ReaLCoE

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Version	Description	Contributions
0.1	First Draft	Josefine Obendorf (Senvion)
1.0	Second Draft	Dr.-Ing. Jan Kruse (Senvion)
2.0	Third draft	Peter Hjuler Jensen / Flemming Rasmussen (DTU) Anna Diedrichkeit (GE)

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List of Abbreviations

AB	Advisory Board
BIBA	Bremer Institut für Produktion und Logistik GmbH
DSO	Distribution System Operator
DTU	Technical University of Denmark Department of Wind Energy
ExBo	Executive Board
GA	General Assembly
IoT	Internet of Things
IWES	Fraunhofer Institute for Wind Energy and Energy System Technology
LCoE	Levelised Cost of Energy
OWF	Offshore Wind Farm
PMO	Project Management Office
TNO	Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek
WEC	Wind Energy Converter
WP	Work Package

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Executive Summary

This document corresponds to the Work Package 9 ‘Project Management’ (WP9) and aims to provide a comprehensive risk management framework for the ReaLCoE project. In doing so, this plan will address the main risk identification, as well as risk assessment and mitigation to secure a smooth coordination and execution.

The introduction provides an overview on how potential risks within the ReaLCoE consortium will be addressed in general. Moreover, the specific roles and responsibilities concerning risk management are defined. A comprehensive table presents the identified risks which are distinguished between ‘foreseen risks’ and ‘unforeseen risks. It includes the probability of their emergence, the possibly affected Work Packages, and risk mitigation measures. While the ‘foreseen risks’ have been identified prior to the project Kick-off, the ‘unforeseen risks’ will be updated and monitored throughout the entire project duration of the ReaLCoE project.

DTU, in its role as the project coordinator together with GE in the PMO, will accordingly ensure that the stated risk mitigation measures are applied in accordance with this risk mitigation plan.

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1. Introduction

The aim of the underlying Risk Mitigation Plan is to ensure the successful implementation of the ReaLCoE project by defining potential risks and proposing respective mitigation measures. In doing so, concrete responsibilities are assigned to the different project partners of the ReaLCoE consortium.

The ReaLCoE project is one of the projects funded under the Horizon2020 program with a Europe wide consortium and the aim to develop next generation 12+MW rated, robust, reliable, and large offshore Wind Energy Converters (WEC) for clean, low cost and competitive electricity. The consortium is led by a pioneer in the sector, DTU, who has brought together some of Europe's most experienced and talented actors in both on- and offshore wind energy to demonstrate a 12+MW WEC.

Looking at the complexity of the project, risk identification, assessment and mitigation are essential to prevent delays and assure a smooth and punctual implementation. Risk management is not a static but continuous process throughout the different stages of a project and revised risk management strategies are crucial to guarantee maximum risk mitigation.

Given that communication is key for risk mitigation in such a compound undertaking, a functioning project risk management is essential, providing clear assignments which party is responsible for reporting and addressing emerging risks. The roles and responsibilities of the different boards involved in risk assessment are introduced in the next section.

Identifying potential risks is the first step towards successful risk mitigation and ReaLCoE partners have already carefully analysed the technical, regulatory, and managerial risks related to the execution of the action, which might affect the achievement of the project objectives, milestones, and deliverables. The identified risks, foreseen/anticipated as well as unforeseen, are listed in section 3 together with the responsible WP and risk mitigation measures. The integrated risk management is a part of the project management in the consortium. A risk register was detailed at the initiation phase of the project and will be maintained throughout the project lifetime. The mitigation measures are going to be reviewed, preventive as well as proactive mitigation measures will be drafted, implemented, and constantly monitored within work packages of the consortium.

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2. Roles and Responsibilities

2.1. Project Management Office (PMO)

By carrying out the daily project management duties, the Project Management Office (PMO) assures that major project management responsibilities are met in terms of performance and organisational matters such as reporting and compliance and the elaboration of the project's progress.

The PMO is mainly responsible for the project's risk management, however, since other bodies are also essential, the PMO is directly connected to the WP leaders through the ExBo.

2.2. Work Package (WP) Leaders

The Work Package (WP) Leaders who are appointed by each WP are responsible for monitoring the WP's progress, in particular ensuring quality, high performance, and the compliance with financial limits. Moreover, they assist in risk management within their Working Packages and coordinate the cooperation with other WPs as each one is part of the EB.

