Ephyra

EPHYRA

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

D7.1 Project management guidelines and infrastructure

WP7 – Project coordination

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BACKGROUND AND DISCLAIMER

Project Background

EPHYRA project with the full title: “Establishing European Production of Hydrogen from RenewAble energy and integration into an industrial environment” was submitted in the call HORIZON-JTI-CLEANH2-2022-2, under the topic HORIZON-JTI-CLEANH2-2022-01-08 “Integration of multi-MW electrolysers in industrial applications”. The project receives support by the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research through the Grant Agreement No. 101112220.

Objective of Deliverable

The present deliverable, titled: “D7.1 Project management guidelines and infrastructure” is the first deliverable of WP7 “Project coordination”. This deliverable will be dynamic and shall be updated whenever required throughout the implementation period of EPHYRA project.

Disclaimer

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Executive Summary

This document, titled: “D7.1 Project management guidelines and infrastructure” is the first deliverable of WP7 “Project coordination”, provides the initial plan for the overall management of EPHYRA project, serving as a handbook in order to ensure the efficient implementation of the project management procedures, together with high-quality deliveries and outputs. Whenever deemed necessary, the General Assembly (GA) can decide on modifying the document by removing and/or adding parts in order to reflect the actual situation of EPHYRA. This handbook is intended for use by the project officer and all project partners, the work package and task leaders and the involved project teams. The EPHYRA consortium will utilise this document to develop a common understanding of the procedures and rules to be followed for the day-to-day project management and execution.

This deliverable is organised as follows:

Chapter 1 includes introductory information on the project and its objectives and the consortium, as well as the scope of work package 7 and in particular the scope of Deliverable 7.1.

Chapter 2 contains information on the administrative management aspects, namely (i) the organizational and governance structures, the dedicated roles and responsibilities of the different bodies within and outside the consortium, as well as the suitability and complementarity of knowledge and expertise of the consortium members.

Chapter 3 describes the project execution procedures, providing the overview and the interlinkages between the work packages, the gradual project phases and the respective timelines, and how they are verified with the completion of the foreseen deliverables and milestones.

Chapter 4 includes information on the steps to be taken for the preparation of meetings, the accompanying agendas and minutes, the procedures for decision making, voting and veto rights. Furthermore, this section includes information on progress monitoring, deliverable drafting and quality check steps (peer-review process) before final submission to the EC.

Chapter 5 is dedicated to the communication and dissemination management internally and externally of the consortium to ensure that the EC and Clean Hydrogen Joint Undertaking visibility rules are followed, while the project results and advancements are communicated widely through the consortium established networks.

Chapter 6 includes the risk management aspects, while Chapter 7 describes the rights and obligations of the consortium members regarding, budget allocation, continuous and periodic reporting on the project progress.

In addition, Chapter 8 includes the procedures relevant to the ownership of results and access rights which are described in detail in the two main reference documents of the project, i.e. the Grant Agreement and the Consortium Agreement.

Finally, two Annexes are included with supplementary information and guidelines.

This deliverable will be dynamic and shall be updated whenever required throughout the implementation period of EPHYRA project.

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ABBREVIATIONS

Abbreviation	Explanation
CA	Consortium Agreement
DEM	Demonstrator, pilot, prototype
DMP	Data Management Plan
DoA	Description of Action
EAB	External Advisory Board
EC	European Commission
EU	European Union
FO	Financial officer
GA	General Assembly
GA	Grant Agreement
H_2	Hydrogen
JU	Joint Undertaking
KoM	Kick of Meeting
LP	Lead partner
M	Month
MW	Megawatt
O_2	Oxygen
PO	Project Officer
PU	Public
SEN	Sensitive
SRIA	Strategic Research & Innovation Agenda
WP	Work Package

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1. Introduction

This deliverable, "D7.1 Project management guidelines and infrastructure", describes the internal actions and processes of the EPHYRA project consortium, regarding the project implementation, administrative management and organizational structures, as well as the cooperation, information exchange and risk management aspects. Therefore, this document should be treated as a guidance document for all procedures applied and the consortium members are expected to refer to it throughout the project lifetime.

1.1 EPHYRA project at a glance

The overall objective of EPHYRA (Grant Agreement No. 101112220) is to demonstrate the integration of a first-of-its-kind renewable hydrogen production facility at industrial scale in Southeastern Europe by employing an improved electrolysis technology, at a scale of 30 MW. The large-scale electrolysis will be integrated with industrial operations within MOH's Corinth Refinery, one of the top refineries in Europe and the largest privately-owned industrial complex in Greece. It will be operated for at least 2 years under commercial conditions and will supply renewable hydrogen to the refinery's processes and external end-users. The industrially integrated renewable hydrogen production will be developed around a circular economy, industrial symbiotic approach, as the electrolyser will be coupled with (i) renewable electricity production, (ii) renewable electricity storage, (iii) an innovative waste heat harvesting technology, (iv) water use environmental optimisation, (v) valorisation of produced oxygen in current MOH Refinery operations, (vi) a digital twin and (vii) a dedicated energy management system. EPHYRA will contribute to all electrolysis technology KPIs as detailed in Clean Hydrogen Partnership SRIA objectives. Therefore, the project will demonstrate its reliability for green hydrogen production at the lowest possible cost thus enabling the EU renewable hydrogen economy, industry decarbonisation and zero-emission fuels uptake. EPHYRA will be implemented by a strong consortium with robust research, innovation and industrial capabilities, able to successfully deliver the project within time, budget and detail objectives. The aim of EPHYRA is to enhance European synergies on the globally expanding hydrogen market and build a unique value proposition on industrial symbiotic renewable hydrogen production.

1.2 EPHYRA project consortium

The members listed below are the partners of the EPHYRA project and have signed the Consortium Agreement.

Table 1 EPHYRA consortium and main role in the project

No	LEGAL NAME	SHORT NAME	COUNTRY	MAIN ROLE IN THE PROJECT
1	MOTOR OIL (HELLAS) DIILISTIRIA KORINTHOU A.E.	MOH	EL	Coordinator / Owner/ Operator
2	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	EL	Beneficiary / Technology assessment, lab scale plasma technology experiments for WWT processing, Modeling, optimization, digital twin
3	DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV	DLR	DE	Beneficiary / Modeling, optimization, digital twin
4	ENERTIME SA	ENERTIME	FR	Beneficiary / ORC technology
5	INSTITUTO TECNOLOGICO DE ARAGON	ITAINNOVA	ES	Beneficiary / Digital twin of electrical network

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No	LEGAL NAME	SHORT NAME	COUNTRY	MAIN ROLE IN THE PROJECT
6	STICHTING NEW ENERGY COALITION	NEC	NL	Beneficiary / Communication, dissemination
7	SOLUFORCE B.V.	SOLUFORCE	NL	Beneficiary / Transport piping (RTP)
8	RINA CONSULTING SPA	RINA-C	IT	Beneficiary / Life Cycle & Cost Benefit Analysis
9	ENVIROMETRICS TECHNIKOI SYMVOULOI SA	ENVIROMETRICS	EL	Beneficiary / Emission monitoring & GHG footprint
10	SIEMENS PROCESS SYSTEMS ENGINEERING LIMITED	SPSE	UK	Associated Partner / Process modelling, digital twin, Real-time digital operation support

1.3 Scope of Work Package 7 – Project Coordination

The objective of this WP is to ensure effective management of the project with emphasis on meeting the European Commission requirements. The specific objectives are to: ↘ Ensure the proper overall management and scientific coordination of the project, by supporting the participants in achieving the project objectives and milestones according to the timelines and deliverables committed to in the work plan, and within the planned budget; ↘ Ensure that the consortium's duties are carried out in compliance with EU regulations and their contractual and legal requirements and abide by the "good practice" of resources management as presented in the Financial Guidelines; ↘ Set-up an effective communication infrastructure & foster the integrative process within the consortium;↘ Identify possible risks, set-up mitigation measures and contingencies and to define measurable indicators for project progress; ↘ Set-up a data management plan and keep it up to date.

1.4 Scope of Deliverable 7.1 - Project management guidelines and infrastructure

The present deliverable, titled: “D7.1 Project management guidelines and infrastructure” is the guidance document of EPHYRA project, developed in the framework of WP7 (Project Coordination) that describes the setup of collaborative workspace, provides guidelines and templates for the execution of the project. The aim of the deliverable is to provide detailed information about: (a) the management structures implemented, define the key actors and their accompanying responsibilities, between the different partners; (b) the general procedures that will be followed regarding the administrative, project execution, monitoring, communication and risk management aspects. D7.1 aims to support the successful achievement of the objectives within the set timeframes and budgets, as described within the signed Grant Agreement.

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2 Administrative Management

This chapter includes the description of the different bodies of the project and the allocation of responsibilities and tasks of each actor.

