SINNOGENES

Storage INNOvations for Green ENErgy Systems

Call: **HORIZON-CL5-2022-D3-01**

Type of Action: **IA**

Project Acronym: **SINNOGENES**

Project ID: **101096992**

Duration: **48 months**

Start Date: **01/01/2023**

DELIVERABLE D1.5

Project Management Handbook - First Update

Co-funded by the European Union

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The SINNOGENES Consortium consists of:

Number	Short name	Legal name
1	UNISY	UNISYSTEMS LUXEMBOURG SARL
1.1	UNIS GR	UNI SYSTEMS SYSTIMATA PLIROFORIKIS MONOPROSOPI ANONYMI EMPORIKI ETAIRIA
2	UBE	UBITECH ENERGY
3	ART	ARTELYS
4	RINA-C	RINA CONSULTING SPA
5	CIRCE	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS
6	FBK	FONDAZIONE BRUNO KESSLER
7	MINDS	METAMIND INNOVATIONS IKE
8	CINT	CINTECH SOLUTIONS LTD
9	UGE	UNIVERSITA DEGLI STUDI DI GENOVA
10	CW	CAPWATT, S.A.
11	INESCTEC	INESC TEC - INSTITUTO DE ENGENHARIADESISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA
12	FEUP	UNIVERSIDADE DO PORTO
13	CARTIF	FUNDACION CARTIF
14	CIEMAT	CENTRO DE INVESTIGACIONES ENERGETICAS, MEDIOAMBIENTALES Y TECNOLOGICAS-CIEMAT
15	INYCOM	INSTRUMENTACION Y COMPONENTES SA
16	FHA	FUNDACION PARA EL DESARROLLO DE LAS NUEVAS TECNOLOGIAS DEL HIDROGENO EN ARAGON
17	SCHN	SCHNEIDER ELECTRIC ESPANA SA
18	DLR	DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV
19	SAND	SANDDORN GMBH HERZBERG
20	HEDNO	DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE
21	IPTO	INDEPENDENT POWER TRANSMISSION OPERATOR SA
22	UoA	ETHNIKO KAI KAPODISTRIAKO PANEPISTIMIO ATHINON
23	CERTH	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
24	EWF	Energy Web Stiftung (Energy Web Foundation)
25	TPG	TRANSPORTS PUBLICS GENEVOIS
26	UNIGE	UNIVERSITE DE GENEVE
27	Hitachi	Hitachi Energy Switzerland Ltd.

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Executive Summary

The updated version of the SINNOGENES Project Management Handbook encapsulates the cumulative advancements and operational insights acquired over the first reporting period of the project. This document outlines critical updates in project management strategies, risks, and consortium communication enhancements set out in D1.1. It reflects on the project's adherence to the outlined objectives and adjustments made in response to evolving project demands and external conditions. While this handbook serves as an interim update, a more comprehensive report detailing granular progress and technical specifics will be provided in the forthcoming technical report and related deliverables.

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Table of Acronyms

Acronym	Definition
CRM	Continuous Risk Management
DMP	Data Management Plan
DERA	Data Exchange Reference Architecture
DSO	Distribution System Operator
EC	European Commission
GA	General Assembly
GDPR	General Data Protection Regulation
H2	Hydrogen
HLUC	High Level Use Case
KPIs	Key Performance Indicators
MS	Milestone
OBJ	Objective
TSO	Transmission System Operator
UC	Use Case
V2G	Vehicle-to-Grid
WP	Work Package

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1 Introduction

1.1 Scope and objectives

As a follow up of D1.1[1], this handbook serves as an essential reference document for the SINNOGENES project, detailing the methodologies, progress, and strategic outlook of partners' efforts for the project's first 16 months. The scope of this updated handbook is to provide a comprehensive update on the progress of the project, articulating the milestones reached and the road ahead. Particularly, it aims to:

- Provide an overview of the project's objectives as they stand in the current reporting period, highlighting the accomplishments and the targeted outcomes.
- Offer a transparent view of the project's progress, aligning with the expectations and standards set forth by the European Union's Horizon Europe framework.
- Serve as a facilitation tool for project stakeholders to understand the implications of the work undertaken, the results achieved, and the expectations for future stages of the project.

