D1.4 Quality and Risk Management Plan

Programme: EMFAF-2023-PIA-FLAGSHIP
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Project acronym: GreenMED
Project title: Green Shipping Pathways Towards a Clean Energy Transition in the Mediterranean

Prepared by: AASTMT, NTUA

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VERSION HISTORY		
VERSION	**COMMENTS**	**DATE**
0.1	Table of Contents	30/11/2023
0.2	NTUA input in Section 5, KPIs and Risk Management	12/12/2023
0.3	AASTMT input in Section 2, Purpose and scope, Intended readership; in Section 3, Review for Documents-Deliverables; in Section 4, Configuration management, Documents for configuration management, Deliverables naming, Deliverables review naming, meeting minutes, E-mailing conventions; APPENDIX C	25/12/2023
0.4	NTUA review after AASTMT revision; individual additions where appropriate.	28/12/2023
0.5	AASTMT additions confirmed	02/01/2024
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1.0	Final Version	31/01/2024

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
CINEA	European Climate, Infrastructure and Environment Executive Agency
DL	Deliverable Leader
EC	European Commission
EU	European Union
FMEA	Failure Mode and Effects Analysis
GA	Grant Agreement
KPI	Key Performance Indicator
MSSO	Mediterranean Sustainable Shipping Observatory
PC	Project Coordinator
QM	Quality Manager
RPN	Risk Priority Number
WP	Work Package
WPL	Work Package Leader

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1. EXECUTIVE SUMMARY

This document describes the project's quality and risk management procedures that apply to GreenMED project. The close following and compliance to the Quality and Risk Management Plan is a joint responsibility of all project partners until the complete discharge of all obligations under the Grant Agreement with the European Climate, Infrastructure and Environment Executive Agency (CINEA), under the powers delegated by the European Commission (EC), to ensure the quality of all project deliverables and the following of coordination guidelines among partners during project's tasks execution. The plan presented hereafter consists of planned and systematic processes and steps to determine and ensure the achievement of the GreenMED quality objectives. Moreover, it is going to be used to monitor the corrective actions employed and to verify that agreed procedures are in place and are being adequately implemented. To this end, this document identifies a list of Key Performance Indicators (KPIs) that will be used and continuously updated throughout the duration of the GreenMED project, to monitor the progress and the quality of the work performed in various executed tasks. Moreover, a list of the major identified risks related to the project operation has been created (and will be maintained and updated throughout the project's course), accompanied with adequate mitigation strategies.

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2. INTRODUCTION

2.1 Purpose and scope

The Quality and Risk Management Plan placed to set out the quality practices for the project, for the purpose of assuring that the quality requirements are planned and adhered to throughout the duration of the project. If necessary, the present document will be further updated to reflect any changes that may occur during the project lifetime and immediate and proper actions are taken in case of risks. The Scope of the quality plan is to be used by:

- Quality Manager (QM) within the consortium.
- Project Coordinator (PC) for approving completed project work.

In more detail, the Quality and Risk Management Plan defines procedures and quality KPIs that the QM will monitor throughout the project. Each Work Package Leader (WPL) will be responsible for the quality of results and deliverables of its WP; the latter will be subject to a peer review appointed reviewer, from the consortium partners not authoring the specific deliverable. The QM and the PC will approve the final deliverable. In more detail, the objectives of the Quality Management Plan are to:

Practices defined in this plan will ensure that quality is integrated into GreenMED working processes. Therefore, the plan consists of planned and systematic activities to determine and ensure achievement of the GreenMED quality objectives.

2.2 Intended readership

The deliverables are available to interested readers depending on the level of accession by the members. D1.4 is intended to be as guidance for members for implementing the scope of the project management plan and can be used as base for general management of all the project activities.

2.3 Document structure

The document is structured into four (4) sections.

Section 1 is the executive summary of the document.

Section 2 is an introductory section that outlines the purpose of the document.

Section 3 discusses the quality reviewing activities that have been designed for the quality assurance of the project deliverables.

Section 4 describes the configuration management activities that will take place within GreenMED for each deliverable.

Section 5 presents in detail the Quality Attributes and the KPIs that are set for the GreenMED project, in order to assess the quality of the project results. At the same time, it introduces an early, but detailed description of the major risks envisaged for the project operation, together with the proposed mitigation strategies.

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3. QUALITY REVIEW

The QM is in direct communication with the PC for assuring project quality, meeting project KPIs and managing project risks. The QM serves also as the contact point for all GreenMED partners on all quality matters, before reaching the PC.

Within the GreenMED project, the review of the project formal documentation and deliverables will be conducted as described in the following sub-sections.

3.1 Reviews for documentation - Deliverables

To ensure that the outcome is up to the proper quality, a review procedure is an essential part of the deliverable preparation process. The QM will oversee this procedure. Thus, in order to issue the deliverable by the deadline, all parties must take the necessary actions to guarantee that this procedure is completed on time.

Each project deliverable is assigned to one responsible partner (Deliverable Leader, DL), as described in the GreenMED Grant Agreement. The detailed list of deliverables, indicating the respective DL, is included in Appendix B. The DL takes the responsibility that the deliverable is of high quality and timely delivered. The DL also assures that the content of a deliverable is consistent with the work performed related to the deliverable and that the objectives related to the goals of the project are met. Any issues related to deliverables, endangering the success of the work package or the project, must be reported by the DL immediately to the PC and discussed within the General Assembly.

For every deliverable, one internal reviewer is appointed from among the individuals and partners who were not members of the core team that developed the deliverable. The Project Coordinator recommends the reviewing beneficiary partner for all deliverables, which are approved by the rest consortium. Modifications may occur based on the needs of each deliverable. The appointed reviewing partner for each deliverable is shown in Table 11. A specific reference person or persons should be identified by the beneficiary appointed for the reviewing task. Once appointed, the reviewer(s)' name(s) and his/her/their affiliation will be reported within the Deliverable. In addition, the process of the review can be carried out by any partner that wishes to comment, and should send back any input to the author within given deadline. Within 10 days of receiving comments a new draft should be send to the reviewer and the PC for verification. If there is a disagreement between the author and reviewer, the PC should intervene.