2.1 Organizational and governance structure

The management structure of the EPHYRA project aims to guide the project towards achieving its specific objectives, while ensuring outcomes of high quality, resulting from the Work Packages (WPs) using the foreseen resources and timelines. The envisaged governance bodies will collaborate closely in order to achieve the overall coordination, consistency, and viability of the activities on the scientific, technical, administrative, financial, innovation, quality and data protection levels. More specifically, the overall project coordination (WP7) aims to monitor the progress of all WPs, coordinate the various tasks and verify the quality of implementation, by ensuring the completion of the foreseen deliverables and milestones.

Figure 1 depicts the organizational structure of EPHYRA project, highlighting the distinctive roles of the partners and bodies included in the consortium and the way they interact internally and externally with other important entities, such as the Clean Hydrogen JU Officers and the External Advisory Board. More information on the roles and responsibilities of the project structural bodies are provided in section 2.2.

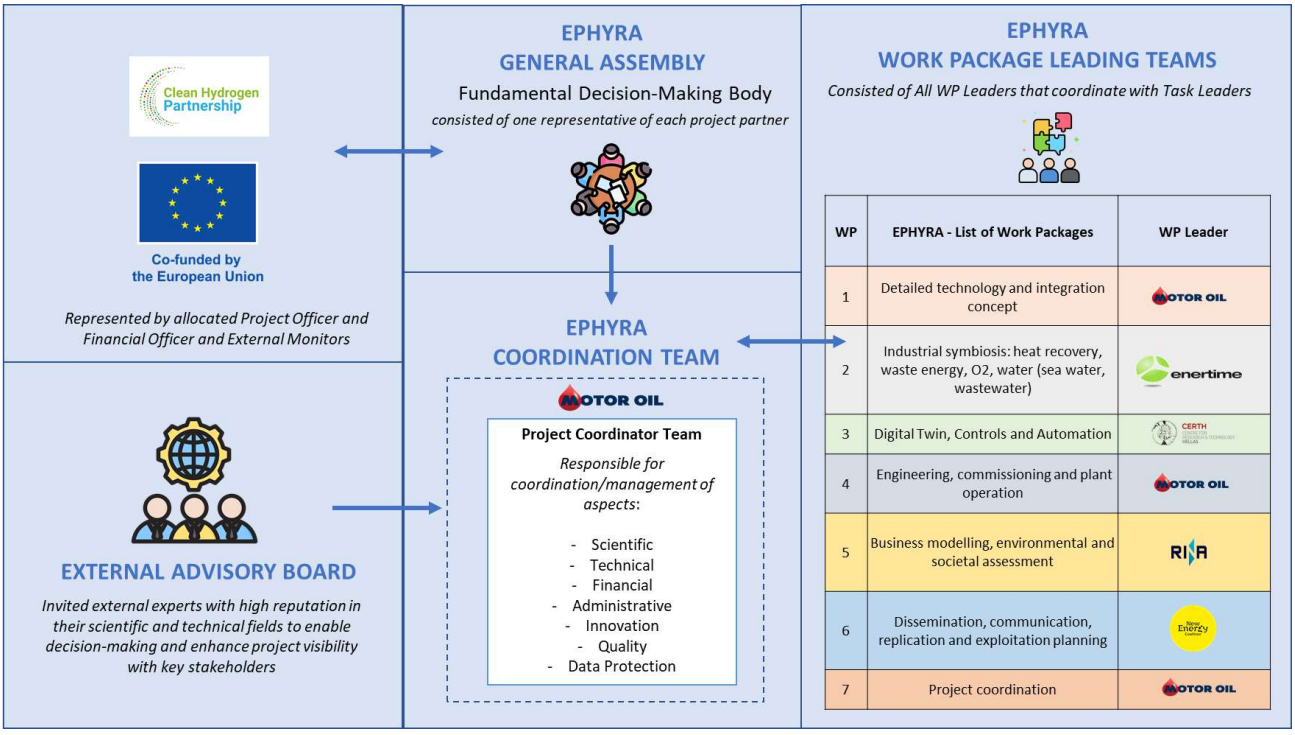

Figure 1 The organizational structure of EPHYRA project

2.2 Roles and responsibilities of governance bodies in the consortium and other relevant entities

2.2.1 General Assembly

The General Assembly (GA) of EPHYRA is the ultimate decision-making body of the consortium. It consists of one representative of each consortium partner, in total 10 members. In accordance with the outlined procedures, the GA will be free to act independently to formulate proposals and make decisions. Each partner has one representative with a voting right, while the coordinator is in charge. According to the Consortium Agreement, the Associated Partner is excluded from voting on and vetoing certain decisions of the General Assembly and therefore is not counted towards any respective quorum. A list of issues outlined in the Consortium Agreement will be considered to have been duly authorized by each member. The tasks performed by the GA, during the project lifetime, are highlighted below:

- Monitoring and evaluation of the project's comprehensive evolution and results according to the objectives, timetable, deliverables and milestones and suggestion of solutions for any deficiencies.
- Review of the draft version and final report; Make recommendations on improvements and approve final versions.
- Dissemination of good practices within research and outreach endeavors, sensitizing partners to potential avenues of dissemination, and strengthening collaborations with external entities immersed in research, entrepreneurial ventures, advocacy, and policy-making activities outside the consortium

The operational procedures, decision-making steps and voting/veto processes are also described in detail under section 6 of the signed Consortium Agreement.

Table 2 General Assembly members

No	Partner's Name
1	MOH
2	CERTH
3	DLR
4	ENERTIME
5	ITAINNOVA
6	NEC
7	SOLUFORCE
8	RINA-C
9	ENVIROMETRICS
10	SPSE

2.2.2 Coordinator's Leadership

The Coordinator is the legal entity acting as the intermediary for all communications between the consortium members and the Granting Authority, i.e. Clean Hydrogen JU. According to the proposed partnership of EPHYRA project, MOH is the leader of the consortium. The Coordinator shall, in addition to its responsibilities as a consortium member, perform the tasks assigned to it as described in the Grant Agreement (chapter 4) and the Consortium Agreement (section 6).

More specifically, the Coordinator shall be responsible for:

- monitoring compliance by the consortium members with their obligations under the Consortium Agreement and the Grant Agreement
- keeping the address list of members and other contact persons updated and available
- collecting, reviewing to verify consistency and submitting reports, other deliverables (including financial statements and related certification) and specific requested documents to the Granting Authority
- preparing the meetings, proposing decisions and preparing the agenda of General Assembly meetings, chairing the meetings, preparing the minutes of the meetings and monitoring the implementation of decisions taken at meetings
- transmitting promptly documents and information connected with the project to any other party concerned
- administering the financial contribution of the Granting Authority and fulfilling the financial tasks described under the Consortium Agreement and the Grant Agreement
- providing, upon request, the consortium with official copies or originals of documents that are in the sole possession of the Coordinator when such copies or originals are necessary for the consortium to present claims
- providing a copy of the Grant Agreement and its Annexes to the Associated Partners.

Before sending any proposal for amendment of the Grant Agreement to the Granting Authority on behalf of the consortium, the Coordinator will present the documents in question to the consortium and receive their explicit agreement, which shall not be unreasonably withheld. If one or more partners of the consortium are late in submission of any Project deliverable, the Coordinator may nevertheless submit the consortium's other Project deliverables and all other documents required by the Grant Agreement to the Granting Authority in time. If the Coordinator fails in its coordination tasks, the General Assembly may propose to the Granting Authority to change the Coordinator. The Coordinator shall not be entitled to act or to make legally binding declarations on behalf of any other member of the consortium, unless explicitly stated otherwise in the Grant Agreement or this Consortium Agreement or agreed in writing by the concerned Party, as appropriate. Finally, the Coordinator shall not enlarge its role beyond the tasks specified in the Consortium Agreement and in the Grant Agreement.

2.2.3 External Advisory Board of EPHYRA project

The EPHYRA External Advisory Board (EAB) will be appointed and steered by the General Assembly. The EAB shall assist and facilitate the decisions made by the General Assembly. The EAB members will form the nucleus of the future EPHYRA stakeholder community.

The EAB will be the binding link between the stakeholder groups across the EPHYRA value chain and help the consortium connect to larger networks, subject to the execution of separate non-disclosure agreements. The Coordinator will ensure that a non-disclosure agreement is executed between the consortium and each EAB member. Its terms shall be not less stringent than those stipulated in this Consortium Agreement, and it shall be concluded no later than 30 days after their nomination or before any confidential information will be exchanged/disclosed, whichever date is earlier.