1.2 Dependencies with other tasks and deliverables

This report is a result of insights and data that are interdependent on the tasks and deliverables running across all SINNOGENES work packages. It is based on information from technical developments, impact analysis, regulatory studies, and stakeholder engagement activities. The report draws on deliverables such as the Flexibility requirements, use cases, regulatory barriers and consumer acceptance, Data Management Plan and Dissemination and Communication Plans which offer insights into the project's activities. Building upon the rules set in D1.1, this report is a testament of the effective and timely execution of these tasks, with data flowing from each work package collaboration between partners into a cohesive narrative that captures the project's current state and future goals.

1.3 Structure of the Report

Structured to offer a clear narrative of the SINNOGENES project's first period, this report is divided into sections that depict a complete view of the project's progress. It opens by addressing the project's advancement against its stated objectives, deliverables submitted, and milestones reached during the reporting period, encapsulating the work completed and the insights gained setting this way the stage for subsequent phases. Subsequent sections cover important communication activities that took place both internal and external to the project. Additionally, the report provides insight into the project's risk management approach, detailing the strategies in place to navigate potential challenges. Finally, it concludes with an exploration of the SINNOGENES project's prospective steps, painting a picture of the intended future developments.

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2 Progress Updates

2.1 Objectives

OBJ#1: Design, implement and demonstrate a toolkit that offers holistic management and assessment of energy storage technologies.

Towards this objective and focusing on the SINNO toolkit, the consortium made remarkable progress by developing the SINNOGENES Middleware which has a central role by enabling secure and privacy-preserving data exchange. Its distributed architecture is based on the third version of the Data Exchange Reference Architecture (DERA 3.0) and supports interoperability between different data sources and applications through the use of common vocabularies and ontologies. Special attention was given to data sovereignty which is guaranteed through the use of the Data Space Connector, a piece of software which enforces data usage policies on every data exchange. Withing the first reporting period beyond the design of the architecture and the development of the middleware, SINNOGENES worked on the documentation and the deployment of the SINNO middleware, including documentation, docker compose file and docker images to the different demos.

OBJ#2: Propose a versatile stack of energy storage technologies integrated into different system applications.

SINNOGENES includes an innovative technology stack of innovative energy storage systems block. Specifically, the project involves the classification and demonstration of energy storage technologies like lithium-phosphate batteries, V2G chargers for lithium-ion batteries, redox flow batteries, flywheels, ultracapacitors, power-to-gas storage, smart heat storage, and a digital replica of hydro-pumped storage. During this first reporting period technical partners under WPs 3, 4, and 5 worked on reviewing, modelling, and validating different storage technologies, and for some of them proceeded with the acquisition of equipment, and initial installation for the respective demo sites.

OBJ#3: Diminish regulatory barriers and explore market compliance requirements of energy storage technologies for supporting decarbonization targets and flexibility services.

Towards this, SINNOGENES investigated the essential prerequisites for market participation, incorporating technical specifications and market compatibility considerations. Through a comprehensive approach that included online surveys, personal interviews with key stakeholders, and desktop reviews, the consortium identified regulatory obstacles hindering widespread adoption [4]. Two critical types of requirements were elucidated: (i) Market Participation Requirements and (ii) Technical Requirements for Flexibility Services. Emphasis was also placed on the importance of fair competition, cooperation between system operators, and compliance with technical standards. Challenges such as rigid regulations and the lack of incentives were highlighted, underscoring the need for a more flexible regulatory framework and economic impetus. Ultimately, the integration of technical adaptation, regulatory reforms, and economic incentives is deemed

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essential for the successful and sustainable integration of energy storage technologies into the current energy market.

OBJ#4: Develop and demonstrate data-driven digital applications, while ensuring data interoperability in the energy storage ecosystem for the empowerment of innovative storage technologies across the EU

SINNOGENES foresees the development of various applications revolving around industrial microgrid optimization, geothermal-based district heating, local energy community facilitation, integrated control of storage and renewable energy sources for industrial plants, digital twinning of hydro-pumped storage, and providing services to urban and freight mobility. During the first 16 months of the project technical partners under WP 3, 4, and 5 worked on reviewing, modelling, validating different grid configurations and ancillary services, performed of technical-economic analysis, while also working on preliminary architecture and initial development of first version of services and tools. At the same time, progress has been made on integrating with the SINNO middleware by producing specifications and performing tests with the connectors.

OBJ#5: Identifying, quantifying, and evaluating the benefits of grid-connected energy storage from a technical, environmental, and economic perspective.

