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Cost-effective PROton Exchange MEmbrane WaTer Electrolyser for Efficient and Sustainable Power-to-H2 Technology

Grant No. 862253

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***Project Coordinator**: Daniel García-Sánchez - DLR*

D8.1 Quality Management Plan

WP8 Management and coordination

WP Leader: DLR
Deliverable Responsible: DLR
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Document history

Version	Date	Author	Description
V.1	07/08/2020	Daniel Garcia-Sanchez (DLR)	Redaction of the 1st version
V.2	19/08/2020	Daniel Garcia-Sanchez (DLR)	Redaction of the 2nd version
V.3	26/08/2020	Antonino Arico (CNR)	Review and Redaction 3rd version
V.4	*22/09/2020*	Petra Georgi (DLR)	Risk Management

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1 Executive Summary

Due to the potential problems that can appear during the development of the project, a quality management plan is needed. The purpose for the quality management is to validate that the project products are completed with an acceptable level of quality. Quality management assures the quality of the project deliverables and the quality of the processes used within the project. The deliverable D8.1 provides concise information about the Quality Management Plan implemented in the PROMET-H2 project.

2 Objectives

This deliverable aims at reporting the quality management plan. This has the main function to be a reference source for all consortium members covering many day-to-day activities to define and specify the internal quality assurance processes.

3 Quality Management Plan

3.1 Introduction

A Quality Management Plan is designed to facilitate cooperation in the project by defining rules and standards for the day-to-day operation in order to achieve a harmonized work. A major section concerns the Quality Control procedures for producing Deliverables where document standards and templates are introduced. Finally, quality control procedures for project management in general are presented in support of all management roles in the project including procedures for project risk monitoring and management and contingency planning. The general principles for the project execution are defined in Grant Agreement (GA) with reference to the Description of the action (DoA) and the Consortium Agreement (CA).

3.2 Deliverables

Deliverables required by European Commission are developed in alignment with the overall objectives of the project; they are the key products for monitoring project implementation.

3.2.1 Guideline for preparation and submision of the deliverables

- The deliverables must use the as defined template designed by the PROMET-H2 partner FHA in WP7. These templates were distributed to the PROMET-H2 partners

- The authors are responsible for the quality of the reported results. The deliverable should not be only a table of results, those results must be discussed and well explained.

- The WP leader check and validate both the quality of the results and the consistency of the deliverable according to the Description of Action (technical part of the Grant Agreement).

- After validation by the WP leader, the authors circulate the deliverable to the consortium.

- Then, the project coordinator will check and validate the consistency of the deliverable according to the Description of Action (technical part of the Grant Agreement).

- If there are no objection in a period of 2 weeks after final circulation of the deliverable, the project coordinator submits the deliverable to the European Commission through the participant portal (SyGMA section).

3.2.2 Products to be tested

Regarding the characterization of materials; an experimental description of the equipment and methods should be added to the deliverable in order to insure the reproducibility of the results.

Regarding the products developed in the project PROMET-H2

- Catalyst synthesis
- Membranes
- MEA
- BBP
- PTL
- Stack components (sealings, frames,…)
- System components (pumps, sensors, controllers,…)

In this topic, the products to be tested by independent quality assurance are to be defined. The selection must be justified accordingly. The corresponding test specifications and test protocols must then be created for these products. The determination of which system elements are checked is documented in the underlying implementation, integration and testing concept. The protection of the know-how and the intellectual property might justify giving a partial description. The deeper description should be keep available by the considered partner.

3.2.3 The results are recorded in the »test protocol system element. Specifications for the test specification of finished products

Like all system elements, finished products can and should be tested. For this purpose, a corresponding »test specification system element is created. In order to achieve a uniform quality assurance standard for finished products in particular, specifications for the test specifications of finished products are defined in this topic. These specifications must then be included in the associated test specification system element.
Below are some examples how this topic is assurance in PROMET-H2:

Task 1.1: Electrocatalysts characterization protocols. In order to allow a harmonized characterization of materials that will ensure a proper and goal oriented selection of catalysts, characterization protocols will be developed. For this, several testing methods are envisioned at lab level to characterize and evaluate the materials.
Deliverable 1.1. Report on development of electrocatalysts: references, performance and initial risk assessment

Task 2.4 Characterization of single cells. MEAs developed in the project will be evaluated in single cells and compared to the defined benchmark and baseline performance.
Deliverable 2.2. First annual report assessing the performance of developed PROMET-H2 Catalyst MEA
Deliverable 2.3. Description of method and parameters with optimized conditions for the CRM recovery from MEAs.