The Coordinator will draft an invitation and a relevant Terms of Reference document in order to inform and invite candidates that are experts with high reputation at the scientific and technical fields, ranging across the entire hydrogen value chain, at international level. The number and the members of the EAB will be decided upon suggestions for candidates provided from the consortium to the coordinator. Then, the coordinator will invite with written communication (invitation letter and Terms of Reference document via email) the suggested members to join EPHYRA project's EAB.

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The EAB is expected to meet through the following ways, throughout the project implementation period:

- Physical and virtual meetings

It is expected that the EAB will meet physically or virtually alongside all General Assembly meetings, namely once every year, to provide feedback and advice on project activities and outcomes (i.e. guidance, ideas and validation). The EAB members shall be allowed to participate in General Assembly meetings upon invitation, but will not have any voting rights. The Coordinator shall write the minutes of the EAB meetings and submit them to the General Assembly.

- Ad – hoc interactions

If deemed necessary, the EAB will be employed either in its entirety or specific members for ad-hoc support such as:

- The co-definition of the key performance indicators to be used for assessing the performance and results of the EPHYRA project.
- The validation and improvement of the business models designed for the rollout of the EPHYRA project.
- The elaboration of recommendations and guidelines for replicating and up-scaling the results of the project in the form of a meaningful guide.
- Involve their networks and contacts in the co-development process within EPHYRA and enhance the visibility of project activities.

2.2.4 Work Package Leaders' Team

The Work Package (WP) Leaders' Team shall assist the work of the Project Coordinator to execute the decisions of the General Assembly and the day-to-day management of the project. It consists of all the Work Package Leaders that work in close collaboration with the Task Leaders of each WP. The Task Leaders coordinate the working groups of the involved project partners, depending on the topic of each task and their expertise in the field, in close collaboration with the WP Leaders. Moreover, the WP leaders are responsible for ensuring the quality of each task/deliverable based on the directions and the timeline defined in the GA; reporting progress at project meetings and management reports to the Executive Board, while organising periodic or ad-hoc meetings, as required for the implementation of each WP. The WP Leaders are shown in Table 3.

Table 3 list of WP Leaders and appointed persons

WP	EPHYRA - List of Work Packages	Leading Partner
1	Detailed technology and integration concept	MOH
2	Industrial symbiosis: heat recovery, waste energy, O2, water (sea water, wastewater)	ENERTIME
3	Digital Twin, Controls and Automation	CERTH
4	Engineering, commissioning and plant operation	MOH

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WP	EPHYRA - List of Work Packages	Leading Partner
5	Business modelling, environmental and societal assessment	RINA-C
6	Dissemination, communication, replication and exploitation planning	NEC
7	Project coordination	MOH

2.3 Suitability of the proposed management structure and complementarity of consortium members

The described governance structure provides a good balance between the various partners and assures an extensive inter-disciplinary collaboration of the consortium members, especially with regards to management design (effectiveness, simplicity, etc.) and flexibility. This interdisciplinary approach will help overcome any challenges related to the symbiotic integration of the green hydrogen (H_2) production into an industrial environment and the circular economy aspects employed. Furthermore, the assessment of the system's sustainability and economic viability requires close cooperation between different disciplines within the Consortium:

- Optimal energy management, including modelling/simulation and validation of power management algorithms and grid control strategies
- Usage of seawater as a cooling medium for condensation for the ORC system
- Oxygen enrichment of refinery units at steady state conditions and safe oxygen management
- Hydrogen purification and compression for transport via tube trailers in a compressed form to external users and safe hydrogen management
- Virtual design, industrial process modelling, simulation and optimisation
- Modelling, optimisation and implementation of process systems and integrated systems used for fuels, chemicals and energy production, management and storage
- Real-time process monitoring and optimisation and data-based forecasting for model predictive control applications
- Sound exploitation planning and business case development for commercialisation

In view of the project complexity, budget, duration, and number of project partners and work packages, the proposed management approach for EPHYRA has been based on the Governance structure under the DESCA model consortium agreement, as described also in the Consortium Agreement.

3 Project Execution

3.1 Overview of the Work Packages

EPHYRA is structured upon 7 Work Packages, briefly presented in Table 4, along with their lead beneficiary, the allocated staff efforts foreseen in person-months (PMs) and the duration in months. The project is envisaged to last for 5 years in order to achieve its objectives.

Table 4 EPHYRA Work Packages, staff effort in PMs and duration in months

WP	EPHYRA - List of Work Packages	WP Leader	Person Months (in total)	Start – End (in Months)
1	Detailed technology and integration concept	MOH	50	M1 – M32
2	Industrial symbiosis: heat recovery, waste energy, O2, water (sea water, wastewater)	ENERTIME	70	M1 – M24
3	Digital Twin, Controls and Automation	CERTH	184	M1 – M56
4	Engineering, commissioning and plant operation	MOH	120	M12 – M60
5	Business modelling, environmental and societal assessment	RINA-C	109	M1 – M60
6	Dissemination, communication, replication and exploitation planning	NEC	51	M1 – M60
7	Project coordination	MOH	45	M1 – M60

In WP1, the electrolyser technology assessment and concepts for the integration of the electrolyser into MOH's processes will be explored. This contains all preparatory work such as basic layout, regulatory work, permitting and procurement. This WP will include a clear go/no-go decision point.

WP2 is dedicated to industrial symbiosis and integration of the electrolysis system in the industrial asset of Motor Oil refinery leveraging available infrastructure (i.e. water, utilities, energy management, waste heat to generate power, land, compression and truck loading facility, permitting and safety procedures) and using products directly in the industrial environment (i.e. hydrogen and by-product oxygen) to decarbonise its operations and achieve best-in-class cost competitiveness of the renewable hydrogen product.

WP3 will develop a digital twin to simulate the different electrolyser technologies and system configurations, optimise the energy management strategy for the plant and optimise the integration of the hydrogen production plant with the refinery.

WP4 is dedicated to the deployment and operation of the system and will integrate WPs 1-3.

WP5 defines the business plan and determines the impact and viability of the overall project and its execution measurement including establishment of Key Performance Indicators.

WP6 will aim at communication and dissemination of project results and the management of stakeholders. It will furthermore explore the replication potentials as well as the exploitation of project results.

WP7 will provide the collaborative framework and management structure to monitor the project's progress and to ensure the achievement of the objectives as foreseen. The interdependencies between the WPs are shown in the PERT chart below (Figure 2).

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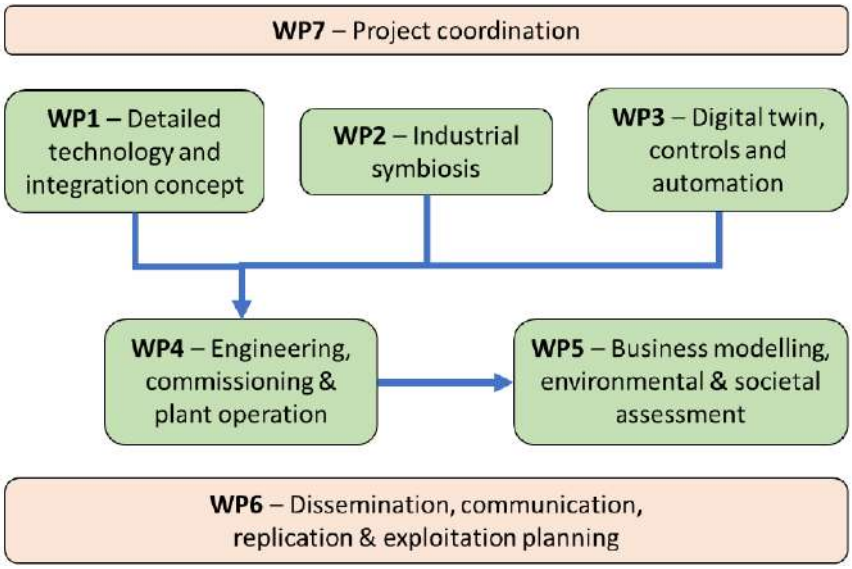

Figure 2 EPHYRA Pert chart showing Work Packages structure and interlinkages

3.2 Overview of the project phases and timeline

In practical and technical terms, during the project, the following phases are distinguished and will be implemented to ensure the project is efficiently managed within the project duration involving relevant partners at various phases while considering multi-disciplinary challenges:

- **Phase 1:** Technological framework - The first phase will be dedicated to maturing and combining all technological aspects of the innovative, industrially symbiotic, renewable hydrogen production, such as electrolysis technology validation, energy management, waste heat harvesting, water use environmental optimisation, produced oxygen industrial integration and digital twin.
- **Phase 2**: Detailed technology validation – The second phase will combine the well-defined technological framework to a complete and robust engineering that will impose all procurement and implementation parameters. This phase will achieve an in-depth detail level required for all large-scale industrial projects implemented within MOH Refinery that is operating under the SEVESO III Directive on “Major accident hazards” (Directive 2012/18/EU).
- **Phase 3**: Go/no-go decision – This a key phase and decision point of the EPHYRA as by combining engineering studies, business plan, implementation plan and required permits timeline, independent experts will give advice on the go/no-go decision.
- **Phase 4**: All permits available – At the end of this phase, development, integration, commissioning and operation will be feasible from an administrative point of view.
- **Phase 5**: System integration & commissioning – The fifth phase of the project consists of the onsite development of the innovative renewable hydrogen production, based on the outcomes of Phases 1-4. Industrial integration will require the vibrant mobilisation of consortium partners and onsite MOH Refinery workforce. System integration and commissioning is a critical stage to hand over a safe, efficient and operational large-scale electrolyser system.
- **Phase 6**: System operation & monitoring – The last phase of EPHYRA will be the actual 24-month operation campaign to produce renewable hydrogen. Real operation of the green hydrogen industrial system will be monitored and reported.