Project documentation will be reviewed against the following criteria:

- Format of the document according to the document templates.
- Consistency with previous relevant documentation (for example, technical specifications combined with the requirements definition).
- The methodology of the work, development or study conducted is in a manner appropriate to the task.
- The results are realistic, useful and actionable and the deliverable is useful to downstream tasks.
- Technical aspects of the documentation will be reviewed in order to ensure that the document meets the technical goals of the project, and that all technical information is

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advancing the current state-of-the-art and the recent technological research level.

- The conclusion of the deliverable makes sense.
- Identification of plagiarism, inappropriate authorship credit, data falsification, image manipulation.
- Appropriate citation.

Other criteria:

- Identification and correction of typing mistakes, spelling or grammar mistakes that may cause misunderstanding.
- Consistency with the GreenMED Grant Agreement.
- The structure of the document is logical and easy to follow.
- Figures and tables are legible and referred to in the text.
- The length of the deliverable's main body is consistent.
- The references of the papers and other sources used are correct.
- Terms and abbreviations are all defined.
- Any mathematical or other symbols used in the document are sufficiently defined.

The general procedure and timeline for the review project documentation is described in the following paragraphs (see also Figure 1).

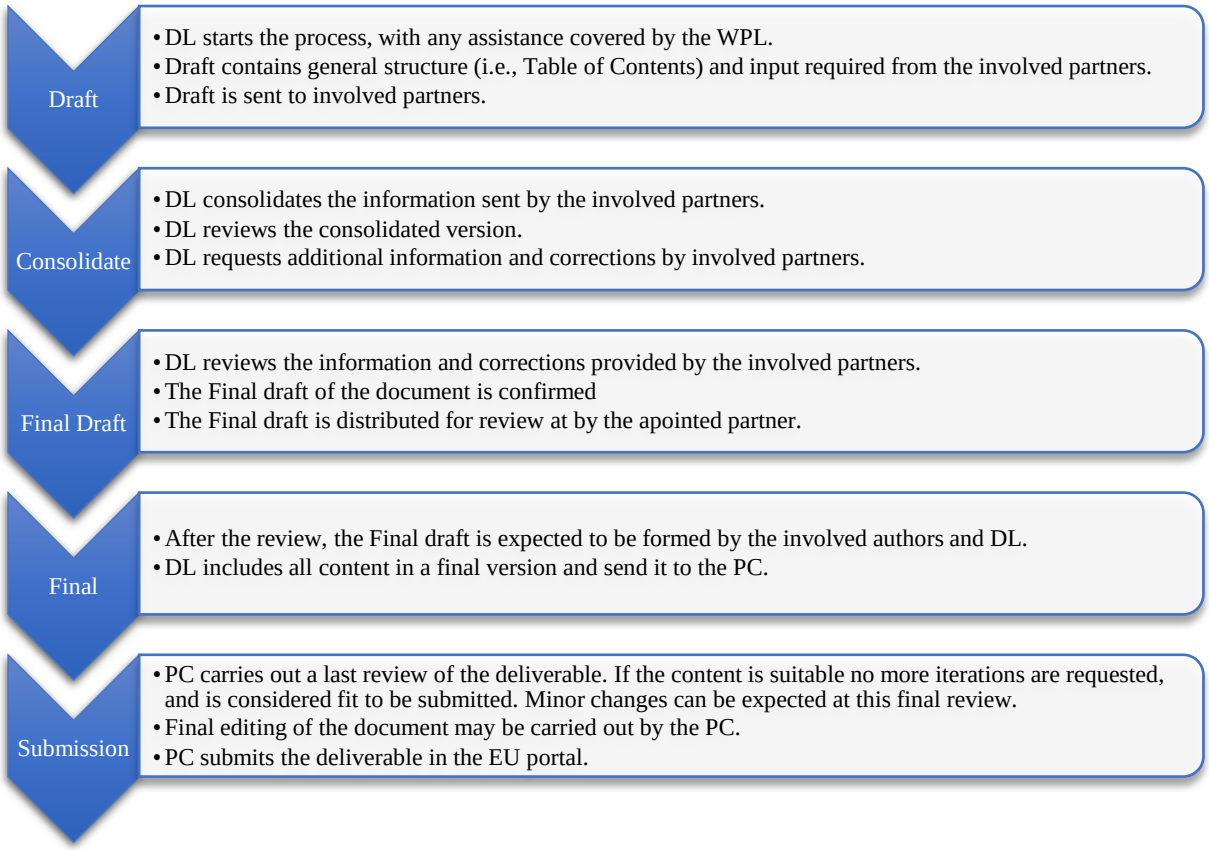

Figure 1: Schematic view of deliverable's preparation, review and submission.

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WPL have to report to the Project Coordinator about the WP progress, results and observed bottlenecks. In general, WPL are responsible for the expected and required process for deliverables per WP. The deliverable preparation is organized at WP-level by the WPL and responsible partner, the DL. Each DL has the responsibility of starting the process providing a general structure (i.e., the Table of Contents) and guidelines for the content to be reported in each deliverable (Draft), inviting the involved partners to contribute to each section, forming a consolidated version of the document. The DL reviews the document once is consolidated and requests additional feedback, if needed, to prepare the Final Draft. The goal is to configure a final version of the deliverable which is sent to the appointed partner for the review process. Once the content is reviewed, revised and approved, the document is send to the PC, in order to perform a final review and submit it to the EU portal.

The exact timeline for deliverable preparation is provided by the signed GreenMED Grant Agreement and stated in Table 11. Depending of the complexity and iterations needed, WPL and DL are in the position of starting the process sooner in order to avoid if possible additional delays. is illustrating the review process and deliverable preparation.

3.2 Reviews for dissemination material

Dissemination material, such as leaflets, newsletters, conference presentations, and scientific publications will undergo a quality check by the General Assembly, which includes all five partners, before their actual publication. The Consortium Agreement describes in detail the process for publishing project results and the required communication among partners in advance. This section only serves the assurance of the quality for dissemination material. All partners should review the material and verify that:

- The quality is at the expected level.
- The contents have proper references to the work conducted by the partners and no information which may require clearance from the partners.
- In case there are concerns, partners should be able to properly justify their opinions.

