Efficient water splitting via a flexible solar-powered Hybrid thermochemical-Sulphur dioxide depolarized Electrolysis Cycle

www.hyselect.eu

D1.1 Project management plan - Public

30.06.2023

WP1 - Project coordination and management

Clean Hydrogen Partnership

Co-funded by the European Union

1.1.1. Disclaimer

1.1.2. Acknowledgement

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1.1.4. Preface

HySelect will demonstrate the production of hydrogen (H_2) by splitting water via concentrated solar technologies (CST) with an attractive efficiency and cost, through the Hybrid Sulphur cycle (HyS). The HyS consists of two central steps: the high temperature -yet below-900 ^oC -decomposition of sulphuric acid forming Sulphur dioxide (SO_2) and the subsequent low temperature (50-80 ^oC) SO_2 depolarized electrolysis (SDE) of water to produce H_2. HySelect will introduce, develop and operate under real conditions a complete H_2 production chain focusing on two innovative, full scale plant prototype core devices for both steps of the HyS cycle: an allothermally heated, spatially decoupled from a centrifugal particle solar receiver, sulphuric acid decomposition-Sulphur trioxide splitting (SAD-STS) reactor and a Sulphur dioxide depolarized electrolyzer (SDE) without expensive Platinum Group Metals (PGMs). Furthermore, a heat recovery system will be integrated to exploit the temperature difference within the cycle and boost the overall process efficiency. In the course of the work, non-critical materials and catalysts will be developed, qualified and integrated into the plant scale prototype units for both the acid splitting reactor and the SDE unit. Experimental work will be accompanied by component modelling and overall process simulation and culminate with a demonstration of the complete process integrating its key units of a 750 kW_{th} centrifugal particle receiver, a hot particles storage system, a 250 kW_{th} SAD-STS and a 100 kW_e SDE into a pilot plant. Testing for a period of at least 6 months in a large-scale solar tower, driven with smart operation and control strategies, will establish the HySelect targeted efficiency and costs. Finally, an overall process evaluation will be carried out in order to assess the technical and economic prospects of the HySelect technology, directly linked to the know-how and developments of the sulphuric acid and water electrolyzers industries.

DLR	German Aerospace Center	DE	DLR
CERTH	Centre for Research and Technology Hellas	GR	CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS
AALTO	Aalto University	FI	Aalto University
ENEA	Italian National Agency for New Technologies, Energy and Sustainable Economic Development	IT	ENEA
FENR	FEN Research GmbH	AT	fen research
GRILLO	Grillo Werke AG	DE	GRILLO

1.1.5. Summary

This document is Deliverable D1.1 Project management plan, developed within WP1 of the Clean Hydrogen JU HySelect project. In this deliverable, the structure of the project, the governing bodies, the management structures, the work plan, and the means of internal communication are presented. This deliverable shall act as the main reference for administration guidelines and procedure of the HySelect project.

Contents

1. Introduction

Deliverable 1.1, Project management plan, is developed within WP1, Project Management and Coordination. Scope of D1.1 is to present the structure, the work plan and the overall management approach adopted, aiming at a timely, efficient and high-quality progress of the work to be undertaken in this project. The Project management plan (PMP), will act as the main reference point; as the manual for all Consortium members in terms of project planning activities, how the project is managed, monitored and controlled and how efficient communication is taking place.

2. Consortium

The HySelect consortium involves 6 organisations from 5 EU countries (see Table 1) and has been formed with the rationale to cover and integrate the entire spectrum of all the key players that can contribute substantially in the area of solar hydrogen production via the Hybrid Sulphur thermochemical cycle. The consortium covers the entire materials and process value chains of both concentrated solar energy-driven SO_3 splitting and Sulphur dioxide depolarized electrolysis (see Fig. 1).

Table 1: The Consortium of the HySelect project

No.	Short name	Organization name	Country	Type
1	DLR	German Aerospace Center	DE	Research Centre
2	CERTH	Centre for Research and Technology Hellas	GR	Research Centre
3	AALTO	Aalto University	FI	University
4	ENEA	Italian National Agency for New Technologies, Energy and Sustainable Economic Development	IT	Research Centre
5	FENR	FEN Research GmbH	AT	Research Organisation
6	GRILLO	Grillo Werke AG	DE	Large Enterprise - Industry

The “Research & Technology-led” innovation edge in the project will emerge from the high-level commitment of the four specialized research partners, one university (AALTO) and three research centres (DLR, CERTH, ENEA) as research and technology developers, that possess state-of-the-art knowledge and experimental infrastructure from basic up to pre-industrial level, provide a sound scientific knowledge base and combine their national expertise into a global force.
The “Market-led” innovation edge is provided by one innovative, highly specialized research organization (FENR), focusing on content dissemination, and one large enterprise (GRILLO) as industrial partner, as well as the DLR team working on further commercializing the receiver technology with extensive experience and international presence in the hydrogen and chemical industry assuming complementary project tasks. Their participation will ensure industrial relevance of the research effort, clear market orientation and secure results exploitation.

The whole spectrum from “Knowledge producers” to “Knowledge end-users” is adequately covered while at the same time the consortium includes partners from essentially all European regions, spanning from the northern (Finland) through the central (Germany, Austria) to the southern (Italy, Greece) Europe (see Fig. 2).