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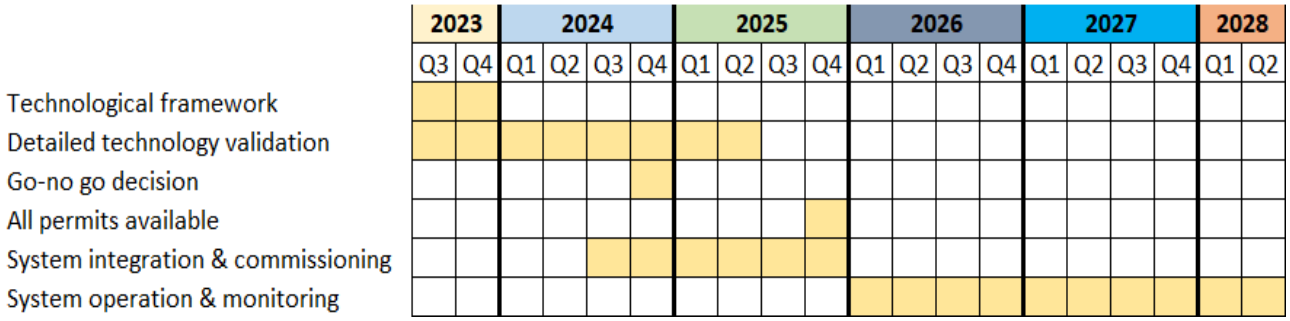

Figure 3 Project phases and timeline

3.3 Overview of the Project Deliverables

All Project Deliverables are associated with a specific WP task. It will be the responsibility of the WP Leader to ensure that the Deliverable is submitted in the time allocated. The following table provides an overview of all the Deliverables, the Lead partner (LP) and the deadlines for submission (M, in months). They are classified according to the dissemination level as public or sensitive, as agreed in the Grant Agreement. Deliverables will have to be quality checked by internal procedures before submission to the Participant Portal, described in section 4.4. The coordinator shall feed a deliverable tracker form (attached in Annex 1) throughout the project lifetime. Table 5 includes the overview of the project deliverables.

Table 5 List of EPHYRA Deliverables

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D1.1	Technology validation	WP1	2 - CERTH	Report	PU - Public	12
D1.2	Industrial electrolyser boundaries	WP1	1 - MOH	Report	SEN - Sensitive	18
D1.3	Material requisition	WP1	1 - MOH	Report	SEN - Sensitive	32
D1.4	Formal operation permit	WP1	1 - MOH	Report	SEN - Sensitive	30
D1.5	Hydrogen safety planning – Draft plan	WP1	1 - MOH	Report	SEN - Sensitive	6
D1.6	Hydrogen safety planning – Final plan	WP1	1 - MOH	Report	SEN - Sensitive	24
D2.1	Report on concept design of the ORC system	WP2	4 - ENERTIME	Report	PU - Public	24
D2.2	Report on the internal use of electrolysis generated oxygen within MOH Refinery	WP2	1 - MOH	Report	PU - Public	18
D2.3	Report on concept design of the RO system and plasma	WP2	2 - CERTH	Report	PU - Public	24

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
	based PWW treatment					
D3.1	Process model	WP3	3 - DLR	Report	SEN - Sensitive	24
D3.2	Renewable energy optimiser	WP3	5 - ITAINNOVA	Report	SEN - Sensitive	24
D3.3	Process optimiser	WP3	2 - CERTH	Report	SEN - Sensitive	56
D3.4	Process model validated with operational data	WP3	2 - CERTH	Report	SEN - Sensitive	38
D4.1	Detailed engineering	WP4	1 - MOH	Report	SEN - Sensitive	24
D4.2	Site preparation, utilities connection and equipment integration	WP4	1 - MOH	DEM — Demonstrator, pilot, prototype	SEN - Sensitive	27
D4.3	Unit operational procedures manual	WP4	1 - MOH	Report	SEN - Sensitive	30
D4.4	Green hydrogen production Unit first year operation assessment	WP4	1 - MOH	Report	SEN - Sensitive	44
D4.5	Green hydrogen production Unit second year operation assessment	WP4	1 - MOH	Report	SEN - Sensitive	56
D5.1	Market assessment	WP5	8 - RINA-C	Report	PU - Public	12
D5.2	Preliminary business plan – GO – NO GO decision	WP5	8 - RINA-C	Report	SEN - Sensitive	18
D5.3	Sustainability assessment	WP5	8 - RINA-C	Report	PU - Public	54
D5.4	TRL9 Roadmapping	WP5	8 - RINA-C	Report	SEN - Sensitive	60
D6.1	Communication and awareness plan	WP6	6 - NEC	Report	PU - Public	6
D6.2	Technology positioning exploitation plans	WP6	8 - RINA-C	Report	SEN - Sensitive	60
D6.3	Standards assessment	WP6	8 - RINA-C	Report	PU - Public	60
D7.1	Project management guidelines and infrastructure	WP7	1 - MOH	Report	PU - Public	3

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Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month)
D7.2	Data management plan	WP7	1 - MOH	DMP — Data Management Plan	SEN - Sensitive	6
D7.3	Annual data reporting 2024	WP7	1 - MOH	Report	PU - Public	10
D7.4	Annual data reporting 2025	WP7	1 - MOH	Report	PU - Public	22
D7.5	Annual data reprorting 2026	WP7	1 - MOH	Report	PU - Public	34
D7.6	Annual data reporting 2027	WP7	1 - MOH	Report	PU - Public	46
D7.7	Annual data reporting 2028	WP7	1 - MOH	Report	PU - Public	58

3.4 Overview of the Project Milestones

To facilitate the progress of the project course, the following checkpoints have been defined as EPHYRA milestones. These Milestones must be completed to move on to the project's next phases. For practical reasons, they have also been listed according to their due date, the responsible partner, the relevant WP and the required means of verification (Table 6).

Table 6 List of EPHYRA Milestones

Milestone No	Milestone Name	Work Package No	Lead Beneficiary	Means of Verification	Due Date (month)
1	Technology and vendor selection	WP1	1-MOH	Letter of Commitment signed	6
2	Concept decision for the ORC system	WP2, WP1	4-ENERTIME	Issues of the relevant report	6
3	Front-end engineering design	WP1	1-MOH	Issue of the relevant Deliverable	12
4	Detailed engineering of the ORC system	WP2	4-ENERTIME	Issues of the relevant report	12
5	Go / no-go decision	WP5, WP4, WP1	1-MOH	Formal information from MOH to consortium partners and Clean Hydrogen Partnership/EC services on the final Go / no-go investment decision.	14
6	Detailed engineering	WP4	1-MOH	Issues of the relevant report	22
7	Formal operation permit	WP4	1-MOH	Issue of permit, from the competent National Authority,	32

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Milestone No	Milestone Name	Work Package No	Lead Beneficiary	Means of Verification	Due Date (month)
				for the operation of the electrolyser	
8	End of construction	WP4	1-MOH	Pipe works, electrical and civil works concluded	32
9	Delivery of equipment	WP4	1-MOH	Interconnection at the refinery	32
10	Mechanical completion and site acceptance test	WP4	1-MOH	Issues of the relevant report	34
11	Green hydrogen production unit start of operation	WP4	1-MOH	Completion of commissioning and start of operation	36
12	Digital twin of H2 production Unit	WP3	2-CERTH	Issues of the relevant report	24
13	Energy optimiser	WP3	5-ITAINNOVA	Issues of the relevant report	24
14	Interim assessment of system operation	WP4	1-MOH	Operational assessment report	48
15	Integrated CBA analysis	WP5	8-RINA-C	Environmental, Economic and Social Aspects to be integrated in a CBA	60

The Gantt chart in the following page (Figure 4) recapitulates the timeline of the different activities and the associated Deliverables/Milestones and the reporting periods for the EPHYRA project execution.