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4. CONFIGURATION MANAGMENT

The purpose of configuration management is to identify, track, ensure consistency and protect the project's deliverables or other results from unauthorised change. The QM on the first level, and the PC on the second level, will be responsible for the overall monitoring of all configuration management activities described in this section. Configuration management is a discipline that gives precise control over the project's assets allowing managers to:

- Specify the versions of deliverables in use and in existence and hold information on their status, who owns them and relationships between them.
- Maintain an up-to-date record containing these pieces of information.
- Control changes to the deliverables ensuring that changes are made only with the agreement of appropriate partners.

4.1 Document configuration management

Configuration management will be ensured through version and tracking history changes of the various project documents, including the following:

- Deliverables (as stated in the deliverables list – presented in Appendix B)
- Meeting minutes
- Meeting agendas
- Other reviewed documents (e.g., manuscripts)
- Excel file (e.g., inventories)

Document history will be tracked in each deliverable in a separate table, describing the different versions of the document and the reasons of change/updates on it. Each deliverable main author will be responsible for updating this.

Document versioning will be tracked through the same table as the document history, following the naming conventions presented below in 4.2. The table will be updated by each document main author, as well.

In the following sub-sections, conventions regarding deliverables' naming, meeting minutes' naming, and other matters, including e-mailing, are laid down. Other documents may follow the conventions regarding deliverables, while meeting agendas may follow the conventions referring to meeting minutes.

4.2 Deliverables naming

Proper naming of deliverables is crucial for effective configuration management. Consistent and informative naming conventions help identify, organize, and track project deliverables. The following should be used for the naming of all deliverables:

1. **Deliverable Number:** An assigned unique number to each deliverable, as presented in Table 11 in Appendix B, following the GreenMED Grant Agreement. These numbers are sequential (e.g., D1.1, D1.2, D1.3). Numbering should be present in deliverable naming.
2. **Deliverable Name:** The assigned name of each deliverable, as presented in Table 11

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in Appendix B, following the GreenMED Grant Agreement. Deliverable name should be present in deliverable naming.

3. **Project Identifier:** GreenMED acronym should be also present in the deliverable naming. This helps distinguish deliverables specific to the EU research project from other internal documents or results.
4. **Date:** Append the date of the deliverable's creation or last modification to the deliverable's naming. This provides a timestamp for reference and helps quickly identify the most recent version of a deliverable. A standardized date format should be used, such as *yyyymmdd*.
5. **Version Indicator:** Version indicator should be included to differentiate between different versions of the same deliverable. A standard versioning format should be used, such as numeric identifiers (e.g., v0.1, v1.0, v1.1). The version indicator should be present in the deliverable's naming.

Based on the above, the following Table 1 presents the conventions for naming the project's deliverable documents.

Table 1: Deliverable naming scheme

Coding	Dx.x_Document Title_GreenMED_yyyymmdd_vA.B
A:	S/n for major release of the deliverable (e.g., complete version, submission to EC)
B:	S/n for updates during the preparation phase between major releases
Examples:	D1.2_Project Management Plan_GreenMED_v0.1 (first draft) D1.2_Project Management Plan_GreenMED_v1.0 (first complete version, submitted for review to partners) D1.2_Project Management Plan_GreenMED_v2.0 (for submission to the EC)

Apart from the naming conventions, the following should also be present within all documents, especially deliverables, as they have already been included in the respective template:

- **Due date of deliverable:** It is essential to include within the document the due date of the deliverable, for reasons of completeness and for stating the in-time submission or possible deviation.
- **Actual submission date:** Together with the due date, the actual submission date should be included within the deliverable, in order to show the in-time submission or possible deviation.
- **Deliverable Type:** Description of the deliverable type should be present within the document. These are, based on Table 11 and the types of deliverables stated in the GreenMED Grant Agreement, "R – Document, Report", "DEM – Demonstrator, pilot, prototype" and "DMP – Data Management Plan". This clarifies the nature of the deliverable at a glance.
- **Programme Name:** The funding programme should be clearly mentioned within the document, i.e., EMFAF-2023-PIA-FLAGSHIP, to clearly distinguish the programme from other EU programs.

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- **Grant Agreement Number:** The Grant Agreement number, i.e., 101124925, should be clearly mentioned within all documents and deliverables, in order to clearly state the nature of the relationship with CINEA and the EC, bound by the Grant Agreement.
- **Project Title:** the project title should be clearly mentioned within all deliverables and documents, i.e., "Green Shipping Pathways Towards a Clean Energy Transition in the Mediterranean".
- **Responsible Partner:** the name of the consortium partner responsible for the preparation of the deliverable should be clearly mentioned within the document.
- **Deliverable status:** The status of the deliverable is essential and should be included within the document, in order to state whether it is in a "Draft" or "Final" status.
- **Authors:** A list of authors should be in place, both from the leading partner and other possible contributing partners.
- **Other contributors:** Other contributors, besides related project partners, should be mentioned within the document, if any.
- **Reviewers:** The deliverable's reviewers, from the reviewing organisation, should be included as well within the document, in order to keep track of the reviewing task.
- **Keywords:** A set of keywords should be included for providing a first picture of the deliverable's contents.

4.3 Meeting minutes

All meeting minutes will follow the respective template and will be communicated to the partners accordingly. The following stand for the various minutes of meetings:

- Minutes of each meeting shall be the formal record of all discussion and decisions taken during the meeting;
- The hosting partner, or any other partner upon agreement, shall produce a working draft of the minutes based on the notes recorded during the meeting, presentations and other material;
- The hosting partner, or any other partner upon agreement, with the support from partners who presented in the meeting shall make the minutes and related materials available to all partners in due time;
- The minutes shall be considered accepted within fourteen (14) calendar days from sending if no partner has objected in writing to the hosting partner, or any other partner upon agreement, with respect to their accuracy;
- The accepted minutes shall be made available to all the partners within the consortium;
- The hosting partner, or any other partner upon agreement, with the assistance of the Project Coordinator shall manage the storage of minutes and related materials;
- The Project Coordinator, and in collaboration with the hosting partner, or any other partner upon agreement, has to distribute any information concerning the above meetings to partners.

During drafting the meeting minutes in the context of configuration management following format should be considered:

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1. **Meeting Title:** The title of the meeting is essential for identification purposes, followed by the indication referring to Minutes of Meeting. These should be present in the document naming.
2. **Project Identifier:** GreenMED acronym should be also present in the deliverable naming. This helps distinguish deliverables specific to the EU research project from other internal documents or results.
3. **Date:** The date of the meeting should be included to the document's naming. A standardized date format should be used, such as *yyyymmdd*.
4. **Version Control:** A version number or label to each iteration of the meeting minutes should be assigned. This allows for easy tracking of changes and ensures that the most recent version is readily identifiable. Version numbering should be in document naming.