SINNOGENES marked significant progress towards the objective of identifying, quantifying, and evaluating the benefits of grid-connected energy storage. To this end, respective partners have established project-level Key Performance Indicators (KPIs), encompassing economic, environmental, and social dimensions, along with methodologies for measurement. Additionally, KPIs for impact assessment across different demo sites and High-Level Use Cases have been delineated. A comprehensive list of data sources for both project and demo-level KPIs has been compiled as part of Task 6.2- **"***Environmental and socioeconomic impact assessment***"** activities. Demo sites have contributed valuable data for analyzing the pre-SINNOGENES status. Simultaneously, there has been the development of new functionalities in the modeling tool, enhancing its capabilities for Task 6.4 modeling activities. These advancements lay a robust foundation for effectively assessing the technical, environmental, and economic benefits of grid-connected energy storage within the SINNOGENES project framework.

OBJ#6: Create replicability pathways towards adoption of the SINNOGENES technologies in a pan-European scale, implement an impact assessment study of the SINNOGENES energy toolkit compatible with the EC modelling methods, while ensuring a strong dissemination strategy and involvement in the BRIDGE activities.

Progress towards the objective of creating replicability pathways for SINNOGENES technologies on a pan-European scale has been notable. In addition to making progress on the definition of the scope of impact assessment definition as described in the previous objective, SINNOGENES has been actively engaged in extensive communication and dissemination activities. These efforts encompass the issuance of newsletters, collaboration with EU projects, participation in BRIDGE activities including General Assembly and working groups through its partners, organization of webinars, and dissemination of scientific publications aimed at addressing the

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European energy ecosystem. These initiatives collectively contribute to strengthening the project's dissemination strategy and facilitating wider adoption of SINNOGENES technologies across Europe.

2.2 Deliverables

In this reporting period 6 deliverables have been submitted following the strict rules and quality procedures described in D1.1:

D1.2 Data Management Plan-a

D1.2[2] as part of the work carried out in WP1 was the first version of the Data Management Plan (DMP) which set the standards for how data is captured, used, and stored within the project, not only during the course of the project but also after its completion. In addition, it describes how the data will be available to other researchers around the world. Finally, this deliverable also provided that applicable standards and methodologies for effective data collection and appropriate dissemination will be followed.

D1.4 Legal and Ethical issues and Guidelines

Also, under WP1, Deliverable D1.4[3] delved into how SINNOGENES complies with the Horizon Europe ethical guidelines and the European Code of Ethics for Research Integrity, the principles of the General Data Protection Regulation (GDPR) and the legal frameworks in various national jurisdictions, including Germany, Greece, Portugal, Spain, and Switzerland based on the demo sites. Within SINNOGENES it has also appointed a Data Protection Officer who oversees all aspects of data protection as an additional step to ensure compliance.

D2.1 SINNOGENES flexibility requirements, use cases, regulatory barriers, and consumer acceptance.

As the most important deliverable of this reporting period, this report included a review of flexibility requirements, regulatory barriers, and considerations/recommendations related to consumer acceptance, as well as a description of the use cases considered for the project. Reflecting the results of Tasks 2.1 and 2.2 carried out from M1 to M12, it contained a technical, regulatory and market overview of the various technologies that can be implemented and the services they can provide to the system. It also focused on stakeholder requirements, which were gathered through an online survey and by conducting interviews with selected individuals representing the entire spectrum of the energy ecosystem. Deliverable 2.1[4] also discussed in great detail the definition of use cases developed for the implementation of the SINNOGENES toolkit within the context of the six different demonstration sites involved in the project.

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D6.1 Dissemination and Communication Plan Material-a

Deliverable 6.1[5] was the first deliverable addressing SINNOGENES' communication and dissemination strategy and activities to support the exploitation of project results and outcomes. The project consortium adopted channels described in this deliverable for communication and dissemination, such as social media, newsletter presentations, press releases, brochures, workshops, conferences and magazines to improve visibility, understanding and engagement.

D6.2 Dissemination and Communication Plan Material-b

Deliverable 6.2[6] as a follow-up to D6.1 went deeper in establishing a common understanding of communication and information sharing among SINNOGENES consortium members. To achieve this goal, the document provided a detailed description of relevant target audiences and provided a more detailed overview of communication and dissemination tools. To better monitor related activities, the consortium validated and enriched the Key Performance Indicators (KPIs) described in SINNOGENES GA related to these topics. Last but not least, this deliverable made special reference to BRIDGE activities as well as individual dissemination and communication plans of SINNOGENES partners.