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																						RP																			RP												RP												RP
					2023							2024												2025												2026												2027												2028				
	EPHYRA GANTT CHART	Lead	Start	End	06/23	07/23	08/23	09/23	10/23	11/23	12/23	01/24	02/24	03/24	04/24	05/24	06/24	07/24	08/24	09/24	10/24	11/24	12/24	01/25	02/25	03/25	04/25	05/25	06/25	07/25	08/25	09/25	10/25	11/25	12/25	01/26	02/26	03/26	04/26	05/26	06/26	07/26	08/26	09/26	10/26	11/26	12/26	01/27	02/27	03/27	04/27	05/27	06/27	07/27	08/27	09/27	10/27	11/27	12/27	01/28	02/28	03/28	04/28	05/28
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
WP1	Detailed technology and integration concept	MOH																																																														
T1.1	Technology validation	MOH	1	12						MS1						D1.1																																																
T1.2	Industrial electrolyser boundaries and licencing	MOH	12	30												MS3						D1.2														MS6, MS7																												
T1.3	Material requisition	MOH	6	32																																D1.3																												
T1.4	Go / No-go	MOH	6	12														MS5																D1.4																														
T1.5	Safety planning	MOH	1	24						D1.5																		D1.6																																				
WP2	Industrial symbiosis: Heat recovery, waste energy, O2, water (sea water, waste water)	ENER																																																														
T2.1	Design and development of ORC system for waste heat recovery	ENER	1	24						MS2						MS4												D2.1																																				
T2.2	Concept development for internal use of generated Oxygen from electrolyser	MOH	1	18																		D2.2																																										
T2.3	Integration of circular concepts to the refinery's water systems and sea water desalination facilities	MOH	1	24																								D2.3																																				
WP3	Digital Twin, controls and automation	CERTH																																																													
T3.1	Develop digital twin of the integrated system to assess integration of different electrolyser technologies and system configurations with the refinery	CERTH	1	24																								D3.1, MS12																																				
T3.2	Develop framework for energy management optimisation	DLR	13	24																								D3.2, MS13																																				
T3.3	Optimize hydrogen production system configuration to produce hydrogen at minimum cost	CERTH	18	56																																																								D3.3				
T3.4	Validate the process model and optimisation modules using operational plant data	CERTH	36	38																																						D3.4																						
WP4	Engineering, commissioning and plant operation	MOH																																																														
T4.1	Detailed engineering of the integrated industrial electrolyzer	MOH	12	22																								D4.1																																				
T4.2	Site preparation, utilities connection and equipment integration	MOH	18	32																											D4.2					MS8, MS9																												
T4.3	Commissioning	MOH	24	36																														D4.3				MS10																										
T4.4	Green hydrogen production Unit operation	MOH	36	60																																				MS11								D4.4				MS14								D4.5				
WP5	Business modelling, environmental and societal assessment	RINA																																																														
T5.1	Market Assessment	RINA	1	24												D5.1																																																
T5.2	Business Plan and Economic sustainability	RINA	12	54																		D5.2																																										
T5.3	Socio-economic sustainability	RINA	12	54																																																			D5.3						
T5.4	Environmental sustainability	RINA	18	54																																																													
T5.5	Process industrial Roadmapping	RINA	48	60																																																												D5.4, MS15
WP6	Dissemination, communication, replication and exploitation planning	NEC																																																														
T6.1	Communication and dissemination activities	NEC	1	60						D6.1																																																							
T6.2	Exploitation and IPR Management	RINA	1	60																																																												D6.2
T6.3	Standardisation activities	RINA	36	60																																																												D6.3
T6.4	Dissemination workshops and networking activities	NEC	1	60																																																												
WP7	Project management	MOH																																																														
T7.1	Strategic decision making and project governance	MOH	1	60			D7.1																																																									
T7.2	Administrative, legal, financial management	MOH	1	60																																																												
T7.3	Scientific and technical management, and coordination	MOH	1	60																																																												
T7.4	Data management plan	MOH	1	60						D7.2																																																						
T7.5	Progress assessment towards project KPIs	MOH	1	60										D7.3												D7.4												D7.5												D7.6												D7.7		
T7.6	Update on synergies including an updated strategy for the co-funding/finance of the project	MOH	1	60																																																												

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RP No	Type	Month from	Month to	Deadline
1	Periodic report	1	18	60 days after
2	Periodic report	18	36	60 days after
3	Periodic report	36	48	60 days after
4	Periodic report	48	60	60 days after

	Project Deliverables	Lead	Related Task
D1.1	Technology validation	CERTH	1.1
D1.2	Industrial electrolyser boundaries	MOH	1.2
D1.3	Material requisition	MOH	1.3
D1.4	Formal Operation Permit	MOH	1.4
D1.5	Hydrogen safety planning – Draft plan	MOH	1.5
D1.6	Hydrogen safety planning – Final plan	MOH	1.5
D2.1	Report on concept design of the ORC system	ENER	2.1
D2.2	Report on the internal use of electrolysis generated oxygen within MOH Refinery	MOH	2.2
D2.3	Report on concept design of the RO system and plasma based PWW treatment	CERTH	2.3
D3.1	Process model	DLR	3.1
D3.2	Energy optimiser	ITA	3.2
D3.3	Process Optimiser	CERTH	3.3
D3.4	Process model validated with operational data	CERTH	3.4
D4.1	Detailed engineering	MOH	4.1
D4.2	Site preparation, utilities connection and equipment integration	MOH	4.2
D4.3	Unit operational procedures manual	MOH	4.3
D4.4	Green hydrogen production Unit first year operation assessment	MOH	4.4
D4.5	Green hydrogen production Unit second year operation assessment	MOH	4.4
D5.1	Market Assessment	RINA	5.1
D5.2	Preliminary Business Plan – GO – NO GO decision	RINA	5.2
D5.3	Sustainability Assessment	RINA	5.3, 5.4
D5.4	TRL9 Roadmapping	RINA	5.5
D6.1	Communication, Dissemination and Exploitation plan	NEC	6.1
D6.2	Technology Positioning Exploitation Plans	RINA	6.2
D6.3	Standards assessment	RINA	6.3
D7.1	Project management guidelines and infrastructure	MOH	7.1
D7.2	Data management plan	MOH	7.4
D7.3	Annual data reporting 2024	MOH	7.5
D7.4	Annual data reporting 2025	MOH	7.5
D7.5	Annual data reporting 2026	MOH	7.5
D7.6	Annual data reporting 2027	MOH	7.5
D7.7	Annual data reporting 2028	MOH	7.5

	Project Name Milestones	Related WPs	Due date
MS1	Technology and vendor selection	1	6
MS2	Concept decision for the ORC system	1,2	6
MS3	Front-end engineering design	1	12
MS4	Detailed engineering of the ORC system	2	12
MS5	Go / no-go decision	1,4,5	14
MS6	Detailed engineering	4	22
MS7	Formal operation permit	1	32
MS8	End of construction	4	32
MS9	Delivery of equipment	4	32
MS10	Mechanical completion and site acceptance test	4	34
MS11	Green hydrogen production unit start of operation	4	36
MS12	Digital twin of H2 production Unit	3	24
MS13	Energy optimiser	3	24
MS14	Interim assessment of system operation	4	48
MS15	Integrated CBA analysis	5	60

Figure 4 EPHYRA Gantt Chart including Milestones and Deliverables

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4 Working Procedures

4.1 Meetings

4.1.1 Representation in meetings

Any Party which is a member of a Consortium Body:

- should be present or represented at any meeting;
- may appoint a substitute or a proxy to attend and vote at any meeting;
- shall participate in a cooperative manner in the meetings.

4.1.2 Preparation and organisation of meetings

- Convening meetings

The chairperson of the respective Consortium Body shall convene ordinary meetings and also convene extraordinary meetings at any time deemed necessary in order to make progress with the project and resolve any issues that may arise.

Consortium Body	Ordinary Meeting	Extraordinary Meeting
General Assembly	At least once every six months (1 online and 1 physical per year)	At any time upon written request of any Member of the General Assembly
Project Coordinator Team	At least every 2 months	At any time upon written request of any Member of the Project Coordinator Team
External Advisory Board	EAB will be invited to the meetings carried out every six months (together with the General Assembly, physically or via online)	EAB will be invited to the extraordinary meetings of the General Assembly when asked by 1/3 of the Members of the General Assembly
Work Package Leaders Team	Depending on the needs of each WP work intensity and progress	At any time upon written request of any Member of the Work Package Team
Working groups of Tasks	At any time upon written request of any Member of the Working group	At any time upon written request of any Member of the Working group

- Notice of a meeting

The chairperson of a Consortium Body shall give notice in writing of a meeting to each Member of that Consortium Body as soon as possible and no later than the minimum number of days preceding the meeting as indicated below.