Based on the above, the following Table 2 presents the naming conventions for a meeting minutes document.

Table 2: Meeting minutes naming scheme

Coding:	Meeting Title_ Minutes of Meeting_GreenMED_yyyymmdd_vA.B
A:	S/n for major release of the document
B:	S/n for updates during the preparation phase
Date:	Date(s) the meeting was held. Format yyyymmdd
Example:	Kick-off Meeting_MinutesofMeeting_GreenMED_20231025_v1.0

Apart from the naming conventions, the following should also be considered for a meeting minutes document, as they have already been included in the respective template:

- **Meeting Details:** Include the date, time, and location. Also, the participants who attended the meeting, including their names, organisation and email.
- **Meeting Agenda:** Summarize the agenda items and topics that were discussed during the meeting, as were included in the meeting agenda, if any.
- **Meeting Summary:** A summery should always be included, containing the key points, discussions, and decisions made during the meeting. Include important details, such as different viewpoints, action items, and any agreed-upon deadlines should be highlighted in the summary.
- **Decisions Taken:** Every decision that is taken should be recorded appropriately within the meeting minutes, including the date of the decision taken, the decision owner and an ID reference number.
- **Action/To Do Items:** Document should include the action items assigned during the meeting. They should be clearly stated, along with their status, the partner responsible for completing it, and the deadline for completion. Responsible partner should monitor the progress of each action item and should update their status in subsequent meeting minutes.

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- **Proposed agenda for the next meeting:** A list of items should be included, based on the meeting discussions, regarding the agenda of the next relevant meeting.
- **Document Review and Approval:** The review and approval of the meetings minutes will be performed by the hosting partner, or any other partner upon agreement, and the Project Coordinator to verify the accuracy and completeness of the minutes. Once approved, document the names and roles of the individuals who reviewed and approved the minutes.
- **Storage and Accessibility:** The storage of the minutes of meeting will be ensured by the Project Coordinator. All project partners will have appropriate access permissions to retrieve and reference the minutes as needed.

4.4 E-mailing conventions

To adhere to D1.2 section 4.2 regarding the communication among partners, the following should be used for all technical communication in electronic format to help in maintaining clarity, consistency in project-related correspondence.

1. **Subject Line:** This line should start with GreenMED, a single dash, and then specific keywords or phrases related to the subject matter to help recipients quickly understand the email's context. For example, "GreenMED – D1.2 Project Management Plan". An indication in the end of the specific keywords or phrases, within square brackets, should be put if an action is required (e.g., [Action Required]), or more specifically, which action is required (e.g., [Request for Review]).
2. **Recipient(s):** The appropriate recipients for the email should be selected. It should be ensured that all relevant stakeholders are included while avoiding unnecessary recipients. The "TO," "CC," and "BCC" fields should be appropriately used based on the level of involvement or need-to-know for each recipient.
3. **Clear and Concise Message:** The purpose and content of the email should be clearly stated, in a well-structured manner. Short paragraphs or bullet points should be used to enhance readability. Sender should be concise and avoid unnecessary details or rambling, while ensuring that the message is easy to understand and addresses the recipient's needs or questions.
4. **Formatting:** Proper formatting should be used to make the email visually clear and easy to navigate. Consider using headings, subheadings, bold or italicized text, and bullet points to highlight key information. However, avoid excessive formatting that may distract from the main content or make the email difficult to read.
5. **Attachments:** If there is a need to include attachments, sender should clearly mention them in the body of the email and ensure that they are relevant and properly labeled. Sender should compress large attachments when possible to reduce file size. If the attachment is sensitive, password-protecting should be considered, or secure file-sharing methods should be employed.
6. **Reply and Forward:** When replying to or forwarding emails, senders should include a brief contextual introduction or explanation, and use selective quoting to reference specific parts of the original email. Senders should avoid forwarding irrelevant or confidential content without proper authorization.

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7. **Confidentiality and Security:** Senders should be mindful of data protection and confidentiality. They should avoid sharing sensitive information via email unless it is appropriately encrypted or secured. If necessary, recipients should be reminded to handle any confidential information with care and to keep it private.

Regarding the subject lines/headings, which are essential for clarity in email exchanges, some examples are laid down below:

- GreenMED – Kick-off Meeting Agenda
- GreenMED – KoM Meeting Minutes [Request for Review]
- GreenMED – WP-level meetings planning [Action Required]
- GreenMED – WP2, T2.2 – List of Requirements and Specifications [Review]
- GreenMED – List of Members for the Advisory Board [Request for Suggestions]

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5. QUALITY ATTRIBUTES AND KEY PERFORMANCE INDICATORS

5.1 Quality attributes

To assess the quality of the project results, in general, several qualitative attributes will be used based on the nature of the GreenMED project and the characteristics of its stakeholders, as well as the "context of use" of project results.

On the other hand, quality is also addressed by ensuring the compliance of all the project activities to the development process. The main attributes that address this need are:

- Planning accuracy
- Rework occurrence
- Conformity to methodologies
- Redundancy

All these attributes will play an important role in the measurement of the project Key Performance Indicators (KPIs) described in the following section.

5.2 Key performance indicators

Monitoring of the progress of the project objectives will be done by the Project Coordinator and Technical Manager (NTUA) and Quality Manager (AASTMT), through KPIs. These KPIs will be monitored bi-annually and the relevant KPIs will be presented in the project's First Progress Report (M6), Interim Report (M12), and Second Progress Report (M18). All the metrics used will be used as a starting point. Table 3 refers to the project implementation KPIs, which are used to keep the project process in track, Table 4 contains the project objectives KPIs, which are crucial for the project to meet its objectives, and Table 5 provides the KPIs arising from the project's expected impact.