Currently, nine WP Leaders are designated to the nine work packages.

Out of the nine WPs, WP2 'Development of new logistic-, installation- and marine operation concepts', WP6 'Digitisation of the wind energy value chain on component/system level', WP7 'Exploitation of exogenous business and financing factors' and WP9 'Project management' are directly concerned with risk mitigation throughout different stages of the process.

2.3. Executive Board (ExBo)

The project's Executive Board (ExBo) represents the WP Leaders and the PMO and provides a platform for exchange and coordination. It oversees the project progress assuring high performance, monitors the project risks and mitigation measures and acts when the work plan is disrupted. Moreover, it provides status information to the PMO and the General Assembly (GA). When risks emerge that impact the whole project, the ExBo must be informed and involved in the decision-making process. Moreover as described in D9.2 "Detailed project management plan", each work package has defined SMART deliverables, which are reviewed regularly with the ExBO to review and discuss progress and risks early.

2.4. Advisory Board (AB)

The Advisory Board (AB) is mainly responsible for the dissemination of results and the contact to policy makers at different levels regarding the project's conclusions. It will consist of external and independent parties. Including their expertise in the project assures the transparency of contracts and risks, especially financial ones.

2.5. General Assembly (GA)

GA is only insignificantly involved in operational monitoring of risks. However, if certain risks make it necessary to adjust / amend the Grant Agreement, it is obligatory to obtain prior approval from the GA. Accordingly, the GA shall be informed about substantial high impact risks that may require an amendment of the Grant Agreement.

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3. Risk Management Table – Identification of Risks

3.1. Foreseen/ Anticipated Risks

The foreseen/ anticipated risks were already defined in the initial planning of the project and discussed in detail with the project partners. Experiences from past projects of the different partners were elaborated on and best practice approaches were developed. In particular, the mitigation measures associated with the risks were reviewed intensively with the partners from the ReaLCoE project.

Table 1: Foreseen / Anticipated Risks

Risk Number	Description of Risk	WP Number	Risk Mitigation Measures
1	No suitable demonstration/ testing site can be found that offers good accessibility and infrastructure like medium voltage grid connection demonstration site. Risk: low, impact: medium to high	WP3	Partners have a number of test sites (TNO, IWES and DTU) with relevant offshore conditions, wind speeds, accessibility, grid connection and use of existing infrastructure. GE engages with these partners /external parties to take a final decision for site.
2	Demonstrator access and access to data. Risk: low, impact: low to medium	WP5	Economic value of the electricity from prototype is substantial and may require that the demonstrator is sold and in operation in the market. Partner data access will be granted through contracts.
3	LCoE analysis. Risk: low, impact: high	WP7	LCoE baseline depends on a complex set of parameters. These are always site specific and learning curves are steep.
4	IoT integration and data security. Risk: low, impact: low	WP6	The integration of IoT technologies requires the WPs to closely collaborate with WP6. Plan and design protection upgrade based on GE-technology.
5	Outdated implementation plan. Risk: low, impact: medium	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP8, WP9	Implementation plan will be continuously revised, and the Task Leader will implement adequate changes.
6	Test site/test rig not ready. Risk: low, impact: high	WP3	Constant tracking of project progress and adaptation plan.

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Risk Number	Description of Risk	WP Number	Risk Mitigation Measures
7	Critical test results delay project development. Risk: medium, impact: medium	WP3	Good planning and constant tracking of progress to identify counter measures at earliest possible point in time, higher simulation effort with deeper details in early stage. Modular approach and parallel development strategies allows easy reallocation of resources.
8	Delay of complete prototype due to single delay in one path of the development. Risk: medium, impact: high	WP 5	Early definition of interfaces, periodical reviews and digital twin concept and parallel development.
9	Not all of partner's work will be demonstrated. Risk: medium, impact: medium	WP1, WP2, WP3, WP4, WP5, WP6, WP7, WP8, WP9	Provide theoretical solutions allowing parametric variations that will be exploited later by GE.
10	A delay in the design freeze might lead to delayed tender processes for following works (e.g., test rig integration delayed, test rig execution delayed). Risk: medium, impact: medium to high	WP3, WP5, WP6	Constant tracking of project process and parallel development. Detailed description of the needed input and define responsibilities in the project.
11	Specimen not ready for testing. The test rig institute blocks a certain time slot for the test execution that cannot be re- scheduled quickly. Risk: medium, impact: high	WP3, WP5	Prominent visibility of high-level project (GE) within the relevant partner network is needed to decide on corrective actions.
12	Test rig capabilities too low for the expected 12+MW specimen. Risk: high, impact: low	WP3	Define a new test methodology taking the given boundary conditions into account.
13	Components sizes are too large to be transported. Risk: low, impact: medium	WP1, WP2, WP5	High transparency of WP1 on turbine specification. WP2/WP5 to give early input for WP1/WP5.