Consortium Body	Ordinary Meeting	Extraordinary Meeting
General Assembly	14 calendar days	7 calendar days
Project Coordinator Team	14 calendar days	7 calendar days
External Advisory Board	14 calendar days	7 calendar days
Work Package Leaders Team	14 calendar days	7 calendar days
Working groups of Tasks	14 calendar days	7 calendar days

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4.1.3 Sending the agenda

The chairperson of a Consortium Body shall prepare and send each Member of that Consortium Body a written (original) agenda no later than the minimum number of days preceding the meeting as indicated below.

Consortium Body	Ordinary Meeting	Extraordinary Meeting
General Assembly	14 calendar days	7 calendar days
Project Coordinator Team	14 calendar days	7 calendar days
External Advisory Board	14 calendar days	7 calendar days
Work Package Leaders Team	14 calendar days	7 calendar days
Working groups of Tasks	14 calendar days	7 calendar days

4.1.4 Adding agenda items

Any agenda item requiring a decision by the Members of a Consortium Body must be identified as such on the agenda. Any Member may add an item to the original agenda by written notice to all of the other Members no later than 7 calendar days preceding the meeting and 2 days preceding an extraordinary meeting.

During a meeting the Members of a Consortium Body present or represented can unanimously agree to add a new item to the original agenda.

Meetings of each Consortium Body may also be held by teleconference or other telecommunication means.

Decisions will only be binding once the relevant part of the minutes has been accepted according to Section 6.3.6.2. of the Consortium Agreement. More specifically, decisions will only be binding once the relevant part of the Minutes has been accepted. T

4.1.5 Minutes of a meeting

- General Assembly Meetings

The chairperson of the GA has the responsibility to produce minutes of each meeting, which will be the formal record of all decisions taken, using the official project word template provided by the coordinator. Within 10 days following the meeting, the chairperson is to distribute the draft minutes to all Members. The minutes shall be considered as accepted if, within 15 calendar days from receipt, no Party has sent an objection to the chairperson with respect to the accuracy of the draft minutes by written notice. The chairperson shall send the accepted minutes to all the Members, and to the Coordinator, who shall retain copies of them.

- Meetings of other Consortium Bodies

Meetings concerning the Project Coordinator Team, the External Advisory Board, Work Package Leaders and the Working groups of Tasks need to be produced in written form by the responsible chairperson and distributed to the involved partners, as well as to the coordinator. The minutes sent within an email in brief, yet comprehensive language, including (i) key points of discussion and (ii) next actions to be taken, can be considered acceptable. Alternatively, the official word template provided by the coordinator can be used, if necessary. Same deadlines apply, i.e. minutes to be produced within 10 days after the meeting and after 15 days following the email to partners to be considered as final, if no Party has sent an objection to the chairperson.

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4.2 Decision – Making

4.2.1 Decisions without a meeting

Any decision may also be taken without a meeting if:

a) the Coordinator circulates to all Members of the General Assembly a suggested decision with a deadline for responses of at least 10 calendar days after receipt by a Party and

b) the decision is agreed by 2/3 of all Parties.

The Coordinator shall inform all the Members in writing of the outcome of the vote.

A veto according to Section 6.3.5 of the Consortium Agreement may be submitted in writing up to 15 calendar days after receipt of this information.

The decision will be binding after the Coordinator sends a notification to all Members and none of the Members has vetoed within 15 days of receipt of the notification. The Coordinator will keep records of the votes and make them available to the Parties on request.

4.2.2 Voting rules and quorum

The General Assembly shall not deliberate and decide validly in meetings unless two-thirds (2/3) of its Members are present or represented (quorum).

If the quorum is not reached, the chairperson of the General Assembly shall convene another ordinary meeting within 15 calendar days. If in this meeting the quorum is not reached once more, the chairperson shall convene an extraordinary meeting which shall be entitled to decide even if less than the quorum of Members is present or represented.

Each Member present or represented in the meeting shall have one vote. Associated Partners are excluded from certain decisions of the General Assembly according to Section 6.2 of the Consortium Agreement.

A Party which the General Assembly has declared according to Section 4.3 of the Consortium Agreement to be a Defaulting Party may not vote or participate in any further General Assembly decision-making following the declaration of default nor shall their presence account for the relevant quorum.

Decisions shall be taken by a majority of two-thirds (2/3) of the votes cast.

4.2.3 Veto rights

A Party which can show that its own work, time for performance, costs, liabilities, intellectual property rights or other legitimate interests would be severely affected by a decision of the General Assembly may exercise a veto with respect to the corresponding decision or relevant part of the decision. Such a veto shall be reasonably and duly justified.

When the decision is foreseen on the original agenda, a Party may only veto such a decision during the meeting.

When a decision has been taken on a new item added to the agenda before or during the meeting, a Party may veto such decision during the meeting or within 15 calendar days after receipt of the draft minutes of the meeting.

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When a decision has been taken without a meeting a Party may veto such decision within 15 calendar days after receipt of the written notice by the chairperson of the outcome of the vote.

In case of exercise of veto, the Parties shall make every effort to resolve the matter which occasioned the veto to the general satisfaction of all Parties.

A Party may neither veto decisions relating to its identification to be in breach of its obligations nor to its identification as a Defaulting Party. The Defaulting Party may not veto decisions relating to its participation and termination in the consortium or the consequences of them.

A Party requesting to leave the consortium may not veto decisions relating thereto.

4.3 Progress Monitoring

Monitoring will aim to assess the work progress and the other events that impact the project. The main formal occasions for project control will be:

- Project Progress Meetings: scheduled both regularly and on special occasions. Regular internal Progress Meetings will be held every six months with the participation of the representatives of all partners. If necessary, teleconference-based meetings shall take place to ensure a proper communication among the partners, while keeping a low-carbon footprint and a defined budget resource. Work Progress Reports and Risk/Problem Management Reports will be issued from meetings and will be collected by the Project Coordinator to complement corresponding documents (i.e., deliverables, project reports, etc.)

- Project Plenary Meetings/General Assembly Meetings: will normally be planned in accordance to project milestones or on request of either the Project Coordinator or Project Partners.

4.4 Deliverable drafting and review process

The due date for deliverables is specified in the GA. Deliverables should be completed within the specified time frame. In case any deliverables or milestones are overdue within the given period, an explanation for the delay MUST be provided, along with the expected completion date. Considering the intricacy of the project, it is important to note that delays cannot be accommodated. Therefore, all partners are encouraged to give early warnings if there is a possibility of any issues that could hinder the timely completion of the tasks. It is advised deliverables to be worked on continuously throughout the relevant task period, and only the corresponding report/accompanying documentation should be prepared during the final month of the task.

Deliverables will have to be reviewed through the following procedure:

1) The Deliverable Leader submits the 1st completed draft to all partners for a 1st round of comments, (deadline: 28 days before official deadline)
2) All partners will have 1 week to submit their comments to Deliverable Leader (deadline: 21 days before official deadline)

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3) 2 Peers will have 1 week to submit their comments to Deliverable Leader (deadline: 12 days before official deadline)
4) The Deliverable Leader will have 1 week to incorporate the comments of 2 Peers and produce the pre-Final Version in order to submit it to the Coordinator for approval (deadline: 5 days before official deadline)
5) The Coordinator will have 5 days to approve or request any final changes to the deliverable leader to finalise the deliverable
6) The Coordinator submits the Final version to the EU Participant

In case that summer vacations, Christmas, Easter, national holidays etc. are close to the official delivery date of a deliverable, then the responsible deliverable leader should make the appropriate time arrangements well before the internal submission date (i.e. 5-6 weeks before the official date) so as to run smoothly the reviewing steps.

Annex 1 includes a Deliverable Tracker form completed by the Coordinator proposing 2 Peer reviewers per deliverable (to be confirmed by each Deliverable Leader or provide alternatives) and maintained as a guidance document regarding the quality assurance steps, throughout the project implementation.