2.3 1st period Milestones

MS1 Data Management Plan available

This first Milestone was achieved through Deliverable D1.2 and related activities in Task 1.4.

MS2 Technology enablers, regulatory barriers and flexibility requirements needs are identified.

SINNOGENENES partners reached MS2 via D2.1 submitted at M12. The project's activities to achieve this goal included an EU-wide energy industry exploration, an online survey with targeted interviews involving key stakeholders in energy markets, and a thorough desk review detailing the technical requirements that imposed by the European and national regulatory frameworks in each member country. The result was an identification of regulatory barriers to the widespread adoption of storage technologies and proposed incentives to enhance end-users' acceptance.

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3 Consortium communication and stakeholder Engagement

3.1 Internal communication

SINNOGENES partners invest heavily in effective internal communication and collaboration activities, as they are essential for the success of the project. These are based on an online collaboration platform, which offers each partner independent access to important documents, meeting agendas, supporting materials, as well as physical and monthly online meetings to access progress on individual Work Packages and Tasks where necessary.

3.1.1 Plenary meetings

Kick-Off Meeting

Figure 1 SINNOGENES Kick-off meeting.

The SINNOGENES consortium met for the first time in Brussels, Belgium on 16 and 17 January 2023 to kickstart the project activities, plan the work and important milestones for the first six months, allocate replication work for different partners and most importantly, start developing the development of the SINNO energy toolkit.

2nd Plenary Meeting

Figure 2 SINNOGENES 2nd plenary meeting.

The second Plenary meeting of SINNOGENES project took place at Trento, Italy, hosted by FBK, on the 5th and 6th of July 2023. The major focus of this meeting was to work hands on finalizing the detailed Use Cases descriptions and, the identification of regulatory barriers as well as the gaps in the energy market. In particularly, concurrent workshops took place in the context of this meeting to define Use Cases across WP3, WP4, and WP5. Discussions ranged from renewable energy surplus management to microgrid prototype prequalification and hydrogen transportation efficiency. Challenges in implementing theoretical analyses, like Local Energy Market operations, were highlighted. More specifically, HLUC6 emphasized planning phase optimization, while HLUC7 focused on industrial decarbonization. At the same time,

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HLUC1 and HLUC2 evaluations considered TSO and DSO service provisions, with HLUC2 constrained by Portuguese regulations. Plans for simulated HLUC demonstrations were outlined, with updates pending from Demo #5 and adjustments needed for Demo #6. Beyond this, the Consortium discussed the developments in each Work Package, the milestones achieved, the way forward.

3rd Plenary meeting

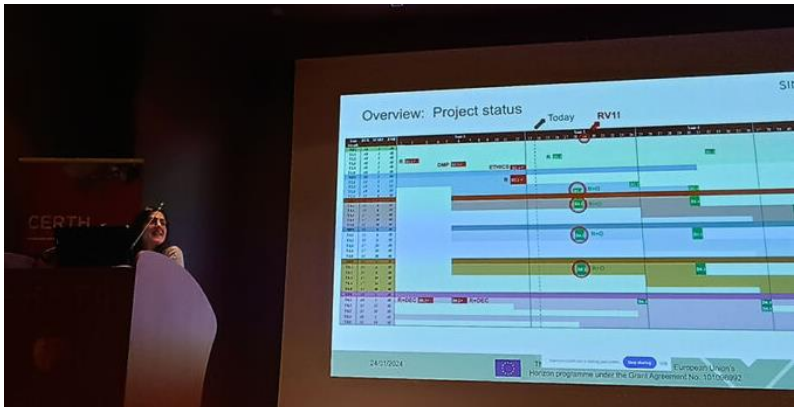

Figure 3 SINNOGENES 3rd plenary meeting.

The third plenary meeting of the SINNOGENES project was convened on January 24-25, 2024, in Thessaloniki, Greece with the priority of planning the next steps of development of the storage tools and technologies in WP 3, 4 and 5, and the overall architecture of the SINNO toolbox. Regarding the first 4 months of the 2024, participants identified key priorities and opportunities for future dissemination, as well as technical milestones to be achieved.