Deliverable 2.4. 2nd annual report updating the performance and characterization of PROMET-H2 MEA.

Task 3.3: Definition and update of testing protocols. This task will act as a pivot task for the definition and overseeing of the update of the needed harmonization of test protocols throughout the project, from single cell to system. Therefore, T3.3. will establish a link with WP2 (single cell testing of MEAs,), WP3 (for tests of BPP and PTL) and WP4 (short stacks).
Deliverable 3.2: 1st document of available testing protocols for electrolysers: Additional needs and needs for PROMET-H2 case

Task 5.2: Alignment of testing plan and protocols. In order to ensure a total alignment of the expected information to be retrieved from the TRL 5 validation, and taking into account the tests performed at cell level and stack level in the previous WPs, specifically with the protocols defined in WP3 (T3.3), Air Liquide will propose a detailed experiment and test plan that will be developed before ending the systems' coupling.
Task 5.4: Baseline characterization and validation of PROMET-H2 in relevant environment
Deliverable 5.2. Definition of test plan of electrolyser only and coupled system

3.2.4 Organization and specifications the for quality management

In order to control the quality management within the project a V-model will be used (see Figure 1). This mainly regards when and which products are to be used for quality assurance in the project, according to which methods, guidelines and standards are to be created and with which tools or components of the "project management infrastructure" they are to be processed. Derived from the quality objectives, the organization of quality assurance and its powers are to be defined in the project. Analytical QA measures include all document review procedures, such as reviews, system element reviews, and process reviews. Furthermore, the procedure of outgoing inspection and incoming inspection, such as the testing of finished products and supplies, must be defined. Within the framework of quality control, it is necessary to describe how emerging "quality problems" should be treated, tracked and resolved through corrective measures.

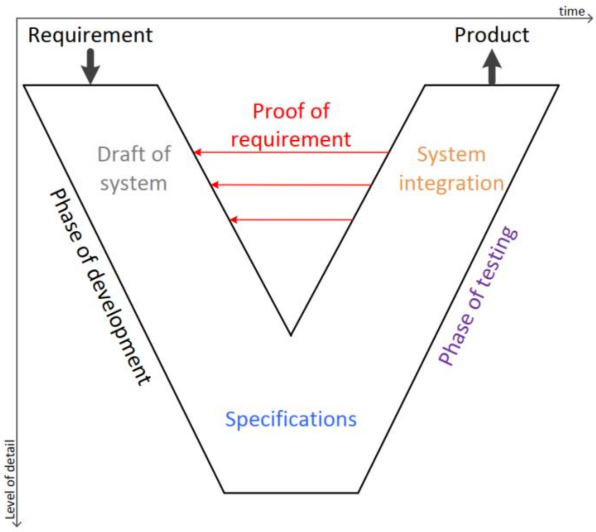

Figure 1 V-Model description

3.3 Project Management

The project organizational structure is represented in Figure 2 and show multiple layers of decision-making:

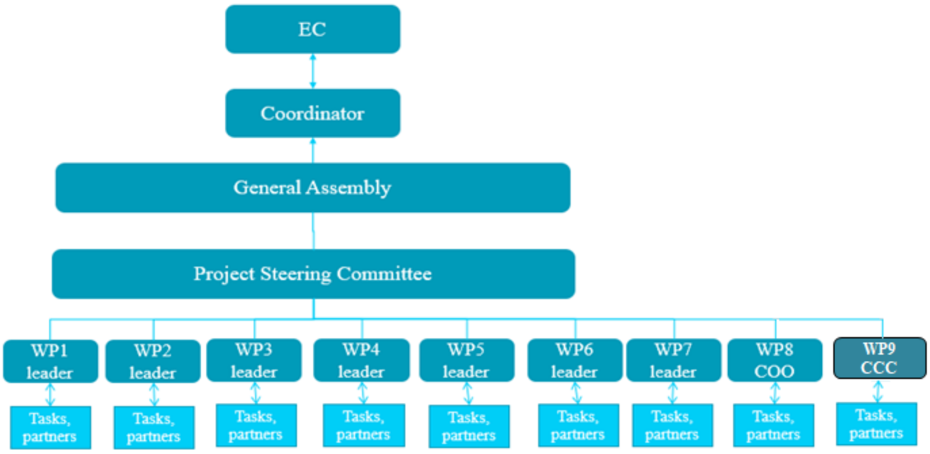

Figure 2 Project organizational structure

The management structure works with distributed responsibilities, in both vertical and horizontal directions. It consists of:

- The Project Coordinator leading the project supported by the scientific manager
- The General Assembly (GeA) as the decision-making body of the consortium;
- The Project steering Committee (PSC);
- WP Leaders.

Project coordinator (DLR, Reporting to EC)

DLR leads the management of the project, being link with the EC and being the contact point for matters regarding the project with the EC. DLR will chair the GeA, and will oversee the technical progress as chair of the
PSC. DLR has wide experience on participating and coordinating EU projects. A summary of the PC key responsibilities are:

- Monitoring project progress, managing risks, avoiding delays,
- Chairing the General Assembly,
- Regularly reviewing progress reports concerning results, deliverables and milestones,
- Ensuring effective internal project communication
- Reviewing/approving reports for submission to the European Commission,
- Liaising with the European Commission (including submitting reports),
- Coordinating any request for amendments,
- Managing partner accession and withdrawal

General Assembly. Partner: all, chaired by DLR. Reporting to coordinator.

The GA will be composed by one representative of each partner, being the highest level decision making body
in the project at consortium level, and will follow the provisions of the consortium agreement. It will cover high
level decision making including: (1) resolution on strategic issues and conflict resolution, as well as on the evolution of the consortium, (2) approval of global management structure and project direction, (3)

modification of the management structure, if needed, and (4) changes to the consortium agreement and to the grant agreement

Project Steering Committee. Partners: all. Reporting to coordinator.
PSC shall intervene and decide on:

- Monitoring the project progress against objectives and milestones
- To track project and alert if partners are under / over-spending
- Ensure the implementation and application of the Grant Agreement and Consortium Agreement
- Decision support on strategic issues and conflict resolution, as well as on the evolution of the consortium
- Approval of the Dissemination and Exploitation plan and its deployment.
- Approval of networking activities with other projects
- Guiding and applying corrective measures in the contingency plans after risks management

WP leaders:
WP leaders are responsible of overseeing the general progress in their work package, communicating and exchanging information with the partners directly involved in the tasks, and task leaders. Monthly progress meetings will be set with partners to review the risks, progress, bottlenecks and advances of the project (by web
conference, teleconference as general rule or in face to face meetings if it's considered needed to solve issues arising in the tasks). Through the direct progress monitored monthly, the WP leaders will be able to present information to the PSC.

Contact details

Responsibility	Beneficiary	Employee Name	E-mail
Project coordination			
Project **Coordinator**	**DLR**	**Daniel Garcia-Sanchez**	daniel.garciasanchez@dlr.de
Financial Coordinator	**DLR**	**Carolin Dolde**	carolin.dolde@dlr.de
WP Leaders			
WP1	**CENMAT**	**Schwan Hosseiny**	shosseiny@cen-mat.com
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WP3	**DLR**	**Aldo Gago**	aldo.gago@dlr.de
WP4	**PROPULS**	**Ulrich Rost**	ulrich.rost@w-hs.de
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WP6	**FHA**	**Dario Cortes**	dcortes@hidrogenoaragon.org
WP7	**CNR**	**Antonino Arico**	arico@itae.cnr.it
WP8	**DLR**	**Daniel Garcia-Sanchez**	daniel.garciasanchez@dlr.de
WP9	**DLR**	**Daniel Garcia-Sanchez**	daniel.garciasanchez@dlr.de

