Deliverable report for

Funded by
the European Union

Grant Agreement Number 101069888

Deliverable D2.1
"Reports to the European Commission"

Due date of deliverable: 2022/11/30
Actual submission date: 2022/12/23

Identifier:	D2.1: Project management plan
Beneficiaries:	CONSORTIUM
Work package/task:	WP2/ Task 2.1
Document status:	draft / **final**
Confidentiality:	confidential / restricted / **public**

This project is funded under Horizon Europe, Grant Agreement no 101069888

Lead beneficiary for this deliverable: CONSORTIUM

Dissemination Level:			
PU	Defined in the DoW	Public	Yes
PP		Restricted to other programme participants (including the Commission Services)	No
RE		Restricted to a group specified by the Consortium (including the Commission Services)	No
CO		Confidential, only for partners of the Consortium (including the Commission Services)	No

This project is funded under Horizon Europe, Grant Agreement no 101069888

Contents

This project is funded under Horizon Europe, Grant Agreement no 101069888

1 Abbreviations

BMP: Budget Management Plan
CDMP: Communication and Dissemination Management Plan
CMP: Communication Management Plan
CMR: Compact Membrane Reactor
CSIC: Consejo Superior de Investigaciones Científicas
D: Deliverable
DM: Dissemination Material
DMP: Data Management Plan
DOI: Digital Object Identifier
EC: European Commission
EU: European Union
FCS: Fuel Cell System
GA: General Assembly
GMT: General Management Team
ICE: Internal Combustion Engine
IPR: Intellectual Property Rights
MM: Minutes of Meeting
MP: Milestone Proof
PGS: Power Generation System
PMP: Project Management Plan
PU: Public
QAC: Quality Assurance Committee
QR: Quality Assurance or Risk Management document
RMP: Risk Management Plan
SEN: Sensitive
TPR: Technical Progress Report
TR: Technical Report
UPV: Universitat Politècnica de València
VoR: Version of Record
WP: Work Package
WBS: Work Breakdown Structure

2 Executive summary

This document constitutes the baseline of the project management plan (PMP) for the ALL-IN Zero project. This first version will be reviewed and updated in months 18 and 36 to include all the changes in the project management structure and the actions taken, if any, to evolve the logistics of the project. The main target of ALL-IN Zero is to develop a multi-fuel system that will feed low, zero or carbon negative fuels like ammonia, natural gas, biogas, or alcohols among other easy-handling fuels, into a Compact Membrane Reactor (CMR) producing an intermediate temporary energy vector (i.e., hydrogen). The temporary energy vector will be consumed in situ by ICE and FCS to generate electrical and mechanical power with zero emissions.

In this document, the project governance structure of the project is defined together with the different roles to be assigned to each member of the project. A set of deliverables and milestones were defined in order to promote the continuous reporting of the project and ensure the fulfilment of its main objective. The quality of such deliverables will be reviewed prior to submission to the platform for continuous reporting of the European Commission. The reviewing process is intended to be carried out internally by the members of the Quality Assurance Committee (QAC), composed by one member per partner, and will ensure that the quality of each deliverable complies with the standards of the European Commission. Complementary to this body, the Executive Board will monitor the progress of the project and will work together with the QAC to communicate unforeseen events or delays to the General Assembly (GA) members and the Coordinator.

The project schedule is defined with a Gantt chart containing a Work Breakdown Structure (WBS), together with the logistics for internal communication and deadlines, the schedule per task, the responsible partner for each task, the related deliverables, and the dependencies on other tasks, to ensure the effective and in-time fulfilment of the objectives associated to the different work packages (WP). Internal communication is classified in WP meetings, led and arranged by the WP leaders, and GA meetings. In the former, the technical aspects related to the preparation of the deliverables and the tasks to be carried out by two or more of the partners involved will be discussed. In the latter, the progress of the project will be assessed and the major actions that imply direct interaction with the European Commission, such as the change of a deliverable deadline or part of the content of the project, will be discussed.

Other parts of the PMP are described as well, such as the budget management plan (BMP) the risk management plan (RMP), the communication and dissemination management plan (CDMP), the exploitation management plan (EMP) and the data management plan (DMP). For the RMP, the CDMP, the EMP and the DMP the general aspects of them are presented since they are defined in the corresponding deliverable.

3 Introduction

The main goal of ALL-IN Zero is to develop a multi-fuel system that will feed low, zero or carbon negative fuels like ammonia, natural gas, biogas or alcohols among other easy-handling fuels, into a Compact Membrane Reactor (CMR) producing an intermediate temporary energy vector (i.e., hydrogen). The temporary energy vector will be consumed in situ by ICE and FCS to generate electrical and mechanical power with zero emissions. In addition, this technology will implement efficient energy

recovery strategies by means of thermal, mechanical and electrical energy exploitation to sustain CMR operation and will turn emissions of CO2 stream coming from CMR (in case they exist due to the fuel type) into business opportunity by means of efficient Carbon Capture and Storage (CCS) techniques to produce synthetic fuels, among other high value uses.

The proposed system (Figure 1) comprises the joint operation of the CMR together with the power generation system (PGS) that can be either an ICE or a FCS. The CMR is fed with any fuel and requires heat, to dissociate any molecule into H2 and other components, and electricity, to capture the H2 flow through the membrane by forcing a flow of protons (H+) through it. The H2 is then introduced into the PGS to produce thermal or electrical energy that is partially fed back into the CMR. This propulsion system requires the complex interaction and control of both the CMR and the PGS to achieve the maximum performance for each fuel and PGS.

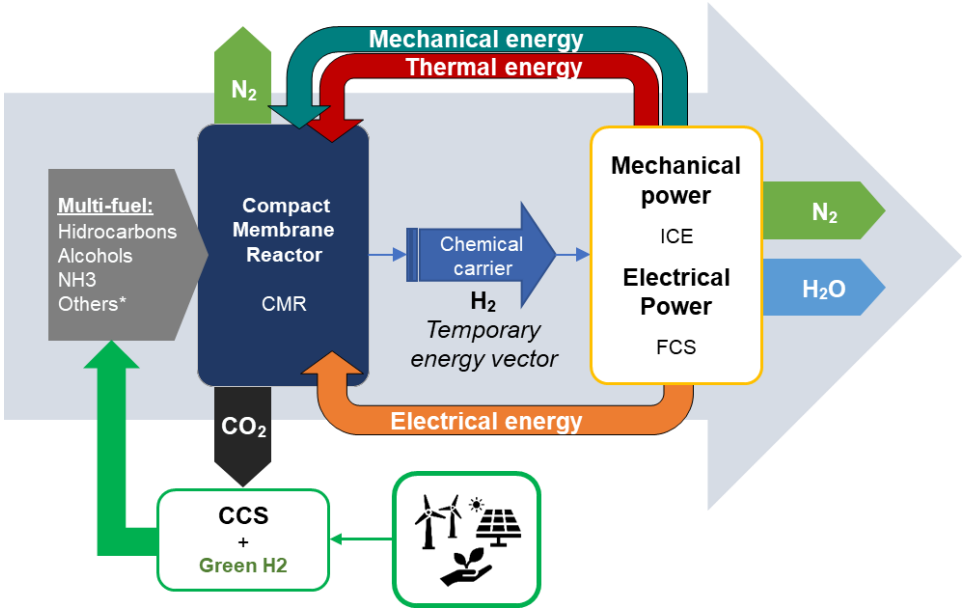

Figure 1: ALL-IN Zero technology concept

ALL-IN Zero will contribute to the implementation of the EU policies and Directives on competitiveness and sustainability (e.g., Emerging technologies for a climate-neutral Europe), through the validation of a novel, clean and high-flexible power generation system with low capital expenditure (CAPEX) and fast implementation due to the use of already well-implemented infrastructure for high energy density liquid fuels as well as ICE and FCS technologies and their related productive chains. However, this requires further research, development, and validation of our innovative multi-fuel feeder system to supply chemical energy from conventional fuels to a CMR, producing an intermediate temporary energy vector to generate power with zero emissions. This new technology will avoid the extra efforts associated with energy storage, waste elimination and purification processes thus enabling more efficient and sustainable power generation from the economic, social, energetic and environmental points of view. Considering these assumptions and previously obtained promising results, the specific objectives of the project are:

- To obtain a preliminary design of the coupled system integrating CMR with current power generation systems (ICE and FCS), and to identify the critical parameters and systems sizing for the selected applications.

- To design and develop a CMR, composed of a multi-functional catalyst and an electrochemical protonic cell (with planar geometry), for the efficient conversion of different kinds of fuels into H2 as a temporary energy vector that can be directly used in situ by the subsequent PGS.
- To characterise and optimise the ICE and FCS power generation systems to define rules for designing the best engine and fuel cell specific performance (ICE/FCS hybridization) and take full advantage of efficiency, autonomy, dynamic response, and other power system properties in accordance with each specific application.
- To generate the modelling framework consisting of individual models of CMR, ICE and FCS to identify the requirements for the integrated system and to develop a virtual dedicated heat recovery system to maximize the integrated system efficiency for flexible fuel operation for each PGS.
- To develop and optimize the auxiliary components required for the CMR-PGS matching and to develop control strategies dynamic enough that involve the individual and joint operation of the CMR-PGS.
- To benchmark the performance of both PGS operating with the H2 coming from a tank and from the CMR in a virtual vehicle model in realistic operating conditions to assess process configuration, technical, economic and environmental implications and advantages of the proposed technology.
- The development of the CMR consists of the simultaneous optimization of the catalyst and the electrochemical cell for the generation and separation of the H2. For one side, the conversion and selectivities of the reaction systems will be used to control and optimize the different catalysts tested. On the other side, the resistance of the electrochemical cell, the faradaic efficiency, and the amount of H2 separated by the action of the electrochemical cell will be the monitored parameters for the optimization of the electrochemical cell.