3.1.2 Online meetings

Work package meetings

In order to manage, plan and monitor the work carried out in WP 2, 3, 4, 5 and 6, monthly meetings are held under the leadership of each WP head and the active participation of the respective task leaders and partners contributing to the effort in the Work Package. For all sessions minutes are held by the person chairing and the presentations are uploaded to SINNOGENES SharePoint.

Task meetings

Task leaders of T5.1, 5.2 and 6.2 identified early on that they needed to organize dedicated online monthly meetings to better monitor the activities taking place within their tasks. Once again, all contributing partners participated, and all sessions were timed by the person chairing and the presentations were uploaded to SINNOGENES SharePoint.

Webinars

An internal webinar held on November 3, 2023, aimed to provide partners with a comprehensive overview of the SINNOGENES Middleware Architecture. The agenda included a small recap of the architecture followed by a detailed tour of the connector UI. Partners were given a demonstration of data exchange processes facilitated by the connector, showcasing its functionality and practical applications.

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Additionally, the workshop covered documentation aspects, guiding partners on how to effectively utilize and configure the Connector for deployment purposes. Overall, the webinar served as a platform for partners to gain insights into the technical aspects of the connector and its role within the SINNOGENES toolkit.

Steering Committee

These meetings are held at a higher level where all WP leaders summarize the progress made in their WPs as well as the related risks. These meetings are held monthly and are chaired by the Project Coordinator, who is responsible for issuing the minutes and ensuring that all presentations are uploaded to SINNOGENES SharePoint.

3.2 Stakeholders' interaction

The SINNOGENES project acknowledges the importance of interacting with identified stakeholders and has dedicated a significant amount of effort and resources to related activities. The goal of this period was primarily to dive into the requirements of end-users, understand which are the unmet needs, and present what is the project concept, approach, and objectives. This subsection is not intended to replace the detailed reporting that will be carried out under WP6 or that has been reported in D2.1, but to refer to important milestones or events that took place in this first reporting period.

External Advisory Board

SINNOGENES formed an External Advisory Board to leverage the experience and knowledge of experts from Renewable Energy Developers, Innovation Centers, European Network of Transmission System Operators and Energy Services. The four selected experts will participate in at least three plenary sessions to review SINNOGENES technologies, concepts and provide feedback on the relevance of our architecture. At the same time, their knowledge of the business potential of the solutions, the project proposals aim to enhance sustainability through standardization and policy adoption. SINNOGENES, already held the first online session as part of the 3rd plenary meeting, where experts were introduced to the concept and business value of SINNOGENES, followed by an open discussion.

Surveys and interviews

A survey was conducted with 44 stakeholders in the European energy sector, which included 20 questions covering different aspects related to the flexibility market, such as its definition, benefits, barriers, solutions, and expectations. The respondents came from different European countries and represent different actors of the electricity market, such as network operators, producers, retailers, consumers, regulators, and experts. At the same time, personal interviews were conducted with people from companies from different industries, trying to address issues not covered in depth in the questionnaire, namely in areas around the complexity and compatibility requirements of the electricity market, future

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challenges and opportunities, government policies and regulations, market and technology impact, flexibility.

BRIGDE

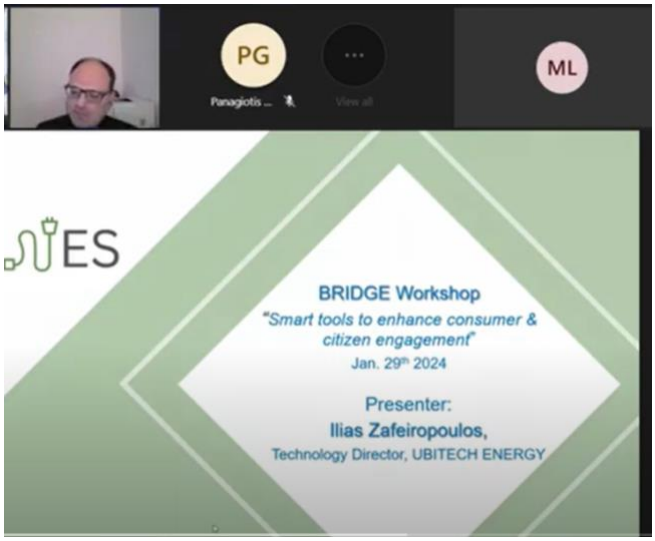

Figure 4 SINNOGENES presentation at BRIDGE workshop.

