SEMPRE-BIO

D7.3 Risk Management Plan V3

SEcuring doMestic PRoduction of cost-Effective BIOmethane

CETAQUA
WATER TECHNOLOGY CENTRE

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PROJECT INFORMATION

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REVIEWERS	CET (David Checa, Marcel Vilaplana)
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DOCUMENT LOG

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V0.1	05-04-2023	Alejandra Córdova	Initial version
V0.2	11-04-2023	Oriol Casal	Review feedback
V1.0	14-04-2023	Alejandra Córdova	Complete version ready for review
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V3.0	23-10-2025	Alejandra Córdova	Initial version ready for review
V3.1	27-10-2025	CET (David Checa, Marcel Vilaplana)	Review feedback
V3.1	31-10-2025	Alejandra Córdova	Complete version ready for submission

DISCLAMER

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Acronym Glossary

RMP: Risk Management Plan	**BoP:** Balance of Plant
WP: Work Package	**PEMEL:** Proton Exchange Membrane ELectrolysis
DEC: Websites, patent filings, videos, etc	**IPR:** Intellectual Property Rights
CA: Consortium Agreement	

1. Executive Summary

SEMPRE-BIO (SEcuring doMestic PRoduction of cost-Effective BIOmethane) is a €9.9M project financed under the Horizon Europe Cluster 5 programme running from November 2022 to April 2026. SEMPRE-BIO aims to demonstrate novel and cost-effective biomethane production solutions and pathways, deemed essential to achieve the European Green Deal and climate and energy targets for 2030 and the net zero greenhouse gas emissions by 2050, and to increase the market up-take of biomethane-related technologies.

With sites in Baix Llobregat (ES), Bourges (FR), and Adinkerke (BE), SEMPRE-BIO will establish three European Biomethane Innovation Ecosystems (EBIEs), which will be indicative of the various baseline settings for biomethane production throughout Europe. The challenge is to lower investment and operating costs, optimise feedstock supply and use, identify alternative feedstock, and reduce their costs, improve plant efficiency and operations, account for carbon savings, and increase and monetize co-benefits, such as from the commercialization of the digestate or the valorisation of residual gas streams.

The aim of the Risk Management Plan (RMP) is to reduce or mitigate the risks that could impact the successful project completion. This document sets out the process of identifying risks, analysing and response planning the actions focusing on reducing or eliminating the potential risks in an effective manner to the different types of critical risks by monitoring and controlling the SEMPRE-BIO project.

The RMP is a living document to be updated throughout the project, in the context of the periodic evaluation/assessment of the project and when significant changes occur.

2. Introduction

This updated Risk Management Plan (RMP) reflects adjustments and new insights gained over the past 36 months of project implementation. Initially, the RMP provided a framework for identifying, assessing, and mitigating risks, with a focus on establishing proactive measures to prevent or reduce potential project disruptions. As the project has progressed, this plan has been refined to incorporate continuous risk monitoring and adaptive management strategies.

The RMP remains a living document, updated periodically to ensure that it accurately represents the project's current status and anticipated challenges. This version captures the evolution of risk management practices within the consortium, including ongoing monitoring of technical and implementation risks associated with the demonstration sites and the project activities.

This version highlights how lessons learned and new risk identification methods are being used to better align the RMP with project goals and requirements. By enhancing risk identification, updating risk classifications, and refining response strategies, this plan aims to improve the project's resilience and ensure that critical risks are effectively managed to support successful project completion.

3. Risk Management

Risk management is the practice of identifying the risk, analysing and responding in an effective way to the different types of critical risks by monitoring and controlling the project.

At the beginning of the SEMPRE-BIO project, the Consortium forecasted a table of risks. This table will be completed and updated during the implementation of the project, in the context of the periodic evaluation/assessment of the project and when significant changes occur: it is then a living document. This Risk Management table (see Table 1) will be maintained and will be used to record all possible risks of the project and any subsequent measures or actions required.

This updated version of the Risk Management Plan reflects changes and adjustments made after 18 months of project implementation. The process of identifying, analysing, response planning, and monitoring risks has evolved based on the project's progress and experiences gained. The approach has been adjusted to prioritise certain risk types, such as equipment delivery risks, based on recent insights.

Although this version represents the last contractual update of the RMP, risk identification, analysis, and monitoring will continue during the final implementation months, ensuring that all open risks, particularly those related to demonstration site completion and commissioning, are actively managed until project closure.