The partners that will perform the research, administrative and dissemination activities in the ALL-IN Zero project and their general role are:

Table 1: Partners of ALL-IN Zero project and roles

Partner Nº	Name	Role
1	UPV (Universitat Politècnica de València)	Project Coordinator
2	CSIC (Consejo Superior de Investigaciones Científicas)	Partner
3	FZJ (Forschungszentrum Jülich)	Partner
4	AVL	Partner
5	AVL-I (AVL IBERICA)	Partner

4 Project governance

4.1 Management structure

The ALL-IN Zero management structure can be divided into the general management team (GMT) and the working team (WT). The GMT is composed by the General Assembly, the Executive Board and the Coordinator. The WT is mainly composed by the Quality Assurance Committee, the Work Package

Leaders and the Task Leaders that will be part of and will manage the working group. The definition and responsibilities of each figure are:

- The Coordinator - the legal entity acting as the intermediary between the ALL-IN Zero partners and the European Commission. The Coordinator shall ensure the fulfilment of the tasks assigned to it as described in the Grant Agreement and this Consortium Agreement.
- General Assembly - the ultimate decision-making body of the consortium.
- Executive Board - the supervisory body for the execution of the Project which shall report to and be accountable to the General Assembly. It carries out the day-to-day project management activities for the coordinator including financial issues, project monitoring and organisational and administrative matters.
- Quality Assurance Committee – ensures the quality of the deliverables by reviewing them and confirm their validity prior to sending them to the Coordinator for the final submission.
- Work Package Leader – responsible for the day-to-day operation, quality and planning of the tasks within the work package. The work package leaders could be part of the Executive Board and the Quality Assurance Committee since they are responsible for the elaboration of the deliverables, which ensures the execution of the project. The WP leaders will nominate the Task leaders.
- Task Leader – responsible for the planning and delivery of the research materials produced within their task, which include the deliverables and the proof for the milestones achievement.

The Coordinator of the ALL-IN Zero project is Professor Ricardo Novella. The rest of the roles are still under definition since this document is a draft/initial version of the project management plan. The nomination of the Quality Assurance Committee and the WP leaders will be a priority since some of the activities have already started and they are key figures to ensure the quality of the deliverables and organize the task leaders and the working group.

The reporting structure depends on the level of the reporting, following the structure in Figure 2. For information related to the fulfilment of any objective that may not be critical or does not pose an obstacle for the research activities of the ALL-IN Zero project the information will flow within the WT. This information may include the data resulting from the research activities or details about the fungible material to be purchased or the purchased equipment, if any. For reports requiring modification of the budget, the delay of any deliverable or milestone or any risk mitigation action, the WP leaders should communicate it to the Executive Board (and the Quality Assurance Committee, only if related to the delay of the deliverables) that will evaluate any possible solution or corrective action, thus elaborating a proposal or set of proposals that will be transferred to the General Assembly to approve or reject them. Following the Grant Agreement and the Consortium Agreement, in the case any modification is expected that implies changes in the overall project structure and/or budget, the Coordinator will communicate it directly to the Project Officer from the European Commission.

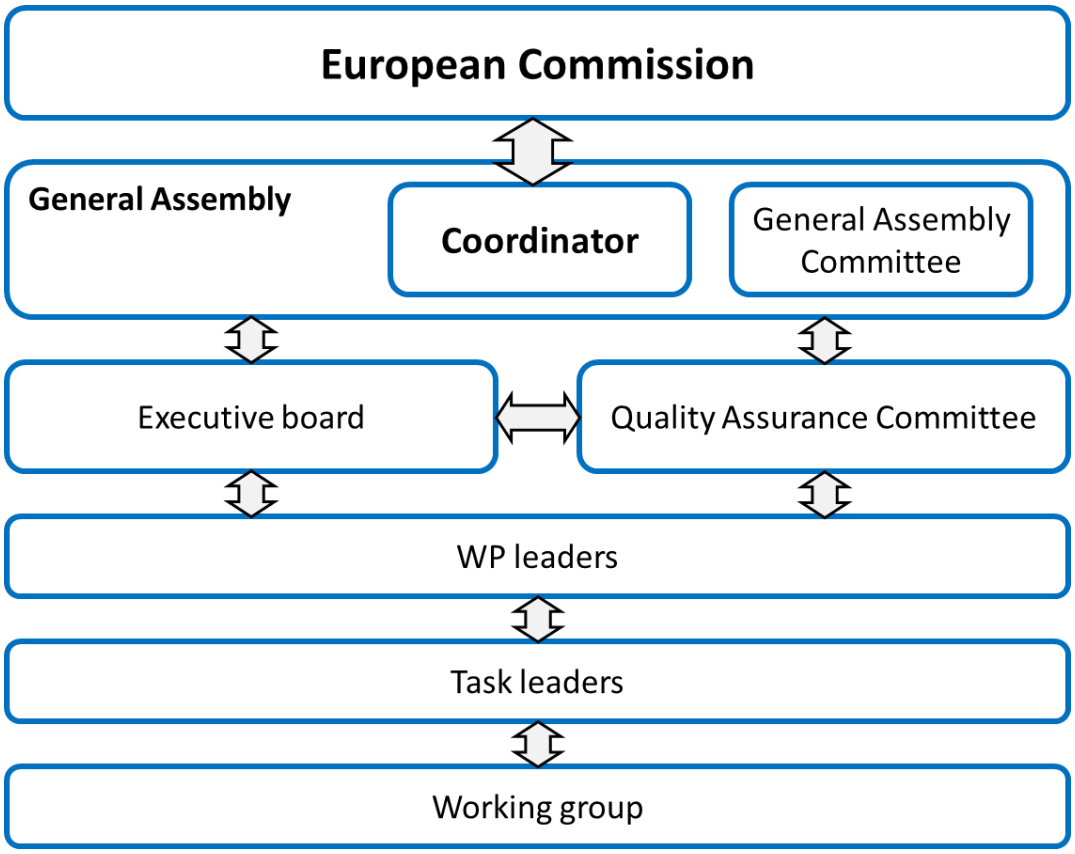

Figure 2: ALL-IN Zero management structure

4.2 Project structure

The project structure is divided into 11 work packages (WP), each one with a WP leader, in which the first WP corresponds to the constant review of the ethics requirements that need to be maintained during the ALL-IN Zero project and the second WP corresponds to the management of the project. Each WP is subdivided into different tasks and subtasks to break down the research process to ensure the fulfilment of each objective, detect possible risks and implement corrective actions, if required. The overall WP structure of the project with the duration of each WP, the associated WP leader and the related deliverables can be found in Table 2.

Table 2: Work packages general information and associated deliverables

Work Package Nº	Work Package name	WP leader	Effort (Person Months)	Start Month	End Month	Deliverable Nº
WP1	Ethics requirements	1 - UPV	0	1	48	D1.1, D1.4, D1.2, D1.3
WP2	Project Management and Coordination	1 - UPV	24.7	1	48	D2.3, D2.2, D2.1
WP3	Preliminary design and systems specifications definition	5 - AVL	8.5	1	5	D3.1, D3.2, D3.3
WP4	CMR material fit in accordance with each power generation system	3 - FZJ	56	1	36	D4.2, D4.3, D4.1

WP5	CMR experimental test definition	2 - CSIC	45.5	13	48	D5.3, D5.1, D5.2
WP6	H2-fueled ICE characterization and optimization	1 - UPV	26.4	1	28	D6.3, D6.4, D6.2, D6.5, D6.1
WP7	Fuel cell system characterization and optimization	1 - UPV	36.8	1	28	D7.3, D7.2, D7.1, D7.4
WP8	Modelling platform development	4 – AVL-I	51.2	23	48	D8.4, D8.3, D8.1, D8.2
WP9	Development of integrated CMR-PGS	2 - CSIC	27.8	35	48	D9.1
WP10	Performance, TCO and emissions technologies evaluation	1 - UPV	19	35	48	D10.2, D10.1
WP11	Communication, dissemination and exploitation	2 - CSIC	11	1	48	D11.11, D11.1, D11.12, D11.4, D11.14, D11.3, D11.2, D11.10, D11.8, D11.6, D11.5, D11.13, D11.7, D11.9

WP leaders will ensure that all deliverables are carried out within the corresponding deadlines and will ensure that the task leaders and working group have the required resources to complete the tasks. As such, the task leaders and the working group will be responsible for communicating the need for any resource, be it in terms of material, software (models) or data. In order to ensure the in-time submission of each deliverable, the WP leader will be in contact with the Quality Assurance Committee to arrange internal deadlines and the flow of information for review.

4.3 Tasks and roles

The tasks corresponding to each WP and the roles of WP leader, task leader and task collaborators are defined in Table 3 and Table 4.