4.4.1 Templates

EPHYRA project deliverables will all use the deliverable template in MS Word, as provided in the shared folder of the project: Templates and Logos

4.4.2 File naming convention

Deliverable files will use a name convention as follows:

- The name of the project: EPHYRA
- The deliverable number: DX.Y
- The deliverable title
- The due date in a contracted format: the three first letter of the month followed by the last two digits of the year (e.g., September 2023 will be written as SEP23)
- The version number: see table below

As an example, the current deliverable would be:
EPHYRA_D7.1_ProjectManagementHandbook_1.0_SEP23

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5 Communication and dissemination management

5.1 Internal collaboration and information flow

To keep all partners fully informed about the project progress and all relevant issues, an open information flow will be established. The main communication channels within the project will include:

- A dedicated and secured shared working space on the Microsoft Teams area of MOH with a structured information database, schedule of events and meetings, forthcoming reporting requirements, and key contact information for each partner (i.e. mailing list), etc. The EPHYRA Teams channel will host an electronic directory for storage of project related documents, which can be uploaded, viewed and downloaded by all partners.
- Telephone or video conferences of WP Leaders or WP Teams.
- 'Minutes' of all project events and meetings, reports on progress and agreed actions (communicated by e-mail).
- Ad-hoc meetings of WP Teams when necessary to facilitate the work within and between WPs.
- Formal project review meetings (every six months). Seven face-to-face meetings of the consortium are planned to be held over the implementation of the project. Each of these meetings will constitute a General Assembly meeting.
- Email correspondence

The Coordinator will be responsible for maintaining the shared working space of EPHYRA Teams channel and for distributing appropriate information (i.e. reports, minutes of the meetings, telephone and video conferences) to all partners.

5.2 Communication and dissemination strategy and tools

EPHYRA will deploy a broad range of communication and dissemination activities to maximise the impact of project results. These activities will be maintained and adjusted during the entire project duration. EPHYRA partners will contribute to leveraging the project impact by participating in dissemination and communication activities and committing to development and implementation of the IPR and exploitation strategy. It is anticipated that in EPHYRA, the dissemination of results including the technical and economic benefits beyond the consortium to industrial and policy making as well as regional stakeholders will be given particular emphasis to facilitate the project exploitation. It is thus essential that EPHYRA closely communicates on progress, lessons learned as well as exchanges on the recent developments of the state-of-the-art.

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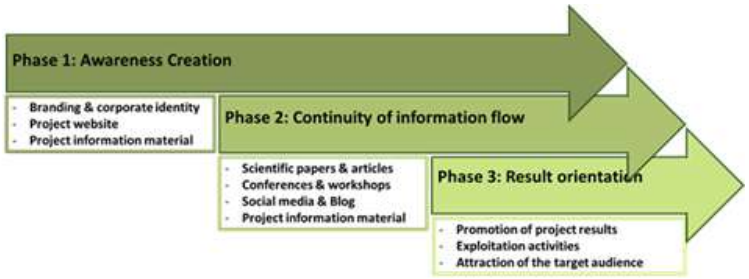

Figure 5 Phased approach of communication and dissemination measures in EPHYRA

A detailed dissemination and communication action plan will be elaborated within WP6 and issued shortly after the start of the project (D6.1 – Communication and awareness plan – to be finalised within M6), in order to serve as an internal practical guide for the consortium partners for engaging with dissemination and communication activities through coordinated actions. Additionally, this plan comprises a dynamic schedule of relevant channels for dissemination activities to be carried out. The scope and purpose of communication and dissemination activities will evolve through the project and in three phases:

- *Phase1: Create Awareness* - To raise awareness, a wide range of communication and dissemination tools will be used. This includes a visual identity with an appropriate project logo, project website, social media channels, project flyer and consistent presentation templates. The unique visual identity is a key aspect as it will improve the project´s brand recognition among end-users, stakeholders and the lay public and will stimulate exchange and follow-up actions. The project website and the social media channels will be launched within the first months and represents the main communication platforms through which the project communicates to their target audience.
- *Phase 2: Continuous information* - As first results become available, the consortium will actively engage in various dissemination activities such as writing papers and articles in high-impact scientific journals and participate in third-party events and conferences to further raise awareness amongst stakeholders. This will enable bilateral exchanges with stakeholders and will be beneficial for new insights for the project. Regular social media campaigns will keep the information flow upright and increase the interest of multiple audiences.
- *Phase 3: Result orientation* - During this third phase, the dissemination and communication efforts will be very closely interlinked with exploitation activities. The main project's results will be mature enough to be shared with target communities using both online and offline channels. In the last year of the project a final Stakeholder Symposium will be organised to channel the project output, attract interest from potential stakeholders and share knowledge with related projects and initiatives (clustering events).

6 Risk Management

The extensive scope and multidisciplinary character of the project requires careful risk analysis and contingency planning to provide a follow-on strategy in case important intermediate goals cannot be accomplished. Therefore, a Risk Management Plan is developed here, and its procedures will be supervised by the Project Coordinator.

Risk management aims to minimise factors that can be detrimental to project objectives. At every level, it will adopt a uniform and systematic approach across consortium members to:

- Identify and evaluate risks; define and plan proactive actions for risk reduction.

- Start, perform, and control mitigation activities.
- Document progress of risk management activities, and evaluate their results with continuity to bring feedback and corrections

The risks are assessed for their impact on the project and for their probability of occurrence, resulting in an estimation of the severity for each risk: low, medium or high. The consortium will establish risk mitigation plans to reduce the impact and likelihood of the risk occurring, as well as action plans to manage the consequences of the risk if it were to arise.

Work Package (WP) Leaders are responsible for the following tasks within their work package(s):

- Identifying and describing any risk.
- Helping to identify the risk owners and assisting in developing the risk response strategies.
- Performing the risk response steps assigned.
- Reporting on the progress of the risk response to the Project Coordinator.
- Assisting the Project Coordinator in activities associated with risk monitoring and control.

A first approach risk assessment has been performed and the following major risk areas have been identified, and contingency plans have been developed as shown in the following table. The implementation of mitigation strategies will be evaluated carefully if the original innovation goal cannot be accomplished. This risk management policy will be kept up to date by the Coordination Team. All the members of the General Assembly are expected to understand the most significant risks that could occur.

Table 7 List of critical risks

Risk number	Description	WP No(s)	Proposed Mitigation Measures
1	Delay of electrolyser package delivery	WP4, WP1	- Early issue of front-end engineering study - Prioritisation of tendering procedures for equipment that have a long delivery time - 5 years project includes 1-year buffer time in order to have at least 2 years of operation of the electrolyser
2	Delay of licencing	WP1	- Electrolyser will be erected and installed in MOH Refinery industrial site that is in continual expansion and has numerous successful ongoing licensing applications - Dedicated Department within MOH Refinery for industrial licensing - HORIZON approval will speed licensing procedures - 5 years project includes 1-year buffer time in order to mitigate any unforeseen delays
3	Late commissioning of the unit	WP4, WP1	• Early implementation of front-end engineering study and detailed engineering • Early material requisition and tendering procedure. • Factory & site acceptance test for major equipment.

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Risk number	Description	WP No(s)	Proposed Mitigation Measures
4	Electrolyser compliance with Strategic Research & Innovation Agenda (SRIA) KPI's for 2024	WP1	• SRIA KPI's for 2024 are a market objective of EU electrolyser Manufacturers and various innovations are developed for each electrolysis technology. • The present project open technology approach gives the necessary flexibility not to commit to a specific technology at the proposal phase but to choose the best value for money technology, compliant with SRIA targets that will finaly offer the most competitive green hydrogen price per kg to the end users
5	Technical difficulty in methodology development	WP5, WP1	Need for simplified user interactive methodology for tool developed
6	Data gathering for LCA analysis	WP5, WP4, WP1	Specific templates for gathering data will be created. Secondary data from databases will be used as well.
7	Feedback from Stakeholders regarding the social aspects	WP5, WP6	The partners will distribute the relevant info among their network partners
8	Plasma processes for PWW purification prove inefficient and energy demanding	WP2	CERTH will design novel reactor configurations aided by advanced simulation tools to improve the process efficiency

7 Financial Management

This section includes the main financial and contractual aspects to take into account for the correct execution and follow-up of the EPHRA Project. It contains all relevant information for consortium partners to refer to during the project, including the financial guidelines, funds distribution, eligible costs and requirements for reporting.

7.1 Project duration, budget and EC contribution

The effective start of the project is 01.06.2023, and the project ends 60 months later, on 31.05.2028.

The project has an overall budget of 24,631,840.00 €, of which a maximum of 17,757,002.50 € shall be financed by the European Commission (EC).

The budget detailed per beneficiary and the corresponding EU contribution of each beneficiary is detailed in the Annex 1 to the Grant Agreement – Description of Action (DoA). In addition, in the Annex 2 - Estimated Budget of the action - is also detailed per beneficiary. The grant reimburses 100% of the eligible costs of the beneficiaries that are non-profit legal entities and 70% of the eligible costs of the beneficiaries that are profit legal entities.

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The distribution of each of the partner's budget among the different cost categories is an estimation. It is allowed to shift budget from one category to another as far as the quantities are not very high and no new subcontracting is executed. Shift of high budget quantities might require the explicit approval of the EC.

The EC contribution to each of the beneficiaries is a maximum contribution conditioned to the acceptance by the EC of expenses up to the budget of the partner (this means that if a partner spends less than what is shown in its approved budget -or the Commission does not accept all its costs, it will receive only the proportional part of the EC contribution).

