

D8.3: Exploitation Plan

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Prepared by:	Natalia Rojas (ATA)
Verified by:	Natalia Rojas (ATA), Neharika Chebrol (TUBS), Christian Windt (TUBS), Gael Verao Fernández (TUBS)

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Executive Summary

The present report focuses on the actual use of the INF⁴INITY's results and anticipates the work that will be developed over the 48 months into concrete solutions facilitating uptake for the INF⁴INITY's consortium and stakeholders.

There are seven key exploitation results (KERs) identified as follows:

1. Nature Inclusive Designs (NIDs) catalogue
2. Integrated NIDs for GICON
3. Benchmark data sets
4. Advanced open-source numerical model
5. Techno-environmental framework
6. Floating platform and anchoring including scour protection new designs
7. Marine spatial use reduction

The methodology for building D8.3 has been mainly focused on defining the exploitation roadmap and commercialisation pathway for the seven KERs. For each KER, the various consortium partners involved have been identified, with one partner being designated as the lead party for the collection of information. Each lead worked together with WP8 through the exploitation activities with the support of the partners involved.

D8.3 establishes what each KER means, emphasizing what makes it better than the state of the art. It also describes the exploitation intentions of the partners and the use model.

A summary of some of the main uses of the KERs is listed in the table below.

KER	Pathway	Use model	Partners involved	TRL by the end of the project
NIDs catalogue	Consultancy service	[Confidential]	NIRAS	-
Integrated NIDs for GICON	Consultancy service	[Confidential]	GICON, NIRAS, BM SUMMER	From 1-2 to 5
	Contract research			
	Exploitation of infrastructure			
Benchmark data sets	Standard	[Confidential]	TUBS, UGENT, IBW-PAN, LUH, MGEP	
Advanced open-source numerical model	Consultancy service	[Confidential]	WIKKI, POLITO, DTU-C	TBC

Techno-environmental framework	License agreements		MGEP, NIRAS, Aquatera Atlántico, SINTEF	From 4-5 to 6-7
	Consultancy service	[Confidential]		
	Training			
	Contract research			
Floating platform and anchoring incl. scour protection new designs	Consultancy service		GICON, BM SUMMER, NIRAS	From 1-2 to 5
	Contract research			
	Exploitation of infrastructure	[Confidential]		
	Standards			
Marine spatial use reduction	Consultancy service	[Confidential]	All	-

Table 1 INF4INITY's KERs list and use options

Results from INF4INITY will be exploited in multiple ways to ensure that the project results maximise the impact of the project activities. All the KERs have a different exploitation strategy and roadmap that has been tailored depending on the capabilities and needs of each of the owners. Each KER describes the problem addressed together with a description of how the problem has been solved so far, the competitive advantages and the innovative aspects, the target market and timing and the early customers and competitors. Also, a description of the IPR background and foreground is included for each KER.

A summary of the exploitation activities and intellectual assets is shown below.

KER	Activities planned to secure use/adoption of the results	Intellectual assets	Intellectual assets - Background/foreground	Other
NIDs catalogue	1.Update catalogue of NIRAS's services to include consultancy related to NIDs in FOW 2.Reach stakeholders that are interested in the results and measure the impact 3. Search for research funding to keep building the NIDs catalogue	None	None	None
Integrated NIDs for GICON	1.Funding: look for funding to monitor the NIDs performance in pilot projects 2. Research funding: Search for funding to improve the	1.IPR Application: File for patents, copyrights, or trademarks for developed NID solutions, software,	The Intellectual Property Rights (IPR) background focuses on the existing floating platform designs or	None



	infrastructure after collecting the monitoring data 3. Update consultancy services for BM SUMMER 4. Pilot projects: Through the implementation of the designs in future pilot and commercial projects	and methodologies where applicable. 2. Joint Ownership Agreement: Finalize agreements among consortium members regarding ownership, exploitation rights, and revenue sharing.	relevant designs that are already developed and knowledge-based deployment methods. Currently, there are no established NID features patented for floating offshore structures, leaving room for new innovations and design concepts to be developed and patented through this project. In general, the designs that will be used for commercial scale by other partners that are not in the consortium agreement need to be consulted with the consortium partners for their approval to use it.
Benchmark data sets	1. Data postprocessing and curation. 2. Development of user manuals and data organization documents for the dataset. 4. Sharing the different datasets with potential users in the research community and industrial partners. 5. Discuss with classification and certification companies	Licensing of the datasets for the protection of intellectual property but guaranteeing open data access.	Each partner will retain ownership of experimental datasets they contribute to the project.
Advanced open-source numerical model	1. Update catalogue of WIKKI's services to include consultancy related to numerical model 2. Design training courses	None	WIKKI OpenFOAM, numerical methods, modelling POLITO: will work on MOST on the INF4INITY project,



	3. Search for research funding to keep working on the model		of liquefaction and scour POLITO owns MOST DTU-C better descriptions of free surface and inclusion of turbulence models for stone protection layers	keeping the foreground. DTU-C: combination of the two methods outlined above WIKKI: improved implementation liquefaction and scour models, reduction of time-to-solution and cost-to-solution. WIKKI will work on the tools OpenFOAM on the INF ⁴ INiTY project, keeping the foreground.
Techno-environmental framework	1. Development of a software interface 2. Development of guidelines and tutorials 4. Sharing a free version with potential customers to present the tool 5. Design training courses 6. Update MGEP service catalogue	Licensing of the techno-environmental tool for the protection of the intellectual property	The different partners collaborating in the project own their specific models that have already been registered. Some of them, like PyWake are open-source, but others require a license (e.g. COSMO or HOWLOG).	The final techno-environmental tool, which integrates the contributions from all partners, will be licensed collectively. The licensing rights will be shared among the partners, with the specific distribution of the license share reflecting the relative contributions each partner has made to the development of the tool.
Floating platform and anchoring incl. scour protection new designs	1. Further National or EU funding projects to tackle the knowledge gaps that were not able to perform in INF ⁴ INiTY project and monitoring pilot projects	Licensing of the FOW turbine substructure, anchoring and scour protection designs for the protection of	GICON already owns a Tension Leg Platform (TLP) FOW concept design that has already been registered and will be used during the project.	

	2. Search for funding to improve the infrastructure after experimental data 3. BMSUMMER to update BM's service catalogue 4. Implementation of the designs in future pilot and commercial projects	intellectual property.	
Marine spatial use reduction	1. Define lessons learned document with all the partner 2. Search for TLP farms case study and apply findings 3. All partners to update consulting services 4. Search for future research funding to test the marine spatial use reduction in future farms	None	None

Table 2 KER's exploitation roadmap summary

Through the exploitation strategy of each KER, the actions to be executed after the end of the project and the role of the partners involved is described. Also, the list of the milestones and roles, the costs estimated and projected revenues are described together with the resources needed and the impact of the KER.

A market assessment has been also delivered for each KER considering target markets, early adopters and competitors as explained below.

KER	Target market	Early adopters	Competitors
NIDs catalogue	Offshore technology developers, industry and value chain (environmental consultants, developers), public bodies (regulatory institutions, marine spatial planners) and policy makers, Research community, Civil society & the media.	Offshore technology developers, industry and value chain (environmental consultants, developers), public bodies (regulatory institutions) and policy makers.	There are already several companies and smaller non-profit organisations that are producing artificial reefs, the most common form of NID for OWF, for commercial purposes. They often have patented designs and may be resistant to changing their designs. However, such smaller producers may also adopt our guidelines and designs, and as such become more like partners. Otherwise, the KER mainly adds perspective and alternative viewpoints on NID for the OW

			industry. As such our report competes for attention amongst the research community and potential competitors (consultant firms, government reports, scientific publications) publishing similar research and guidelines. Several such reports are available for OWF but generally they are reviews focused on either designs or ecological problems to be addressed. The strength of our report is the multiple interdisciplinary angles that the INF4INITY consortium brings.
Integrated NIDs for GICON	Offshore technology developers (floating offshore wind farms, particularly those focused on deep-sea applications). Public bodies (regulatory institutions, marine spatial planners) and policy makers. Industry and value chain (Companies that prioritize both energy production and ecological sustainability, especially in regions with stringent environmental regulations, will benefit from this approach). Port Authorities and Logistics Companies (role in supporting offshore installations, and logistics companies ensure efficient transportation of materials and equipment). Fisheries and Coastal Community Representatives.	Offshore technology developers, Public bodies (regulatory institutions, marine spatial planners) and policy makers.	No NID's solutions for FOW in deep waters but main competitors would be FOW developers and consultant firms
Benchmark data sets	Research community	Research community	Other floating wind developers

	Floating offshore wind developers. Offshore industry	Floating offshore wind developers.	Other research institutes
Advanced open-source numerical model	Wind park developers, classification companies, engineering companies	Wind park developers, classification companies, engineering companies	None
Techno-environmental framework	Ocean technology developers Consultative Stakeholders: Research community Private investors Public funders Policy makers Insurance organizations Certification bodies Civil society	The early adopters of the techno-environmental tool are expected to be from the industry and supply chain sector—specifically operators and promoters—who currently lack a solution for incorporating socio-environmental aspects into their optimization analyses. These stakeholders will benefit significantly from the framework’s ability to integrate technical, economic, and socio-environmental factors into the decision-making process. Additionally, public and government agencies are anticipated to be early adopters, leveraging the tool to ensure that the expansion of floating offshore wind (FOW) farms is managed responsibly. This includes optimizing maritime space usage and minimizing socio-environmental impacts, aligning with regulatory and sustainability goals.	The main competitors offering alternative solutions for offshore wind techno-economic modelling include companies such as [Confidential]. These tools provide various functionalities customised to specific needs, including cost modelling, logistics planning, and reliability analysis
Floating platform and anchoring incl. scour protection new designs	Ocean technology developers Research community Private investors Public funders Policy makers	Research community Floating offshore wind developers. Offshore industry	The main competitors are engineering companies offering alternative solutions to FOW turbine, such as [Confidential], have already installed pre-commercial wind farms. The main advantage of these companies is that they have demonstrated the viability of their design, from the