3.4 Achievable project goals

The milestones are checkpoints in the project that help you chart progress throughout the course of the project. These control points help identify that a number of tasks or key deliverables have been completed allowing you to move on to the next phase of PROMET-H2

PROMET-H2 Milestones:

Milestone number	Milestone title	WP number	Lead beneficiary	Due Date	Means of verification
MS1	Kick off meeting	WP8	1 - DLR	2	Kick off project meeting has been carried out. Confidential minutes of meeting
MS2	Validation of PTL and BPP in alignment with the criteria listed in project targets	WP3	1 - DLR	10	The performance and durability of the PTLs and BPP from WP3,will be compared with PROMET-H2 PTLs and BPP targets listed in Targets(1.4 Ambition)
MS3	Performance check progress towards goals: Thin Membrane with reduced H2 crossover < 2%	WP2	8 - CHEM	12	Progress minutes, WP2 technical meeting Tasks 2.1 to 2.3
MS4	Down selection of catalysts after single cell evaluation for upscaling of materials	WP1	10 - CENMAT	15	Internal report, reporting to PSC minutes of meetings (WP leaders are informed)
MS5	Draft of cost model with parameters and indicators defined at consortium level	WP6	6 - FHA	16	Parameters and indicators for modelling costs, upscaling studies agreed.
MS6	Preparation meeting before P1 ends	WP8	1 - DLR	16	Minutes of meetings, confidential
MS7	Validation of catalysts performance and durability in alignment with the criteria listed in Table 4	WP1	10 - CENMAT	18	The performance and durability of the catalysts from WP1, will be compared with PROMET-H2 Catalyst targets described table 4
MS8	Validation of MEA performance and durability in alignment with the criteria listed in table 8	WP2	12 - FZJ	20	The performance and durability of the MEA from WP2, will be compared with PROMET-H2 MEAs targets listed in table 8
MS9	Update on recycling procedures and	WP2	12 - FZJ	22	Check validity, minutes technical meeting

	considerations. Inter- nal evaluation update carried out previous to selection, reporting and deliverables				
MS10	Long term stability test started for the rain- bow stack	WP3	11 - NEL	22	NEL starts testing, information from first partial results to partners
MS11	Successful start-up of PEMWE system with baseline stack	WP5	7 - AL	23	Commissioning and start up process finalised, test plan accepted
MS12	Update on testing protocols: focus on stack and link with system testing	WP3	1 - DLR	24	Internal progress review, risks management, contingency plan
MS13	short stack evalua- tion: additional needs identified, parameters	WP4	5 - PROPULS	24	Technical review: progress meeting information on potential changes needed to accommodate final components
MS14	1st workshop carried out	WP7	2 - CNR	24	Document-report with conclusions of the workshop. Information on web
MS15	Updated information for LCA and LCC concerning recyclability retrieved from WP2 and CRM and costs retrieved from WP2 and WP3	WP6	6 - FHA	25	Internal survey carried out. Progress on task 6.1 as interface with WP2 and WP3
MS16	Coupled operation with methanol pilot plant: methanol from green H2 synthesis	WP5	7 - AL	30	Internal report, progress report/minutes on PSC
MS17	2nd workshop carried out	WP7	2 - CNR	30	Document-report with conclusions of the workshop. Information on web
MS18	Updated information for LCA and LCC concerning recyclability and CRM and costs retrieved including upscaling	WP6	6 - FHA	33	Internal survey carried out. Progress on task 6.3 as interface with WP2 and WP4-5
MS19	PROMET-H2 25kW stack	WP4	5 - PROPULS	32	Progress report/minutes
MS20	Definitive version of the exploitation strategy including	WP7	2 - CNR	36	Exploitation working group minutes of meeting. Public

	each KER and final report on DACP activities ready.				information available in deliverables under review
MS21	3rd workshop	WP7	2 - CNR	36	Document-report with conclusions of the workshop
MS22	Stack and system Capital Cost <750 €/kWel	WP6	6 - FHA	36	The analysis of costs from WP6 shows Stack and system Capital Cost <750 €/kWel

4 Risk Management

The Risk Management Plan documents the processes, procedures and tools that will be used to manage and control uncertain events that could have a negative impact on the PROMET-H2 project.

