovery System Design (WP2):** The conceptual design and technical scenarios for the Organic Rankine Cycle (ORC) system will be finalized, with basic engineering starting soon. ORC specifications will be aligned with electrolyser heat output, and simulations for integration will begin. Installation and commissioning are planned during the refinery's scheduled shutdown.
- **Digital Twin & Process Optimization (WP3):** Potential integration with onsite renewable and energy storage systems will be examined via various optimisation models. The deployed digital twin will be validated with on-site, real-time data.
- **Engineering & Construction (WP4):** Following the completion of front-end engineering design, MOH has initiated detailed engineering for the integrated industrial green hydrogen production unit. This phase focuses on defining the system's precise technical specifications and operational requirements.
- **Market, Business & Sustainability Assessments (WP5):** Socio-economic impact analysis will progress through expanded data collection. Coordination with environmental partners continues to refine the Life Cycle Inventory and define the scope of the Life Cycle Assessment.
- **Communication & Dissemination (WP6):** A new visual identity for the project will be launched, with updated content to showcase technical progress and drive engagement at relevant events and platforms.
- **Project Management & Coordination (WP7):** A project amendment is being finalized to integrate new partners, along with updates to the consortium agreement and project documentation. Preparations are underway for the 2nd Periodic Report (M38, July 2026) and an Advisory Board workshop in autumn 2025. Risk management and alignment with EU hydrogen initiatives remain ongoing priorities.

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