	Insurance organizations Certification bodies Civil society		engineering design to the operation of the wind farm on a small scale. It should be noted that all the turbines installed use slack mooring chains rather than TLP, which has a higher environmental impact on the seabed. Furthermore, none of these technical designs have integrated NIDs to mitigate the environmental impact. [Confidential].
Marine spatial use reduction	The target market includes Marine spatial planning policy makers, FOW Industry and value chain	Environmental-conscious energy developers and governmental institutions aiming to balance energy production with marine conservation. Research organisations, i.e. SINTEF would use the results in further research topics.	Other floating wind developers Research community Industry and value chain (FOW developers)

Table 3 KERs marketing outcomes

By addressing the milestones and actions listed in D8.3, FOW can become a cornerstone of a resilient, low-carbon energy future, supporting the environmental, social and economic objectives agreed by the European commission for the sector. This plan provides the foundation to realize these ambitions, setting a clear course for an impactful and sustainable exploitation of the INF⁴INITY project.

D8.3 Exploitation plan is a life document which will be updated in M24 and M45.

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List of Abbreviations

Abbreviation	Definition
ARS	Artificial Reef Structures
CFD	Computational fluid dynamics
DDE	Detailed Design Engineering
DLC	Design Load Cases
EERA	European Energy Research Alliance
EPC	Engineering, Procurement and Construction
FEED	Front End Engineering Design
FOW	Floating Offshore Wind
GASP	Gravity Anchors and their associated Scour Protection
IPR	Intellectual Property Right
KER	Key Exploitable Result
KPI	Key Project Indicator
LCOE	Levelised Cost of Energy
MOST	Matlab OFWT Simulation Tool
MSP	Marine Spatial Planning
NGO	Non-Governmental Organization
NID	Nature Inclusive Design
NREL	National Renewable Energy Laboratory
OWF	Offshore Wind Farm
TLP	Tension Leg Platform

1 Introduction

The present report details the INF⁴INiTY's consortium's Plan for the Exploitation, Work Package 8, Deliverable 8.3 (D8.3).

An exploitation plan is a strategic document or framework that outlines how to derive maximum value from a project, research, or innovation. D8.3 ensures that the results and innovations of the INF⁴INiTY project are effectively utilized, whether in a commercial, social, or academic context.

D8.3 is aligned with D8.2 Stakeholders Engagement which identifies target audiences, stakeholders, and markets that would benefit most from the project outcomes. INF⁴INiTY's exploitation plan helps to allocate resources (time, money, and personnel) strategically to exploit the results of the project including a roadmap for exploitation activities.

D8.3 guides the team towards the demonstration of the practical value of the INF⁴INiTY project to potential investors, partners, policymakers and other stakeholders providing a compelling argument for additional funding, support or collaborations.

The report outlines how INF⁴INiTY's outcomes will remain relevant and impactful beyond the project's initial lifecycle including plans for scaling, maintaining, or adapting the outputs for future needs.

For academic or collaborative projects, D8.3 ensures effective dissemination of results to relevant communities, industries, or the public promoting a broader adoption and use of the outcomes.

The preparation for exploitation is an iterative process that comes to the fore when project results are emerging. D8.3 is the start and closure of task 8.3 with the aim of ensuring a dynamic and successful exploitation of project results, avoiding infringement of Intellectual Property Rights (IPR) and mitigating risks that could endanger the exploitation of results.

D8.3 is structured in nine sections. After the introduction and description of the objectives, the report presents the key exploitable results (KERs) as they have been identified and revised throughout the project to date. The assessment of each KER is presented in tables including the IPR for each result.

The exploitation plan and strategy for the KERs on how to transform public research into impacts for public and private value are summarized in the sections below. Also, the exploitation roadmap and routes for each KER are described.

2 Objectives

As described in the project proposal, one of the main objectives of the INF⁴INiTY project is *“To provide pathways to commercialization (financing, certification, O&M, offshore logistics, etc.) for individual and integrated sub-sea nature inclusive design (NID) innovations”*.

Specifically, for WP8 there is one objective defined as *“To de-risk INF⁴INiTY with a view to its commercial exploitation and sustainability”*.

D8.3 serves to plan and describes the exploitation activities of partners, in order to generate the commercial and societal impact envisioned by the consortium. The related task, T8.4, in WP8 therefore coordinates, monitors, and reports activities of INF⁴INiTY consortium partners’ exploitation efforts and focuses on support activities.

D8.3 is the first version of the plan and will be updated in M24 and M36. A final update will be released on M45.

3 Key Exploitation Results

The Key Exploitation Results (KERs) identified in the INF⁴INiTY project and lead partners are listed in the table below.

KERs	Lead partner
KER 1: NID catalogue for FOW applications	NIRAS
KER 2: Integrated NIDs for GICON’s SOF	GICON
KER 3: Benchmark data sets	TUBS
KER 4: Advanced open-source numerical solvers and codes	WIKKI
KER 5: Techno environomic decision-making framework	MGEP
KER 6: Floating platform and anchoring incl. scour protection new designs	GICON
KER 7: Marine spatial use reduction by FOW	SINTEF

Table 4 INF⁴INiTY’s Key exploitation results

A description of the seven KERs identified follows:

- **KER1: NID catalogue for floating offshore wind (FOW) applications.** A report that will provide guidelines regarding which organism groups, and specific species, should be targeted by NIDs in three different regions in Europe: a temperate marine region (Scottish Sea), a brackish inland sea (the Baltic Sea) and a subtropical sea (the Adriatic Sea). Recommendations for NID designs that optimize the positive effects on local ecosystem and target species will be presented. Also, the negative effects on habitats and vulnerable species will be considered.
- **KER 2: Integrated NIDs for GICON’s SOF.** The design integrates Artificial Reef Structures (ARS) into floating offshore wind (FOW) platforms, creating habitats that support diverse marine species while ensuring structural stability. The ARS components provide both shelter and food sources for marine organisms, fostering an increase in biodiversity in areas previously affected by the installation of

offshore platforms. These structures are specifically tailored for deep-water environments and floating platforms like Tension Leg Platform (TLPs), where traditional ecological enhancement methods have limited effectiveness. Gravity anchor plus scour protection for a permanent home for the local ecosystem.

- KER 3: *Benchmark data sets*. Open-source benchmark datasets available to the research community, FOW developers and offshore industry
- KER 4: *Advanced open-source numerical solvers and codes*. Advanced numerical solvers for the assessment of scour and liquefaction
- KER 5: *Techno environomic decision-making framework*. Holistic tool that considers social and environmental aspects from the early stages of the design including the development of a new methodology to quantify the socio-environmental aspects in economic terms.
- KER 6: *Floating platform and anchoring incl. scour protection new designs*. Innovative engineering solutions for FOW turbine components including floating substructure, gravity anchor, and scour protection
- KER 7: *Marine spatial use reduction by FOW*. Innovations around the optimization of marine spatial use.

4 Stakeholders

D8.2 is the Stakeholders Engagement report delivered in M7. It has the purpose of engaging stakeholders in a bidirectional process to share knowledge outputs that would impact the society and inform, guide and manage the execution of the INF⁴INITY project. This aim is connected to the overall strategy of WP8, and all the tasks related. The deliverable is structured along different stakeholder groups (collaborative/consultive/informative) and uses the following sub-categories:

1. Collaborative: offshore technology developers, public bodies, industry and value chain, European ocean testing facilities and laboratories.
2. Consultative: research community, private investors, public funders.
3. Informative: policy makers, non-governmental organization (NGOs), insurance organizations, certification organizations, civil society & the media, other users.

The table below shows the stakeholders groups and sub-groups that would be related to each KER and the period of time that the dissemination activities should be delivered.