4.1 Risk Management process

The risk analysis is a process based on the following steps:

- Risk identification: identification of any event that could prevent the project from progressing as planned or from successful completion. Risks can be identified at all levels of the project (phase, work package, processes (e.g. procurement risks), etc.) with regard to their impact on costs (personnel and equipment), time and quality (incl. scope).
  There are different types of risks: technical risks, time risks, procurement risks, organizational risks, financial risks, risks in case of project failure (non realization), etc.
  Risk identification includes the documentation of the characteristics of each risk. Some risks are identified prior to project kick-off whereas others will be identified during the project lifecycle. A risk can be identified by anyone associated with the project.
- Risk assessment: estimate of the probability of occurring and of the degree of impact to schedule, cost and quality and assigning risk priority. The probability of the risk event occurring and the impacts will be the basis for determining the degree to which the actions to mitigate the risk should be taken. The evaluation of mitigation strategies should be based on the multiplication of risk cost times the probability of occurrence. Alternatively a qualitative evaluation is possible.
- Risk mitigation and contingency planning: early steps should be taken to reduce the probability of the risk occurring and a plan prepared (series of activities/tasks) in case the risk occurs. Mitigation strategies should cost less than risk probability calculation. Contingency plan will be reviewed and updated when necessary.
- Risk tracking and reporting: monitoring of risks throughout the life of the project. Risk register and contingency plan will be tracked and reported along the project duration. The risk registry will be updated by the PGM at least on a monthly basis.
  Project status reporting contains a section on risks: new risks and changes of existing risks.

4.2 Risk responsibility

Risk identification	all project stakeholders
Risk registry	Project Coordinator
Risk assessment	Risk Owner, WP leaders, Project Coordinator
Risk response options	Risk Owner, all project stakeholders
Risk response approval	WP leaders, Project Coordinator
Risk contingency planning	Risk Owner, WP leaders, Project Coordinator
Risk reporting	Risk Owner, WP leaders, Project Coordinator

4.3 Risk assessment

4.3.1 Risk impact

High (red) if:

- Impact on time: in case the risk occurs, the concerned project will be delayed of ≥ 6 months (benchmark) or/and
- Impact on costs: the amount of damage or increase in costs is ≥10% (benchmark) of the planned costs of the concerned project and cannot be compensated with the project resources or/and
- Impact on quality: the project goal won't be achieved

Medium (yellow), if

- Impact on time: in case the risk occurs, the concerned project will be delayed of ≥ 2 months and < 6 months (benchmarks) or/and
- Impact on costs: the amount of damage or increase in costs is ≥5% and <10% (benchmarks) of the planned costs of the concerned project and can hardly be compensated with the project resources or/and
- Impact on quality: the project goal will only be achieved partly

Low (green), if

- Impact on time: in case the risk occurs, the concerned project will be delayed of < 2 months (benchmark) or/and
- Impact on costs: the amount of damage or increase in costs is < 5% (benchmark) of the planned costs of the concerned project and can be compensated with the project resources or/and
- Impact on quality: the project goal will be achieved

Impact

Assessment	Explanation						
	Quality/ Security/ Scope	Time			Costs		
	Project Goal/ Performance	[Month of delay]			[% of €]		
HI	Loss of > 1 Key Parameter Goal cannot be reached with means of the program		≥	6		≥	10 %
MED	Degradation of a key parameter Part of the goal not reached	2	until	5,9	5	until	9,9 %
LO	Degradation of a minor parameter Goal can be reached		<	2		<	5 %

4.3.2

Assessment	Explanation	Description
HI (likely)	**50-95%**	**Probability of occurring likely**
MED (occasional)	**30-50%**	**Probability of occurring possible**
LO (seldom)	**5-30%**	**Probability of occurring unlikely**

4.3.3 Risk classification

The result of the relation probability of occurring towards impact is evaluated by Risk Owner, WP leaders and Project Coordinator, and leads to the risk classification in: critical, acceptable or negligible.