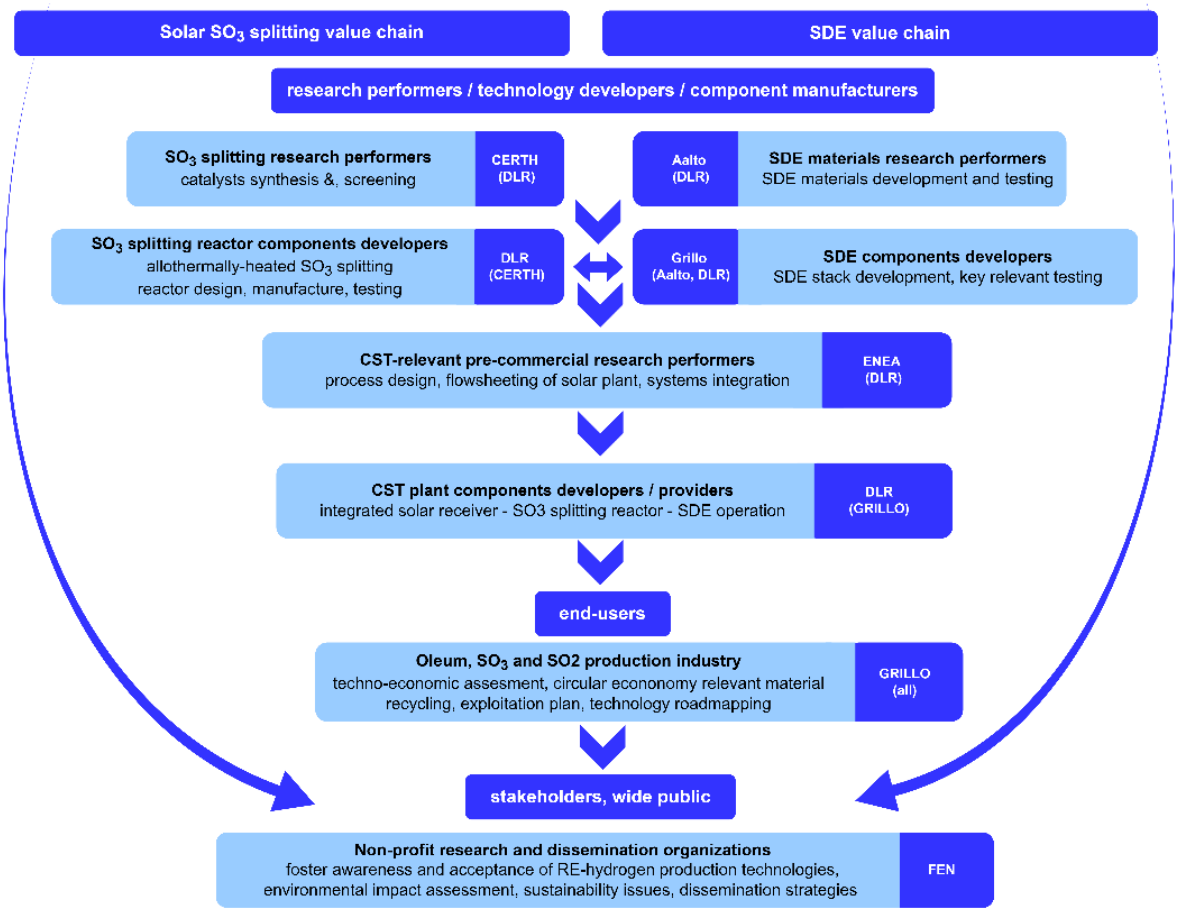

Fig. 1 The value chain of the HySelect consortium

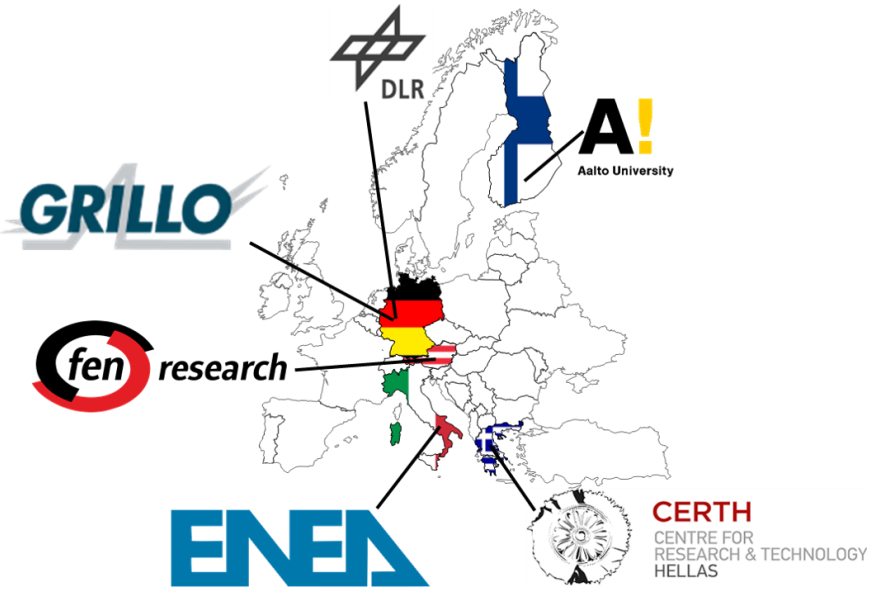

Fig. 2 Geographical distribution of the HySelect consortium

3. Project management and governance structure

The project Organisational, Management and Governance structure is based on standard industrial-oriented Research & Development (R&D) practices for similar size multi-partner projects. The management principles of the project aim to achieve the fair representation and the flexibility of all members in the decision-making bodies and the transparent governance in the different levels of management. According to what is foreseen in Task 1.1 Establishment of project management and governance structure of the Description of Action (DoA), the project's management hierarchy is distributed into three levels: Project level, Work-Package level and Task level. In each level appropriate Management bodies are responsible for the assessment of progress and results and of major technical, policy and management decisions. This Management structure is shown schematically in Fig. 3 and is also described in detail below, together with the composition and mission of each management body and some key details from the decision-making process. The latter is covered in full extent (quorum requirements, voting etc.) within the already signed respective Consortium Agreement (CA). The actual participation and close involvement of the industrial partner and the specialized Research Organisation on the decision-making, the results-assessment, and the commercial exploitation Management bodies (described in detail below) will ensure that the research effort and orientation will have a strong industrial driver to maximize industrial relevance and impact.

3.1. Project level

Three entities cooperate for the management at the Project Level: the General Assembly, the Project Coordinator and the Exploitation Committee.

3.1.1. General Assembly (GA)

The General Assembly consists of one representative of each partner (total of 6 Members). Each participating organisation has appointed a regular Member and an alternate Member in case the former cannot participate. The project's General Assembly is shown in Table 2.

Table 2: The General Assembly of the HySelect project

No.	Organization	Member	alternate Member
1	DLR	Dennis Thomey	Dimitrios Dimitrakis
2	CERTH	George Karagiannakis	Nikolaos Tsongidis
3	AALTO	Annukka Santasalo	Michael Gasik
4	ENEA	Michela Lanchi	Raffaele Liberatore
5	FENR	Nikolaus Fleischhacker	Niusha Shakibi Nia
6	GRILLO	Martin Kürten	Irina Pfeifer

This body possesses a decisive and strategic role and its mission is to streamline the research towards efficient solutions and useful market applications. The GA will assess at high level the results coming from the various research efforts and will be responsible for major decisions:

- workplan calendar and progress monitoring measures
- budget distribution and review and approval of financial issues
- efficient partnership communication channels
- efficient self-assessment methodology, monitoring of the quality management plan, review and approval of the risk assessment
- effective dissemination strategy
- conflict resolution management