Table 3: Task per work package, task leaders and collaborators definition (WP1-WP6)

Work Package Nº	Work Package name	Tasks	Task Leader, Collaborators
WP1	Ethics requirements	-	-
WP2	Project Management and Coordination	Task 2.1 Project coordination and internal communication	UPV, All partners
		Task 2.2 Administrative, Financial and legal management	UPV, All partners
		Task 2.3 Quality assurance and risk management	UPV, All partners
WP3	Preliminary design and systems specifications definition	Task 3.1 Analysis of the proposed technology fundamentals and system	CSIC, UPV, AVL
		Task 3.2 Critical variable identification and test procedures definition	AVL, CSIC, UPV
		Task 3.3 Systems sizing based on integrated system application	AVL, UPV
WP4	CMR material fit in accordance with each power generation system	Task 4.1 Catalysts developing for the hydrogen generation reaction systems	CSIC, FZJ
		Task 4.2 Protonic cell fabrication, characterization and testing	FZJ, CSIC
		Task 4.3 Electrochemical characterization of the protonic cells	FZJ, CSIC
WP5	CMR experimental test definition	Task 5.1 Evaluation of the CMR system under single fuel conditions. Operation conditions adjustment	CSIC, FZJ
		Task 5.2 Multifuel CMR performance. Operation conditions adjustment	CSIC
		Task 5.3 Long-term experiments and higher active area electrodes (scale up)	CSIC
WP6	H2-fueled ICE characterization and optimization	Task 6.1 H2ICE prototype research engine design and manufacturing	AVL
		Task 6.2 H2ICE system supply and commissioning at the test bench	AVL, UPV
		Task 6.3 H2ICE air-combustion experimental characterization	UPV
		Task 6.4 H2ICE oxy-combustion experimental characterization	UPV

Table 4: Task per work package, task leaders and collaborators definition (WP7-WP11)

Work Package Nº	Work Package name	Tasks	Task Leader, Collaborators
WP7	Fuel cell system characterization and optimization	Task 7.1 – FC system intrusive sensorization and actuators' control system decoupling	AVL-I
		Task 7.2 - FC system supply, commissioning and test bench integration	AVL-I, UPV
		Task 7.3 - FC system steady-state characterization	UPV, AVL-I
		Task 7.4 FC system transient characterization	UPV, AVL-I
WP8	Modelling platform development	Task 8.1 - CMR electrochemical and fluid-dynamics model for flexible fuel operation	CSIC
		Task 8.2 - H2ICE 0D-1D fluid-dynamics model development	UPV, AVL-I
		Task 8.3 FC system fluid-dynamics and electrochemical model development	AVL-I, UPV
		Task 8.4 System integration into vehicle virtual environment according to application	UPV, CSIC, AVL-I
WP9	Development of integrated CMR-PGS	Task 9.1 – Dedicated heat exchange system	CSIC, UPV
		Task 9.2 - Auxiliary components design based on operational capabilities	CSIC, UPV
		Task 9.3 Control strategy development for realistic operating conditions	UPV, AVL-I
WP10	Performance, TCO and emissions technologies evaluation	Task 10.1 - Performance evaluation in real operating conditions without the CMR	UPV, AVL-I
		Task 10.2 - Performance evaluation of CMR-PGS vehicle in realistic operating conditions	UPV, CSIC
		Task 10.3 Total cost of ownership and cradle-to-grave emissions comparison	UPV, CSIC
WP11	Communication, dissemination and exploitation	Task 11.1 Exploitation activities and business plan	AVL-I, All partners
		Task 11.2 Communication and Dissemination plan and reporting	CSIC, All partners
		Task 11.3 Implementation of Communication and Dissemination activities	CSIC, All partners
		Task 11.4 Knowledge management and IPR protection	AVL-I, All partners
		Task 11.5 Data Management	UPV, All partners

5 Project implementation

5.1 Internal meetings organization

The internal meetings for the ALL-IN Zero project can be classified into two different levels: General Assembly and WP meetings. This classification attends to the objectives and the nature of the decisions to be taken in each meeting.

Internal WP meetings will be organized once per month and active WP to evaluate the progress of the tasks, set up internal deadlines and define roadmaps specific to the WP to ensure the in-time elaboration of each deliverable. The internal meetings will be carried out online by using the main communication platform, defined as of now as Microsoft Teams, and the WP leaders will be responsible for arranging them in a suitable time slot for all the attendants and for notifying them once the date and time is selected. The attendants for these internal meetings will mainly consist of the working group, the task leaders and the WP leaders of the corresponding WP. Furthermore, a member of the executive committee will attend, when possible, to carry out his/her supervisory function. The specific objectives behind the WP meetings are:

- Monitor the progress of the work
- Identify & communicate possible risks
- Assign roles for specific subtasks
- Ensure the preparation of deliverables
- Define requests/topics to be discussed in general assembly meetings

General Assembly meetings will be arranged every 6 months by the designated partner. From each partner, 1-2 members will attend: a member of the General Assembly and a support member. The General Assembly meetings will be held in person and arranged by the designated partner in the location where the partner is located. The initial proposal for the arrangement of the General Assembly meetings can be found in Table 5. The specific objectives to be fulfilled at these meetings are:

- Report the progress on each WP
- Take major risk mitigation actions
- Discuss requests/topics issued in the internal communication meetings
- Decide on major communication activities
- Distribute the tasks and define the document related to periodic reporting

For each internal meeting a simple meeting minutes document and an attendance sheet will be generated every meeting and uploaded to the common repository. The WP leaders are responsible for the submissions of these documents.

Table 5: General Assembly meetings designated partner and month

Meeting nº	Month	Host
1 (Kick-off)	0-1	UPV
2	6	AVL-G
3	12	FZJ

4	18	CSIC
5	24	AVL-I
6	30	FZJ
7	36	AVL-I
8	42	CSIC
9	48	UPV

5.2 Interaction between work packages

The main interaction between work packages will consist of the continuous data exchanges foreseen in the data management plan and the general assembly meetings. Nonetheless, given the strongly related nature of some WP that share the same partners (such as WP4 and WP5) the internal meetings will include in the agenda a time slot to discuss topics arising from other WP that may affect the activities of the current WP. As can be seen in the PERT diagram of the project (Figure 3), there is significant interaction between WP, which is translated into the need of having an efficient and effective WP interaction structure, defined by the data management plan and the topics raised in the general assembly meetings and internal WP meetings.

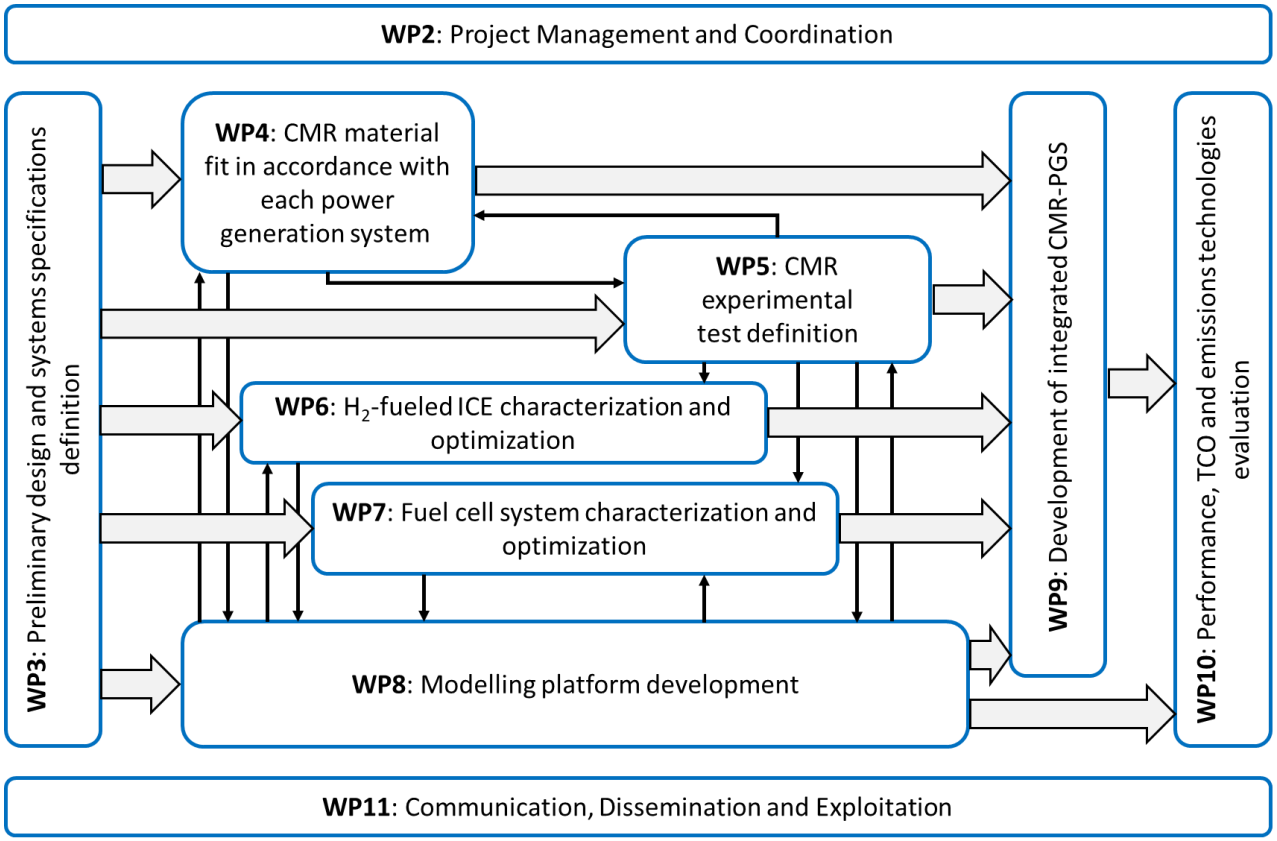

Figure 3: ALL-IN Zero PERT diagram

The data exchange will mainly consist of providing the information required as input and supplied as output in each WP, be it in the form of a deliverable or internal data. In general terms, the inputs and outputs required for each WP are included in Table 6 and Table 7. This table can serve as a basis for

the minimum required flow of information between WP that ensures the normal fulfilment of the objectives of the ALL-IN Zero project.

