



SEMPRE-BIO

D7.2 Risk Management Plan V2

**SEcuring doMestic PRoduction of
cost-Effective BLOmethane**

CETAQUA
WATER TECHNOLOGY CENTRE



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PROJECT INFORMATION

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V0.2	11-04-2023	Oriol Casal	Review feedback
V1.0	14-04-2023	Alejandra Córdova	Complete version ready for review
V1.1	18-04-2023	INV (Laia Mencia)	Review feedback
V1.2	24-04-2023	Alejandra Córdova	Second version
V1.3	25-04-2023	INV (Laia Mencia, Estafanía González)	Review feedback
V1.4	26-04-2023	Alejandra Córdova	Final version ready for submission
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V2.0	15-10-2024	Alejandra Córdova	Initial version ready for review
V2.1	22-10-2024	CET (David Checa, Marcel Vilaplana)	Review feedback
V2.2	31-10-2024	Alejandra Córdova	Complete version ready for submission

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Acronym Glossary

RMP: Risk Management Plan

WP: Work Package

DEC: Websites, patent filings, videos, etc

CA: Consortium Agreement

BoP: Balance of Plant

PEMEL: Proton Exchange Membrane
Electrolysis

IPR: Intellectual Property Rights

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 18 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. In this version, the approach to risk management has been broadened to cover new categories of risks and include more precise actions, end date and traceability.

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.

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 1. 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 lists all critical risks identified in Annex 1 of the Grant Agreement (GA), initially drafted by the Consortium at the project's outset and subsequently reviewed and updated after 24 months of implementation, along with the corresponding mitigation measures implemented by the project team.

Table I. Risk Management table extract.

Nº	WP	Risk Identification	Level of Risk			Risk Qualification	Actions	Status	Traceability
			P	I	R				
1	WP1	DTU's reactor configuration campaign is delayed, delaying in turn reactor design and start-up	4	3	12	MEDIUM	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	6	3	18	HIGH	Oversizing the reactor, operating at lower flow rates.	In Progress	
3	WP2	Achieved biomethane has not enough purity for use	4	1	4	MEDIUM	Recirculating the biomethane to the biogas header, oversizing equipment, including scrubbing system(s), operating at lower rates.	In Progress	
4	WP2	The PEMEL does not achieve the nominal production capacity of 20 Nm ³ /h	4	1	4	MEDIUM	Operating at lower biogas flow rates.	In Progress	
5	WP2	Either the PEMEL or the bio-methanation reactor do not allow for intermittent operation	2	1	2	LOW	Do not have abrupt output changes: work with step-up and ramp-up strategies (full operation in minutes, not seconds)	In Progress	
6	WP1, WP2	Delay in the development or construction of BoP for the PEMEL	5	5	25	HIGH	Constant progress monitoring on the already selected constructor, Joint work and close collaboration among the constructor, BoP developer, and process owner to coordinate efforts. Establishing contractual penalties for the constructor in case of delays.	In Progress	
7	WP2	The microbial composition is not adapted to the gaseous feedstock and homo-acetogenesis is favoured rather than methanogenesis pathway	2	3	6	MEDIUM	Follow microbial resource management and apply bioaugmentation with pure methanogenic culture to alleviate process inhibition.	In Progress	
8	WP2	The digestate does not contain all important nutrients for a sufficient growth of methanogenic microbiome	4	1	4	MEDIUM	Supplementation with exogenous micro-elements that are scarce in the digestate.	In Progress	

9	WP3	The water solidification damages the heat exchanger and/or methane slip leads to methane hydrates formation on the heat exchanger	2	5	10	MEDIUM	Introduction of an additional dehydration unit to reduce the effects for mechanical damage and resend condensates to digester so as to capture the methane slip.	In Progress	
10	WP3	Part of the H ₂ S solidification is mixed with the CO ₂ and the CH ₄ or it cannot be regenerated by the CO ₂	4	3	12	MEDIUM	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.	In Progress	
11	WP4	Low productivity of value-added products in the innovative technological systems	4	3	12	MEDIUM	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.	In Progress	
12	WP1 WP4	Increase of the costs of the materials	3	3	9	MEDIUM	Switching of part of the equipment and materials to cheaper ones or constructing a smaller bench unit.	In Progress	
13	WP2 WP3 WP4	Delayed delivery of the equipment, components and materials required to construct the technological systems	5	5	25	HIGH	Mitigate delivery delays by setting realistic schedule buffers, engaging key suppliers early in design, assessing their responsiveness and risk management, implementing robust supply chain risk management, developing detailed contingency plans, monitoring orders and deliveries in real-time, and establishing a dedicated supply chain team with direct supplier communication lines.	In Progress	
14	WP5	Limited availability of process and operational data for process design primarily due to competition situation and IP-protection	2	3	6	MEDIUM	Utilization of literature data as fallback will be utilised.	Finished	Deliverable 5.1. Submitted 30/06/23
15	WP6	Dissemination, exploitation and communication activities raise little interest	4	3	12	MEDIUM	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	4	3	12	MEDIUM	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	2	3	6	MEDIUM	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.	Finished	Dismissed
18	WP2 WP3 WP4	Permitting of the demonstration plants delays the construction and start-up	4	3	12	MEDIUM	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 active.	In Progress	
19	WP7	Potential delays in the project that could impact scheduled deliverables, milestones, and tasks.	5	5	25	HIGH	Mitigate delivery delays by setting realistic schedule buffers, select reliable vendors with clear contracts, maintain constant communication and regular meetings.	In Progress	

4. Conclusion

After 24 months of implementation, this deliverable reflects the updated risk management methodology aimed at increasing the likelihood of successful project completion and minimising the impact of potential risks. The Risk Management Plan (RMP) serves as a central reference for the consortium, guiding risk mitigation throughout the SEMPRE-BIO project under the supervision of the Project Coordinator.

The RMP continues to play a critical role not only in reducing the likelihood of crisis situations but also in proactively preventing significant risks. Initially reported at month 6 (Submitted on 26 April 2023), the RMP has undergone regular updates, with this version marking the comprehensive review at month 24. The next scheduled update is planned for month 36, with a contractual deadline of 31 October 2025, allowing the consortium to incorporate any emerging risks and mitigation strategies as the project progresses.

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)