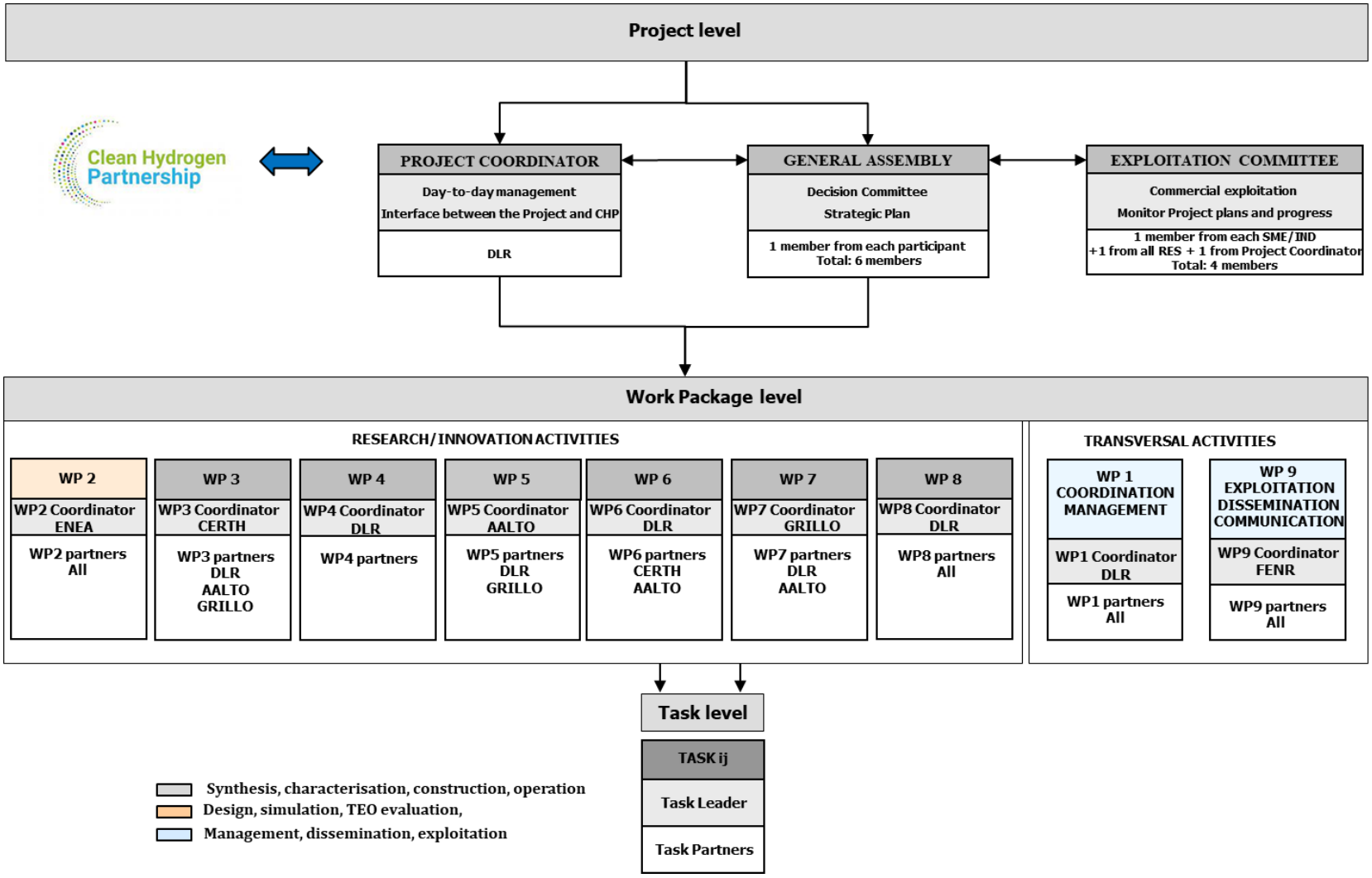

Fig. 3 the Management structure of HySelect

The GA also has the authority for the decision to add new sub-programs upon the Project's progress, and the respective launch call for tenders as well as to invite experts to attend its meetings with roles as advisors.
The Project Coordinator (see below) shall chair all meetings of the GA, unless decided otherwise by the GA and will be responsible for convening the GA as often as the interests of the Consortium so require and at least twice a year (periodic project meetings every 6 months), setting the GA meetings' agenda, chair the GA meetings and ensure that the Project partners implement the decisions taken by the GA. Except for items where a unanimous vote is required (described in detail in the Consortium Agreement) decisions by the GA will be taken upon a majority of more than 50% of the votes of all GA members. Every GA member has the empowerment by his organisation to commit the staff and other resources required by the project according to the agreed contract. Changes in the work programme will be discussed and decided by the GA for submission to EU.

3.1.2. Project Coordinator (PC)

The PC acts on behalf of the GA and is responsible for the Project Management (work, budget) and the representation of the Project. **The Coordinator is the single point of contact between the European Commission-EC (through the Clean Hydrogen Partnership) and the Partners** and in this function, among others, communicates all information in connection with the Project between the EC and the Partners, receives the entire financial contribution from the EC and allocates it to the Partners, prepares annual accounts and financial statements after collecting from all Partners the cost and other statements for submission to the EC. The PC is responsible for the day-to-day administrative and scientific coordination of the project, organizes the communication between the partners, usually via the WP coordinators and consolidates the project planning. **Mr. Dennis Thomey**, member of the Institute of Future Fuels and acting head of the Solar Process Demonstration Department of DLR is responsible for the coordination of the Project. The Coordinator, the Institute and the Department have extensive project management and coordination experience of EU research projects, especially on concentrating solar technologies-related areas.

3.1.3. Exploitation Committee (ExCo)

The Exploitation Committee (ExCo) consists of one member from the specialized Research organisation and one from the industrial partner participating in the consortium (FENR, GRILLO), one from the coordinator (DLR) and one representative of the remaining three Research and University partners (CERTH, AALTO, ENEA,) elected among them – total of 4 members. AALTO and CERTH expressed their availability for representing the research partners therein, and all other research organisations unanimously agreed. According to these, the project's EC has been formed as in Table 3.

Table 3: The Exploitation Committee of the HySelect project

No.	Organization	Member	Alternate member
1	DLR	Dennis Thomey	Christos Agrafiotis
2	CERTH	Annukka Santasalo	Nikolaos Tsongidis
3	AALTO		
4	ENEA		
5	FENR	Niusha Shakibi Nia	Nikolaus Fleischhacker
6	GRILLO	Martin Kürten	Irina Pfeiffer

The role of the ExCo is the monitoring of the plans and progress of the Project and advise on all issues relating to the commercial exploitation, the input to standards, the input to EU policy, on further research and education and on social goods as well as on the implementation of the Innovation Management and the Exploitation activities.

3.2. Work Package Level

Each Work Package (WP) has an appointed Work Package Leader (WPL) who assumes the technical leadership and responsibility. WPLs are responsible for the day-to-day scientific coordination of the WP tasks (planning and monitoring, timely completion and submission of deliverables, milestones, reports). They coordinate communication between tasks, between the WP and the PC and between their WP and the other WPs in the project. Partners involved in a WP can meet according to the specific needs of the WP under the chairmanship of the WPL. Each organisation involved in a WP has also defined the person responsible on its behalf for the specific WP - who will also be the main contact point for the partners involved in the WP - as well as an alternative contact person. This WP responsible on behalf of the organisation, distributes the organisation's work within the specific WP internally to further personnel. According to that arrangement, common, internal mailing lists per each WP have been created for inter-WP communication, aiming at efficiently small groups and effective dissemination of information avoiding information overload and excessive mailing lists. Table 4 lists the main and alternate responsible per WP and per organization, WPLs are in bold at the time of submission of this Deliverable. The maintenance and actualization of the internal mailing lists per WP falls within the duties of each organization's WP responsible.

3.3. Task Level

Similarly to the Work package level, each organisation has appointed a Task Leader for each task within each WP. Every TL is responsible for the Task supervision and implementation and provides the relevant information to the respective WP Leader (technical reports, etc.). The TLs are directly responsible for the detailed planning and day-to-day work needed to carry out the tasks related to the specific activities. Task Leader lists are kept in the same common email lists as above.

3.4. Interrelation and complementarity

An overview of the interrelation and complementarity among the various management entities is given here. The GA is the decision-making body with power to make decisions on: (i) the direct strategic orientation of the project, (ii) allocation and distribution of the budget; (iii) inclusion of new partners and (iv) exclusion of partners (based on relevant provisions and procedures of the Consortium Agreement).
The PC is the operational body between the EC and the partners, whereas the ExCo assumes the commercial exploitation of the research results. The day-to-day management of the project is implemented by the PC and the WP leaders appointed. Interrelation among the technical content of the WPs is "enforced" by the Project Coordinator, whereas on the Administrative level, the General Assembly in addition to the regularly scheduled meetings, shall convene extra Technical Meetings among relevant or interconnected WP leaders in order to promote exchange of information on progress made and on ways to tackle common problems. Within each WP, the WPL is responsible for initiating and implementing such intra-WP meetings to address relevant WP issues.
The organisational structure and decision-making mechanisms of HySelect are based on common practices, already successfully employed in EC collaborative projects. All participants are well acquainted with the current organisational structure that allows the management of the contractual obligations at the coordination and administrative level, such as planning of WPs activities, coordination of tasks, meetings and reporting within the consortium and towards the EC. At the same time, the proposed structure maintains a flexible and efficient

approach (e.g. day-by-day communication between the partners via e-mails and tele-conferences or technical meetings) to timely resolve the complex requirements of the scientific and technical advances and determine the most suitable solution per challenging item identified in the course of the project.