Table 6: Work packages inputs and outputs (WP1-WP6)

Work Package Nº	Work Package name	Input	Output
WP1	Ethics requirements	-	-
WP2	Project Management and Coordination	-	
WP3	Preliminary design and systems specifications definition	Output from CMR towards engine Information on vehicle target application for sizing of engine, etc.	WP4, WP5, WP6 & WP7: Test environment overview, test plan overview, description of engine, list of measured variables, List of Engine I/O's WP6, WP7 & WP8: Expected engine performance and expected amount of energy vectors from and to engine
WP4	CMR material fit in accordance with each power generation system	WP3: Optimum operating conditions (P, T, flow rate, current) WP5: CMR performance as an initial reference for material development WP8: Additional data to evaluate CMR materials	WP9: Data about CMR material appropriateness for each PGS WP8: Experimental data to validate the modelling platform WP5: Data about CMR material (catalysts development, protonic cell fabrication and electrochemical characterization)
WP5	CMR experimental test definition	WP3: Optimum operating conditions (P, T, flow rate, current) WP4: CMR characterisation as an initial reference for analysis of degradation WP8: Additional data to test CMR performance	WP8: Experimental data to validate the modelling platform WP9: Data about CMR operation (H_2 flow, energy requirement…) WP6/WP7: CMR operating conditions and H_2 production capabilities from different fuels WP4: Data of CMR operation and degradation mechanisms
WP6	H_2-fueled ICE characterization and optimization	Drawings of all hardware, cylinder head adaptations, assembly components for DI and PFI options Information about injectors, sensors and actuators. Hardware e.g.: DI injector, RPEMS, intake and exhaust manifold, plug screw, sealings, spark plug and coil Dyno, actuators, plenums, pipes, flanges measurement devices (exhaust...) Run-in procedure, safety tests, check of measurement devices Test plan for PFI & DI injectors and tumble/swirl cylinder head Specification of changes to oxygen supply	Hardware: intake and exhaust manifold, PFI adaptor, plug screw, sealings, tumble cylinder head, swirl cylinder head… Selected DI and PFI injectors, spark plug and coil Engine control hardware and software. Ready built engine for test bed set-up WP8: Test results with PFI & DI injectors with tumble and swirl cylinder heads

Table 7: Work packages inputs and outputs (WP7-WP11)

Work Package Nº	Work Package name	Input	Output
WP7	Fuel cell system characterization and optimization	WP3: preliminary FCS specification and requirements WP5: CMR operating conditions and H2 production capabilities from different fuels WP8: Additional data to develop the EMS and power demand curves	WP8: Experimental data to validate the modelling platform WP9: Data about how the FCS could operate given the CMR operation (H2 flow, energy requirement…)
WP8	Modelling platform development	WP4 & WP5: CMR experimental data WP6: ICE experimental data WP7: FCS experimental data	WP9: Model designed for energy balance optimization WP10: Different powertrain architecture models, one with H2 tank and the other with the CMR
WP9	Development of integrated CMR-PGS	WP4/WP5/WP6/WP7: Data about the energy flows of each system WP4/WP5: Experimental data to design subsystems (WMS), if required WP8: Additional data to develop integrated CMR-PGS	WP10: Control strategy development data for realistic operating conditions (integrated model)
WP10	Performance, TCO and emissions technologies evaluation	WP8 & WP9: Integrated vehicle model with the CMR WP8 & WP9: Integrated vehicle model without the CMR (H2 from tank)	Performance report of the PGS with the CMR compared to the system without the CMR. TCO and LCA report
WP11	Communication, dissemination and exploitation	Results from WP3-WP10	Scientific publications and dissemination material

5.3 Reporting

The periodic and continuous reporting will be carried out at different levels depending on the nature of the deliverable. In any case, the Quality Assurance Committee will be responsible for evaluating, and correcting, if necessary, the deliverables. For the continuous reporting, the WP leaders will be directly involved together with the task leaders and the working group. The Task leaders are responsible for preparing the specific deliverable related to the task with the support of the working group and the WP leaders. The WP leaders will be responsible for sending the deliverable to the Quality Assurance Committee 7-10 days before the deadline for review while the Quality Assurance Committee will send the reviewed deliverable 3 days before the deadline to the Coordinator for its submission.

For the periodic reporting the Coordinator will be part of the reviewing process to provide the final acceptance after the Quality Committee Assurance reviews it. In this case, the members designated to elaborate the reports will send it 14 days prior to the deadline to the Quality Assurance Committee which will transfer a reviewed version to the Coordinator 7 days before the deadline for its final acceptance.

5.4 Risk management

The Quality Assurance Committee will be in charge of quality monitoring and will work together with the Executive board to evaluate possible risks that may arise during project development. In this sense, they will periodically check whether addressed strategies and ongoing developments properly respond to objectives (through the preparation of the deliverables and the tracking of the milestones). When a risk is identified, it will be notified to the Coordinator that will decide which risk mitigation action must be taken and will notify the Project Officer. The Executive board will then trigger the implementation of mitigation/ contingency measures with the support of the WP leaders and will propose any revision or redirection of WP to guarantee the achievement of project objectives. It is imperative that the Task leaders notify the WP leaders if any risk is detected.

ALL-IN Zero consortium partners will play a key role in this task by reviewing the deliverables and results directly related to their expertise area. The Task leaders are responsible for preparing the deliverables with the support of the working group and the WP leaders. Each WP leader will send the deliverables before each WP meeting, and involved partners will review the circulated information, providing during the meetings comments and improvement before each Milestones achievement, providing support to achieve these in time and quality. After all the members of the WP accept the content of the deliverable, it will be sent to and reviewed by the Quality Assurance Committee. This analysis and monitoring will consider the identified risks of the project as well as unforeseen events or risks detected by WP and Task Leaders during the development of the project.

The Executive Board and the Quality Assurance Committee will continuously perform the risk analysis over the development of the project. During the project, the Coordinator will identify and control the factors that are critical to the final success of the project.

All the members of the project, particularly those composing the Executive Board, the Quality Assurance Committee and the WP leaders must be aware of the foreseen potential risks that may appear during the project and the risk-mitigation measures that could be taken (with the acceptance of the Coordinator) in Table 8, Table 9 and Table 10.

Table 8: Foreseen risks in the ALL-IN Zero project and proposed risk-mitigation measures (1)

Description of risk ***Likelihood / Severity***	**WP(s) Involved**	**Proposed risk-mitigation measures**
R1: Poor communication and cooperation between consortium members ***Low/Low***	All	A good coordination and participative plenary meetings will avoid this issue. Teleconferences will be carried out as needed for coordination. The same geographic location of main technical partners and previous joint experiences will ensure a smooth cooperation in the project.
R2: Partner not performing to expectations ***Medium/Medium***	All	In case of underperformance of some partner, the following actions will be taken depending on the causes: (a) Other partners will offer assistance; (b) Initiation of project task forces; (c) In extreme cases, the partner will be replaced.
R3: Key milestones or critical deliverables delayed ***Medium/Medium***	All	Task leader will be informed of any expected delay with time enough to start mitigation actions for minimal impact. In case of no success, the WP leader, then the TM and finally the PC will be informed. This latter will involve the Steering Committee if necessary. At each step, partner underperformance will be analysed and mitigation actions taken.
R4: Lack of quality of deliverables ***Low/Medium***	All	WP leaders will review the quality of the deliverables prior to submission to the TM. In case quality is still deficient, the TM may involve the Technical Committee for an analysis of underperformance of the partner and mitigation actions taken.
R5: Budget deviations ***Low/Medium***	WP0	In case of budget overruns, contingency actions will be decided by the Steering Committee together with the EC´s PO. Possible solutions include: (a) transfer budgets from one financial period to another; (b) increase partner contribution; (c) transfer parts of tasks to other WPs; (d) initiate dialogue with EC regarding reduction of work scope.
R6: Energy balance is significantly linked to systems sizing and fuel **Medium/Low**	WP3	Evaluate the performance of different CMR-PGS sizing and fuel combinations through theoretical calculations and look for a design that has acceptable performance for each option, outlining the optimum sizing for each fuel.
R7: Critical variables are not measurable directly with the available testing facilities **Low/High**	WP3	Diagnosis procedures will be defined to be able to estimate the value of the critical variables from other measurable variables with an acceptable tolerance.
R8: Not a unique catalyst with enough activity for all H_2 generation reaction systems ***Medium/Low***	WP4	A large number of materials will be tested as catalyst for the reaction system. Multi-catalyst can be used to be integrated and generate a system able to have a suitable kinetic activity under the different fuels (at the same device) considered to generate hydrogen.
R9: Performance of the electrochemical cell is not adequate under the reaction conditions ***Low/Low***	WP4	Different catalyst and electrochemical cells will be developed. Materials will be tested individually and those that do not meet specifications for the different items (catalyst and electrochemical cell) will be dismissed. Screening the combination matrix of different developed catalyst and electrochemical cells will allow generating several options that serve as alternatives and reach the required output.