BRIDGE is an EC initiative under Horizon Europe's Smart Grid, Energy Storage, Islands and Digitization Projects to create a structured view of the cross-cutting issues addressed in projects that may be a barrier to innovation. BRIDGE aims to encourage continuous exchange of knowledge between projects, thus enabling them to produce conclusions and recommendations on the future exploitation of outcomes or findings through four different Working Groups representing the main areas of interest. During this period, SINNOGENES participated in BRIDGE activities on several occasions, such as a presentation at the Smart Tools Subgroup Workshop on January 29, 2024, an interview with the BRIDGE secretariat, and active participations in the BRIDGE 2024 General Assembly.

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4 Risk Management Updates

As highlighted in the first version of this handbook, Risk management is an inherent part of SINNOGENES. For this reason, it was decided to enrich the already detailed plan laid out in the previous version of this document. In this updated plan, the consortium envisages all risk management activities, i.e., who is responsible for monitoring and reporting, how risks are visualized and what actions will be taken by SINNOGENES to mitigate the identified risks.
The project adopted the CRM (Continuous Risk Management) model which is considered one of the most proactive and continuous approaches. Going one step beyond the initial analysis made in D1.1, SINNOGENES broke down risk management in the following activities:

- Risk identification: Identifying potential risks that could impact the project.
- Risk assessment: Analyzing the likelihood and impact of each risk and prioritizing them based on their severity.
- Risk mitigation: Developing and implementing strategies to reduce or eliminate the identified risks.
- Risk monitoring: Continuously monitoring the project for new risks and assessing the effectiveness of the risk mitigation strategies.
- Risk communication: Ensuring that stakeholders are kept informed of the risks and the status of risk mitigation efforts.

4.1 Risk identification

At the proposal stage, SINNOGENES had already identified several risks and appropriate mitigating actions, which can also be found in the Grant Agreement. In the course of these first 16 months, all partners have agreed to continuously identify risk scenarios using the Description of Action and the Consortium Agreement as inputs and reviewing the use and performance of their organizational assets. As Project Coordinator and Quality and Risk Manager, UNISY is responsible for coordinating and organizing discussions aimed at regularly monitoring emerging risks at a Plenary, Steering Committee, and Work Package level meetings. In order to better identify the potential threats to the project threats, SINNOGENES has classified the following types of risks:

- Project management risks: This type includes risks relevant to administrative, schedule, performance, financial as well as ethical related risks.
- Technical risks: This type comprises of issues that may have to do with immature technologies, quality of delivered technical work, and performance.
- Innovation and Communication risks: These risks could be relevant to the acceptance by the stakeholders, the exploitation of the findings, as well as the proper communication of the SINNOGENES activities and results.

By building upon the first version of this deliverable, UNISY has created an online registry which resulted from the second cycles of the identification process. The main idea for this repository is to be the central point of access to all risks identified and managed during the project lifecycle as well as their evaluation and mitigation

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actions. As it can be accessed by all partners through the SINNOGENES SharePoint, it will help us keep track of all the information on the risks and manage the respective actions to address them. To better picture these risks we proceeded with the following risk classification:

- Risk ID and categorization: The identification number of the risk (this risk categories are under continuous review as new ones may arise at some point in the project)
- WP: The Work Packages connected to the risk.
- Risk description: A short portrayal of the risk specified as an event that will occur if something is done/not done and its anticipated impact.
- Probability: The likelihood of the event occurring.
- Impact: The impact on the project's objectives if the risk occurs.
- Remedial actions: The response plan that will be implemented to reduce probability and/or impact of the threat.
- Risk score: A way to visualize the calculation of the combination of probability and impact of a particular risk. These are Low, Medium, High and are established from the matrix shown in Figure 5.
- Who mitigates/monitors: This section sets the responsible partner/s (risk owners) that is/are involved in the threat.
- Risk timeframe: Statement of a specific period in the life of the project in which the risk applies.