Table 3: Initial implementation Key Performance Indicators (KPIs)

KPI	Goal (Justification and Targets)
Real month of milestone achievement / due month	Keep the project on schedule, by delivering milestones in due month. **Target:** KPI ≤ 1 , per milestone
Real month of deliverable submission / due month	Keep the project on schedule, by submitting deliverables in due month. **Target:** KPI ≤ 1 , per deliverable
Overall project risk level	Flag any deviations from targets in advance to allow preventive action. **Target:** Risk level below moderate (all risks)
Minimum standards in review process	All deliverable to undergo at least a two-phase review procedure; review by at least one reviewer, and by Quality Manager (AASTMT) or Project Coordinator (NTUA). **Target:** Review by at least 2 partners

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KPI	Goal (Justification and Targets)
Actual number of meetings / Scheduled meetings	Maintain coherence and focus of the consortium, monitor project progress and decisions made, synchronise activities, discuss technical, administrative and other issues regularly Scheduled General Assembly meetings (plenary) 2 times/year Scheduled WP meetings 4 times/year Task meetings schedule is adjustable **Target:** KPI ≥ 1 , for plenary/WP/task meetings
Creation of recognizable brand identity	Items to enhance GreenMED brand; Project logo, GreenMED templates, illustrations, graphics.
Communication toolkit	Brochures, posters, roll-up banners, videos, Newsletters.
Dedicated website	Construction of public website for project communication.
Participation in Conferences and events	Participation in scientific conferences or industrial exhibitions to disseminate and communicate GreenMED; presentation of GreenMED or its results in conference booths and other dissemination events **Target:** at least 2 conferences/exhibitions, and 2 other events
Peer-reviewed publications	Publications in re-known scientific journals and Conferences **Target:** at least 2 publications in journals, and 3 Conferences
Use of EU dissemination networks	Participation in EU/CINEA/WestMED Initiative events.
Project events	2 foresight workshops, 2 technical dissemination workshops, 1 scientific dissemination workshop
GreenMED / MSSO network	MSSO community building, necessary for expert input and engaging with the industry **Target:** 30 stakeholders in the MSSO network

Table 4: Initial project objectives Key Performance Indicators (KPIs)

KPI	Goal (Justification and Targets)
Stakeholders as members of the MSSO network	Engaging with the industry, for obtaining necessary input and validating results. **Baseline:** 30 **Target:** 50
Number of workshops involving MSSO members	Conduct several activities under MSSO, to engage with stakeholders. **Baseline:** 5 **Target:** 7
Mediterranean maritime transportation activity mapped with respect to transport work	Cover as much as possible the maritime transportation activity. **Baseline:** 90% **Target:** 95%
Mediterranean fuel supply chain mapped with respect to bunkering coverage	Cover as much as possible the supply chain in the Mediterranean. **Baseline:** 80% **Target:** 90%

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KPI	Goal (Justification and Targets)
Number of different technologies considered	Consider the wide range of green shipping technologies. **Baseline:** 20 **Target:** 30
Satisfy user requirements for MSSO interactive tool	For the development of the MSSO interactive tool, satisfy all requirements, in order for it to be functional and user-friendly. **Baseline:** 90% **Target:** 95%
Number of strategic recommendations for policy makers	Generate an adequate number of recommendations for policy making. **Baseline:** 5 **Target:** 10
Number of recommendations for informed investment decisions	Generate an adequate number of recommendations for informed-investment decisions. **Baseline:** 10 **Target:** 15

Table 5: Initial project impact Key Performance Indicators (KPIs)

KPI	Goal (Justification and Targets)
Jobs Created	GreenMED aims to create jobs from both its actual outputs (i.e., MSSO), and indirectly for shipping companies and ports in the Mediterranean, following the necessity that is highlighted through the project's outputs with respect to the region's decarbonisation (until 2030). **Baseline:** 1 (MSSO Operation), 5 (in jobs relevant to energy efficiency) **Target:** 2 (MSSO Operation), 10 (in jobs relevant to energy efficiency)
Persons Benefitting	GreenMED aims for people benefitting from its activities and dissemination events, including members of MSSO (members may subscribe in MSSO both within the duration of the project, and after, through its sustainable and continuous operation). **Baseline:** 300 (participation in project activities) **Target:** 1000 (as members of MSSO, until 2030)
Entities increasing social sustainability	GreenMED aims at the engagement of entities in its activities and as MSSO memberships (both during and after the project), which will enhance their social sustainability. **Baseline:** 5 (participation in project activities) **Target:** 50 (as members of the MSSO network, until 2030)
Cooperation activities between stakeholders	The project has already plans for conducting 5 activities for stakeholders (2 foresight workshops, 2 technical dissemination workshops, 1 scientific dissemination workshop). **Baseline:** 5 (scheduled activities within project's duration) **Target:** 7 (scheduled activities within and beyond project's duration)
Innovation enabled	GreenMED will develop the MSSO interactive tool, a goal-based tool, for supporting stakeholders, which can be considered as an innovation. **Baseline:** - **Target:** 1 (MSSO interactive tool)

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KPI	Goal (Justification and Targets)
Entities benefitting from promotion and information activities	GreenMED aims at the benefitting of entities from its dissemination workshops. **Baseline:** - **Target:** 50 (through dissemination activities)
Actions to improve governance capacity	Governance capacity is directly affected by the creation of MSSO. **Baseline:** - **Target:** 1 (MSSO establishment)
Datasets and advice made available	GreenMED will provide datasets, inventories, scenarios, decarbonisation pathways, and industry and policy recommendations, resulting in a list of items made available to stakeholders. **Baseline:** - **Target:** 50 (unique items)
Usage of data and information platforms	GreenMED website and MSSO platform will enable the usage of data and information generated/accumulated by the project activities. **Baseline:** - **Target:** 3,000 (page views)

5.3 Risk management

In GreenMED, risks are considered an integral component of the workplan. The variety of obstacles with respect to studies, data, and stakeholder engagement contribute to various potential challenges during the project execution lifecycle. However, these challenges are proactively addressed by leveraging the accumulated project implementation experience of partners and applying a well-structured management scheme.

The management of risks in GreenMED follows a circular/iterative process, encompassing the identification, analysis, management, and monitoring of risks. The Quality Manager (AASTMT) is tasked with ongoing surveillance of project risks, in the context of ensuring project quality, regular update of the GreenMED risk registry, and formulation of appropriate mitigation strategies for unacceptable risks. **Error! Reference source not found.** provides an overview of the elements of the GreenMED risk management process, which are detailed below.