Table 9: Foreseen risks in the ALL-IN Zero project and proposed risk-mitigation measures (2)

Description of risk *Likelihood / Severity*	WP(s) Involved	Proposed risk-mitigation measures
R10: The cell is not performing adequately for the single fuels in the individual experiments. ***Medium/Medium***	WP5	Further tailoring of the cell composition for a versatile fuel performance will take place in agreement with WP2. Electrocatalytic parameters such ASR, Faradaic efficiency, conversions, will be improved tuning materials compositions and manufacturing parameters.
R11: Deactivation of the catalyst or cell. ***Medium/Medium***	WP5	This risk considers 2 different mitigation actions; 1) Optimisation of the operation conditions and electrochemical parameters, and 2) If coking takes place: variation of feed mixtures compositions, and water to carbon species ratio.
R12: Issues concerning high cell resistances. ***Medium/Medium***	WP5	The current collection along the planar cell would be improved adding metallic inks and grids to the surface of the electrodes. Metal wire to current collector welding is also another mitigation plan to enhance the electrical contact
R13: Poor cell performance under multi-fuel regime. ***Medium/Medium***	WP5	Tailoring the materials, changes in reactor design, as well as adding some previous steps such pre-reforming are envisaged to ensure the versatile cell performance under the proposed switch in feed mixtures
R14: Delays in H2 supply for the research facility **Medium/Low**	WP6	Use of spare H_2 bottles from the H_2 production facility at UPV for short periods of time and schedule the tests with certain margin to ensure that delays in H_2 distribution do not affect the experimental campaign.
R15: H_2 oxy-combustion T are too high and may compromise engine integrity **Medium/High**	WP6	Use of inert gases from other facilities at UPV mixed with the inlet gases on the combustion chamber to decrease the combustion temperature.
R16: H_2 leakages and lubricant incompatibility **Medium/High**	WP6	Use of non-porous materials to isolate H_2 for the engine couplings, H_2 sensors installed at the facility and periodic analysis of the lubricant properties to check its decay state.
R17: Tests considering CMR failure cause significant degradation in the FC stack **Medium/Medium**	WP7	Perform the experimental test for CMR failure at the end of WP5 after the required data for the modelling activities is generated.
R18: H_2 leakages due to intrusive sensorization **Low/Low**	WP7	Perform tests during the commissioning to ensure no leakages are produced due to the intrusive sensorization and schedule periodic checks to ensure all the flows are within the expected range.
R19: Delays in development of the models due to lack of software capabilities **Medium/Medium**	WP8	Workload will be distributed to the other models that can be developed in the common software platform while lower-order models based on the experimental are developed, when required, for those that present difficulties in their development.

Table 10: Foreseen risks in the ALL-IN Zero project and proposed risk-mitigation measures (3)

Description of risk *Likelihood / Severity*	WP(s) Involved	Proposed risk-mitigation measures
R20: Physical trends are not understandable or difficult to understand **Low/Medium**	WP8	Use of high-detail computational fluid-dynamics (CFD) models to capture in detail the physical phenomena causing the trends.
R21: System models significantly increase computational cost **Medium/Medium**	WP8, WP9	Sensitivity analyses will be performed to understand which submodels can be simplified to lower-order models that require lower computational resources. The low-order models should act on source terms of the mass, species, momentum and energy conservation equations.
R22: Simple inner models in the control strategy do not represent faithfully dynamic models' performance **Medium/Medium**	WP9	Use of numeric correction algorithms to increase the accuracy of map-based low-order models in the control strategy. These algorithms should be fitted depending on the dynamic nature of the operating conditions of the system.
R23: Emissions and costs data about the CMR manufacturing are not found **High/Low**	WP10	Data based on CMR cell manufacturing will be extrapolated to perform the full CMR stack costs and emissions estimation.
R24: Uncertainty in the cost and emissions data from the literature is too high **Low/Low**	WP10	Uncertainty and error analysis will be included in the final evaluation of the TCO and LCA benchmark results.

5.5 Decision-making procedure

The decision-making process will follow the project governance/management structure in Figure 2 according to the level of responsibility of each figure.

For all the minor decisions related to the technical aspects of each task, the task leaders and WP leaders will hold the responsibility to take them without prior approval. For situations related to significant changes in the methodology, objectives or budget of the project, the working group, task leaders and WP leaders will inform a member of the Executive board during the internal WP meetings together with a proposal to solve the situation. Then, the Executive board will meet the Quality Assurance Committee to evaluate the situation together with the impact it may have, the associated risks and the risk mitigation actions that may be necessary. They will rise the proposal to the General Assembly members and the Coordinator to take a decision on the matter. Finally, the Coordinator will transfer the decision to the Project Officer of the European Commission.

5.6 Budget management plan

This information on financial management is based on the ALL-IN Zero Grant Agreement No 101069888 and the Funding & Tender Opportunities Online Manual – Section Grant Management https://webgate.ec.europa.eu/funding-tenders-opportunities/display/OM/Grant+management.
This financial management plan includes the procedures for financial reporting, payment handling and accounting.

5.6.1 Financial Statements

The financial statement of costs (Form C) should be completed by each partner and is submitted via the Participant Portal at the end of each Reporting Period (M18, M36 and M48 of the project). The financial statements should be according the partners normal accounting rules. However, each partner should check that:

- The ALL-IN Zero Project costs are correctly identified within their accounts
- Only eligible costs are claimed for and can be separated from non-eligible costs
- All records (timesheets, invoices, receipts etc) are properly stored and are retrievable in the case of an audit

The **general eligibility conditions** for **actual costs** are the following:

- they must be actually incurred by the beneficiary
- they must be incurred in the period set out in Article 4 (with the exception of costs relating to the submission of the final periodic report, which may be incurred afterwards; see Article 21)
- they must be declared under one of the budget categories set out in Article 6.2 and Annex 2
- they must be incurred in connection with the action as described in Annex 1 and necessary for its implementation
- they must be identifiable and verifiable, in particular recorded in the beneficiary's accounts in accordance with the accounting standards applicable in the country where the beneficiary is established and with the beneficiary's usual cost accounting practices
- they must comply with the applicable national law on taxes, labour and social security and
- they must be reasonable, justified and must comply with the principle of sound financial management, in particular regarding economy and efficiency

For eligibility conditions related to **unit cost** or **contributions** (if any), for **flat-rate costs** or **contributions** (if any), for **lump sum costs** or **contributions** (if any), for **unit**, **flat-rate** or **lump sum costs** or **contributions** according to usual cost accounting practices (if any) and for **financing not linked to costs** (if any), please read Article 6 of the ALL-IN Zero Project Grant Agreement No 101069888.

Ineligible costs include:

- costs or contributions that do not comply with the conditions set out in Article 6.1 and 6.2 of the ALL-IN Zero Grant Agreement, in particular:
    - costs related to return on capital and dividends paid by a beneficiary debt and debt service charges
    - provisions for future losses or debts
    - interest owed
    - currency exchange losses
    - bank costs charged by the beneficiary's bank for transfers from the granting authority
    - excessive or reckless expenditure
    - deductible or refundable VAT (including VAT paid by public bodies acting as public authority)
    - costs incurred or contributions for activities implemented during grant agreement suspension (see Article 31)
- costs or contributions declared under other EU grants (or grants awarded by an EU Member State, non-EU country or other body implementing the EU budget), except for the following cases:
    - if the action grant is combined with an operating grant11 running during the same period and the beneficiary can demonstrate that the operating grant does not cover any (direct or indirect) costs of the action grant

- costs or contributions for staff of a national (or regional/local) administration, for activities that are part of the administration's normal activities (i.e., not undertaken only because of the grant)
- costs or contributions (especially travel and subsistence) for staff or representatives of EU institutions, bodies or agencies
- other:
    - costs or contributions declared specifically ineligible in the call conditions.

5.6.1.1 Personnel Costs

Eligible **Personnel costs** are:

- Related to personnel working for the beneficiary under an employment contract (or equivalent appointing act) and assigned to the action
- Limited to salaries (including net payments during parental leave), social security contributions, taxes and other costs linked to the remuneration, if they arise from national law or the employment contract (or equivalent appointing act).

There are two methods of calculating personnel costs:

- Actual personnel costs: Calculation method defined in Grant Agreement;
- Or Unit costs which will not be applied within the ALL-IN Zero project.

For further details please read Article 6.2 of the ALL-IN Zero Project Grant Agreement No 101069888.