The Risk Management table is accessible through the project management google drive folder and in the Project Continuous Report at the EU Funding & Tenders Portal.

The Consortium has actively discussed and implemented strategies to mitigate additional risks identified throughout the project's progress. Decisions on handling these risks have been collaboratively made. In cases where severe risks emerged that could potentially threaten the project's success and proved challenging to manage, the Project Coordinator has communicated with the Project Officer to ensure they are informed about the risks and possible consequences.

3.1. Risk Identification

Risk identification is the process of documenting any risks that could keep a project from achieving its objective. It is the first step in the risk management process.

Risk identification has involved systematically documenting any risks that could prevent the project from achieving its objectives. As a critical step in the risk management process, risk identification has been ongoing throughout the SEMPRE-BIO project, aiming to recognize risks early, enabling effective planning, monitoring, and control.

Topics considered for risk identification have included the analysis of Work Packages (WPs), deliverable and task status. Project members have actively identified risks, which were then channelled through WP leaders. These leaders reported the risks and proposed mitigation measures to the Project Steering Board, which reached a consensus on each final risk and corresponding response strategy. Identified risks have been recorded in the Risk Management table, maintained by the Project Coordinator.

3.2. Risk Analysis

For each risk identified, it is important to assess and indicate the probability that the risk may occur and if it occurs, the severity of the potential impact. The Steering Boards members will estimate the risk likelihood, impact and overall risk level (weight). Then, for each risk, a mitigation strategy will be elaborated. The results of risk analysis will be included into the Risk Management table.

The risk is estimated using a risk matrix. The risk matrix is based on two intersecting factors: the likelihood that the risk event will occur and the potential impact that the risk event will have on the project objectives.

Risk level meaning:

- Low ($1 \leq R \leq 2$): The risk is either low in likelihood or low in impact, making it acceptable. However, it should still be monitored to ensure it does not escalate.
- Medium ($3 \leq R \leq 12$):The combined likelihood and impact make this risk moderate. While it may not be critical, a mitigation strategy should be developed to manage it proactively.
- High ($15 \leq R \leq 30$): This risk level is unacceptable, as it could significantly impact project outcomes and jeopardise the achievement of project objectives. Immediate action is required to reduce or prevent this risk.

		Likelihood				
		1 - Very Low	2 - Low	3 - Medium	4 - High	5 - Very High
Impact	5 - Very High	5	10	15	20	25
	4 - High	4	8	12	16	20
	3 - Medium	3	6	9	12	15
	2 - Low	2	4	6	8	10
	1 - Very Low	1	2	3	4	5

Image I. Risk Matrix

The original risk matrix has been reviewed and, where necessary, updated to reflect new scales for probability and impact. This ensures a more accurate classification of risks as the project progresses. For example, some risks have been re-evaluated based on updated monitoring data, allowing for adjustments in their probability and impact levels. Additionally, the risk classification criteria have been adapted to prioritise certain risk categories, such as equipment, based on their growing relevance. This helps to maintain alignment between risk classification and the project's evolving priorities.

3.3. Risk Response Planning

Risk response plans have focused on reducing both the probability of risk occurrence and the impact of the risk on the project's objectives.

Risk response requires the following action plans:

- Risk description with risk assessment.
- Description of the mitigation strategy to reduce the risk.
- Designate an owner of the risk action.
- Risk action completion date.

In risk response plans, it is mandatory to pay more attention to high and medium priority risks than lower priority ones, through mitigation measures to reduce the likelihood and/or probability of the risks to an acceptable level.

For each risk, a risk response has been documented in the risk management table in agreement with the partners. Where response plans have been successfully executed, the risk scores were updated accordingly, as agreed upon with the partners.

3.4. Risk Monitoring and Control

Risk monitoring and control has been an iterative process throughout the project, continually identifying new risks, planning mitigation strategies, tracking existing risks, reclassifying them following mitigation actions, and reporting on risks consistently. The Risk Management table remains accessible to all partners through the project's Google Drive folder and is included in the Project Continuous Report on the EU Funding & Tenders Portal.

Each WP leader has been responsible for regularly updating the Project Coordinator on the status and effectiveness of each risk and its mitigation plan, ensuring the Risk Management table reflects the latest assessments. All project partners have been encouraged to communicate and discuss emerging risks and proposed response actions with their Work Package Leader or the Project Coordinator.