Risk identification. Everyone involved in the project needs to be aware of their contribution to the project objectives and what might prevent them from delivering it. The risks will be reviewed at regular intervals to restate current priorities, as project priorities may shift over time (deadlines, budget re-forecasts, and performance expectations) and unforeseen difficulties might arise.

Risk analysis. GreenMED will use estimates of likelihood and impact against the key risks. GreenMED will try to quantify risks wherever possible, by using a scoring system to ensure comparison of risks. The quantification of project risks will be performed considering the most likely outcome scenario for all identified risks.

Risk management. Risk responses in GreenMED will fall under one of the types: a) Avoid the risk: This can be done by avoiding a predefined work flow where feasible alternatives exist; b) Mitigate the risk: If a risk cannot be avoided, management will try to reduce the risk, by

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making it either less likely or less consequential. This will include the development of contingency plans for those risks which cannot be avoided; c) Accept or retain the risk: Inevitably there will be some risks that are intrinsic in the nature of the work being undertaken and which it is not possible to mitigate, control or avoid because of the time window and possible increased costs. The number and impact of these sorts of risks in the GreenMED project are minimal.

Risk monitoring. GreenMED will run a well-maintained risk register for monitoring risk-management performance. The registry defines mitigating actions for each risk, citing who will do what and by when.

Risk Contingency Plans. To monitor and minimize GreenMED risks, the consortium will prepare a list of risks and propose contingency plans as early as possible. Table 10 in the Appendix presents an initial identification of the main risks and the proposed risk mitigation measures. Most risks and proposed risk mitigation measures are already identified in the GreenMED GA.

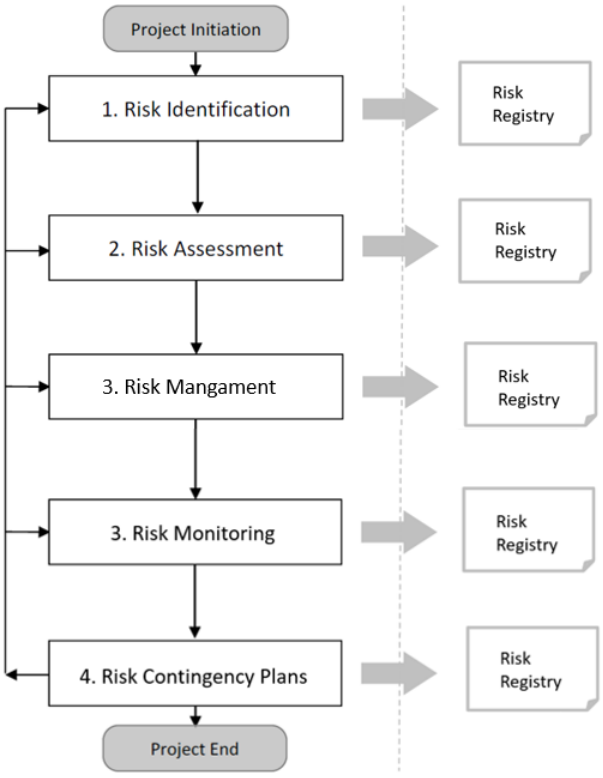

Figure 2: Elements of the GreenMED risk management process.

The GreenMED project will utilize a Failure Mode and Effects Analysis (FMEA) process, wherein quality risk levels will be assigned to each stage of the project. This approach enables the consortium to proactively identify potential risks at an early stage and implement countermeasures in advance.

The Failure Mode and Effects Analysis is a systemic approach employed to reduce or eliminate risk events at an early stage of development. Risk event modes represent the potential ways a process can fail, while effects indicate how these Risk events may result to the outcomes of the project. Consequently, the FMEA approach aims to identify, prioritize, and mitigate these risk

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event modes.

In the context of GreenMED, the effectiveness of FMEA lies in its cross-functional, partner-based approach. The term "potential" is often emphasized before FMEA to underscore its optimal use during the early stages of the concept development. This ensures that risk events are preemptively addressed to prevent issues during the implementation of the project.

Firstly, a spreadsheet will be used to document the completed FMEA for GreenMED project. Within this spreadsheet specific assigned columns will be used which are briefly presented below:

- **FMEA ID #:** This column assigns an identification number for internal use
- **Work Package #**: This column indicates the related project work package.
- **Potential Risk Event**: A Risk Event is defined as the way an event could potentially fail to meet the objectives. In other words, what can go wrong?
- **Potential Causes for Risk Event**: A cause of Risk Event is defined as a design weakness which may result in a Risk Event. Note that all potential root causes need to be identified for each Risk Event.
- **Potential Risk Event Impact**: A Risk Event impact is defined as the result of a Risk Event. Note that Risk Event impacts should be identified for each Risk Event.
- **Severity (S)**: This column indicates how serious the potential Risk Event is. A numerical value, S, is assigned to the severity of the Risk Event. This value is in the range of 1 to 5, 1 has the lowest impact, and 5 has the highest (Table 6).

Probability (P): This column indicates how likely (or often) it is that the cause of Risk Event will occur. A numerical value, P, is also assigned to the occurrence which ranges from 1 to 5 (

Table 7).

- **Current Controls or Mechanisms**: For each potential cause of Risk Event, this column identifies current controls or mechanisms in place to prevent the cause of the Risk Event from occurring or which detect the Risk Event.

Detection Rating (D): It estimates how well the controls, or the mechanisms can detect either the Risk Event cause or its mode. The detection rating is on a scale of 1 to 6 where 1 means the control is certain to detect the problem and 6 means the control is absolutely certain not to detect it (see

Table 8).

- **Risk Priority Number**: In this column, the risk priority number is evaluated for each cause of Risk Event, by multiplying the severity by the probability by the detection rating as follows:

$$RPN = (Severity) \cdot (Probability) \cdot (Detection)$$

The RPN number, along with the risk level (see

Table 9) provides guidance for ranking potential Risk Events in the order they should be addressed.

- **Risk Level**: Risk is the combination of likelihood of occurrence and severity. Risk

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levels can be selected based on a Risk Matrix as shown in Table below. It is clear that the higher the risk level, the more justification and mitigation is needed to provide evidence and lower the risk to an acceptable level.