KERs	Dissemination month	Stakeholder group(s)	Stakeholder sub- group (s)
NID catalogue for FOW applications	Month 12 to end project +2 years	Collaborative, consultive and informative stakeholders	Collaborative: offshore technology developers, industry and value chain (environmental consultants, developers), public bodies (regulatory institutions, marine spatial planners) Consultative: research community

			Informative: policy makers and civil society & the media
Integrated NIDs for GICON's SOF	Month 12 to end project +3 years	Collaborative, consultive and informative stakeholders	Collaborative: Offshore technology developers (FOW farms, particularly those focused on deep-sea applications), public bodies (regulatory institutions, marine spatial planners), industry and value chain (companies that prioritize both energy production and ecological sustainability, especially in regions with stringent environmental regulations, will benefit from this approach, port authorities and logistic companies) Consultative: private investors and public funders Informative: policy makers, NGO's (fisheries and coastal communities representative), civil society
Benchmark data sets	Month 25 to 48	Collaborative, consultive and informative stakeholders	Collaborative: FOW developers, ocean technology developers , software developers, European ocean energy testing facilities Consultative: research community, public funders Informative: certification organizations insurance organizations
Advanced open-source numerical solvers and codes	Month 36 to end project +2 years	Collaborative, consultive and informative stakeholders	Collaborative: FOW developers, industry and value chain (wind park developers, engineering companies, ocean testing facilities and laboratories) Consultative: research community Informative: classification companies, insurance companies, public bodies, NGOs
Techno environomic decision-making framework	Month 36 to end project +2 years	Collaborative, consultive and informative stakeholders	Collaborative: FOW developers Consultive: research community, Private investors, public funders

			Informative: policy makers, Insurance organizations, Certification bodies, Civil society
Floating platform and anchoring incl. scour protection new designs	Month 12 to end project +2 years	Collaborative and consultative stakeholders	Collaborative stakeholders: Ocean technology developers, practitioners and consultant engineers, windfarm operators, grid operators Consultative stakeholders: Research community, private investors,
Marine spatial use reduction by FOW	Month 36 to end project +2 years	Collaborative and informative stakeholders	Collaborative: industry and value chain Informative: policy makers, and civil society and media.

Table 5 Main stakeholders' groups for each KER

D8.3 is aligned with D8.2 and will follow the guidelines and steps described in this deliverable to reach and interact with stakeholders efficiently.

5 External Expert Advisory Board

An External Expert Advisory Board (EEAB) will be set up for the project that will advise on the project and its outcomes. It will be made up of experts from the FOW sector appointed by the Steering Committee. It will be steered by the Technical Committee. The EEAB will be joining the consortium meetings once every year to observe the progress of the project.

The consortium already has the commitment of [Confidential]

The progress of the KERs will be shared once per year with the EEAB with the aim of getting feedback and support for the exploitation of the seven main exploitation results of the INF⁴INITY project.

6 Related deliverables

More context and additional information about the support for exploitation activities in WP8 are provided by related deliverables, specifically:

- D8.1 C&D and knowledge exchange plan
- D8.2 Stakeholder engagement plan

7 State of the art

Europe has emerged as a global leader in offshore wind energy, with the North Sea region hosting numerous large-scale wind farms. However, many of these installations are located in relatively shallow waters, limiting the potential for further expansion. In order to capitalise on the vast offshore wind resources in deeper

waters, European countries have been allocating substantial financial resources to the development of FOW technology.

The European Union has set ambitious targets for renewable energy, and the revised Renewable Energy Directive (adopted in 2023) raises the EU's binding renewable energy target for 2030 to a minimum of 42.5% (Commission, 2023), with the aim to be climate-neutral by 2050 (European Commission, 2024). FOW is seen as a key technology in achieving these goals, especially in countries with extensive deep-water resources, such as for example Norway, France, Portugal and Spain.

Significant technological advancements have been made in recent years, driving down costs and improving the performance of FOW turbines. Larger and more efficient turbines can be adapted for floating installations. Innovative mooring systems and various substructure designs, including semi-submersible and tension leg platforms, are being explored to optimize performance and cost. Industry leaders are actively investing in R&D to develop advanced substructure technologies.

Despite these advancements, the deployment of FOW faces several challenges. The initial capital costs of FOW farms are higher compared to fixed-bottom installations. However, as the technology matures and economies of scale emerge, costs are expected to decrease and for example, the IRENA "Floating Offshore Wind Outlook 2024" report suggests that the Levelised Cost of Energy (LCOE) of FOW farms is expected to drop to USD 100 per MWh by the middle of this decade, and to USD 67 per MWh by 2050 (from the current USD 200 per MWh) (IRENA, 2024) .

Port capacity (probably the most acute bottleneck because of the long lead times for development), the pace of electricity grid development (including the strategic management of grid connection requests) and availability of vessels (with only a handful of vessels capable of handling the largest 14-15 MW turbines being installed at the latest projects) are the crucial factors that are likely to limit the build-out of offshore wind in Europe to 2030 (Europe, 2024) .

Also, clear and supportive regulatory frameworks, such as the European Union's Renewable Energy Directive, are essential to facilitate the deployment of floating wind. According to the Wind Europe "Latest wind energy data for Europe" report, governments across Europe have recognised the value that offshore wind brings. From combined 2030 offshore wind targets of 114 GW at the start of 2021, ambitions were revised up to a maximum value of 157 GW by 2030 in December 2022. Since this peak, many National Governments have scaled back their 2030 targets as they realise that the time needed to develop a political framework for offshore wind, construct and improve electricity grids to connect the projects and develop local supply chains means that getting projects in the water by 2030 is a tall order. Although the reports indicate that the offshore wind build-out to 2030 across Europe will be unlikely to match government ambitions for that target date, it is not envisaged any reduction in installations – just a delay of 1-2 years in many cases. Governments across Europe remain committed to offshore wind development and the outlook for the industry is very positive.

It is important to highlight that the potential benefits of FOW are substantial. FOW farms can be deployed in deeper waters, unlocking vast untapped wind energy resources. FOW has the potential to generate significant amounts of clean energy, especially in regions with extensive deep-water areas. FOW farms can be located further offshore, minimizing visual impacts on coastal communities. Additionally, they can be co-located with other offshore activities, such as aquaculture or wave and solar energy. There are of course some concerns around the potential impacts on marine ecosystems or the interference with fishing activities

that would need to be carefully considered by the marine spatial planning authorities and the project developers. The INF⁴INiTY project will reduce the gap of those environmental impacts and concerns by developing an innovative artificial reef structure combining the floating structure of the FOWT together with an innovative nature-inclusive designs for gravity anchors and their associated scour projection system. The project will reduce the marine space needed for the implementation of FOW allowing the coexistence of FOW with other sectors.

Thus, floating offshore wind technology has the potential to play a significant role in Europe's energy transition. While challenges remain, the rapid pace of technological advancements and the increasing demand for renewable energy are driving the growth of this emerging sector. By addressing the current challenges and capitalizing on the opportunities, Europe can solidify its position as a global leader in floating offshore wind energy.

8 Exploitation strategy and roadmap

The following sections summarize and formalize the exploitation results of the INF⁴INiTY project. Each section explains the problem addressed by each KER together with the description about how the problem has been solved so far, the competitive advantages and the innovative aspects of each KER, the target market and timing and the early customers and competitors. Additionally, a description of the IPR background and foreground is included for each KER. An exploitation roadmap is also included, which takes into account key actions, milestones, roles, financial costs and impact.

8.1 KER 1 NIDs Catalogue

KER 1 is based on the guidelines established during the project regarding which organism groups, and specific species, should be targeted by NID in the three different regions of Europe defined at the project proposal. KER 1 includes recommendations for NID designs that optimize the positive effects on local ecosystem and target species together with the negative effects on habitats and vulnerable species.

8.1.1 Problem

Although various NID features have been proposed for offshore wind farms (OWF), few have been tailored for use at depths that are relevant for the next generation of floating OWF. Furthermore, NID designs for OWF have largely focused on temperate regions and fish, neglecting to consider other organism groups and marine ecosystems. INF⁴INiTY's stakeholders, including OWF developers, contractors, consultants, and regulatory institutions, have difficulties identifying which NID ideas are suitable for local regions and specific projects. Consequently, when OWF developers are considering employing NIDs in projects there is a lack of sources guiding which designs can be expected to generate the most positive effects on local ecosystem. Most NID designs for OWF to date are still conceptual and have only been built in small scale, and the effectiveness are rarely assessed. As it is challenging, and costly, to evaluate how NID are affecting local ecosystems it is important that designs that are maturing to be developed by the industry, both for pilot experiments and eventually at large scale, are tailored to local ecosystems. KER 1 aims to provide guidelines on how to adapt NID designs to local ecosystems and develop new design concepts for floating OWF, both for the floating platforms and the on-bottom infrastructure.

8.1.2 Alternative solution

The industry often claims that OWF are generating positive effects on local ecosystem. Specifically, the foundation (e.g. gravity anchor) and the scour-protection provide scarce hard-bottom surfaces, which attract fish and invertebrates, and as such are a form of NID in their own. This is sometimes a valid argument but depending on the local ecosystem and composition of species, other negative effects may lead to an overall negative impact on the ecosystem, or its vulnerable or commercially important species.

More recently artificial reefs that provide habitat and shelter for fish has been built and employed as NID by the OWF industry. This has mainly been done for fixed platforms at pilot experiment scale and using commercially available designs. A central aspect of these pilot tests has been to generate publicity and the effectiveness of the deployed NIDs have rarely been quantified.

8.1.3 Unique selling point

The conclusions and guidelines from KER 1 will specifically aid stakeholders in developing NID design that are generating optimal positive ecological impact in return on their investment. As pilot scale NID's are maturing to full scale implementation, it is key that there is sound ecological information underlying the choice of design. Otherwise, the investment may generate publicity but risk being ineffective or even counterproductive. Another unique point of the NID catalogue is that brings NID solutions not the on-bottom infrastructure, but also for the floaters.

8.1.4 Market

The main stakeholders have been identified in Table 5. The following table includes a summary of early adopters, market competitors and use model for KER 1.