Table 4: Contact persons (WP Leaders in bold) per WP and per organization of HySelect

	DLR	CERTH	AALTO	ENEA	FENR	GRILLO
WP1	**Dimitrios Dimitrakis**	George Karagiannakis	Annukka Santasalo	Michela Lanchi	Niusha Shakibi Nia	Martin Kürten
	Dennis Thomey	Nikolaos Tsongidis	Michael Gasik	Raffaelle Liberatore	Nikolaus Fleischhacker	Irina Pfeifer
WP2	Dimitrios Dimitrakis	Grigorios Pantoleontos	Annukka Santasalo	**Michela Lanchi**	Niusha Shakibi Nia	Martin Kürten
	Christos Agrafiotis	Nikolaos Tsongidis	Michael Gasik	Raffaelle Liberatore	Nikolaus Fleischhacker	Irina Pfeifer
WP3	Christos Agrafiotis	**Nikolaos Tsongidis**	Annukka Santasalo	-	-	Martin Kürten
	Dimitrios Dimitrakis	George Karagiannakis	Michael Gasik	-	-	Irina Pfeifer
WP4	**Alexander Hirt**	-	-	-	-	-
	Luka Lackovic	-	-	-	-	-
WP5	Dimitrios Dimitrakis	-	**Annukka Santasalo**			Martin Kürten
	Larissa Queda	-	Michael Gasik			Irina Pfeifer
WP6	**Christos Agrafiotis**	Chrysoula Pagoura	Annukka Santasalo	-	-	-
	Dennis Thomey	Nikolaos Tsongidis	Michael Gasik	-	-	-
WP7	Dennis Thomey	-	Annukka Santasalo	-	-	**Martin Kürten**
	Dimitrios Dimitrakis	-	Michael Gasik	-	-	Irina Pfeifer
WP8	**Dimitrios Dimitrakis**	Nikolaos Tsongidis	Annukka Santasalo	Maria Valenti	Niusha Shakibi Nia	Martin Kürten
	Christos Agrafiotis	Dimitrios Koutsonikolas	Michael Gasik	Giovanna Adinolfi	Nikolaus Fleischhacker	Irina Pfeifer
WP9	Christos Agrafiotis	Villy Zacharopoulou	Annukka Santasalo	Michel Lanchi	**Niusha Shakibi Nia**	Martin Kürten
	Dimitrios Dimitrakis	Chrysoula Pagoura	Michael Gasik	Raffaelle Liberatore	Nikolaus Fleischhacker	Irina Pfeifer

4. Conflict resolution

Conflicts or technical issues within the contractual commitments that are not related to contract budget, resources allocation or overall project focus changes, will be discussed and attempted to be settled at WP level first. The partner(s) involved in the conflict issue(s) will inform the WPL for the possibility of such a conflict. The WPL then will assume the necessary mediation actions to resolve the conflict, deciding at first whether this conflict needs to be discussed in a bilateral meeting between the partner(s) involved or within a WP meeting. In parallel the WPL will inform the PC for the planned actions and communicate to the PC the results of the conflict settlement procedure.
If resolution of conflict in question is not possible with the consensus of the partner(s) involved at the WP level, the PC will assume the duties of contacting the involved parties and trying to resolve the conflict. Should the disagreement remain, the issue will be transferred to the GA. The decision to be made at that level, according to the provisions and rules stated in the Consortium Agreement, will be considered by all partners as the final resolution of the issue. Naturally, minutes of all the meetings above – bilateral, WP-level, GA level – will be drafted by the organisation chairing these meetings and will be distributed in the consortium.

5. Project planning

The overall project planning consists of two parts: the work breakdown structure (WBS) presented in Section 5.1 and the Gantt chart in Section 5.2.

5.1. Work break down structure (WBS)

The Pert diagram (Fig. 4) and the WBS (Fig. 5) are shown schematically below. They give an overview of all relevant work packages (WPs) and visualise their interaction throughout the evolution of the project. This planning will be continuously updated in the course of the project and used by the coordinator to control the progress of the work tasks as well as the timely preparation of deliverables and achievement of milestones.

HySelect is scheduled as a 48-month project. The work programme is comprised of 7 Research/Innovation Work packages (WP2-WP8), covering the design/simulation and technical activities necessary to develop the project's novel ideas, complemented by two WPs addressing its coordination and management (WP1) and actions for exploitation of the project's outcome, dissemination and communication of its results (WP9), respectively. As shown in the Pert chart, WP1 (management and coordination) depicted on the top is the leading work package steering all other WPs. Moreover, the main goal of the project – the protection, exploitation, dissemination and communication of scientific results – is clearly indicated by locating WP9 on the bottom of the diagram. Therefore, WP1 and 9 represent the frame while the core of the project is comprised of work packages 2 to 7. All investigations eventually lead to a technology demonstration in WP8 so that this WP plays a particularly important role in the project while the overall evaluation of the process takes place in WP2.
WP1 Project coordination and management extends throughout the Project duration and deals with management and scientific coordination of the legal, administrative, financial and contractual tasks of the project.
WP2 Process design, simulation and techno-economics extends throughout the Project duration as well. Within the first year the plant concepts will be prepared and the interfaces for an integrated plant will be defined. According to the plant concepts shortlisted, in the second- and third-year detailed flowsheets will be drafted and mass and energy flows will be simulated. These simulations are the input to WP8 on which the smart operation and control strategies will be based on. In year three and four, based on the formulated flowsheets, scale up studies will be undertaken for selected plant capacities, leading to the technoeconomic evaluation of