Timesheets

For the purpose of reporting, we will need to report which Work Package staff have been working on and a breakdown of how much time has been spent on each Work Package. For all staff it is compulsory for them to complete a timesheet. Timesheets should be completed on at least a monthly basis and must record the time down to a work package level. Timesheets should also be authorised by a line manager or another senior manager. If a company's existing timesheet system can meet these requirements, then this can be used for recording the time for the ALL-IN Zero Project.

5.6.1.2 Preparation of financial statements

The Executive Board is responsible for collecting, checking and compiling the project's Financial Statements. The Executive Board will also inform the Project Coordinator of any delays or difficulties encountered in the production and compilation of the financial statements including any delay in receiving information from a partner or a major discrepancy and where necessary propose a contingency plan.

Financial statements will aim to be submitted with other reporting documents to CINEA through the Funding and tender's website within 60 calendar days after the end of each reporting period.

To ensure a timely response the following procedure will be applied for the preparation of the Financial Statements:

- Two months before the end of the Reporting Period the Executive Board will send a reminder to all partners
- 45 calendar days after the end of the Reporting Period the partners should have completed their Financial Statements on the Participant Portal
- The Executive Board will check all financial statements and CFS them for compliance
- In the case of a partner not submitting their Financial Statements in time, the Project Coordinator can decide whether or not to include that partner's financial statement in the submission to INEA. Excluding a partner's financial statement will result in them having to wait until the next reporting period for further funds, but would allow the payments to all other partners to be delivered on schedule and avoid the delay of payment to the majority of the consortium.

- The Executive Board will validate the Financial Statements and the Certificates and send them to the Coordinator at least 2 days prior to the deadline

5.6.1.3 Certificate of Financial Statement

If a partners total requested funding exceeds €430,000 they will need to provide a Certificate of the Financial Statement (CFS) provided by an independent auditor or equivalent competent person. The CFS should be submitted no later than 60 days after the end of the final reporting period. A model for the financial statements is provided within the Grant Agreement Annexe 4.

5.6.2 Payment handling

5.6.2.1 Payments from the EC

All HE projects have a Coordinator, the EC will pay all the money on behalf of the project to this coordinator in this case this is the Universitat Politècnica de València (UPV). The coordinator is then responsible for distributing the money to the other partners on the project.
The maximum total EC financial contribution for ALL-IN Zero Project is fixed at 2,529,167.25€.

5.6.2.2 Pre-financing.

This is made at the start of the project, usually within 30 days of the EC signing the Grant Agreement
The pre-finance payment made to the coordinator will be 53,33% of the Maximum EC Financial Contribution (as ALL-IN Zero has three reporting periods) less the 5% contribution the guarantee fund. This translates into pre-financing of 1.348.804,89€. Of this 1.222.346,53€ is transferred to the consortium (coordinator) and 126.458,36€ kept by the Commission for the Guarantee Fund.

Interim Payments
These are made after each period financial reports are submitted and accepted by EC. The interim payment, similar to the initial prepayment, will be limited to the interim payment ceiling (if any).

Final Payment
This is made at the end of the project once EC has accepted all deliverables and reports and will include any final payment due to the project. This will include the Guarantee Fund payment.

Guarantee Fund
The Guarantee Fund is a percentage of the budget, in the case of ALL-IN Zero the EC withholds 5% of each partner's budget at the start of the project in the Guarantee Fund. If the project runs smoothly and there are no issues this 5% is paid out by the EC with the final payment.
The EC use the money in this fund to reimburse the project in the situation where one of the partners is made bankrupt and takes with it money in excess of the costs reported.

5.6.2.3 Distribution of funds to partners

The EC financial contribution is received by the Project Coordinator on behalf of the consortium, split by the number of reporting periods. The Project Coordinator will then distribute the EC financial contribution to each partner without unjustified delay according to the rules set out in the Consortium Agreement and Grant Agreement. The first pre-finance payment will be distributed to the partners with each receiving 48.33% of their Maximum EC Financial Contribution.
Subsequent payments will be based on the validation of the deliverables and the cost statements submitted to EC and potentially dependent upon any budget changes proposed by the Project Executive Board and approved by the General Assembly and the CINEA/ EC Project Officer.

5.7 Chronology

The ALL-IN Zero Project duration is 48 months and the duration of each WP and task are showed in Figure 4. This Gant chart enables understanding when the internal WP meetings will be held periodically.

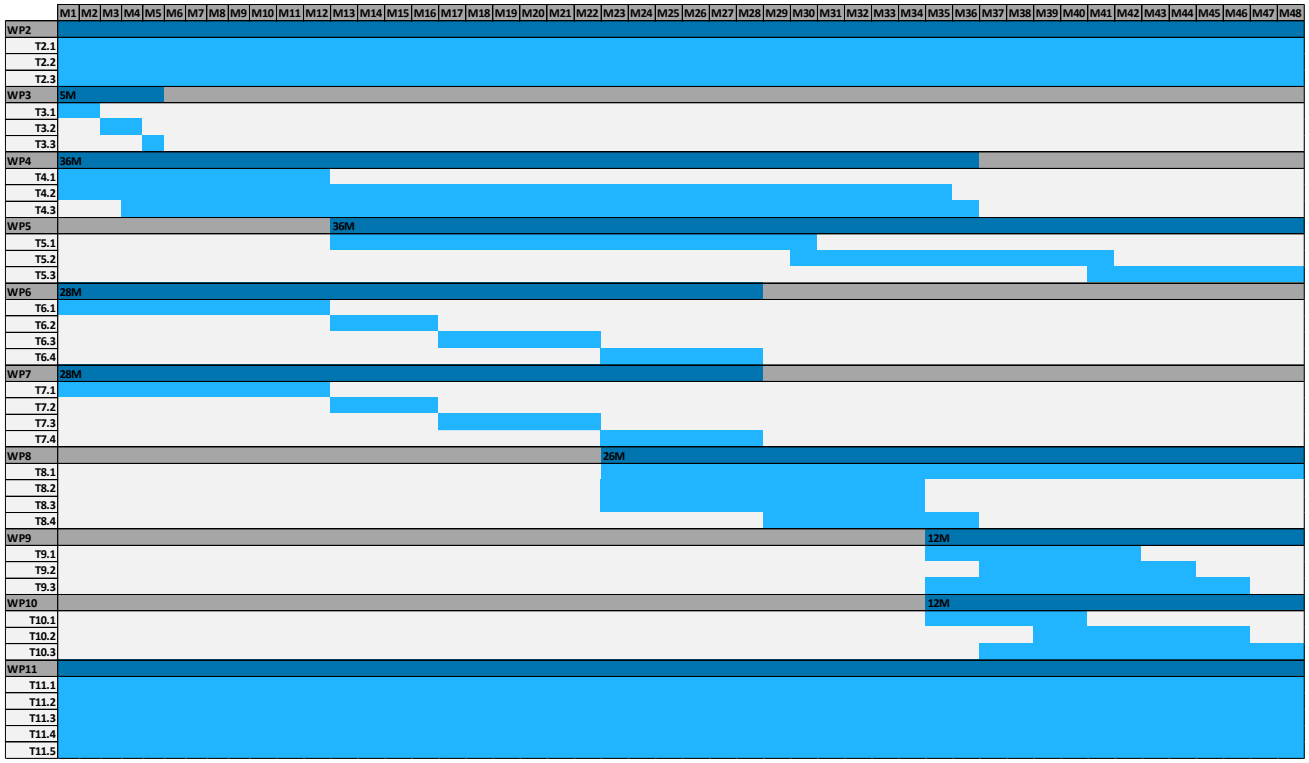

Figure 4: ALL-IN Zero Gant chart

The control of time and the fulfilment of the planned schedule will be monitored with the submission dates of the deliverables and the proof for the milestones, if any.

5.8 Control of deliverables

The list of deliverables planned to ensure the fulfilment of the objectives of the ALL-IN Zero project can be found in Table 11 and Table 12 together with the proposed deadlines, the partner responsible for their in-time elaboration and the dissemination level: public (PU) or sensitive (SEN).