Early adopters	Competitors	Go to Market – Use model
Early adopters include government institutions that are making decisions regarding environmental policies for exploitation of marine environments and granting permits to OWF developers. Offshore wind developers may also adopt INF4INITY's NID design guidelines into pilot tests in existing OWF as a first step towards larger scale implementation.	There are already several companies and smaller non-profit organisations that are producing artificial reefs, the most common form of NID for OWF, for commercial purposes. They often have patented designs and may be resistant to changing their designs. However, such smaller producers may also adopt KER 1 guidelines and designs, and as such become more like partners. Otherwise, KER 1 mainly adds perspective and alternative viewpoints on NID for the OW industry. As such the NIDs catalogue competes for attention amongst the research community and potential competitors (consultant firms, government reports, scientific publications) publishing similar	[Confidential]

research and guidelines. Several such reports are available for OWF but generally they are reviews focused on either designs or ecological problems to be addressed. The strength of KER 1 is the multiple interdisciplinary angles that the INF4INiTY consortium brings.

Table 6 KER 1 Market aspects

8.1.5 Intellectual Property Rights

The current IPR background and foreground has been summarized in the following table:

IPR Background	IPR Foreground
The IPR background focuses on the existing floating platform designs or relevant designs that are already developed and knowledge-based deployment methods. Currently, there are no established NID features patented for floating offshore structures, leaving room for new innovations and design concepts to be developed and patented through this project. In general, the designs that will be used for commercial scale by other partners that are not in the consortium agreement need to be consulted with the consortium partners for their approval to use it.	Foreground will mainly include the NID features to be implemented on/in the FOW infrastructure, both near surface and near bottom, as well as the multi-functional integration of these features on the OWF. The co-existence of multi-functions potentially involves numerous unknowns, issues, uncertainties. The project will aim to resolve uncertainties regarding the coexistence of energy infrastructure and ecological enhancements, with the end goal of producing a detailed catalogue of applicable NID solutions for various OWF scenarios.

Table 7 KER 1 IPR

8.1.6 Actions

The key actions for the exploitation of the NID's catalogue are:

1. Distribute the report and share findings amongst INF4INiTY's network of stakeholders (OW developers and government employees in the offshore renewable sector).
2. Actively look for funding to evaluate NID performances in pilot experiments focusing on documenting the ecological performance.
3. Promote the material in the NID catalogue through various channels such as presentations in scientific conferences, via one-to-one contact with our existing clients, who may not be a stakeholder for the project.
4. Search for any National or EU funding projects to further extent the knowledge gaps that were not able to perform in within the INF4INiTY project
5. Update NIRA's offered services.

8.1.7 Roles

NIRAS will lead the exploitation of KER 1. NIRAS has clients amongst the OWF developers in Scandinavia, as well as contacts among local government involved in reviewing applications and environmental impact assessments.

BM SUMER has clients in offshore wind market ranging from investors (such as TSO) to contractors, for whom BM SUMER carries out design and consultancy work on an ongoing basis (such as the 2GW framework program of [TenneT](#)).

GICON has active clients in Malaysia for deployment options, where the methods and concepts (lessons learned) from INF⁴INITY project can be utilized. Also, GICON is involved in FOW tendering process in the EU Regions to deploy this design as pilot project.

8.1.8 Milestones

The list of the milestones and KPIs to be used for monitoring the implementation of the actions is listed below.

1. Track views and citations on Google Scholar.
2. Aim for 10 citations in 2 years.
3. Share report with 10 institutions and OW developers.
4. Measure the impact of KER 1 in at least five organizations.
5. Aim for utilizing the NID catalogue for at least one project in the following 18 months.
6. Extending the project design to Detailed Design Engineering (DDE) level, further extension to certification and follows pilot project, eventually in a commercial scale. 2027 onwards.

8.1.9 Financial cost

Sharing the report and promoting its implementation may not require too much time and can be done in conjunction with other projects. This will take some time, possibly on the scale of tens to a hundred hours. There will be some costs related to travel and presentation in conferences. Also, there will be some cost associated to open-access publications.

GICON performing the DDE will costs [Confidential]. These can bring KER1 to TRL 6-7 after 1-2 years end of the project.

First year effort:

- Marketing activities - 1 PM
- Raising funding – 1 PM

The estimation of costs for the following years will mainly depend on the return realised in terms of customers attracted the first year. The cost needed for the above effort would be around [Confidential].

There will be revenue expected for NIRAS from the service provision regarding the implementation of NID designs in the upcoming projects.

For GICON, it depends on the client and focused on the project

8.1.10 Other sources of coverage

Mostly partner's own budget used during promotion of the catalogue via presentations/publications. Additionally, partners may invest in implementing the NID and ARS in combination to offshore floating structure solutions in their existing or patented designs, which not only demonstrates the technology's viability but also fosters early adoption. Also, national or regional incentives targeting renewable energy and marine conservation sectors can provide additional funding opportunities to lower the financial burden.

8.1.11 Impact in 3-year time

As the major impact of the NID catalogue, it is estimated that the catalogue (the know-how presented in it) will potentially make its way into the engineering applications via written material on which the applications are based (codes, standards, certifying authority documents, legislative documents, etc.). In the longer timespan, this catalogue will serve for NID features to become an integral and indispensable part of OWF planning and design.

8.2 KER 2 Integrated NIDs for GICON - SOF

KER 2 Integrates ARS into GICON's floating offshore platform creating habitats that support diverse marine species while ensuring structural stability. GICON® SOF is a research project that aims to build the first floating foundation with an offshore wind turbine of the 2 MW class in Germany.

8.2.1 Problem

Floating OWF, particularly TLP structures, face the challenge of incorporating NIDs features that promote biodiversity without compromising structural integrity. Existing NID concepts have primarily been developed for fixed platforms in shallow waters and often focus on attracting fish without considering broader ecosystems or deep-water environments. Also, in the current offshore industry, it is focused on utilizing a fixed structures to use as mooring connection for holding fish aquaculture system, and also growing mussel farming in commercial scale, but not with floating structures as a base. Furthermore, with a lack of knowledge and methods, this leaves developers without clear guidelines for effective NID solutions tailored to deeper, more complex offshore habitats, making it difficult to ensure positive ecological impacts across a wider range of marine species.

8.2.2 Alternative solution

Up to now, the integration of NIDs was mostly focused on the gravity anchor or different types of anchoring systems with scour protection to provide an ecosystem for the marine species. But those designs are not really tested in real environment whether this system with create and how to monitor or quantify the benefits are not available. Recently, ARS have been tested in pilot projects, mainly with fixed platforms, but their ecological impact remains unknown.

8.2.3 Unique selling point

The proposed solution offers a NIDs approach that not only enhances marine biodiversity but also provides an integrated structural function for the FOW platform, particularly in deep-water environments. Tailored NID designs focus on creating habitats that foster the growth of various marine species while maintaining the necessary stability for these platforms. This dual-function design maximizes both environmental and structural efficiency, unlike traditional methods that mainly prioritize platform stability without considering long-term ecological benefits. By promoting ecosystem services alongside platform durability, the solution becomes an attractive option for developers committed to sustainability and meeting regulatory requirements.

8.2.4 Market

The main stakeholders have been identified in Table 5. The following table includes a summary of early adopters, market competitors and use model for KER 2.

Early adopters	Competitors	Go to Market – Use model
Environmental-conscious energy developers and governmental institutions aiming to balance energy production with marine conservation. These stakeholders will likely incorporate NID guidelines in pilot projects to assess the feasibility and benefits of integrating ARS into FOW structures.	Competitors in the NID space typically focus on providing artificial reefs and other habitat enhancement solutions for fixed offshore platforms. These companies may have patented ARS designs but often lack solutions optimized for floating platforms. While their solutions have been effective in shallow waters, they are not always suitable for deep-sea environments. This project's focus on integrating NID features into floating platforms offers a unique competitive edge by expanding the ecological and geographical scope of such designs. Also, making those designs and methods to open-source, such that it can be adapted.	[Confidential]

Table 8 KER 2 Market aspects

8.2.5 Intellectual Property Rights

The current IPR background and foreground has been summarized in the following table:

IPR Background	IPR Foreground
The IPR background focuses on the existing floating platform designs or relevant designs that are already developed. And knowledge-based deployment methods. Currently, there are no established NID features patented for floating offshore structures, leaving room for new innovations and design concepts to be developed and patented through this project. In general, the designs that will be used for commercial scale by other partners that are not in the consortium agreement need to be consulted with the consortium partners for their approval to use it.	The foreground will include newly developed NID solutions that can be integrated into floating platforms. These designs will focus on enhancing ecological benefits while ensuring structural functionality. The project will aim to resolve uncertainties regarding the coexistence of energy infrastructure and ecological enhancements, with the end goal of producing a detailed catalogue of applicable NID solutions for various OWF scenarios.

Table 9 KER 2 IPR

8.2.6 Actions

The key actions for the exploitation of the NID's catalogue are:

1. Distribute the report and share our findings and lessons learned amongst INF⁴INiTY's stakeholders at least up to 6 months after the project end.

2. Look for funding to evaluate NID performances in pilot experiments focusing on documenting the ecological performance, during the project end phase since applying for most EU fundings takes 8-12 months.
3. During the project phase and after the project end, the team will actively promote the material in the NID catalogue through various channels such as presentations in scientific conferences, via one-to-one contact with our existing clients, who may not be a stakeholder for the project.
4. National or EU funding projects to further extent the knowledge gaps that were not able to perform in INF4INITY project
5. Authorizations: based on funding, the team will begin collecting necessary permits and regulatory approvals for testing and implementing NID designs in real-world OWF scenarios.
6. IPR Application: file for patents, copyrights, or trademarks for developed NID solutions, software, and methodologies where applicable.
7. Joint Ownership Agreement: finalize agreements among consortium members regarding ownership, exploitation rights, and revenue sharing.
8. Update NIRAS and BMSUMMER offered services.