the overall process. In parallel, an environmental assessment of the technology will be carried out, future sustainable business cases will be identified and key stakeholders will be contacted.
WP3 Materials and catalysts development is the first of the core technical work packages. It spans the first three years of the project and focuses on the development of materials for both key components, the splitting reactor (developing of sulphuric acid splitting catalysts and functional materials for the sulphuric acid evaporator - splitting reactor) and the SD electrolyzer (development of an advanced protective catalyst coating for the SDE cell and membrane materials). Results from WP3 will directly feed the respective work in WP5 (electrolyzer) and WP6 (reactor).
WP4 Centrifugal solar particle receiver and particle storage, has a duration of two years, in the middle of the project and covers all activities related to the solar interface, namely the particle receiver and the particle storage. Identification of specifications, hardware engineering and extensive testing of the facility are foreseen to prepare the ground for the demonstration campaign in WP8.
WP5 Sulphur dioxide depolarized electrolyzer, has also a duration of two years and activities take place during the second and third year. This WP builds on the results of WP3 and extends them to a fully functional pilot-scale SDE unit, the first of-its kind in this size. WP5 will deliver the SDE pilot to WP8 for integration in the complete plant and demonstration.
WP6 Sulphuric acid splitting reactor and vaporisation unit, is another major technical work package, and similar to the previous WP, it spans the second and third year, builds on the results of WP3 and aims to deliver a pilot sulphuric acid-sulphur trioxide splitting reactor. At the end of this WP, the reactor will be delivered to WP8 for integration into the HySelect plant and demonstration of operation.
WP7 High temperature heat recovery, gas separation system and balance of plant, is the last of the core technical WPs, has the same duration of two years in the middle of the project and constitutes the framework within which the integration of activities in the next WP shall take place. Keeping in mind the complexity of such a demo-plant, WP7 was foreseen to specifically deal with and cover all aspects of the peripheral units required for the operation of the HySelect plant, and the necessary design, engineering and purchasing for closing the balance of plant. Activities covered in WP7 include the heat recovery and gas separation systems, acid concentrations and all periphery from piping and tubing to sensors, measurement and analysis equipment, storage and safety.
WP8 HySelect pilot plant, is the WP where everything comes together. It takes up the last two years of the project and deals with the integration of the components delivered by the core technical WPs, the development of the automation and control strategies, the coupling of the solar and chemical parts of the plant, culminating in the demonstration campaign scheduled to take place in the last project year.
WP9 Knowledge management, exploitation, dissemination and communication activities extend throughout the Project and involve actions for the exploitation of the project's outcome within and outside the partnership and communication of the project's results to the scientific/industry community, opinion-makers and the wider public highlighting its scientific/industrial/social relevance.

The overall project can be schematically sub-divided in three major overlapping phases:

- Phase 1, Months 1-24: Preparation activities: concepts, flowsheets, materials. WP2, WP3. This phase is monitored by achievement of MS1 in M12, MS2 in M18 and M3 in M24.
- Phase 2, Months 12-36: Core technical activities in order to deliver the particle receiver, the reactor, the electrolyzer, the periphery. WP4, WP5, WP6, WP7. This phase is monitored by milestones MS5, MS6 and MS7 due in M36.
- Phase 3: Months 24-48: Demonstration of HySelect. All components and units will be integrated and operation of the plant will be demonstrated. WP8. Monitored by MS8 due in M39.

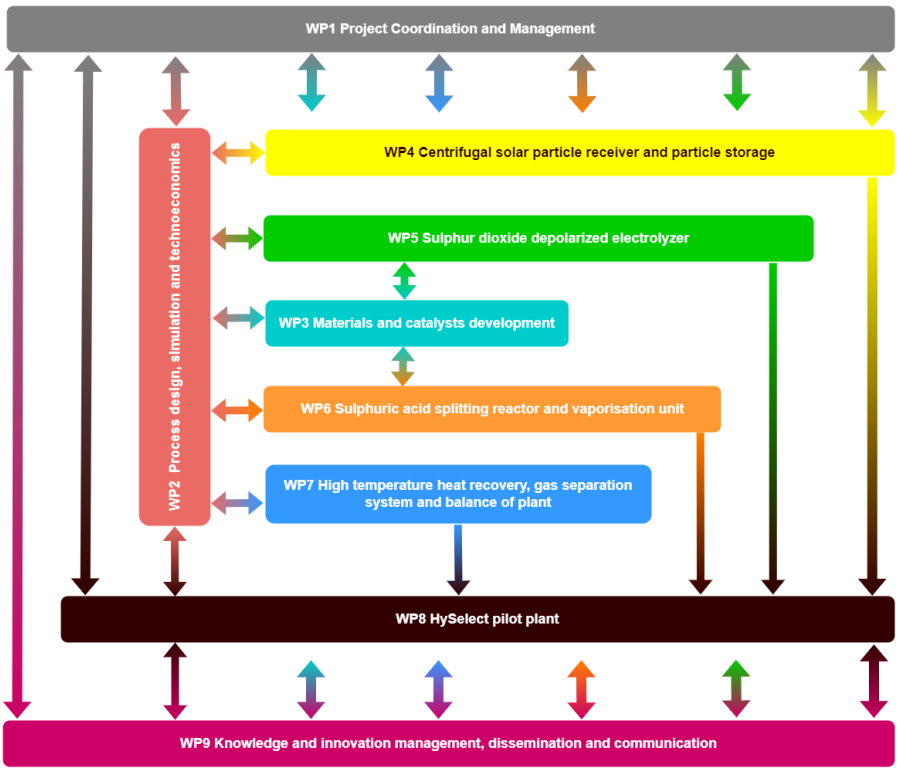

Fig. 4 The Pert chart of the HySelect project

Table 5: Milestones of the HySelect plant

No.	Description	Due	Respons.
MS1	Initial version of new plant layout and overall system control strategy	Dec 31, 2023	ENEA
MS2	Final selection of non-precious metal-based Sulphur trioxide splitting catalytic systems for shaping into porous objects	Jun 30, 2024	CERTH
MS3	Availability of custom engineered Au-coated bipolar plates and novel separator materials tested in SDE cell	Dec 31, 2024	AALTO
MS4	Proof-of-concept of temporal separation of solar energy delivery and storage in high-temperature particle streams and later unitization, demonstrated on-site by a solar tower campaign	Dec 31, 2024	DLR
MS5	Stack design based on optimized SDE cell with novel material solutions without PGMs allowing reduction of costs demonstrated and engineering and procurement of pilot 100 kW_e SDE completed	Dec 31, 2025	AALTO
MS6	Particles-heated SO_3 splitting reactor of improved efficiency via novel design features	Dec 31, 2025	DLR
MS7	Engineering and procurement of pilot 250 kW_{th} particles-heated SO_3 splitting reactor/ heat exchanger prototype completed	Dec 31, 2025	DLR
MS8	Completion of components manufacture, assembly and installation of integrated system on solar platform	Mar 31, 2026	DLR