Risk reviews have been conducted during regular project meetings; however, dedicated risk review sessions can also be scheduled separately as needed, depending on the overall risk level of the SEMPRE-BIO project.

3.5. Risk Management Table

The following table 1 presents an extract of the project's Risk Management Table, which compiles all critical and relevant risks identified in Annex 1 of the Grant Agreement and subsequently reviewed throughout project implementation. This version reflects the latest evaluation after the implementation of mitigation measures and continuous monitoring. Both the initial risk level (Ri) and the current residual level (Rf) are presented to illustrate the evolution of each risk, together with the current management stage ("Status") for each risk. The complete Risk Management Table, encompassing all identified risks, their historical evolution, and detailed mitigation updates, is maintained in the project's shared repository and within the EU Funding & Tenders Portal.

Table I. Risk Management table extract.

Nº	WP	Risk Identification	Level of Risk		Evolution	Mitigation Actions	Status	Remarks/ Traceability
			Ri	Rf				
1	WP1	DTU's reactor configuration campaign is delayed, delaying in turn reactor design and start-up	12 (Medium)	1 (Low)	Reduced	Allocating time contingencies, early identification of bottlenecks, clear alignment of experimentation needs for reactor design between DTU and CET.	Finished	Deliverable 2.1. Submitted 30/06/23
2	WP2	Methanation reaction conversion is lower than nominal by design	15 (High)	15 (High)	Stable	Oversizing the reactor, operating at lower flow rates.	Pending implement ation	To be monitored once activity starts. The start-up is still ongoing.
3	WP2	Achieved biomethane has not enough purity for use	4 (Low)	4 (Low)	Stable	Recirculating the biomethane to the biogas header, oversizing equipment, including scrubbing system(s), operating at lower rates.	Pending implement ation	To be monitored once activity starts. The start-up is still ongoing.
4	WP2	The PEMEL does not achieve the nominal production capacity of 20 Nm3/h	4 (Low)	8 (Medium)	Increased	Operating at lower biogas flow rates.	Pending implement ation	To be monitored once activity starts. The start-up is still ongoing.
5	WP2	Either the PEMEL or the bio-methanation reactor do not allow for intermittent operation	2 (Low)	2 (Low)	Stable	De-couple to a certain extent the design of experimentes from both pieces of equipment (e.g. including H2 buffer storage or a route to flare H2)	Mitigation in progress	H_2 buffer tank installed and venting line available for safe release if required. The storage (20 L @ 16 bar) provides only short-term buffering capacity (minutes), sufficient to smooth fluctuations but not to sustain extended operation. To be monitored once activity starts; start-up is still ongoing.
6	WP1, WP2	Delay in the development or construction of BoP for the PEMEL	6 (Low)	25 (High)	Increased	1. Continue technical monitoring of the supplier's progress and request written updates on manufacturing and testing stages. 2. Maintain provisional operation with the temporary equipment until final delivery is secured.	Mitigation in progress	PEMEL needs to change connections, The BoP has been partially installed and tested. However, one critical equipment is pending delivery due to supplier technical and financial constraints. A temporary unit is in use to enable initial testing and start-up activities.