8.2.7 Roles

GICON will lead the exploitation of KER 2. GICON has active clients in Malaysia for deployment options, where the methods and concepts (lessons learned) from INF4INITY project can be utilized. Also, GICON is involved in FOW tendering process in the EU Regions to deploy this design as pilot project.

BM SUMER has clients in offshore wind market ranging from investors (such as TSO) to contractors, for whom BM SUMER carries out design and consultancy work on an ongoing basis (such as the 2GW framework program of TenneT).

NIRAS has clients amongst the OWF developers in Scandinavia, as well as contacts among local government involved in reviewing applications and environmental impact assessments of.

8.2.8 Milestones

The list of the milestones and KPIs to be used for monitoring the implementation of the actions is showed in Table 10.

Within the INF4INITY project frame, the milestones include research publications in conferences or seminars. Also sharing the experimental results to the research community and industrial partners for feedback. After the project end, the milestones include extending the project design to DDE level, further extension to Certification and follows pilot project, eventually in commercial scale.

Milestone	Timeline (Months)
Dissemination	1-6
Business Plan	1-6
IPR Protection	2-8
Funding Acquisition	3-6 Based on the client and funding

Design Progression (upgrade of design)	4-9
Pilot Project Initiation	Based on the client and funding
Marketing and Promotion	3-12

Table 10 GICON's milestones and timeline

8.2.9 Financial cost

Performing the DDE will cost approximately [Confidential]. These can drive KER 2 to TRL 6-7 after 1 to 2 years of project end.

8.2.10 Other sources of coverage

Partners may invest in implementing the NID and ARS in combination to FOW structure solutions in their existing or patented designs, which not only demonstrates the technology's viability but also fosters early adoption. Timing is critical in securing financial resources. Grants or incentives should be sought early in the project to cover research and development (R&D) costs, while risk capital or loans can be utilized closer to the commercialization stage to scale up production. Also, national or regional incentives targeting renewable energy and marine conservation sectors can provide additional funding opportunities to lower the financial burden.

8.2.11 Impact in 3-year time

The development and implementation of NID solutions will create new job opportunities across various sectors. These include marine engineering, environmental consulting, manufacturing of NID components, and monitoring of marine ecosystems. Additionally, skilled positions in research, development, and ecological assessment will emerge as NID becomes more integrated into offshore wind projects, driving employment in both the renewable energy and environmental sectors.

Beyond economic growth, the NID approach contributes significantly to societal well-being by improving marine biodiversity and enhancing the sustainability of offshore energy production. Healthier ecosystems provide a range of ecosystem services, including habitat restoration, which benefit coastal communities and the global environment, and tourism. The increased generation of renewable energy from OWF, bolstered by NID, will also reduce greenhouse gas emissions, contributing to climate change mitigation and energy transition goals.

8.3 KER 3 Benchmark data sets

KER 3 benchmark data sets provide open-source benchmark datasets available to INF⁴INITY's stakeholders.

8.3.1 Problem

There is a lack of benchmarking datasets of soil characterization of possible deployment locations for floating OWF. Also, there is a lack of benchmarking data-sets for numerical validation of fluid/structure models, specifically for floating structures with artificial reef structures. Up to now, there are not site-specific and future Design Load Cases (DLCs) for development of floating offshore technologies under the impact of climate change.

8.3.2 Alternative solution

There are previous projects that have also studied the inclusion of NIDs in offshore floating structures: IEA Wind Tasks, UNITED, MPVAQUA. Nevertheless, no available benchmark datasets are available to the research community and developers for validation and benchmarking of numerical models.

8.3.3 Unique selling point

KER 3 provides specific benchmark data including ARS solutions together with site-specific and future DLCs characterisation under the impact of climate change. Also, KER 3 provides large-scale benchmark datasets reducing scale effects and guidelines for numerical modelling of ARS in floating structures.

8.3.4 Market

The different experimental data sets can serve different needs within the stakeholders listed in Table 5. FOW developers and ocean technology developers can use the experimental data sets from the substructure experimental test to validate the numerical implementation of a specific hydrodynamic model. In addition, experimental data sets that parameterise the effect of soft and hard marine growth on floating structures allow developers to use this information during the design phase of a FOW turbine by incorporating the effect of marine growth into the hydro-servo-aeroelastic analysis of a FOW turbine.

The same applies to software developers who can use the data for numerical benchmarking. Furthermore, the release of the datasets and the experimental set-up can foster collaboration with other test facilities, as they can use the know-how from INF4INITY for their own experimental campaigns. Moreover, the soil characterisation results will provide FOW developers with reliable data for anchor and scour protection design. Finally, certification organisations can use the experimental results on the drag coefficients of hard and marine growth to update or validate their recommendations on how to include the effect of marine growth in the design of floating substructures.

Similarly, the advanced characterisation of the metocean conditions will result in site-specific data sets with the DLCs both for historical conditions and future conditions under different climate change scenarios. These data sets will enable offshore renewable energy developers to design more efficient devices and/or components. In addition, public funders, certification organizations and insurance organizations will better understand the consequences of climate change, which will enable them to make better informed decisions.

Since the framework applies to the design phase of FOW focused on TRL5 stage, the different datasets generated are based on metocean conditions and soil characteristics for the Scottish, Baltic and Adriatic Seas, respectively.

The project aims to initiate collaborations with at least:

- Two certifications' bodies, for including the parametrization of hard and soft marine growth in their standards for FOW design.
- One certification body and one insurance organization, for considering the potential impact of climate change in the updated standards, and bankability estimations and insurance policies.
- Two ocean energy facilities, for enhancing the experimental datasets and study scale effects of experimental testing of FOW substructures and hydrodynamic behaviour of hard and soft marine growth.

The main stakeholders have been identified in Table 5. The following table includes a summary of early adopters, market competitors and use model for KER 3.

Early adopters	Competitors	Go to Market – Use model
The research community and software developers are expected to be early adopters as they can use the experimental datasets to increase the fundamental knowledge of the physical processes involved improve existing numerical models or develop new ones. In addition, ocean energy test facilities could also be among the first to implement the project results, either by extending or participating in new experimental campaigns, or by exploiting the know-how on how to integrate NIDs into the substructure and GASP at laboratory scale, thus providing and advancing the state of the art in FOW experimental modelling. Additionally, FOW and ocean technology developers are also expected to be amongst the first to use the soil characterization and DLC datasets. Certification and insurance organizations are also expected to be early adopters of the site-specific and climate change-informed DLCs, by considering them in the standards and insurance policies to better assist the technology developers and farm promoters.	The main competitors are other research institutes that have datasets of hydrodynamic response of a FOW such as [Confidential]. However, none of these floating platforms include the effect of marine growth and NIDs integrated into the floating substructure. In addition, GASP solutions including NIDs have not been tested offshore, and most technologies are still in the development phase. The experimental results from the project will provide new insights into the effectiveness and feasibility of incorporating NIDs with the gravity anchor and scour protection.	[Confidential]

Table 11 KER 3 Market aspects

8.3.5 Intellectual Property Rights

The current IPR background and foreground has been summarized in the following table:

IPR Background	IPR Foreground
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The different partners collaborating in the project have expertise and specific procedures for experimental modelling of floating offshore wind turbines. The IPR background for this KER 3 is included in the Consortium Agreement (CA).	Ownership and Protection: each partner will retain ownership of experimental datasets they contribute to the project. License Agreement: the experimental datasets will be licensed under a Creative Commons Attribution 4.0 International License enabling open access data. Commercialization: there are no plans for commercialization. Future Registration and Use: the dataset generated during the project are the starting point for experimentally study NIDs in FOW turbine. Therefore, there may be opportunities for additional experimental campaigns and exploitation of the results. The IPR management strategy will evolve to address any new innovations.
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Table 12 KER 3 IPR

8.3.6 Actions

The key actions for the exploitation of the NID's catalogue are:

1. Data postprocessing and curation. Datasets will be stored on Zenodo with a unique identifier, automatically becoming part of OpenAIRE. Therefore, they will be directly available to the research community and floating offshore wind developers for boosting nature inclusive designs for the FOW industry. Additionally, the datasets will be curated giving them a coherent and easy to follow structure. They will include both the raw and post-process data, the documentation of the experimental set-up and an experimental report indicating data treatment and post-processing.
2. Development of user manuals and data organization documents for the dataset.
3. Licensing of the datasets for the protection of intellectual property but guaranteeing open data access.
4. Sharing the different datasets with potential users in the research community and industrial partners. The datasets and research findings will be disseminated via peer-reviewed journals and industry conferences. This will engage the research community, regulatory bodies, and policymakers, helping raising awareness of the existence of the datasets and promoting their use.
5. Presentation of the datasets in webinars/conferences.
6. Reach standards organizations.

8.3.7 Roles

TUBS, as the project co-ordinator, will oversee data management providing long data storage services.

IBW-PAN will share the experimental datasets with potential users in the research community and industrial partners. IBW PAN will also present it in conferences and webinars.

The responsibility of the quality control of each dataset is responsibility of each WP leader (TUBS, UGent, IBW-PAN and MGEP).