SINNOGENES **RISK MANAGEMENT MONITORING**

RISK SCORE CALCULATOR		Impact				
		Trivial	Minor	Moderate	Major	Extreme
Probability	Most likely	Medium	Medium	High	High	High
	Likely	Medium	Medium	Medium	High	High
	Moderate	Low	Medium	Medium	Medium	High
	Unlikely	Low	Low	Medium	Medium	Medium
	Rare	Low	Low	Low	Medium	Medium

INSTRUCTIONS
1 - Edit the relevant sheet
2 - Each WP Leader must apoint a Risk Owner for every risk under the selcted area
3 - The Risk Owner assesses his/her risk on a 4-Months basis using the The P&I Risk Matrix
4 - Enter relevant information for your Risk within the reppsective boxes

ID	WP	Risk description	Probability	Impact	Risk Score	Remedial actions	Who mitigates	Status	Check Resp.	Risk application timeframe	Last Check Date	Risk Materialisation	Mitigation Measures applied.	Comments could no
6	WP3-5	Unexpected delays during the equipment supply and shipment to the demo sites phases	Moderate	Moderate	Medium	Select industrial suppliers of proven quality and experience in the field with warranty provided for their products, combined with their record of successful practice, closely monitor the timeline of delivery upon purchase.	Buyer	Active	WP3, 4, 5 Leaders	M6-40	1/25/2024	No	Yes	
8	WP2-5	Lack of industrial maturity or compatibility for certain ESSs that are crucial for an actually innovative solution	Moderate	Moderate	Medium	Closely collaborate with academia and industrial sector to get market trends. Devices to be deployed will be selected upon optimal terms of capacity, built and expected performance.	Demo leaders	Active	WP3, 4, 5 Leaders	M1-24	1/25/2024	10	Yes	
9	WP2-5	Low interoperability in between the various SINNOGENES hardware and software components	Unlikely	Major	Medium	Closely supervise the deployment of each component, assuring its proper operation in coordination with the main SINNOGENES platform and interconnected assets. Extensive troubleshooting and integration tests will be performed and recorded as experience for future use.	UBE	Non Active	UBE	M18-M30	n/a	n/a	n/a	
10	WP2-5	Low forecasting in terms of storage potential, best possible time of stored energy release, market's disturbances or opportunities, outages etc.	Unlikely	Moderate	Medium	Work on platform's compatibility with existing network SCADA and communication tools by collaborating with the respective authorities.	WP2, 3, 5 Leaders	Non Active	UBE	M12-M30	1/25/2024	No	Yes	
11	WP2-4	Significant complexity of introducing domestic and commercial ESSs' owners as participants in the energy markets, through their provision of ancillary services	Unlikely	Major	Medium	Simulate the energy market's operation as a training module, regurarly update SINNOGENES platform to comply with the energy market regulations, automatically issue notifications for users and respective authorities to swiftly solve connectivity and participation issues.	Demo leaders	Non Active	WP3, 4, 5 Leaders	M18-M30	n/a	n/a	n/a	

Figure 5 SINNOGENES Risk Management Online repository.

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5 Challenges

SINNOGENES has encountered challenges during the first 16 months that were related to two of the demo sites and may involve revisions to project activities due to unforeseen circumstances. More specifically the project faced the following issues.

Geothermal storage capacity in Soria, Spain: This demo site's aim is to integrate two prototypes of fast-response energy storage into the microgrid (flywheel, ultracapacitor), as well as electricity and thermal networks through the exploitation of geothermal energy. This thermal utilization will be realized through a geothermal field, which construction was associated with a national project. Due to the cancellation of the project intended to promote renewable energy sources in Spain, funding for the construction of the planned 100-well geothermal field has not been secured despite an extensive search for capital. As an alternative, CIEMAT, which is responsible for the pilot, explores the possibility to proceed with the construction of four new monitored boreholes which coupled with the existing eight boreholes, this will result in a geothermal field comprising 12 boreholes. The final solution will be chosen by having the ultimate criteria to have the minimum impact on overall project objectives, which will remain unchanged, as well as the work packages, deliverables, milestones, and specific tasks.

H_2 storage and distribution infrastructure at the Geneva marina area: The initial focus of the Geneva demo was to assess energy forecasting services for storage, distribution and consumption in public transport infrastructure based on land and water vehicles. Hence, it was planned to install the H_2 storage and distribution infrastructure at the Geneva marina area, which would serve as a charging station for both land and water vehicles. However, the marina, although situated in a private area, required planning permission from the local town authorities, supported by the harbor master's office. Currently, this was not feasible due to prioritization of other new development projects on the waterfront by the local authorities. As an alternative, Hitachi, which is responsible for the pilot, explores the possibility of proceeding with the construction of a more advanced H_2 production and distribution plant at the Hitachi Energy premises with fully localized hydrogen value chain in the ZIMEYSA industrial park. This alternative could enable the decarbonization of heavy mobility in a rapidly expanding industrial area near the city center. The final solution will be chosen by having the ultimate criteria to have the minimum impact on overall project objectives, which will remain unchanged, as well as the work packages, deliverables, milestones, and specific tasks.