7.2 Contractual documents

The reference documents for the project Consortium members, which define the tasks, rights and obligations of the partners are:

- the Grant Agreement (GA) (including its annexes) and
- the Consortium Agreement (CA) (including its addendums if any).

Both documents will be accessible through the common working space of Microsoft Teams of the EPHYRA project.

An amendment to a GA is a legal act modifying the commitments stated in the GA, which may create new rights or impose new obligations on the parties. It allows the Consortium to modify the GA during the project lifetime. A Grant Agreement amendment can be requested either by the EC to the consortium or by the consortium to the EC. The amendment is effected through an exchange of official letters with the EC. Amendments can only be done by the project coordinator who, after launching the amendment request, and once all the amendment data are completed, signs electronically the request. Any project amendment submitted by the consortium is subjected to official acceptance by the EC. Any substantial modification to the content of Annex 1 (DoA), as well as the administrative information of the project (related to project partners, project budget, etc.) needs the official acceptance of the EC through an amendment process. The project coordination team strongly encourages the partners to check with the project coordinator any issue that might be subject to an amendment.

7.3 Progress reporting

There are two types of reporting within the EPHYRA project lifetime:

7.3.1 Continuous reporting

The beneficiaries must continuously report on the progress of the action (deliverables, milestones, outputs/ outcomes, critical risks, indicators etc.), in the Portal's Continuous Reporting tool and in accordance with the timing and conditions it sets out.

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7.3.2 Periodic Reporting

Periodic Reporting must include the technical reports and the financial statements. The coordinator must submit a periodic report within 60 days following the end of each reporting period:

(a) The Periodic Technical Reports containing:

- An overview of the action implementation
- An explanation of the work carried out by the beneficiaries
- A summary for the publication by the Commission
- Answers to a questionnaire that addresses various aspects of project implementation and assesses its economic and societal impact, especially concerning Horizon 2020 key performance indicators and monitoring requirements

(b) Periodic financial Report containing:

- An individual financial statement from each beneficiary
- An explanation on the use of resources
- Certificates on the financial statements

Each beneficiary must certify that:

- The information provided is complete, reliable, and true
- The costs and contributions declared are eligible
- the costs and contributions can be substantiated by adequate records and supporting documents that will be produced upon request or in the context of checks, reviews, audits and investigations
- for the final periodic report: all the revenues have been declared

The generation of reports will be a collaborative effort between the Coordinator and the Executive Board using as input the internal periodic reports and templates provided by the Coordinator. Technical reports will be made accessible to the Consortium for assessment and approval. Each partner is responsible for uploading their respective financial details onto the EC portal. After obtaining approval for both the financial and technical segments of the reports, the Coordinator will then upload the information and associated documentation onto the EC Portal. Subsequently, the submission of the reports to the European Commission will be finalized.

The Coordinator, MOH, will coordinate periodic technical and financial reporting using an efficient management structure. The Consortium must submit periodic reports, within 60 days following the end of each reporting period, via the Periodic Reporting Module of the Portal's Grant Management System in order to receive payments. In addition to the periodic report for the last reporting period, the coordinator must submit the final report within 60 calendar days following the end of the last reporting period.

Figure 6 shows the required continuous and periodic reporting stages for EPHYRA project.

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✓ Continuous reporting module
✓ Periodic reporting module

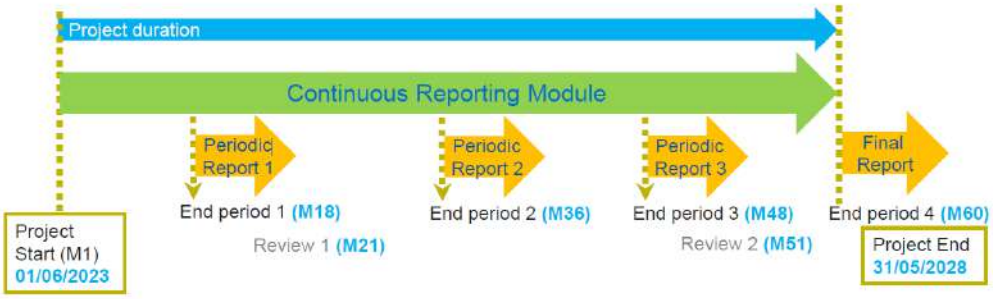

Figure 6 Continuous and periodic reporting module of EPHYRA project

More details are provided in Annex 2 that includes the Presentations by the project officer and financial officer of EPHYRA.

8 Ownership of results and access rights

Given the importance and interrelations of the partners regarding the produced outcomes of the project and the involved access rights, these aspects have been explicitly described in the Consortium Agreement under the following sections:

- Chapter 8 “Results”:
  - Ownership of results
  - Joint Ownership
  - Transfer of results
  - Dissemination

and

- Chapter 9 “Access Rights”:
  - Background included
  - General principles
  - Access rights for implementation
  - Access rights for exploitation
  - Access rights for entities under the same control
  - Additional access rights
  - Access rights for parties entering or leaving the consortium
  - Specific provisions for access rights to software

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Annex 1 List of Deliverables & Reviewing procedure

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Due Date (month)	Reviewers	Draft to consortium (-28 days)	Draft to reviewers (-21 days)	Draft to Del. leader (-12 days)	Final version to Coordinator (-5 days)
D1.1	Technology validation	WP1	CERTH	12	MOH SOLUFORCE				
D1.2	Industrial electrolyser boundaries	WP1	MOH	18	CERTH ENERTIME				
D1.3	Material requisition	WP1	MOH	32	ITAINNOVA SOLUFORCE				
D1.4	Formal operation permit	WP1	MOH	30	ENERTIME DLR				
D1.5	Hydrogen safety planning – Draft plan	WP1	MOH	6	CERTH SOLUFORCE				
D1.6	Hydrogen safety planning – Final plan	WP1	MOH	24	CERTH SOLUFORCE				
D2.1	Report on concept design of the ORC system	WP2	ENERTIME	24	MOH CERTH				
D2.2	Report on the internal use of electrolysis generated oxygen within MOH Refinery	WP2	MOH	18	CERTH ENERTIME				
D2.3	Report on concept design of the RO system and plasma based PWW treatment	WP2	CERTH	24	MOH ENERTIME				
D3.1	Process model	WP3	DLR	24	CERTH SPSE				
D3.2	Renewable energy optimiser	WP3	ITAINNOVA	24	DLR SPSE				
D3.3	Process optimiser	WP3	CERTH	56	ITAINNOVA SPSE				
D3.4	Process model validated with operational data	WP3	CERTH	38	DLR ITAINNOVA				
D4.1	Detailed engineering	WP4	MOH	24	CERTH SOLUFORCE				
D4.2	Site preparation, utilities connection and equipment integration	WP4	MOH	27	ENERTIME CERTH				
D4.3	Unit operational procedures manual	WP4	MOH	30	ENERTIME SOLUFORCE				
D4.4	Green hydrogen production Unit first year operation assessment	WP4	MOH	44	ENERTIME SOLUFORCE				
D4.5	Green hydrogen production Unit second year operation assessment	WP4	MOH	56	ENERTIME SOLUFORCE				
D5.1	Market assessment	WP5	RINA-C	12	MOH CERTH				
D5.2	Preliminary business plan – GO – NO GO decision	WP5	RINA-C	18	MOH CERTH				
D5.3	Sustainability assessment	WP5	RINA-C	54	CERTH ENVIROMETRICS				

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Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Due Date (month)	Reviewers	Draft to consortium (-28 days)	Draft to reviewers (-21 days)	Draft to Del. leader (-12 days)	Final version to Coordinator (-5 days)
D5.4	TRL9 Roadmapping	WP5	RINA-C	60	MOH ENVIROMETRICS				
D6.1	Communication and awareness plan	WP6	NEC	6	RINA-C MOH				
D6.2	Technology positioning exploitation plans	WP6	RINA-C	60	NEC ENVIROMETRICS				
D6.3	Standards assessment	WP6	RINA-C	60	MOH CERTH				
D7.1	Project management guidelines and infrastructure	WP7	MOH	3	NEC RINA-C				
D7.2	Data Management Plan	WP7	MOH	6	SPSE DLR				
D7.3	Annual data reporting 2024	WP7	MOH	10	NEC ENVIROMETRICS				
D7.4	Annual data reporting 2025	WP7	MOH	22	RINA-C ENVIROMETRICS				
D7.5	Annual data reporting 2026	WP7	MOH	34	NEC RINA-C				
D7.6	Annual data reporting 2027	WP7	MOH	46	NEC ENVIROMETRICS				
D7.7	Annual data reporting 2028	WP7	MOH	58	RINA-C ENVIROMETRICS				

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Annex 2 Presentation of PO and FO with project monitoring and financial rules

EPHYRA KOM presentation - POs (1)

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