Risk assessment matrix

		Probability of occurrence		
		high	medium	low
Impact	high	critical	critical	acceptable
	medium	critical	acceptable	acceptable
	low	acceptable	negligible	negligible

Risk Class	Action
Red = critical	Risk not acceptable: Countermeasures have to be determined und executed, Escalation for decision through Project Coordinator, if applicable: Steering Committee
Yellow = acceptable	Acceptable risk: Effects have to be monitored by project management. Appropriate countermeasures have to be determinated by WP leaders, Project Coordinator
Green = negligible	Insignificant Risk: the project managers decide whether change is necessary or not

4.4 Risk response

A response must be defined for each identified risk. It is the responsibility of the project team (Risk Owner, WP leaders, Project Coordinator) to select a risk response.
The response options are:

- accept
- avoid
- reduce
- transfer

4.5 Risk monitoring and reporting

During project execution all risks have to be monitored. If required, risk mitigating countermeasures have to be initiated.
The risk tool (Excel-file) is a central document for risk identification, assessment and contingency plan. The Project Coordinator is responsible for ensuring an appropriate use and update of the risk tool. The file will be prepared by the coordinator, the file will be available for all partners. Each partners will be responsible to provide their input in that file.

→ During project execution all WP Leader have to inform about the occurrence of risks directly after the occurrence of incidents. All WP Leader report on risks in writing in the 6-monthly PM status report.
→ All WP Leader have to transfer without delay new risks or risk changes into the risk-tool. *[Or: Project Coordinator will transfer without delay new risks or risk changes into the risk-tool.]* Moreover the WP Leader will give an update about the current status of the risks to Project Coordinator the on a 3-monthly basis (reporting).
→ All WP have to evaluate and complement the identified risks with countermeasures.
→ The Project Coordinator has to inform the Steering Commitee about relevant project risks and he has to submit the current risk assessment incl. countermeasures for approval.

4.6 Opportunity management

Opportunity management looks for what might go better in the project. A way to reduce risks and/or to improve effectiveness and efficiency is identifying potential opportunities. Some risks may also be turned into opportunities. Therefore the PROMET-H2 risk tool is also used as opportunity register. Opportunities will be identified, tracked and scored in the risk tool, where they will be available, as well as in reports in order to be acted upon quickly to gain maximum benefit.

4.7 First identification of risks and mitigation

The main technical risks for the project was evaluated and preliminarily reported the DoA. Those risks have specifically been reported in the section 1.3.5. WT5 Critical Implementation risks and mitigation actions of the DoA.

Risk ID	Risk	Risk owner	Affected WPs	Impact on project	Propability of Occurence	Mitigation	Mitigation costs
1	Bad performance or failure of components part of the stack		1,2,3,4	Hight	Low	Before development of the prototypic stack design and assembly (Task 4.2 and 4.3), an adapted single test cell will be assembled for MEA materials (task 2.5) and final components evaluation (Task 4.1) considering the individual developments in WPs 1, 2 and 3. Although WPs 1 to 3 will select best candidates considering stack integration as one of the key priorities, the development of a single test cell enables the detection of any required further improvement, if applicable.	
2	Delays in assembly of the stack		4	Medium	Medium	In PROMET-H2, WPs 1, 2 and 3 will run in parallel to develop the different novel components integrating the stack, with sufficient duration due to the R&D character of the project. Progress in these tasks will be closely monitored by WP leaders and DLR through short term milestones additional to those listed in section 3.2.4. In the case some task related to development of those definitive components experiment delays, it will still be possible to progress with design of the stack (T4.2) and assembly of other components as part of T4.3.	
3	Non relevant data driving the scale up studies, techno-economic evaluation		5,6	Medium	Low	A detailed experiment and test plan will be developed before ending the systems coupling (T5.2) and different modes for testing the coupling of the processes are foreseen (T5.4) to obtain data suitable for all type of business cases, including very varied loads in protocols. This information will be used as a basis for T6.3 considering the multi MW case, being based not only on the background of partners in large scale PEMWE, but also in coherence with existing techno-economic data in EC and FCH2JU studies as well as scientific literature.	
4	Poor possibilities for recycling of stack components compared to LCA goals		1,2,3,6	Hight	Low	CRMs recycling and reduction strategies (S1.3.5 from DoA) are a cornerstone to achieve the desired CAPEX reductions in PROMET-H2, which is a key strength for industrial partners in the consortium to	