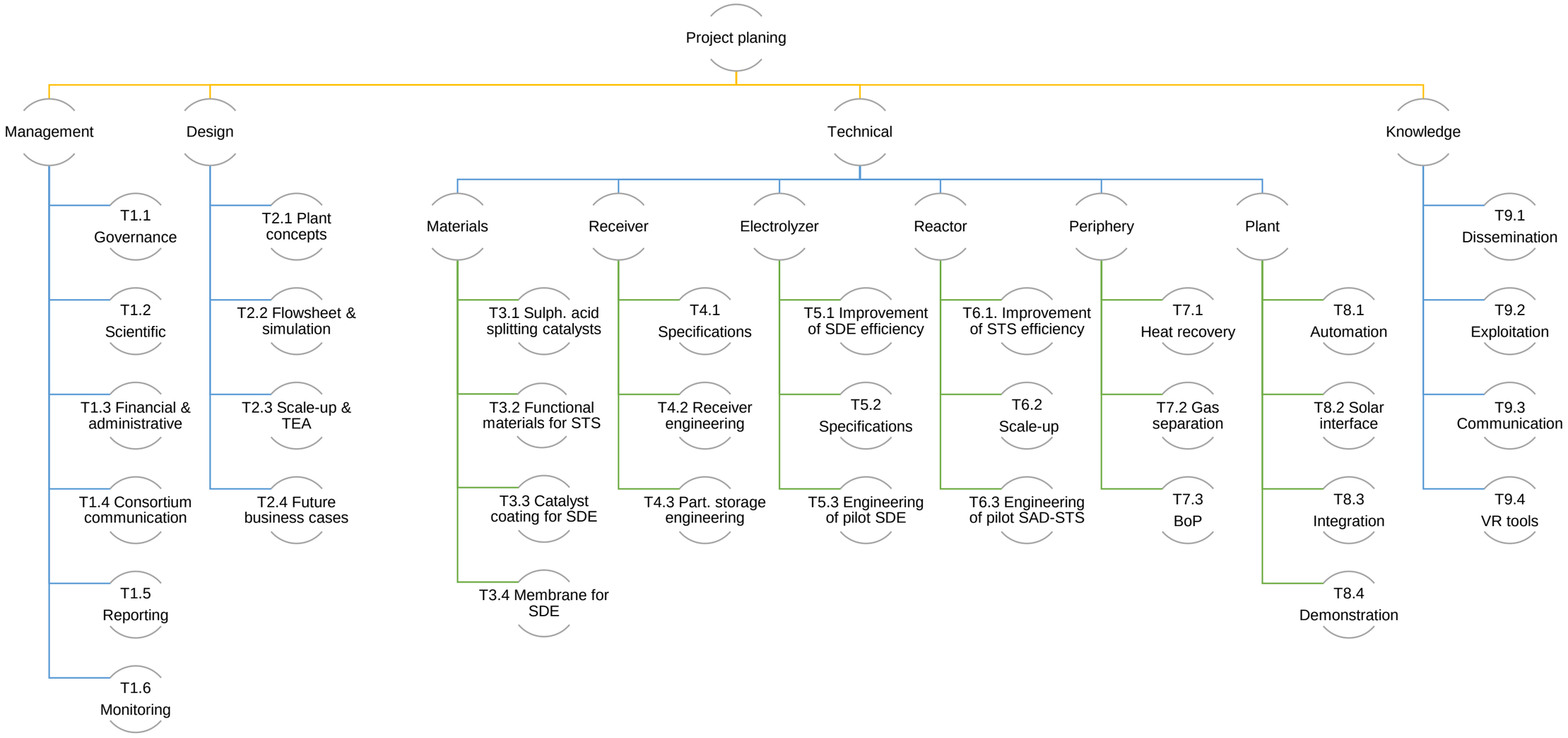

Fig. 5 The Work Breakdown Structure of the HySelect project

5.2. Gantt chart

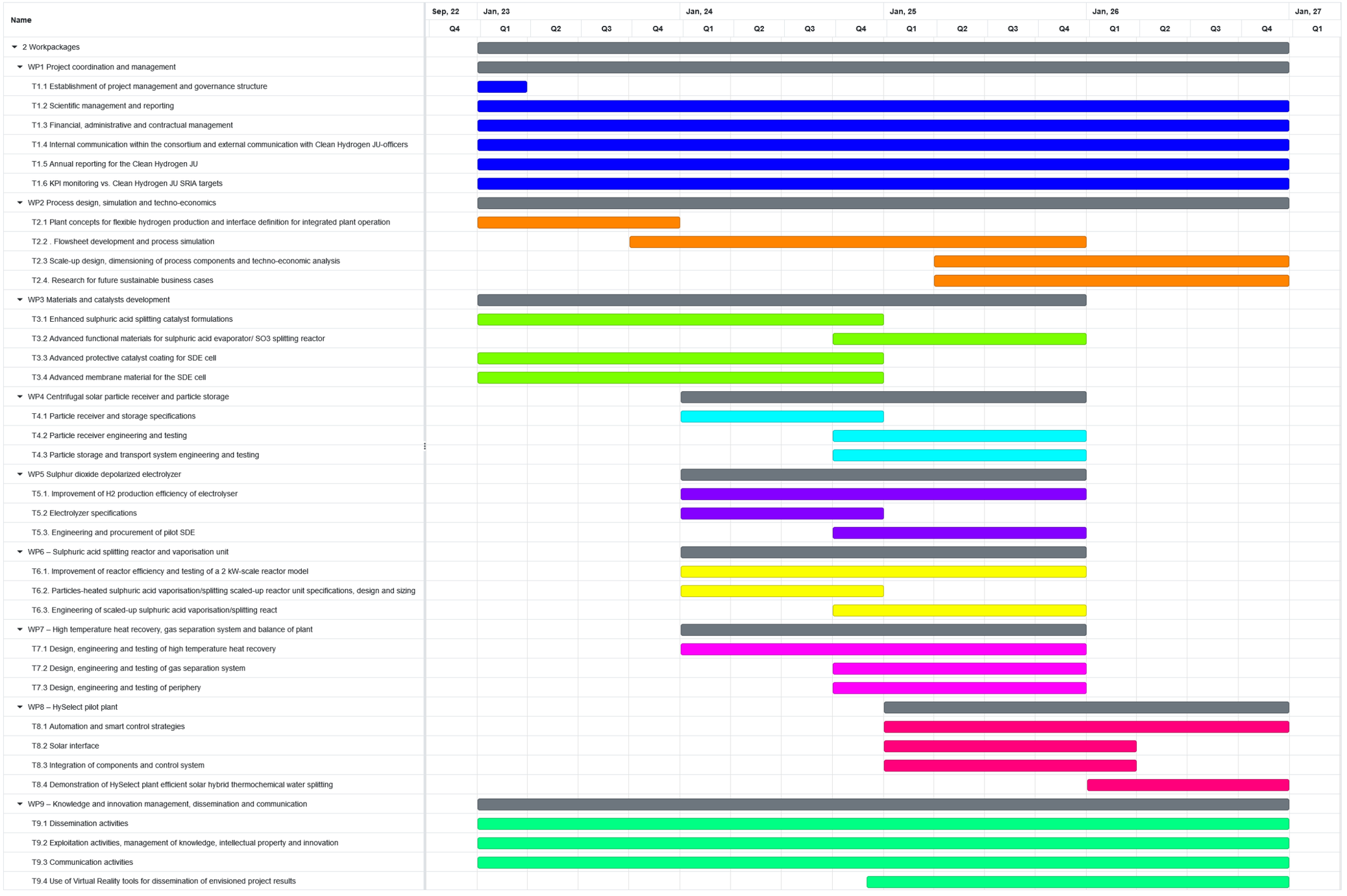

Fig. 6 The Gantt chart of the HySelect project

6. Communication tools

6.1. Teamsite

The efficient communication and exchange of information and data between the partners, is facilitated through a teamsite that has been created by the Project Coordinator, DLR in its own intranet domain. This teamsite is different than and should not be confused with the Project's website https://www.hyselect.eu/ that is used for public dissemination of the project's results (Deliverable 9.1). The project's secure teamsite is administrated by the coordinator and content is added from all partners that are involved in the WP and have been granted password-protected read/write access by the coordinator. The teamsite also functions as the project repository for draft and finalised documents, templates, presentations, information, etc.; all such documents can be stored and exchanged therein. Typical such documents included already are the project's Kick-Off Meeting minutes and presentations; naturally, draft and final versions of Deliverables and Progress reports will be included therein in due time. For practical reason, the teamsite is divided in 9 subfolders corresponding to the project's WPs. A screenshot of the teamsite is shown in Fig. 7.