Table 11: List of ALL-IN Zero deliverables, lead beneficiary, dissemination level and deadline (WP1-WP6)

Work Package Nº	Deliverable Related Nº	Deliverable Name	Lead Beneficiary	Dissemination Level	Due Date
WP1	D1.1	OEI - Requirement No. 1	UPV	SEN	31 Aug 2023
WP1	D1.2	OEI - Requirement No. 2	UPV	SEN	31 Aug 2024
WP1	D1.3	OEI - Requirement No. 3	UPV	SEN	31 Aug 2025
WP1	D1.4	OEI - Requirement No. 4	UPV	SEN	31 Aug 2026
WP2	D2.1	Project Management Plan	UPV	PU	30 Nov 2022
WP2	D2.2	Project Management Plan 1st revision	UPV	PU	29 Feb 2024

WP2	D2.3	Project Management Plan 2nd revision	UPV	PU	31 Aug 2025
WP3	D3.1	Detailed description of experimental activities	CSIC	PU	31 Oct 2022
WP3	D3.2	Critical parameter identification	AVL	PU	31 Dec 2022
WP3	D3.3	Preliminary sizing analysis	AVL	PU	31 Jan 2023
WP4	D4.1	Developed catalyst for the hydrogen generation reaction systems and situation of the electrochemical materials	CSIC	SEN	31 Aug 2023
WP4	D4.2	Electrochemical materials and performance of the protonic cells for developing the modelling tasks	FZJ	SEN	29 Feb 2024
WP4	D4.3	Electrochemical performance and stability of the protonic cell under process conditions for testing in WP5	FZJ	PU	31 Aug 2025
WP5	D5.1	Catalytic and electrochemical performance of CMR under single fuel conditions	CSIC	SEN	28 Feb 2025
WP5	D5.2	Multi-fuel CMR performance and operation conditions adjustment	CSIC	SEN	31 Jan 2026
WP5	D5.3	Study of long-duration and higher active area electrodes testing under fuel switching regime	CSIC	SEN	31 Aug 2026
WP6	D6.1	H2ICE prototype technical specification data and manual	AVL	PU	31 Aug 2023
WP6	D6.2	Developed H2ICE research engine	AVL	PU	31 Oct 2023
WP6	D6.3	H2ICE installed and adapted to UPV's test bench	AVL	PU	31 Dec 2023
WP6	D6.4	Experimental results and report on H2ICE air-combustion characterization	UPV	PU	30 Jun 2024
WP6	D6.5	Experimental results and report on H2ICE oxy-combustion characterization	UPV	PU	31 Dec 2024

Table 12: List of ALL-IN Zero deliverables, lead beneficiary, dissemination level and deadline (WP7-WP11)

Work Package Nº	Deliverable Related Nº	Deliverable Name	Lead Beneficiary	Dissemination Level	Due Date
WP7	D7.1	Fuel cell system specification datasheet and manual	AVL-I	PU	31 Aug 2023
WP7	D7.2	Fuel cell system integrated into UPV's test bench	AVL-I	PU	31 Oct 2023
WP7	D7.3	Fuel cell integration report	AVL-I	PU	31 Dec 2023
WP7	D7.4	FC system experimental database	UPV	PU	31 Dec 2024
WP8	D8.1	CMR reactor model developed and validated including the long-term degradation characterization	CSIC	SEN	31 Aug 2026
WP8	D8.2	H2ICE 0D-1D multi-cylinder model	UPV	SEN	30 Jun 2025
WP8	D8.3	Steady-state and transient FC system models	AVL-I	SEN	30 Jun 2025
WP8	D8.4	Integrated H2ICE-CMR and FC system-CMR vehicles models	UPV	SEN	31 Aug 2025

WP9	D9.1	Final vehicle models with real-time energy management strategy optimizer	UPV	SEN	30 Jun 2026
WP10	D10.1	Performance report of the PGS with the CMR compared to the system without the CMR	UPV	PU	30 Jun 2026
WP10	D10.2	TCO and LCA report	UPV	PU	31 Aug 2026
WP11	D11.1	ALL-IN Zero Early Exploitation and Business Plan	AVL-I	SEN	31 Aug 2023
WP11	D11.2	ALL-IN Zero Mid-term Exploitation and Business Plan	AVL-I	SEN	31 Aug 2024
WP11	D11.3	ALL-IN Zero Final Exploitation and Business Plan	AVL-I	SEN	28 Feb 2026
WP11	D11.4	Progress report on Innovation Management (1st release)	AVL-I	SEN	31 Aug 2024
WP11	D11.5	Progress report on Innovation Management (2nd release)	AVL-I	SEN	28 Feb 2026
WP11	D11.6	Project communication and dissemination plan	CSIC	SEN	31 Dec 2022
WP11	D11.7	Communication materials	CSIC	PU	28 Feb 2023
WP11	D11.8	Monitoring and evaluation annual report of communication and dissemination activities (1st release)	CSIC	PU	31 Aug 2023
WP11	D11.9	Monitoring and evaluation annual report of communication and dissemination activities (2nd release)	CSIC	PU	31 Aug 2024
WP11	D11.10	Monitoring and evaluation annual report of communication and dissemination activities (3rd release)	CSIC	PU	31 Aug 2025
WP11	D11.11	Monitoring and evaluation annual report of communication and dissemination activities (4th release)	CSIC	PU	31 Aug 2026
WP11	D11.12	Data Management Plan (1st release)	UPV	PU	28 Feb 2023
WP11	D11.13	Data Management Plan (2nd release with partial open access)	UPV	PU	30 Jun 2024
WP11	D11.14	Data Management Plan (Open access release)	UPV	PU	31 Aug 2026

The WP leaders are responsible for the production of the deliverables and the fulfilment of the milestones and, in case any delay is expected, it must be notified to the Executive Board and to the Coordinator. Once the potential delay has been detected and notified, the Executive Board must propose and implement proactive measures to mitigate the submissions later than the specified deadlines. If the delay is unavoidable, a change in the submission date for the deliverables will be notified to the Project Officer by the Coordinator.

The WP leaders will submit the deliverable to the common repository where the Coordinator will download it. Once any deliverable is prepared and reviewed by the Quality Assurance Committee, the Coordinator will submit it to the European Commission platform.

5.9 Data management

ALL-IN Zero project will follow an open science approach when sharing the results, enabling for third parties to access, mine, exploit, reproduce and disseminate the data generated by the project. Considering the importance and security that sharing and opening data entails, attention will be given

to security issues, as the parties must be warranted that no drawback or damage can come from adopting the proposed innovation, even at the experimental stage. The project team, in close collaboration with the Exploitation and Dissemination Managers and the Project Coordinator, will decide in detail which data will be openly accessed without compromising the project IPR. In case some data, result or system design is susceptible of being patentable, the intellectual property will be ensured before they are published. The FAIR Guiding Principles for scientific data management will be pursued in ALL-IN Zero. The DMP will define for each case configuration several databases that will be created according to the following general structure when applicable: experimental measurements, simulation setup and results. Each configuration will have a summary sheet where the main information about the configuration will be included and a second part where sheets with detailed information about the repositories will be given together with the FAIR metrics.

To continuously follow this strategy, a data management plan will be developed as part of D11.12 that will be devised to support and regularize the management life cycle for all data that will be collected, processed, and generated by the project. Its details will be included in the project management plan once it is defined. This plan will outline how research data will be handled during the project, and even after the project is completed, describing what data will be collected, processed or generated and following what methodology and standards, whether and how this data will be shared and/or made open, and how it will be curated and preserved. The proposed data management plan will ensure that the project's activities are compliant with the Horizon Europe Open Access policy. The data produced in the project will be managed through the EUDAT Collaborative Data Infrastructure, which is compliant with the EOSC initiative. EUDAT offers heterogeneous research data management services and storage resources for the research community and will be used in ALL-IN Zero through an infrastructure provided by UPV. In particular, the project will foster the use of EUDAT services for storing large datasets (B2SHARE), data management (B2SAFE), data identification (B2HANDLE), data transfer (B2STAGE), and metadata (B2NOTE) among the partners.

It is estimated that ALL-IN Zero will require a storage capacity of 1TB, considering requirements for backup and failure protection, to contain all the information and data pertaining to the development of the project, such as videos, software, content from meetings, workshops, and project information with associated metadata. To ensure that personal data protection issues are properly handled, these data sets will be processed to ensure that all transcripts are anonymous and personal details are removed or given pseudonyms in the transcript. A Digital Object Identifier (DOI) will be assigned to each of the datasets generated by the project, allowing safe and permanent access and the metadata associated (study design, sampling methodology, fieldwork, variable-level detail, and all information necessary for a secondary analyst to use the data accurately) to them will be openly available under CC0 license. This repository will be hosted on UPV's own servers as the project's coordinating partner.

The data associated to the internal meetings, i.e., minutes, reports, deliverables, presentations… will be stored following a redundancy policy through the common communication platform Microsoft Teams and the internal repository for the project members to facilitate the access to the day-to-day data.

6 Communication

6.1 EU / Internal communication

The communication between the European Commission and the ALL-IN Zero project will be carried out through the Project Officer (European Commission) and the Coordinator (ALL-IN Zero).

Internal communication between the Coordinator and the project members will be established by email, telephone or video conferences. The periodic WP meetings and General Assembly meetings will serve to converge the key messages and decisions among all the partners.

A common repository was created to share the already-generated files (presentations, minutes, attendance sheets) via SharePoint (Microsoft Teams). It is expected that the main internal communications are carried out through this platform but the relevant data for the ALL-IN Zero project will be stored in the intranet accessible from the webpage of the project (https://allinzero.eu - in development).

The most relevant communications will be sent by the Coordinator to all the partners via Email.

6.2 Documentation management

The reference number of the documents issued by the partners during the project will follow the rules described here-after:

- An index with all the documents sorted by WP will be accessible to all the partners. Once any partner uploads any document, it must be included in the general index.
- The information in the general index for each document must include the following information:

Type of document	Dissemination level	WP	Reference	Partner	Short description	Date

- Each WP will have its own repository and associated reference that will be included in each file.

The WP leaders will be responsible for uploading all the files to the common repository with the correct name and upload this information into the general index.

The type of document could be defined as:

- D: Deliverable
- MP: Milestone Proof
- MM: Minutes of Meeting
- TR: Technical Report
- TPR: Technical Progress Report
- QR: Quality Assurance or Risk Management document
- DM: Dissemination Material

The dissemination level could be either Public (PU) or sensitive (SEN) and must be in line with the dissemination level of its related deliverable. In case there is any discrepancy between the dissemination levels of a given document and its related deliverable, the valid dissemination level would be that of the Gran Agreement, i.e., the deliverable dissemination level.