3.2. Unforeseen Risks

Every project, no matter how well planned, carries the risk of unforeseen circumstances and results that can endanger the project. To keep track of the unforeseen risks, this section gives an overview of the unforeseen risks that might potentially arise during the implementation of the ReaLCoE project.

Table 2: Unforeseen Risks

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Risk Number	Description of Risk	WP Number	Risk Mitigation Measures
1	Lack of resources for implementing the project (especially technical resources). Risk: medium, impact: high	All WPs	Early communication of the lack of resources between project partners, coordinator, and project officer.
2	Change of beneficiaries. Risk: medium, impact: low (depending on the beneficiary's responsibilities within the project).	All WPs	A potential change of beneficiaries needs to be communicated as soon as the change is known to PMO/DTU. The early communication of the change of beneficiaries is crucial to avoid delays in the project implementation.
3	Delivery times of components. Risk: medium, impact: medium	WP1 - WP7	To avoid substantial delays in the project implementation, it is highly important to have regular exchanges with the important suppliers. Potential delays shall be discussed with the respective supplier aiming to find solutions or alternatives.
4	Weather conditions. Risk: medium, impact: medium	WP3; WP5	Weather conditions are unpredictable for the long-term project planning; accordingly, time buffers need to be calculated for the project planning to avoid delays resulting from bad weather conditions

The unforeseen risk table will be updated on a regular basis and shared among the project partners (regular upload of the updated versions on project sharepoint). To have a full picture of the unforeseen risks, the Project Management (WP9) has developed a tracking/ monitoring in which, for the continuous reporting, also information on unforeseen risks is requested from the project partners.

4. Risk Reporting / Risk Related Communication

4.1. Within the ReaLCoE Consortium (among Partners)

Within the consortium, the communication mainly takes place via SharePoint, online meetings, and E-Mail. This can assure a fast and non-complicated way to deal with emerging risks, foreseen as well as unforeseen ones. Moreover, the different bodies, especially the ExBo, facilitate the exchange and facilitate reporting risks occurring in the WPs and the above-mentioned tracking/monitoring provides information to the project partners. With the project SharePoint, individual documents and correspondence can be securely stored and accessed by each partner. The management of communication, internally and externally, will be done by WP8 and WP9, the latter one being the main responsible for risk management.

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4.2. Towards the Funding Donor / European Commission

The ReaLCoE consortium uses a targeted approach to inform on the project's progress and results. Establishing a good working relationship with the European Commission project officer by pro-actively communicating relevant aspects of the project, especially emerging risks, is the aim. Thus, the key is to use a tailored but flexible approach by informing at an early point of time to secure the possibility of fast reaction.

5. Concluding Remarks

This document corresponds to the WP9 'Project Management' and provides a comprehensive risk management framework for the ReaLCoE project. Roles and responsibilities are assigned and provide a comprehensive framework for risk mitigation.
While analysing possible risks, only one risk came up with a high probability of occurrence, i.e., the test rig capabilities could be too low for the expected 12+MW specimen. However, the assumed impact is low and since it was detected before occurrence, appropriate actions can be taken. The likelihood of most risks, nevertheless, is low, making their management feasible. DTU, in its role as the project coordinator, will together with GE, accordingly, ensure that the stated risk mitigations measures are applied in accordance with this risk mitigation plan.
For any question, comments or suggestions for improvement related to the underlying risk mitigation plan, please contact PMO.

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