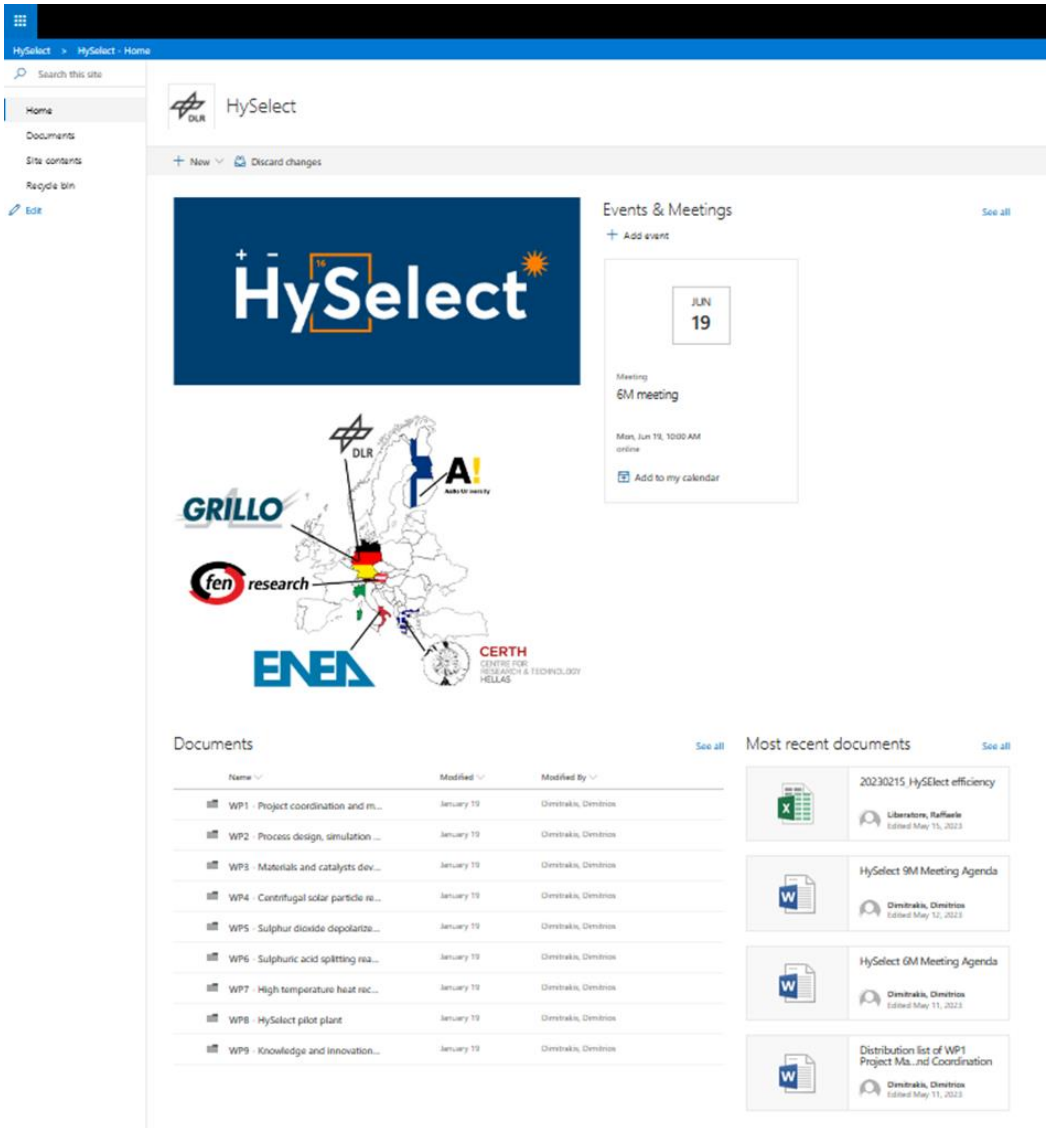

Fig. 7 Screenshot of HySelect teamsite

6.2. Meetings

The project coordinator is responsible for the organisation of regular meetings of the complete consortium to secure the internal communication of the project. The consortium meetings or project meetings will be held typically twice a year, at the premises of the different project partners each time. The representation of each project partner in such meetings is mandatory. These meetings may take the form of an in-presence, online or hybrid meeting as decided by the GA each time.
A live (in continuous editing) list of possible meeting dates has already been circulated to the consortium via the teamsite in order to facilitate easier planning, and can be seen in Table 6.

Table 6: Project Meeting planer

No.	Description	Venue	Date
01	Kick-off	DLR Brussels	09.02.2023
02	6M	online	19.06.2023
03	9M	GRILLO Duisburg	September 2023
04	12M	online	December 2023
05	15M	in presence - location tbd	March 2024
06	18M	online	June 2024
07	21M & Review	Brussels	September 2024
08	24M	online	December 2024
09	27M	in presence - location tbd	March 2025
10	30M	online	June 2025
11	33M	in presence - location tbd	September 2025
12	36M	online	December 2025
13	39M	in presence - location tbd	March 2026
14	42M	online	June 2026
15	45M	online	September 2026
16	48M & Workshop	DLR Cologne - Juelich	December 2026

In-between these regularly scheduled project meetings, additional online meetings may be employed for the effective communication among the partners during the project. The purpose of these meetings is to inform the consortium in a timely fashion of any new developments, needs of introducing corrective actions and any other issues that will enable a realistic time schedule and ensure that the project is on track towards achieving its objectives and vision. The Project Coordinator is responsible for the organisation of the agenda and for the coordination of such meetings. The meetings' details (day, time, link, agenda) will be

communicated by the PC at least one week before the date of each meeting, in order to allow time to the participants for scheduling and preparing all necessary information.
Additional to the above, the WP leaders can organize WP-relevant technical meetings either in-presence or online or hybrid as frequently as judged to meet the requirements within each WP. Such meetings will be held on an ad-hoc basis, initiated by the respective WPL, in coordination with the PC, who will be present in them and will also serve for resolution of any conflict. It was agreed among the partners to try to hold such a WP meeting (preferably online) in every ongoing WP according to the Gannt Chart, every 3 months.
In every physical as well as remote meeting, meeting minutes will be taken by a colleague appointed as rapporteur at the start of the meeting. As a general procedure, the draft meeting minutes will be circulated to all partners by the rapporteur within 10 calendar days of the meeting for their approval and comments. The minutes shall be considered as accepted if, within 15 calendar days from sending, no partner has sent an objection in writing.

7. Deliverables

7.1. Official deliverables

According to Article 21 of the Grant Agreement, the beneficiaries must continuously report on the progress of the action (e.g. deliverables, milestones, outputs/outcomes, critical risks, indicators, etc.; if any), in the Portal Continuous Reporting tool and in accordance with the timing and conditions it sets out. The list and details of the project deliverables, their level of dissemination (e.g. public, sensitive), and their due dates are listed in Annex 1 of the Amendment to the Grant agreement (AMD-101101498-2, A1). The majority of the deliverables will be in the form of reports, describing the work carried out. Even in the cases where the deliverable may be a physical demonstrator, software, a database, document or publicity material, a relevant report will be produced as well, to summarize the relevant work and will be uploaded to the EC Participant Portal.