8.3.8 Milestones

The list of the milestones and KPIs to be used for monitoring the implementation of the actions is listed below.

1. Beta version of the dataset repositories (M3 after the end of the project)
2. Receive feedback from potential users (M4-M5)
3. Final version of dataset repositories (M6)
4. Communication and advertisement of the datasets (M6+)

8.3.9 Financial cost

The main cost includes the data postprocessing and the licensing, which will happen within the first year after the end of the project. Afterwards, there will be a fix cost associated with the server maintenance of the dataset repositories. In addition, as approximate cost for communication and advertising activities during the first 3 years after the end of the project sum up to [Confidential].

8.3.10 Other sources of coverage

Resources needed to bridge the investment needed to increase TRL and ensure the result is used. Financial support would be required during the time-to-market to increase the visibility of the datasets and that they are used by the target users.

8.3.11 Impact in 3-year time

The release of open datasets for validation of nature inclusive design of FOW provides a first step to reducing the uncertainties of floater design with artificial reef structures. The use of nature inclusive designs will give the FOW sector an environmental aspect that has been ignored by FOW developers. Including these aspects on the design phase of FOW turbines will improve the acceptance of offshore renewable energy projects while reducing their environmental impact. This has the potential to contribute to the competitiveness and growth of the FOW sector reducing the levelized cost of energy through improved numerical simulation tools for the design phase that have been validated.

8.4 KER 4 Advanced open-source numerical solvers and codes

KER 4 provides advanced numerical solvers for the assessment of scour and liquefaction.

8.4.1 Problem

The development of new wind energy sites requires a thorough assessment of numerous physical phenomena. Conventional approaches, such as engineering formulae, scaled prototypes, and physical tests, may lack precision or prove resource intensive. Many physical phenomena have to be assessed during the development of a new wind energy site being KER 4 a solution for the assessment of scour and liquefaction.

8.4.2 Alternative solution

The classical engineering approach is the existing pathway using engineering formulae, building a scaled prototype and performing physical tests. The classical engineering approach relies on engineering formulae, usually simplified, physical testing using scaled prototypes which is expensive and advanced CFD models that are very computational demanding.

8.4.3 Unique selling point

Better physical understanding and get-it-right-first approach and the deliver designs carrying lower costs. In summary KER 4:

- Provides a deeper physical understanding of phenomena.
- Ensures a "get-it-right-first" approach for lower-cost designs.
- Reduces time-to-solution and cost-to-solution.

8.4.4 Market

The main stakeholders have been identified in Table 5. The following table includes a summary of early adopters, market competitors and use model for KER 4.

Early adopters	Competitors	Go to Market – Use model
FOW developers, engineering companies, ocean testing facilities and laboratories, research community, classification companies	[Confidential]. There are alternative university codes, but no commercial offering. The commercial offer is the key advantage	[Confidential]

Table 13 KER 4 Market aspects

8.4.5 Intellectual Property Rights

The current IPR background and foreground has been summarized in the following table:

IPR Background	IPR Foreground
POLITO: owns the background on MOST software	POLITO: will work on MOST on the INF4INiTY project, keeping the foreground.
DTU-C: Better descriptions of free surface and inclusion of turbulence models for stone protection layers	DTU-C: Combination of the two methods out-lined above
WIKKI: OpenFOAM, numerical methods, modelling of liquefaction and scour	WIKKI: improved implementation liquefaction and scour models, reduction of time-to-solution and cost-to-solution. WIKKI will work on the tools OpenFOAM on the INF4INiTY project, keeping the foreground.

Table 14 KER 4 IPR

8.4.6 Actions

The key actions for the exploitation of the advanced open-source numerical solvers and codes are:

1. Hosting the MOST software.
2. Providing user documentation.
3. Facilitating downloads and community engagement.
4. Disseminate research outcomes and use cases through academic and industry conferences to expand awareness and adoption.
5. WIKKI to create website for the engineering service (within 1 year after the project).
6. Offer training courses (within 1 year after the project).

8.4.7 Roles

POLITO will maintain the freeware status of MOST. Additionally, it will oversee the technical development and updates of the software. Finally, it will lead dissemination efforts, including website management and presentations of KER 4.

WIKKI will focus on the commercialisation of the scour and liquefaction codes, together with offering engineering services.

The rest of the supporting partners will collaborate in offering training and educational resources and to the outreach and engagement strategy.

8.4.8 Milestones

The list of the milestones and KPIs to be used for monitoring the implementation of the actions is listed below.

POLITO short-Term Goals (1 year):

1. Update the official website with downloadable software and training materials.
2. Organize a training session for early adopters.
3. Present at two key conferences to establish visibility.

WIKKI:

4. One customer within 1-year and seven customers within 3 years.

8.4.9 Financial cost

The financial cost estimated to implement the planned activities are:

[Confidential]

8.4.10 Impact in 3-year time

The expected job-related impact of KER 4 is for POLITO: 0.5 jobs and WIKKI: 0.5 jobs.

8.5 KER 5 Techno environomic decision-making framework

KER 5 involves a holistic tool that considers social and environmental aspects from the early stages of the design including the development of a new methodology to quantify the socio-environmental aspects in economic terms.

8.5.1 Problem

To maximise the revenue of FOW turbines and farms, developers aim at extracting the maximum energy with the most cost-effective solutions. However, FOW turbines and farms can also have a significant social and environmental impact. The different solutions are currently evaluated (and optimised) only based on their technical capacities and economic cost.

Unfortunately, social and environmental aspects, although crucial for the final acceptance of the projects, are considered only at rather final stages of the project to minimise its negative impacts. This is mostly due to the lack of a holistic framework that incorporates all the relevant aspects, including social and environmental, in a single framework and evaluation metric (enhanced LCOE). Therefore, the potential

positive socio-environmental impacts of the projects are often overlooked or ignored during the design of the different technologies. Such a holistic framework is particularly relevant for NIDs, where the valorisation of the positive socio-environmental effects is crucial.

8.5.2 Alternative solution

As no holistic framework exists nowadays, social and environmental aspects are analysed independently, and are not considered in the design stage, mainly due to the lack of a framework that enables such a holistic assessment. That way, social and environmental aspects are only considered to evaluate the (negative) impact of the solutions to demonstrate that the impact is low.

8.5.3 Unique selling point

Alternative solutions do not offer the holistic assessment and optimisation framework, meaning that different aspects are analysed/optimised independently (or directly neglected), preventing from reaching the optimal trade-off among all the relevant aspects. The techno-environmental framework enables this holistic analysis and provides a unique tool to maximise technical and economic benefits by maximising the positive socio-economic impact.

8.5.4 Market

Offshore technology developers (including turbine and component manufacturers), as well as industry operators and promoters, will utilize KER 5 to enhance designs holistically. By incorporating technical, economic, and socio-environmental considerations, the framework enables private investors, public funders, and policy makers to plan and implement more efficient and sustainable wind farms, addressing all phases of installation, operation and maintenance (O&M), and decommissioning.

Additionally, the tool allows for the comprehensive assessment of farms, solutions, and strategies, accounting for socio-environmental impacts. Insurance organizations, certification bodies, and civil society can also leverage the framework as a holistic evaluation tool to validate designs and strategies.

Since the framework applies to the design phase of FOW farms, its initial implementation will target regions with significant FOW activity. The North Sea is the primary focus, where multiple gigawatts of FOW capacity are expected to be deployed in the coming years. Key markets include Scotland, Norway, Denmark, Germany, and the Netherlands.

In the second stage, expansion will prioritize regions such as the Baltic Sea and the Mediterranean, where FOW development is also anticipated to grow.

The main stakeholders have been identified in Table 5. The following table includes a summary of early adopters, market competitors and use model for KER 5.

Early adopters	Competitors	Go to Market – Use model
The early adopters of the techno-environmental tool are expected to be from the industry and supply chain sector specifically operators and promoters who currently lack a solution for incorporating socio-environmental aspects into their	The main competitors offering alternative solutions for offshore wind techno-economic modelling include companies such as [Confidential]. These tools provide various functionalities customised to specific needs, including cost modelling,	[Confidential]

optimization analyses. These stakeholders will benefit significantly from the framework's ability to integrate technical, economic, and socio-environmental factors into the decision-making process. Additionally, public and government agencies are anticipated to be early adopters, leveraging the tool to ensure that the expansion of FOW farms is managed responsibly. This includes optimizing maritime space usage and minimizing socio-environmental impacts, aligning with regulatory and sustainability goals. Given the high level of activity in the North Sea, and particularly in Scotland, investors and agencies operating in this region are expected to be among the first to adopt the framework. Their early engagement will be critical in demonstrating the tool's value and fostering its broader adoption. Currently, project partners are actively engaging with companies and public agencies interested in using the tool in the near future, paving the way for its practical implementation and validation	logistics planning, and reliability analysis. [Confidential]. The techno-economic model developed during the INF⁴INiTY project addresses these limitations through three distinct strengths. It provides a comprehensive life-cycle evaluation, encompassing construction, O&M, and decommissioning phases, enabling strategic decision-making throughout the project lifespan. Its computational efficiency supports large-scale marine spatial planning and in-depth sensitivity analyses, overcoming the challenges posed by computationally intensive alternatives. Additionally, the model integrates social and environmental factors into the analysis, ensuring a balanced evaluation framework that goes beyond purely economic and technical considerations. These features position it as a versatile and forward-looking tool for addressing the challenges of floating offshore wind development.
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Table 15 KER 5 Market aspects

8.5.5 Intellectual Property Rights

The current IPR background and foreground has been summarized in the following table:

IPR Background	IPR Foreground
The different partners collaborating in the project own their specific models that have already been registered. Some of them, like PyWake are open source, but others require a license (e.g. COSMO or HOWLOG).	The IPR foreground for this project will focus on developing a comprehensive theoretical framework and a preliminary assessment and optimization tool, both of which may be subject to registration for intellectual property protection in the future. Ownership and Protection: Each partner will retain ownership of the individual developments they contribute to the project. These individual contributions will be protected through appropriate IPR mechanisms, such as

copyrights or patents, depending on the nature of the innovation.