- **Mitigations/Requirements**: This column indicates the recommended actions taken to mitigate each potential Risk Event cause. Note that these actions may be design or process changes in order to lower severity or the likelihood of occurrence. This column can also include additional controls to improve Risk Event detection.
- **Responsibility/Target Date**: Responsibility and target completion date need to be assigned in this column. This makes responsibility clear-cut and facilitates tracking.
- **Actions taken**: This column indicates the actions taken. After these actions have been taken, severity, S, probability, P, and detection, D, need to be re-assessed and consequently, the risk priority number and the risk level re-evaluated. Based on the revised risk priority number and the risk level, the outcome is determined: either close the action or to require further actions.

Table 6: The scale of severity rating S.

Severity (S)	Meaning
1	Negligible, no relevant effect on reliability
2	Minor, affects very little of the system
3	Moderate
4	Critical
5	Catastrophic

Table 7: The scale of the probability ranking P.

Probability (P)	Meaning
1	Extremely Unlikely
2	Remote (relatively few Risk Events)
3	Occasional (occasional Risk Events)
4	Reasonably Possible (repeated Risk Events)
5	Frequent (Risk Events are almost inevitable)

Table 8: The scale of the detection rating D.

Detection Rating (D)	Meaning
1	Detection method is highly effective, and it is almost certain that the risk will be detected with adequate time.
2	Detection method has moderately high effectiveness.
3	Detection method has medium effectiveness.
4	Detection method is unproven or unreliable; or effectiveness of detection method is unknown to detect in time.

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5	There is no detection method available or known that will provide an alert with enough time to plan for a contingency.

Table 9: Risk Matrix

P/S	1	2	3	4	5
5	Moderate (5)	High (10)	High (15)	Unacceptable (20)	Unacceptable (25)
4	Low (4)	Moderate (8)	High (12)	High (16)	Unacceptable (20)
3	Low (3)	Moderate (6)	Moderate (9)	High (12)	High (15)
2	Low (2)	Low (4)	Moderate (6)	Moderate (8)	High (10)
1	Low (1)	Low (2)	Low (3)	Low (4)	Moderate (5)

The next step is for each Work Package Leader to compile the risks associated with their tasks and to assign responsibility for these actions and set target completions dates. Once corrective actions have been completed, GreenMED partners will reassess and record the severity, probability of occurrence and likelihood of detection for the high priority Risk Events. This is so that the effectiveness of the corrective action taken can be determined. This activity within the partners is planned for the upcoming months of the project.

5.3.1 Consortium Risk Management

The GreenMED consortium has considered consortium-related risks that deal with (1) underestimation of some tasks, (2) low productivity and (3) low quality of work. These risks are already minimised during the selection of partners, which most of them have been selected following specific criteria: a) they are leaders in their areas of expertise; b) they are selected after previous successful cooperation, with coordinator or with other trusted members of the consortium; c) they all have evidence of long history of successful completion of research projects.

However, these risks will be minimized and managed by using established methodologies for cost estimation, continuous project planning, monitoring and control. Such methodologies are standard practice in the professional work of the consortium partners. To this end, timely awareness of and reaction to potential problems will be crucial to effective risk management.

5.3.2 Risk Registry

This Risk Registry will be updated at least bi-annually and will be presented in the First Progress Report, the Interim Report, and the Second Progress Report. The risks will be quantified within Task 1.3 “Quality assurance and risk management”. The Risk Registry is included in the Appendix A, while an online version is kept within the EU Portal, in the context of the project’s continuous reporting.

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REFERENCES

Not applicable.

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APPENDIX A – RISK REGISTRY

Table 10 lists the major risks that have been initially identified, as well as the proposed mitigation strategies. Most risks are already identified in the GreenMED GA.

Table 10: Critical risks & risk management strategy

Risk No.	Description	WP No.	Proposed Mitigation Measures
1	Project progress is slow; milestones and deliverables are delayed.	All	A structured monitoring procedure is implemented (D1.4) to ensure that timely mitigation measures will be taken, and the completion of the project will remain untouched by technical problems related to specific WPs. The project's organisational structure will facilitate the continuous monitoring and evaluation, as well as the decision-making for corrective actions.
2	Conflicts and disagreements among partners in the Consortium.	All	The Consortium partners have already collaborated successfully in other research projects and are committed to establishing a positive climate for fulfilling the objectives of this project, and to making consensus decisions on open issues. Any potential conflicts within the Consortium will be resolved quickly by following the conflict resolution process (D1.2).
3	The quality of the work conducted by a partner of the Consortium is below expectations.	All	An all-inclusive quality management plan (D1.4) will be implemented by the Quality Manager (AASTMT), as well as Technical Manager (NTUA), to ensure the highest quality of outcomes in WPs implementation.
4	Partner is underperforming with respect to initial project planning.	All	All Consortium partners are committed to the project, and agreed to the initial project planning. Grace periods are foreseen, but in case of an underperforming partner, the General Assembly may consider shift of resources to alternative partner, since the project management structure is flexible and CA allows it.
5	Partner leaving the project.	All	The Consortium features overlapping coverage in critical areas of expertise. The General Assembly, due to the small size of the Consortium, will try and prevent the exiting. However, if necessary, the management structure may allow inclusion of a new partner.
6	Key-person left or is temporarily unavailable.	All	The small size of the Consortium allows for efficient communication between all partners. However, all partners will have to involve more than one persons, ensuring immediate substitution.
7	Necessary coordination level is not achieved.	All	The project coordination, at all levels, will be closely observed. If needed, the General Assembly will propose the corrective actions improving the coordination.
8	Inadequate project management.	All	A complete and systematic project management plan (D1.2) is defined, along with the appropriate allocation of work and tasks to Consortium partners. Any