7	WP2	The microbial composition is not adapted to the gaseous feedstock and homo-acetogenesis is favoured rather than methanogenesis pathway	6 (Low)	6 (Low)	Stable	Follow microbial resource management and apply bioaugmentation with pure methanogenic culture to alleviate process inhibition.	Pending implement ation	To be monitored once activity starts. The start-up is still ongoing.
8	WP2	The digestate does not contain all important nutrients for a sufficient growth of methanogenic microbiome	4 (Low)	1 (Low)	Reduced	Supplementation with exogenous micro-elements that are scarce in the digestate.	Finished	The digesters are up and running since April 2024 (First Periodic Report) with a biogas production of 110 m3/h. The macro-and micronutrients are adequate in the digestate (BioImpact webinar WP3 ppt)
9	WP3	The water solidification damages the heat exchanger and/or methane slip leads to methane hidrates formation on the heat exchanger	10 (Medium)	5 (Low)	Closed (not materiali sed)	Introduction of an additional dehydration unit to reduce the effects for mechanical damage and resend condensates to digestor so as to capture the methane slip.	Finished	During testing, residual moisture was detected, but the additional dehydration system worked properly and prevented ice or hydrate formation. The risk is now mitigated and controlled; nevertheless, we continue monitoring humidity and temperature parameters as a preventive measure.
10	WP3	Part of the H2S solidification is mixed with the CO2 and the CH4 or it cannot be regenerated by the CO2	12 (Medium)	1 (Low)	Reduced	Reducing the amount of water in the raw biogas with traditional solutions or introducing an additional higher temperature regeneration process to restart the heat exchanger once a week.	Finished	The risk has been resolved with appropriate process modifications.
11	WP4	Low productivity of value-added products in the innovative technological systems	12 (Medium)	12 (Medium)	Stable	Modification of the operating conditions and the technological configuration to improve the solubility of gases in the liquid phase and the use of other high rate biocatalyzers.	Pending implement ation	To be monitored once activity starts. The start-up is still ongoing.
12	WP1 WP4	Increase of the costs of the materials	2 (Low)	10 (Medium)	Increased	Switching of part of the equipment and materials to cheaper ones or constructing a smaller bench unit.	Finished	Risk materialised partially for CS1 due to market-wide inflation and supplier cost escalation. CS2 did not experience a significant impact. In CS3, design and material adjustments were successfully implemented without compromising performance. All mitigation actions were applied, and the resulting impact was managed and documented within the project's financial reporting framework.

13	WP2 WP3 WP4	Delayed delivery of the equipment, components and materials required to construct the technological systems	6 (Low)	25 (High)	Increased	Maintain close coordination with suppliers to expedite delivery of pending equipment. Implement corrective measures to ensure temporary operation where feasible (e.g. use of provisional components). Prioritise critical-path installations to minimise impact on commissioning schedule. Integrate lessons learned into procurement procedures for future operations or similar projects.	Mitigation in progress	Risk materialised across all demonstration sites: - CS1, a key equipment replacement is required due to non-compliance detected post-installation; delivery of the new unit is delayed, extending commissioning timelines. Follow-up and coordination with the supplier ongoing. - CS2: Previous delays in equipment delivery were reported. Monitoring continues. - CS3 already fully operational — risk closed in July 2025: Milestone 10 completed.
14	WP5	Limited availability of process and operational data for process design primarily due to competition situation and IP-protection	6 (Low)	2 (Low)	Reduced	Utilization of literature data as fallback will be utilised.	Finished	Deliverable 5.1-Defined data collection for harmonized evaluation, submitted 30/06/2023.
15	WP6	Dissemination, exploitation and communication activities raise little interest	12 (Medium)	4 (Low)	Reduced	The DEC plan will be updated according to the project needs. A low interest in the project can be spotted early, and additional, more targeted communication channels be developed.	In Progress	Report on the progression of the C&D activities as defined in D6.1 and D6.2
16	WP6	Lack of internal consortium consensus to IPR issues	12 (Medium)	2 (Low)	Reduced	It is planned to prepare internal regulations of IPRs related legal issues and will be analyzed in course of the CA preparation. The preliminary IPR related regulations have been established.	Finished	Deliverable D6.4 Submitted 31/10/23
17	WP7	Low commitment of the partners to the project plan and deadlines	6 (Low)	1 (Low)	Closed (not materialised)	Most partners (and all with a leading role) are familiar with this type of project and have proven their commitment during proposal preparation. Clear responsibilities are allocated for each task.	Dismissed	Dismissed
18	WP2 WP3 WP4	Permitting of the demonstration plants delays the construction and start-up	12 (Medium)	4 (Low)	Reduced	Permitting will start early in time by doing an early identification of documentation needs for the three case scenarios. For the Barcelona case a very similar legalization and permitting process has already been obtained by CET, whereas for the French case study the current permit will allow for most of the implementation and operations. The Belgium case study will be the ones where these activities will be the most	Finished	-CS1: AUTHORIZED. -CS2: NOT REQUIRED (VERIFIED). Falls below legal thresholds; design adheres to French regulations; local officials briefed and supportive -CS3: AUTHORIZED. The permit was granted for an indefinite period.