License Agreement: The final techno-environmental tool, which integrates the contributions from all partners, will be licensed collectively. The licensing rights will be shared among the partners, with the specific distribution of the license share reflecting the relative contributions each partner has made to the development of the tool. This collaborative approach ensures fair attribution and enables the tool to be commercialized under a unified framework.

Commercialization: The techno-environmental tool will be available for licensing to third parties, such as offshore wind developers, public agencies and other stakeholders, who will benefit from using the tool in their operations. The license model will include terms that allow for scalability and revenue generation while ensuring that the partners retain control over the tool's future development and use.

Future Registration and Use: As the tool and methodologies are further developed and optimized, there may be opportunities for additional registrations or protection of new components. The IPR management strategy will evolve to address any new innovations, ensuring that both the tool and its enhancements are adequately protected and commercialized.

Table 16 KER 5 IPR

8.5.6 Actions

The key actions for the exploitation of the techno environmental decision-making framework are:

1. Development of a software interface.
2. Development of guidelines and tutorials.
3. Licensing of the techno-environmental tool for the protection of the intellectual property.
4. Sharing a free version with potential customers to present the tool.
5. Presentation of the tool in webinars/conferences.
6. MGEP to update services to be provided.

8.5.7 Roles

MGEP will be developing the main activities of KER 5 (i.e. software interface and licensing) with the support of the rest of the participants (NIRAS, SINTEF, DTU-W, POLITO and Aquatera Atlántico). The communication activities will be shared with all the rest of the partners.

8.5.8 Milestones

The list of the milestones and KPIs to be used for monitoring the implementation of the actions is listed below.

1. Beta version of the tool (M3, after the end of the project)
2. Receive feedback from potential customers (M4-M5)
3. Final version of the tool (M6)
4. Communication and advertisement of the tool (M6+)

The project aims to initiate collaborations with at least:

- Two private investors, assisting in decision-making for selecting optimal areas for wind farm development.
- Two public/government agencies, aiding in defining priority areas for deployment.

Ideally, partnerships will include stakeholders from a focus group in Scotland and another in the Mediterranean or Baltic Sea. Additionally, collaborations with research groups, insurance/certification organizations, and developers with an interest in these regions are critical for the project's success.

8.5.9 Financial cost

The main cost includes the software development and the licensing, which will happen within the first year after the end of the project. An approximate cost of [Confidential].

In addition, as approximate cost for communication and advertising activities during the first 3 years after the end of the project sum up to [Confidential].

8.5.10 Other sources of coverage

A financial support of about [Confidential] would be required during the time-to-market, which is expected to get by combining national/regional incentives and projects fundings during the first year and risk capital afterwards.

8.5.11 Impact in 3-year time

The main impact of the techno-environmental framework and tool/software will be the valorisation of socio-environmental aspects that have been ignored in OWF projects, in addition to the enhanced protection of these aspects, which should lead to a better acceptance of offshore renewable energy projects.

This acceptance will facilitate the expansion of these projects and, thus, the growth of the investment and new jobs.

8.6 KER 6 Floating platform and anchoring with scour protection new designs

KER 6 is about innovative engineering solutions for FOW turbine components including floating substructure, gravity anchor, and scour protection. The INF4INiTY project offers significant advancements in FOW turbine design, particularly in the areas of floating substructure and anchor foundations. The INF4INiTY project aims to compensate for the environmental impacts of FOW farms through the development of a TLP-type FOW turbine design concept that integrates NIDs on the floating substructure, gravity anchor and scour protection. The INF4INiTY approach is innovative and unique in the sense that NID's are integrated by the design of FOW

turbine as an inherent part of the design. The project's objective is twofold: Firstly, to preserve habitats for threatened species and foster overall biodiversity (such as the case considered in the Scottish and Adriatic Seas), and secondly, to restore biodiversity and productivity (such as the case considered in the Baltic Sea).

8.6.1 Problem

In the recent years, there has been an increased awareness about the spatial claim that FOW has on the ocean space, with conflicts with the needs for preservation of the ocean ecosystem. The incorporation of NIDs into the design of offshore wind turbine can significantly contribute to the ecological functioning of the marine environment. This can be achieved by: i) maintaining the local ecosystem by minimising the impact of offshore wind turbines and ii) restoring native biodiversity in regions that have been damaged by human activity).

The INF⁴INiTY project aims to contribute to the resolution of this issue by providing innovative engineering solutions for FOW turbine components, namely: a floating substructure, a gravity anchor, and scour protection. One of the project's objectives is to develop a comprehensive design for a TLP that incorporates NID solutions.

The incorporation of NID features that promote marine biodiversity into TLP structures represents a significant challenge, as it must be done in a way that does not compromise the structural integrity of the structure. The majority of existing NID concepts that can be attached to the substructure have been developed for bottom-fixed platforms in shallow waters. These concepts often focus on attracting fish without considering the broader ecosystem or deep-water environments.

The lack of knowledge and methodologies hinders developers from implementing effective NID solutions tailored to deeper, more complex offshore habitats. This impedes the ability to ensure positive ecological impacts across a wider range of marine species.

8.6.2 Alternative solution

A variety of systems for floating offshore wind substructures are currently under development, with spar-type and semi-submersible floaters representing many of the market solutions. The majority of these solutions employ catenary mooring systems, which have a considerable negative impact on the seabed floor during both the installation and operational phases, given the larger footprint and penetration. To date, only one offshore wind project has demonstrated the integration of NIDs within the FOW turbine substructure (the EFGL project). No specific designs for the integration of NIDs with anchor and scour protection systems have been identified for FOW turbines.

8.6.3 Unique selling point

Alternative solutions do not offer engineering designs that aim to integrate NIDs solutions from the Front End Engineering Design (FEED) phase, rather they are trying to accommodate NIDs to an already existing solution, which might not be considered cost effective, and can have a negative environmental impact as the NIDs chosen might not be tailored for the local ecosystem. At this juncture, INF⁴INiTY project aims at filling the gap for the design of applicable NID solutions in relation to and together with the TLP platform design that is being developed. The designs that will come out from the INF⁴INiTY project are:

- Floating substructure design that can accommodate NIDs solutions specifically chosen for the 3 study locations without affecting the substructure stability and compromising its physical integrity.

- Gravity anchor solution that can accommodate NIDs tailored for the 3 study locations and that do not affect the installation of the gravity anchor and without compromising its holding/bearing capacity.
- Scour protection solution focused on obtaining an armour layer grading that can accommodate the targeted species identified for the Scottish and Adriatic Seas and can promote the ecosystem recovery on the Baltic Sea.

As the treat to and concerns with ecosystem health has been increasing for the last decade by accelerated marine renewable planning and installation, the emerging codes of practice point out NID's, which is expected to evolve into a legislative requirement nationally and European scale given the future projection of FOW turbine capacity. On this trajectory, NID integration by/with the design of FOW turbine shall be the ultimate practice for FOW turbine applications. This vision of INF⁴INiTY project stands out as a unique selling point for generic FOW turbines and a unique selling point for the TLP's.

8.6.4 Market

The main stakeholders have been identified in Table 5. Table 17 below includes a summary of early adopters, market competitors and use model for KER 6. The design methodology and FEED from the INF⁴INiTY project can be employed or adapted by offshore technology developers as a guideline for the design of a FOW facility with integrated NIDs. Furthermore, the designs can be adopted during the tendering phase of FOW farms, thereby enhancing the sustainability of the project while simultaneously providing cost-effective and reliable engineering designs.

The provision and FEED design of integrated NIDs will instil confidence in the viability of NIDs for floating offshore wind in the minds of private investors, windfarm and grid operators, public funders and policy makers. NIDs can be an integral part of the design process and, ultimately, a new standard that will enable future wind farm developments to comply with country-specific and EU nature legislation, including the approval or inspection processes by environmental agencies.

The initial designs will target the European seas, demonstrated by application to the three characteristic locations defined in the project scope: (1) Scottish Sea, a morphologically-active sea basin with strong wind potential and challenging wave/current conditions, (2) Adriatic Sea, a biologically diverse sea basin with moderate wind and wave conditions, and (3) Baltic Sea, a semi-closed estuarine sea basin which suffers oxygen deficit in large depths, and with moderate wind and calm/moderate wave conditions.

With this approach, the solutions provided for the floating substructure can be applied to generic regions and can be adapted to meet the metocean conditions and DLCs in other locations. Similarly, the gravity anchor and associated scour protection is being developed for various seabed conditions and is designed using a modular approach that allows the design to be easily adapted to other sites. Likewise, the scour protection grading and composition is being adapted to the ecosystem of the above-mentioned study sites, but the methodology for defining the required characteristics is applicable to various other locations.