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			deviations will be closely monitored and addressed by the General Assembly.
9	Member of the AB leaves or is temporarily unavailable.	WP5	GreenMED has secured either Letters of Support or oral commitments from specific organisation which is highly interested to contribute to the implementation of the project by participating in the AB. In case an AB member expresses the intention to withdraw from the project or is temporarily unavailable, the Consortium will quickly address this issue by using the extensive network of the partners to replace the AB member with another interested organisation, from the relevant field of the industry.
10	Required resources for partner have been underestimated.	All	In this case, the project's governing bodies will consider the following possible mitigation measures to ensure that planned work can follow the outlined timetable and adhering to the high standards of quality specified by this Consortium: a) re-arranging resources among the partners; b) committing further internal resources of organisations in project activities (if possible); and re-planning work on the activities as required.
11	Difficulties in/Lack of data collection.	WP2	Regardless of the needs in data, the GreenMED consortium will ensure at all cases that the data will be sufficient, either directly capitalising on the data available from partners, or with the contribution of AB and the partners' networks. In addition, specific budget has been allocated to partners (i.e., NTUA) within WP2 to address unforeseen needs in data, or extend data availability above and beyond the data necessary for meeting the project's objectives.
12	Lack of proper stakeholders' mapping/engagement.	WP4, WP5	Before GreenMED submission, Letters of Support were collected, along with oral commitments, to ensure that the project meets stakeholders' interests. The partners' networks will facilitate reaching the potential beneficiaries. An appropriate communication strategy will be adopted focused on reaching the most promising group (D5.1).
13	Project outputs not in line with industry.	WP2, WP3, WP4	Requirements for project outputs and results will be drawn from the interaction with stakeholders, and the Consortium will ensure that the final outputs will meet industry needs, by hosting a number of foresight and dissemination workshops (i.e., 5).
14	Questionable results from projections.	WP3	Involved partners will ensure that all methods and techniques used for Phase II of the project, namely the realisation and implementation of a projection model for both the energy demand and supply chain, will meet high standards from international literature. Validation methods will also ensure projections' accuracy, while involved stakeholders will be presented with the results in order to provide relevant feedback.

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15	Low quality of deliverables (technical specifications and content).	All	GreenMED's hierarchical management approach relies on having Task Leaders and WP Leaders responsible for the timely delivery of reports (i.e., deliverables) adhering to high-quality standards. WP Leaders will oversee the quality review process that includes consistency and requirements for technical content and presentation (English language use). The final approval for the submission of the deliverables to the EC will be given by the Quality Manager (AASTMT) and finally the Coordinator (NTUA).
16	Problems in managing of project outputs and results.	WP2, WP3, WP4, WP5	All aspects regarding the ownership of results are well defined within the CA. Additionally, GreenMED project planning includes T5.4, led by the Dissemination Manager (CMMI), to ensure the sustainability and the continuation of project outputs, including their joint management by Consortium partners. The operation of the Maritime Sustainable Shipping Observatory (MSSO) will be considered under this task, to address any potential issues.
17	Force Majeure (e.g., war).	All	Such a situation is not possible to be predicted in advance. The General Assembly will elaborate according to the context of the situation and investigate for possible mitigation measures. The Consortium will ensure on a case-by-case basis that the continuation of existing collaborations is appropriate at that time, using national and European-level policy guidance (where relevant) to assess this. It is crucial to the continuation of cooperation, the assurance of mutual trust, respect for academic values and the peaceful use of the results of joint research. In case the monitoring of the decisions about sanctions showed that the consortium should suspend any cooperation with specific country's government organisations and specific countries supporting the invasion, the Coordinator should also suspend any payments to these countries' entities under existing contracts. The final approval for the secession of the specific entities from the project will be given by the Project Officer.
18	COVID-19 or another pandemic Outbreak [external risk].	All	The Consortium partners have already collaborated successfully in numerous projects since the COVID-19 outbreak. In case the COVID-19 or another pandemic spreads extensively, all necessary measures will be taken to ensure the health and safety of all stakeholders (partners and external participants) by employing virtual equivalents of required group activities whenever possible. Based on the scope of this project, any pandemic outbreak is not expected to disrupt the implementation of the project planning. On-site events (meetings, workshops, etc.) will be resumed once the situation normalises.

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APPENDIX B – DELIVERABLES

This part of the Appendix lists, once more, the project deliverables (Table 11), as reference for needs of this document. It also includes the reviewing partner for alldeliverables.

Table 11: Project Deliverables

No.	Deliverable Name	WP No.	Lead Partner	Reviewing Partner	Type[1]	Dissem. Level[2]	Due Date Month
D1.1	KoM Minutes	WP1	NTUA	ALL	R	EU	1
D1.2	Project Management Plan	WP1	NTUA	ALL	R	SEN	2
D1.3	Data Management Plan	WP1	MT	NTUA	DMP	PU	4
D1.4	Quality and Risk Management Plan	WP1	AASTMT	NTUA	R	PU	4
D1.5	First Progress Report	WP1	NTUA	VPF	R	SEN	6
D1.6	Second Progress Report	WP1	NTUA	MT	R	SEN	18
D1.7	First Project Factsheet	WP1	NTUA	AASTMT	R	SEN	12
D1.8	Second Project Factsheet	WP1	NTUA	AASTMT	R	SEN	24
D1.9	Policy Brief for the first Recording Period	WP1	NTUA	CMMI	R	SEN	12
D1.10	Policy Brief for the second Recording Period	WP1	NTUA	CMMI	R	SEN	24
D2.1	Report on data specifications and processing	WP2	MT	VPF	R	SEN	8
D2.2	Techno-economic analysis and early results	WP2	VPF	MT	R	PU	12
D3.1	Report on the assessment of Mediterranean status quo	WP3	MT	CMMI	R	PU	14
D3.2	Scenario Building and Projecting	WP3	NTUA	CMMI	R	PU	18

[1] R: Document, report / DMP: Data Management Plan / DEM: Demonstrator, pilot, prototype
[2] EU: R-UE/EU-R-EU Classified / SEN: Sensitive / PU: Public

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D3.3	Report on the assessment of future scenarios	WP3	VPF	MT	R	PU	21
D4.1	Report on MSSO community building and engagement outlook	WP4	CMMI	AASTMT	R	PU	12
D4.2	The MSSO interactive tool	WP4	VPF	CMMI	DEM	SEN	22
D4.3	Policy and industry recommendations	WP4	AASTMT	VPF	R	PU	23
D4.4	Report on the results of the technical and scientific workshops	WP4	CMMI	AASTMT	R	PU	24
D5.1	Dissemination and communication plan and terms of reference for the Advisory Board	WP5	CMMI	NTUA	R	PU	3
D5.2	Dissemination and Communication midterm summary report	WP5	CMMI	MT	R	PU	12
D5.3	Dissemination and Communication final summary report	WP5	CMMI	NTUA	R	SEN	24
D5.4	Strategy for Sustainability and Continuation	WP5	CMMI	VPF	R	SEN	24

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