The reference will follow the format: [Type]XXYY_ZZZZ. Where [Type] denotes the type of document (only using the acronyms just defined, XX the WP number (01… 11), YY (the document number, which is the last document number uploaded for that WP and document type +1) and ZZZZ the year in which it was generated. The name of all the documents uploaded must start with the reference.

These guidelines will be within the data management plan in D11.12.

7 Dissemination and Exploitation of results

7.1 Communication and dissemination management plan

The detailed project communication and dissemination plan will be defined in D11.6, the communication materials such as the website, brochures, presentations, etc. will be generated for D11.7 and it will be monitored and updated if required through D11.8 to D11.11. All the dissemination materials will be stored in a common repository so that all the members of the project have access to them. Any member doing dissemination activities will send the Dissemination a Communication Manager (part of the Executive Board) the materials used and proofs of the dissemination activities (such as photographs or videos) to be submitted to the ALL-IN Zero webpage and prepared in case of the European Commission's request.

Coordinated dissemination activities and exploitation strategies of project results as well as management of intellectual property (IP) are key instruments supporting the achievement of the expected project outcomes and wider impacts, guaranteeing future uptake as well as increasing awareness of the transport and fuel industries, public authorities and citizens in general. To ensure a focused and structured approach, WP11 led by the Dissemination and Communication Manager (DCM), Dr. Sonia Escolástico from CSIC, will include:

- An awareness-oriented phase, during the first years of the project, to raise awareness within a qualified community \ stakeholders' community and to engage the general public/society about the project and its objectives.
- A result-oriented phase to promote the scientific results and knowledge generated in the project, in order to allow potentially interested parties such as academic experts and researchers, have early access to relevant data and to get to know the achievements as well as related benefits of the project.
- An exploitation-oriented phase to disseminate the potential economic, social and environmental benefits of implementing ALL-IN Zero technology, in order to ensure a sustainable exploitation of its outcomes in key market segments.
- The DCM will play a key role in developing the detailed project communication and dissemination plan - PCDP (by month 4, D11.6). The PCDP will include activities such as the early identification of dissemination and communication targets, refining objectives, activities

assigned to partners, timing and indicators for monitoring and evaluation of dissemination objectives, being continuously adapted in close connection with WP activities and consortium partners.

In the project´s first two years, dissemination activities will remain limited to the distribution of publishable abstracts and progress resumes. Main dissemination activities will be realized towards the last two years of the project, where initial data and evidences on scientific advances and technological results will be available. Each partner of the consortium will contribute at specific levels according to their expertise and business activities. A report on monitoring and evaluation of communication and dissemination activities will be delivered yearly and will collect all relevant information.

The communication activities and social media will be planned and implemented throughout the project, intended for the identified target audiences while 1) promote the project during the four year period of the grant, 2) engage public/ society on issues related to the project, and 3) increase technology awareness.

These communication activities will aim at giving the project's achievements more visibility throughout Europe, through the channels where our audiences spend most of their time, and maximize the expected impacts. The communication materials will be developed considering the message, the characteristics and needs of the targeted audiences as well as those of the communication channel. The Dissemination and Communication manager, Dr. Sonia Escolástico (CSIC) will lead the development of these communication materials, thriving to install a two-way communication between the consortium and its audiences. There will be clear acknowledgement of EC funding in all dissemination activities, at any media, platform or event. The planned strategy will yield several communication materials as detailed next:

- **Visual and Corporative identity of the project**. It will guarantee the project gets a professional and consistent look, which is very important given the transferability of this project to the market. In addition, it will enable for instance to be quickly recognized by our audiences out of a crowd of posts.
- **Promotional material** such as flyers, brochures and posters will be designed and made available in digital form. These will contain a project overview, outline the partners' involvement in the individual work packages, the overarching goals of the project and how they will enhance scientific, industrial and economic development across the European Union. These will be distributed to the partners to help them present and promote the project and its outcomes. Printed material will be issued for relevant actions and always taking into consideration to print only the necessary quantity for sustainability reasons (~200 units per partner).
- **2 Videos** aiming at raising awareness of the project and its expected outcomes will be created and disseminated for partners to use to present the project, as well as for press relation purposes. The videos will include partners' interviews, user´s experiences, and the use and validation of ALL-IN Zero technology under laboratory settings.
- **Set up and maintenance of a dedicated project website**. The web will include information of the project, hosting technical documents, public deliverables (without violating IPR, copyrights and privacy) and showing present and possible applications of project results, as well as facilitate contact with project partners for interested stakeholders. The access to the project newsletter will be available through the web. Interested parties will have the possibility to register to receive updated information and networking opportunities.

- **Electronic newsletters** reporting on project events and results will be issued on the project's website reaching a wide community of potential stakeholders
- **Mass media presence** (tv, newspapers, magazines and radio). Press notes about the project will be developed whenever relevant events and activities. The press notes will be designed by the task leaders of each development and distributed by all partners through their networks. The wide geographic coverage and broad contact networks ensured by the Consortium at European level, will guarantee a proper awareness creation
- **Kicking off** a social media strategy (e.g. Facebook, Twitter, LinkedIn, ResearchGate). A social media strategy will be designed to best use social media according to the project objectives, identifying in which social media platforms our target users are most active, what type of content will be communicated (suitable to the platform rules) and when (designing a social media calendar), and how to establish and cultivate relationship with them. All social media platforms will be used to drive our target audiences to our project website and social channels, enabling to constantly grow our outreach. Supported by a dashboard, metrics of social media activity will be registered to analyse and maximize impact of publications. In addition, we will include events monitoring, news monitoring, community building, online press relations and dissemination. All partners will be invited to participate to this strategy with the Dissemination and Communication Manager, linking to their existing social media accounts as multipliers of information to maximize impact.

7.2 Exploitation management plan

The detailed exploitation management plan will be designed and developed in detail in D11.1 through D11.3. To guarantee industrialization, replication and effective deployment of ALL-IN Zero technology, while benefitting from the exploitation capabilities from the consortium partners, the exploitation manager Mrs. Angela Pedace from AVL-I, will coordinate the elaboration of the joint exploitation strategy and business plan (D11.1). This exploitation strategy and business plan will evolve in parallel to the development of the project, with one intermediate release (D11.2) and a final release at the end of the project (D11.3). The exploitation strategy will be supported by the project communication and dissemination plan (D11.6), reporting ALL-IN Zero benefits to the different key audiences and stakeholders and covering all possible communication means to increase public awareness and acceptance, ensuring ALL-IN Zero effective long-term deployment and sustainability.

ALL-IN Zero exploitation strategy has been designed in a long-term vision based on two different approaches:

- Joint exploitation: According to the three major stages defined in Task 11.1, the project will firstly define in detail the exploitable results of the project, the relation to IPRs and the individual exploitation interests (as defined in the following approach), establishing the basis for a joint business plan. In a second step, a thorough market analysis will be performed, considering the effects of external (e.g., politic context, societal acceptance, technological advances in hydrogen storage and transportation as detailed in barriers and obstacles) and internal (e.g., energy efficiency, technology cost, flexibility) factors that may affect the business scenarios planned. As a result, a Final Exploitation Plan (D11.1-D11.3) will be designed detailing all required activities and stages involved to bring ALL-IN Zero technology to market, including innovation management activities (D11.4-D11.5), as well as the subsequent commercial strategy to ensure market penetration and achieve effective exploitation.

- Individual exploitation: Each consortium partner has defined its individual strategic interests that will be further developed during the project (as part of Task 11.1) in relation to ALL-IN Zero results both from the research and commercial point of view.

The main exploitable result after future technology up-scale/industrialization will be the assembled multi-plane electrocatalytic conversion module, which consists of multiple unitary reactor parts composed each of a planar and structured catalyst. The assembled multi-plane electrocatalytic conversion module (CMR), a multi-fuel feeder and a power generation system (ICE and FCS) will be integrated for direct electrocatalytic conversion of fuels into hydrogen to produce electrical and mechanical power with zero emissions in the sectors of heavy-duty long-haul vehicles and emergency or decentralized power generation. The market deployment of these two main applications will be carried out by means of the future establishment of a Joint Venture between the consortium partners, taking advantage of established commercial contacts, routes, providers, etc. from AVL, as well as contacts with relevant actors from FZJ, CSIC and UPV. FZJ will provide assembled multi-plane electrocatalytic conversion module, CSIC will be in charge of structured catalyst for integration into the membrane reactor, CMT will provide integrated modelling for direct electro-catalytic conversion of fuels into H2 and AVL will be in charge of long-term manufacturing of the system in order to reach the market.

7.3 Open access to ALL-IN Zero data and publications

ALL-IN Zero project will ensure immediate open, free-of charge access to the peer reviewed scientific publications generated. A machine-readable electronic copy of the version of record (VoR) or final peer-reviewed manuscript accepted for publication will be uploaded once available together with the corresponding underlying data via the publisher and/or via trusted repository with technical and organizational requirements that provide guarantees that the content will be accessible mostly in open access in the long term. For this purpose, Europe PMC repository has been chosen, an open science platform to collect life science publications and preprints form trusted sources, as well as UPV´s institutional repository RIUNET.