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6 Project Timeline and Future Steps

The SINNOGENES project has demonstrated significant progress so far, consistently meeting project deadlines and successfully achieving all milestones. With a strong understanding of the gaps within the European energy ecosystem and a detailed description of its Use Cases, the project is well-positioned to address key challenges and drive innovation in energy storage technologies.

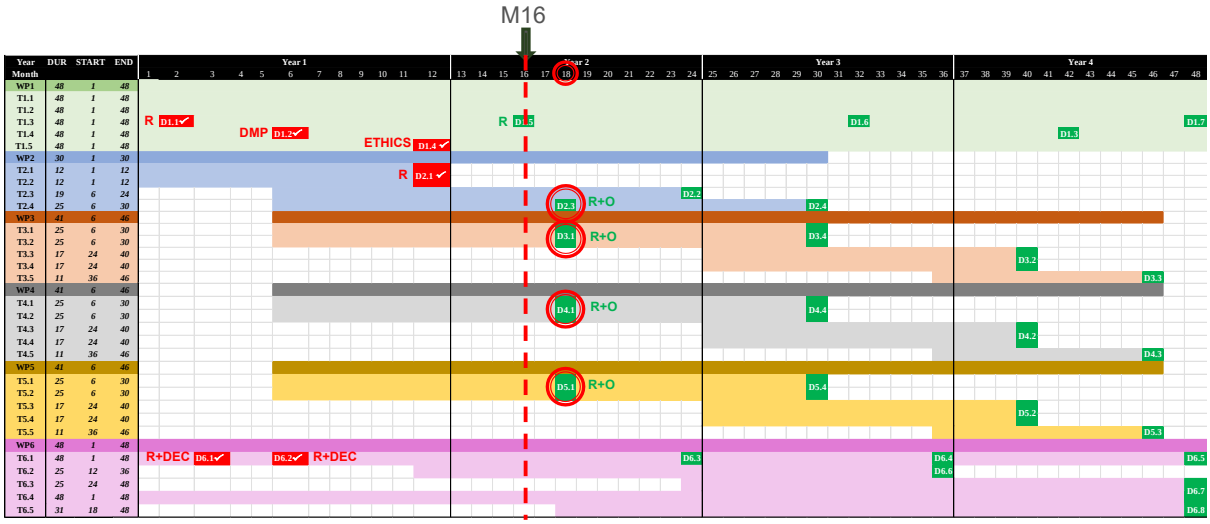

Figure 6 SINNOGENES GANTT diagram.

Looking ahead, the project aims to deliver the design and implementation of tools for storage technologies across various sectors, including industrial environments, transport, and insular systems. Additionally, the project plans to unveil the first version of the SINNO toolkit architecture alongside a comprehensive integration plan, facilitating seamless deployment and use in the demo sites. Efforts will also focus on developing a secure data exchange framework between stakeholders, ensuring privacy and reliability. Furthermore, activities will commence in all demo sites, emphasizing both operational and exploitation aspects. Environmental and socioeconomic impact assessments will continue to inform project strategies, with a strong emphasis on scalability and replicability planning. Moreover, the project will prioritize the development of new functionalities in modeling tools to assess the impact of flexibility services effectively together with intense dissemination and communication activities.

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7 Conclusion

This handbook updated the first version of the project's handbook and reported the steps made by the SINNOGENES project over the current reporting period, setting out the accomplishments and laying a pathway for the upcoming phases. Through this report, the project documented its way through various objectives, detailing the progress from concept to execution across multiple work packages and highlighting the milestones that mark its route. At the same time, the challenges encountered are dealt with proactive strategies, ensuring the project's alignment with its goals despite the complexities inherent in research projects. As SINNOGENES moves forward, the lessons learned and the data gathered will serve as a compass for upcoming activities, ensuring that the partners' work remains on track and continues to contribute to the energy landscape as envisioned in the Grant Agreement.

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