7.2. Internal deliverables

The consortium management should be flexible enough to respond to challenges, unexpected events or time inconsistencies in the course of the project in a quick and effective manner. Such issues can be, for example, any non-optimally scheduled delivery dates of task outputs that are meant to be used as inputs to another during the authoring of the proposal and the Grant Agreement, need for corrective actions, etc. It is not advisable to handle such eventualities by GA amendments that are lengthy and time-consuming. Instead, the involved WP leaders can define in consent “internal deliverables”, i.e. smaller, “autonomous” packages of work and results which should be communicated before the official Project Deliverables’ deadlines to other partners needing them as input for timely completion of their own tasks. Timely exchange of information and results among the involved partners it is crucial for effectively resolving such issues.
In fact, this approach was initiated through discussions among the partners during the Kick-off Meeting. It was pointed out by ENEA that the due dates for the Deliverable 2.3 on the “Complete flow-sheet and P&ID” in WP2 (Month 48) were non-optimal for the partners involved in Deliverable D2.2 (due Month 36). The solution agreed upon by the partners involved, is the delivery by DLR of an internal deliverable D2.3i, due Month 36, with a pre-final flow-sheet and P&ID, that will be part of D2.2 to be uploaded to the portal by ENEA, and an additional internal deliverable by ENEA, D2.4i, Scale-up design of the optimized plant & techno-economic analysis, due month 48, to be part of and upload with D2.4, by FENR. Thus, whenever needed in the course of the project, similar action will be taken proactively.

In total there are 38 official and 2 internal deliverables. For completeness, a chronological list of the deliverables, by submission date, is given in Table 7 below.

Table 7: HySelect deliverables in chronological order

D9.1 Project's website	31.03.2023	FENR
D1.1 Project management plan	30.06.2023	DLR
D1.2 Quality management plan	30.06.2023	DLR
D9.2 Data Management Plan	30.06.2023	DLR
D9.3 Dissemination, exploitation and communication plan	30.06.2023	FENR
D2.1 Subsystems requirements for solar platform testing	31.12.2023	ENEA
D1.3 First annual data JU report 15M	31.03.2024	DLR
D3.1 SO3 splitting catalysts shortlisting	31.03.2024	CERTH
D9.4 Preliminary market study	30.04.2024	FENR
D3.2 Selected catalytic formulations	31.12.2024	CERTH
D3.7 Tested short SDE stack	31.12.2024	DLR
D4.1 Solar-driven H2 production concept	31.12.2024	DLR
D5.2 Pilot SDE design	31.12.2024	AALTO
D6.2 250 kWth SAD-STS reactor design	31.12.2024	DLR
D1.4 Second annual data JU report 27M	31.03.2025	DLR
D3.5 SDE membrane materials	31.12.2025	AALTO
D3.6 Au-coated SDE bipolar plates	31.12.2025	AALTO
D5.1 Qualified and optimized SDE stack	31.12.2025	AALTO
D7.1 High-temperature heat recovery system	31.12.2025	GRILLO
D8.1 HySelect PMS model	31.12.2025	ENEA
D2.2 Final plant layout and control strategy	31.12.2025	ENEA
D2.3 (i) Complete flowsheet and P&ID	31.12.2025	DLR
D3.3 Structured SO3 splitting catalytic systems	31.12.2025	CERTH
D3.4 Long-term stable structured SO3 splitting catalysts	31.12.2025	DLR
D4.2 Solar receiver-heated particles of sufficiently high temperature	31.12.2025	DLR
D4.3 Stored particles of sufficiently high temperature	31.12.2025	DLR
D5.3 Pilot SDE prototype	31.12.2025	GRILLO
D6.1 2 kWth prototype SAD-STS reactor	31.12.2025	DLR
D6.3 250 kWth SAD-STS reactor prototype	31.12.2025	DLR
D7.2 SO2 separation system	31.12.2025	GRILLO
D1.5 Third annual data JU report 38M	28.02.2026	DLR
D8.2 HySelect PMS validation	31.03.2026	DLR
D8.3 Fully automated operation	31.03.2026	DLR
D2.3 Complete flowsheet and P&ID	31.12.2026	DLR
D9.5 Final Workshop	31.12.2026	DLR
D9.6 Dissemination/exploitation activities	31.12.2026	FENR
D9.7 Virtual Reality tool	31.12.2026	DLR
D2.4 (i) Scale-up design of the optimized plant & techno-economic analysis	31.12.2026	ENEA
D2.4 Sustainable business case research	31.12.2026	FENR
D8.4 Completion of solar HyS plant campaign	31.12.2026	DLR

7.3. Format

A template for deliverables is uploaded to the teamsite to allow for uniform deliverables format among all partners, already communicated to the Project Officer as well. Each deliverable should follow a set structure as set out in the templates of:

- A cover page with the project's logo, the title of the deliverable, its due date and the relevant Work package, followed by a table denoting all other relevant information, like Revisions, Authors, Nature of Deliverable, Dissemination level, etc. as in the present document.
- Summary (and public abstract if confidential document)
- Table of Contents (if deemed necessary)

- Introduction – an outline of the aims and objectives of the deliverable, explaining in parallel its interdependences with other tasks and deliverables (e.g. inputs/outputs to/from other tasks).
- Main body of the report, explaining the results generated and illustrating the technical and scientific progress made.
- Conclusions summarizing the major outputs of the deliverable and the implications of the results on other parts of the project, highlighting their impact for end-users, scientific community, and/or the general public. The conclusions should also address any deficiencies in the work carried out and where future improvements or further work should be directed.
- References
- Appendices (if needed, including data or information not suitable for the main body of the report either due to its detailed nature or due to confidentiality reasons).

Deliverables will be tracked by the Project Coordinator, identifying those due in the near future, the deadlines for each deliverable, follow-up actions and the names of the persons producing and reviewing them. The PC will report this progress to the General Assembly at the relevant meetings.

8. Reports

8.1. Official reporting

According to Article 21.2 of the Grant Agreement, the project is divided into three reporting periods (RPs) as follows:

- RP1: from Month 1 to Month 18 (i.e. January 1st, 2023 – June 30th, 2024)
- RP2: from Month 19 to Month 36 (i.e. July 1st, 2024 – December 31st, 2025)
- RP3: from Month 37 to Month 48 (i.e. January 1st, 2026 – December 31st, 2026).

Within 60 days from the end of each RP, a Report must be submitted to the granting authority by the PC, i.e. two Periodic Reports and one Final Report are due in total. The Reports are mandatory and linked to interim and final payments by the granting authority. The reports should:

- Answer questions in the template
- Describe the activities carried out during the implementation
- Be in line with the project's grant agreement
- Describe the risks encountered and mitigation measures applied
- Be concise, clear and not ambiguous
- Include quantified results where possible

The periodic and the final reports contain
(a) a "periodic technical report",
(b) a "periodic financial report"
The requirements and contents for each one are described in the Grant Agreement.

8.2. Review Meetings

At the end of month 21 (Sep. 2024), the Project Coordinator in coordination with the Project Officer will organize the mid-term Review Meeting, in the Clean Hydrogen JU premises in Brussels, where all partners shall participate and possibly external experts invited by the EC.

9. Conclusions

A Project Management Plan is prepared and described in detail. The plan presents the structure of the project, the governing bodies, the management structures, the work plan and the means of internal communication. The PMP includes a Gantt chart and a work breakdown structure to deliver a clear overview of the work packages, tasks and activities to be

undertaken. With D1.1 the framework is created within which the project planning is undertaken and all project activities are managed, monitored and controlled to ensure high quality results and their delivery in a timely and efficient manner.