						active.		
19	WP7	Potential delays in the project that could impact scheduled deliverables, milestones, and tasks.	25 (High)	20 (High)	Reduced	- Continuous coordination between WP leaders and the PC to prioritise critical-path activities and reschedule dependent tasks. - Update of internal project timeline and deliverable deadlines according to the latest technical progress. - Reporting to track completion forecasts. - Preparation of a request for project duration adjustment to ensure the completion of remaining activities and deliverables under optimal conditions.	Mitigation in progress	Risk materialised due to accumulated delays in several WPs and demonstration activities. Impact managed through revised planning and coordination actions. Preparation of a formal request for project duration adjustment in progress.
20	WP7	Delays in PR validation and not receiving subsidies in time	25 (High)	25 (High)	Stable	Maintain close coordination with the PO to expedite the validation of the PR. Provide timely responses and clarifications to any financial or technical requests raised during the review process. Ensure internal liquidity management within the partners to cover ongoing expenses until the next payment is received. Monitor the status of the PR validation and payment process through the Portal and report updates during management meetings. Document lessons learned to strengthen future reporting and validation processes	Mitigation in progress	Risk materialised due to extended review period PR2 by the external monitor, delaying the validation of the Periodic Report (PR) and subsequent payment release. Several SME partners are temporarily affected by cash-flow constraints as a result. Active follow-up with the PO is ongoing; however, the EC has temporarily paused administrative approvals until 17 November due to internal processes.
21	WP2, WP3, WP4	Operational or safety issues during start-up and commissioning of the demonstration plants (CS1, CS2 and CS3).	25 (High)	25 (High)	Newly Identified	Assign on-site technical leads to validate installation, safety and instrumentation. - Engage constructors and suppliers for warranty or corrective actions.	Mitigation in progress	- CS1 & CS2: Currently under monitoring. Derived from previous construction and BoP-related risks. - CS3: Already operational and no longer exposed to this risk. Each site will report incidents and mitigation measures through the S&T meetings.

Status definitions: "Pending Implementation" – mitigation plan defined but not yet started. "Mitigation in Progress" –specific mitigation measures currently being executed. "In Progress" – risk under continuous monitoring. "Finished" – actions completed and risk closed. "Dismissed" – risk no longer applicable after reassessment.

4. Conclusion

This third version of the Risk Management Plan (RMP) provides a consolidated overview of the project's risk landscape up to month 36, building upon the previous versions submitted at month 6 (April 2023) and month 24 (October 2024). It reflects the lessons learned and the continuous improvement of the consortium's risk management practices.

The RMP remains a living tool, ensuring systematic identification, assessment, and mitigation of technical, administrative, and implementation risks throughout the SEMPRE-BIO project. As the consortium prepares a formal request for project extension, risk monitoring and mitigation will continue to be actively maintained to guarantee operational continuity and the successful delivery of project objectives. This version therefore serves as a bridge between the original project plan and the forthcoming extended phase, reinforcing the consortium's commitment to proactive and transparent risk management until the full completion of demonstration activities.

5. History of Changes

Table 2. History of changes.

Version Number and date	Change and justification	Section of D7.5
2.0 15/10/2024	Updated the number and name version of deliverable to correspond to the new version of the document for the previous deliverable.	Introduction: Deliverable Information
2.0 15/10/2024	Previous year's version, incorrectly Final version labelled as v2.3, now v1.4.	Introduction: Document Log
2.0 15/10/2024	Updated to reflect project progress at 24 months of implementation. Added updated risk management strategies, monitoring adjustments, and refined risk classifications in sections 2 and 3.	Introduction (Section 2) Risk Management (Section 3)
2.0 15/10/2024	Updated risk management table, added new risks, revised mitigation measures.	Risk Management Table (Section 3.5)
2.0 15/10/2024	Removed Basecamp, as it is no longer available. Google Drive is now the platform to share documents, replacing Basecamp.	Risk Management (Section 3) and Risk Monitoring and Control (Section 3.4)
2.0 25/10/2024	Risk matrix updated.	Risk Analysis (Section 3.2)
2.0 25/10/2024	Risk Management table extract improved .	Risk Management Table (Section 3.5)
3.0 23/10/2025	Updated the number and name version of deliverable to correspond to the new version of the document for the previous deliverable.	Introduction: Deliverable Information
3.0 23/10/2025	Updated to reflect project progress at 36 months of implementation.	Introduction (Section 2)
3.0 23/10/2025	Updated risk management table, added new risk, revised mitigation measures, status and evolution.	Risk Management Table (Section 3.5)