						approach energy storage markets. For this reason, stack components recycling and reuse are key priority for the project and the pathways explored will for sure, in more or less extent, add value over state-of-art methods. Besides, T6.1 and T6.3 are dedicated to evaluation of recycling of stack components as well as cost model and life cycle assessment respectively, supporting the components development (WP1-3) towards circular economy considerations. The previous experience from partners in the field (e.g. FHA with HYTECHCYLING, MON with PLATIRUS and CROCODILE) will also ensure that progress is added in this field.	
5	Performance of advanced materials is not as good as expected		1,2,3,4	High	low	WPs 1 to 3 will develop individual PROMET-H2 components including key steps such as: (1) materials selection, (2) design and simulation tasks, and (3) development of a series of candidates for final selection. This process ensures that individual performance of these stack components will be best in class, meeting the expectations set out in PROMET-H2 objectives with high probability. Besides, the comparison with baseline commercial cells with already known values (developed in WP4) will facilitate the detection of margins for improvement for PROMET-H2 cells.	
6	System efficiency is lower than 70% HHV		4,5	High	low	Section 1.3.5 part III) explains how the novel hydraulic cell compression is a promising approach for electrolyser operation allowing the stack be operated at a higher temperature level than conventional stacks with mechanical compression, which will lead to increased stack and system efficiency. Besides, although the stack is the core of a PEMWE (and the focus of PROMET-H2), the project will also develop an innovative system to accommodate it looking for energy efficiency criteria, considering also upscaling to multi MW sizes in which overall system efficiency values are improved over kW prototype values.	
7	No significant reduction of		4,5	High	low	CAPEX decreasing will be achieved by significant reduction and/or total	

	CAPEX compared with SOA					elimination of the CRM in the catalysts and coatings of the PEMWE stack (see WP1-WP3). Furthermore, optimizations required for cost reduction will be contemplated in task 4.2 while WP5 will deal with integration of the 25 kW stack into a system with less expensive electrical and BoP components. Besides, small improvements in costs at this prototype power range are expected to be translated in considerable savings for multi MW cases.	
8	The results obtained in testing tasks do not fit with the initial simulations and expectations		1,2,3,5	Medium	Medium	Although the PROMET-H2 objectives build on existing KPIs and realistic expectations cemented over past EU projects and research (and initial simulations and designs will be based on them), it is possible that results in testing tasks deviate from them. In case these deviations are negative, it is possible (for individual testing in tasks WP1-3) to implement required countermeasures over core PROMET-H2 components as well as to identify strategies for further improvement during and after project execution (for the case of the final system testing in WP5).	
9	CRM reduction is lower than expected		1,2,3	High	low	Most CRM reduction will be tackled by means of WP1, where the work will be oriented to develop and test at lab scale the performance of materials based on Ag-doped TiMn oxide for anodes and heteropolyacids-containing transition metal-sulphides/nitrides/carbides cathodes. Also, WP2 will consider recycling of CRM in MEA (task 2.6) and reduction of CRM in WP3. Thus, in the very improbable case that CRM reductions are not considerable for one component, this is compensated by the fact that this will be achieved in other items.	
10	Single-cell stack does not work well in real environment as a part of the overall PEMWE system		4,5	High	Low	Task 4.2 will engineer the PEMWE stack considering system interfaces and in task 4.3, a short stack will be manufactured and tested to have a final evaluation of the components scalability, which will provide a view on how final testing tasks will be. Also, the 25 kW PEMWE system (task 5.1) will be adapted to the requisites of the novel PROMET-H2 stack, ensuring that the whole assembly performs in consonance with expected objectives listed	

						in section 1.1**Fehler! Verweisquelle konnte nicht gefunden werden.** from DoA.	
11	The techno-economic assessment shows that PEMWE system is not feasible for energy storage		6	High	Low	In section 2.1.2 a from DoA preliminary study demonstrates that PEMWE technology could reduce costs and improve efficiency if follows the expectations of PROMET-H2 are met. This examples as well as other relevant business cases (covering different end uses, sizes, installations and market conditions) will be elaborated at the end of the project considering the techno-economic KPIs delivered in testing tasks.	
12	Unrealistic business plan to provide continuity to the PEMWE system after project's end		7	High	Low	In section 2.1.2 part ii) from DoA, an exploitation strategy and business plan are initially defined at proposal stage, including a potential list of KER already linked to each partner. Moreover, task 7.3 is dedicated to ensure the success with the identification of KERs, the drafting of related business plans and the writing of a solid exploitation strategy. DLR as EWG leader will monitor these aspects with dedicated meetings (see section) and EU workshops (involving relevant stakeholders, see subtask 7.1.3) to facilitate exploitation of the project after its execution.	
13	Narrow scope of dissemination and exploitation actions		7	Medium	Low	WP7 will deal with communication of the project activities and dissemination/exploitation of results to stakeholders, at policy makers, at industry and end users. There will be a Communication, Dissemination and Awareness Plan (CDAP) which will be regularly updated to make sure that relevant actions to give promotion to the project are found in every moment via the appropriate channels	
14	Low interest from key stakeholders around PEMWE stack and system		7	High	Low	Many points of the Communication, Dissemination and Awareness Plan (CDAP) are focused on targeting key stakeholders and follow the most suitable strategy for its needs. Besides, some direct stakeholders are also members of PROMET-H2 consortium (e.g. Air liquid using H2 from PEMWE for methanol production or NEL as PEMWE OEM requiring novel stack components)	

15	A company or partner leaving the Consortium		8	Medium	Low	The Consortium will attempt to reallocate their responsibility to existing partners. If no-one is able to assume the role, a new partner will be chosen to join PROMET-H2 following the rules and guidelines set by the EC, which would be informed in detail.	
16	Problems with the IPR management		8	Medium	Low	The Project Coordinator will be in charge of tracking and proposing adequate IPR actions for generated methodologies and knowledge and for establishing exploitation and dissemination strategies. Furthermore, the independent nature of most partners' results will simplify the IP management required.	
17	Lack of financial resources from one partner		8	Medium	Low	The solvency of industrial partners has been assessed. All the partners have already participated in national or European projects, having a wide experience and history, which reduces this risk. Each partner will use their own funding (if required) to achieve its part of the WP objectives.	
18	Delays in deliverables		8	Medium	Low	Management Team will remind partners about upcoming deadlines, notably concerning deliverables and milestones. Also, Project Coordinator will be regularly reviewing progress reports concerning results, deliverables and milestones.	
19	Partner systematically does not fulfil its commitment		8	High	Low	The coordinator will maintain close vigilance on failing partners, and in case of critical failures, an exclusion and replacement of the partner will be negotiated with the rest of the Consortium and the EC. However, this case is not probable due to the track record in EU projects of consortium members and due to their high interest in the hydrogen and methanol production (see section 2.1.7 from DoA).	
20	Confidential information disclosed		8	Medium	Low	Confidentiality clauses and implications of breach are considered in the CA, signed by all parties. In case of breach, clauses in the agreement will be applied. In addition, any non-permanent staff employed in the project will have confidentiality clauses in their employment contracts. When necessary, non-disclosure agreements (NDAs) will be put in place and signed with third parties (e.g. the Advisory	

						Group) to protect exploitable knowledge	

5 Conclusion

A concise information about the Quality Management Plan implemented in the PROMET-H2 project is provided in the contents of the deliverable D8.1. due to the D8.1 all the project partners will have the same point of reference and an understanding of common methods and procedures with particular emphasis on the contractual obligations towards Horizon 2020. D8.1 provides a reference source for all consortium members to help with organization of day-to-day activities, to define and specify the internal quality assurance processes. These guidelines aim to reduce project overhead, facilitate project management for all partners and thus assure timely and high quality performance

List of Figures

Abbreviations

BBP	Bipolar Plate
CA	Consortium Agreement
DoA	Description of the action
FCH	Fuel Cell and Hydrogen
GA	Grant Agreement
GeA	General Assembly
MEA	Membrane Electrode Assembly
PC	Project Coordinator
PTL	Porous Transport Layer
PSC	Project Steering Committee
QA	Quality Assurance