Early adopters	Competitors	Go to Market – Use model
The ever-accelerating growth in the offshore wind market of Scottish Sea makes this region the number one	The main competitors are engineering companies offering alternative solutions to FOW turbines,	[Confidential]



candidate for early adapting markets of the INF⁴INiTY designs. The UK aims to achieve 50 GW of total offshore wind capacity by 2030, with 5 GW dedicated to floating offshore wind (UK Government, 2022). Especially the East and South-East zone of the Scottish Sea, where the efficient wind power to be harnessed lays in deep-water areas with marine ecosystems under stress, will be the ideal commercial inauguration target. The ambitious offshore wind targets of Great Britain as well as growing interest of investors (FOW developers) combined with the concerns on increased environmental risks will facilitate an ideal means of market entry for INF⁴INiTY designs which will quench the need of NID integrated FOW turbines. Research community as well as engineering and consultancy practitioners of offshore industry are the other players in the market that are viable applicators of INF⁴INiTY designs.

The Scottish Sea market will be followed by the Dutch and German North Seas, where the investors and grid operators are already enforcing NID's in the design of subsea components for bottom-fixed offshore wind development. During the projected switch in the North Sea from bottom-fixed to floating solutions within the next 5-10 years (due to the increasing installation depth) utilization of INF⁴INiTY designs will be timely.

The Baltic Sea is estimated to follow the North Sea in terms of market entry for INF⁴INiTY innovations. The overall technical potential for offshore wind in the Baltic Sea is estimated at 93 GW, encompassing contributions from various countries such as Sweden (20 GW), Denmark (19.5 GW), and Poland (12 GW) (COWI, Thema Consulting Group, Ea Energy Analyses, 2019). This

[Confidential], have already installed pre-commercial wind farms. The main advantage of these companies is that they have demonstrated the viability of their design, from the engineering design to the operation of the wind farm on a small scale. It should be noted that all the turbines installed use slack mooring chains rather than TLP, which has a higher environmental impact on the seabed. Furthermore, none of these technical designs have integrated NIDs to mitigate the environmental impact. [Confidential]. Having NID features as an inherent part of the design for all substructure components, INF⁴INiTY approach offer an overwhelming advantage against its competitors.

highlights the substantial untapped opportunities in the region. Although the first floating wind investment is planned by Copenhagen Infrastructure Partners (CIP) near the Bornholm island as a precedent for large-scale floating wind in the region, it is estimated that it would 10-15 years before the FOW turbine installation in the Baltic. Mediterranean, particularly Adriatic and Aegean are virgin markets with great potential for FOW projects. Italy, Turkey and Greece are particularly ambitious for offshore wind and are willing to catch the curve. These regions also comprise high potential as a market for INF4INITY innovations, albeit not before two decades.

Table 17 KER 6 Market aspects

8.6.5 Intellectual Property Rights

The current IPR background and foreground has been summarized in the following table:

IPR Background	IPR Foreground
BM SUMER has developed several engineering tools for seabed-structure interaction problems related to offshore wind, such as the Scour Calculator, Wave Calculator, and Liquefaction Calculator. BM SUMER is bringing their engineering expertise, experience on one-to-one design practice, scientific/technical publications, research datasets, and other know-how on the table as the IPR background.	The IPR foreground for this project is the FEED of a FOW turbine for the floating substructure, gravity anchor and scour protection. Ownership and Protection: each partner will retain ownership of the individual developments they contribute to the project. These individual contributions will be protected through appropriate IPR mechanisms, such as copyrights or patents, depending on the nature of the innovation. License Agreement: license agreements of the FEED of the FOW turbine can be offered to FOW developers, operators and other key industry players. This provides them with access to the engineering design of the turbine for FOW farm tendering. Commercialization: the FEED design will be available for licensing to third parties, such as offshore wind developers, public agencies and other stakeholders, who will benefit from using design. The license model will include terms

that allow for scalability and revenue generation while ensuring that the partners retain control over the designs.

Future registration and use: as the FEED design is further developed and optimized, there may be opportunities for additional registrations or protection of new components. The IPR management strategy will evolve to address any new innovations, ensuring that both the tool and its enhancements are adequately protected and commercialized. Any know-how that will be publicly published as articles, reports, or guidelines shall be utilized and benefited indirectly by using it in the future designs and/or attracting new customers.

Table 18 KER 6 IPR

8.6.6 Actions

The key actions for the exploitation of KER 6 are:

1. Presentation of the different design and technological advancements in webinars and conferences. GICON and BM SUMER will promote the results through their existing clients which might not be included in the stakeholder database.
2. Licensing of the FOW turbine substructure, anchoring and scour protection designs for the protection of intellectual property.
3. Look for further national or EU funding projects to tackle the knowledge gaps that were not able to perform in INF⁴INiTY project.
4. BM SUMER will organize a dedicated two-day short course titled “Nature-inclusive scour protection design for new generation offshore wind structures” for participants from academia and industry, during which the INF⁴INiTY innovations will be delivered.

8.6.7 Roles

BM SUMER has clients in offshore wind market ranging from investors (such as TSO) to contractors, for whom BM SUMER carries out design and consultancy work on an ongoing basis. BM SUMER also regularly carries out training activities for practitioners from industry and early-career academics.

GICON, has clients in Malaysia for deployment options, where the methods and concepts (lessons learned) from INF⁴INiTY project can be utilized. Also involving in offshore tendering process in the EU Regions to deploy this design as pilot project.

8.6.8 Milestones

The list of the milestones and KPIs to be used for monitoring the implementation of the actions is listed below.

1. Organizing a dedicated short course or participants from academia and industry (6 months following the project) .
2. Sharing FEED design with the research community and industrial partners. (1 year following the project).
3. Receive feedback from potential users (1.5 years following the project).

4. Extend the project to Certification.
5. Extend the project to EPC (Engineering, Procurement and Construction) level.
6. Extend the project to pilot scale and eventually commercial scale.
7. BM SUMMER services update.

The project aims to initiate collaborations with at least:

- Two FOW farm developers to adopt the technological solutions develop within the project.
- Two public/government agencies aiding them in defining the methodology and requirements for FOW turbine design for including NIDs solutions at the floating substructure, gravity anchor and associated scour protection.
- Two certification bodies, aiding in defining NID integration in the structural design of a floating offshore wind turbine part of the engineering standards, focusing on the structural, hydrodynamic and geotechnical analysis of the structure including NID.

8.6.9 Financial cost

[Confidential]

8.6.10 Other sources of coverage

Mostly partners own budget used during promotion of the new designs in presentations/publications. Additionally, partners may invest in developing the resulting FOW turbine design beyond TRL 5. Timing is critical in securing financial resources. Grants or incentives should be sought early in the project to cover research and development (R&D) costs, while risk capital or loans can be utilized closer to the commercialization stage to scale up production. Also, national or regional incentives targeting renewable energy and marine conservation sectors can provide additional funding opportunities to lower the financial burden.

8.6.11 Impact in 3-year time

The development and implementation of FOW turbine including NID solutions will create new job opportunities across various sectors. These include marine engineering, environmental consulting, manufacturing of NID components, and monitoring of marine ecosystems. Additionally, skilled positions in research, development, and ecological assessment will emerge as NID becomes more integrated into offshore wind projects, driving employment in both the renewable energy and environmental sectors.

Beyond economic growth, the NID approach contributes significantly to societal well-being by improving marine biodiversity and enhancing the sustainability of offshore energy production. Healthier ecosystems provide a range of ecosystem services, including habitat restoration, which benefit coastal communities and the global environment, and tourism. The increased generation of renewable energy from OWF, bolstered by NID, will also reduce greenhouse gas emissions, contributing to climate change mitigation and energy transition goals.

8.7 KER 7 Marine spatial use reduction by FOW

KER 7 is about the innovations around the optimization of the Marine Spatial Use in FOW farms.

8.7.1 Problem

DNV describes in its report Oceans Future to 2050 (DNV, 2021) that there will be a need for an ocean area 9 times as large as today, in order to meet the prospects for ocean energy and aquaculture. There will be large overlapping interests in the same area, between the various marine industries. It is interesting to consider that there are several processes taking place around offshore wind and fisheries today in Europe together with other conflicts with the blue economy sector.

An innovative use of the marine space will support the coexistence of blue economy sectors with FOW and reduce the footprint of commercial farms.

8.7.2 Alternative solution

Marine spatial planners are providing administrative and technical support to countries in implementing the Marine Spatial Planning (MSP) legislation to reduce conflicts, protect the environment and encourage investment. There is a minimum distance between wind turbines currently applied to the marine areas. This distance could be reduced through KER 7.

8.7.3 Unique selling point

The TLP design will in general use less space compared to the present SEMI solutions since the mooring lines for TLP are vertical. The integration of NIDs solutions will also be favourable for the other marine industries and ecosystems.

8.7.4 Market

The main stakeholders have been identified in Table 5. The following table includes a summary of early adopters, market competitors and use model for KER 7.

Early adopters	Competitors	Go to Market – Use model
Early adopters would be environmental conscious energy developers and governmental institutions aiming to balance energy production with marine conservation. Research organisations, i.e. SINTEF would use the results in further research topics.	Other floating wind developers Research community Industry and value chain (FOW developers)	[Confidential]

Table 19 KER 7 Market aspects

8.7.5 Intellectual Property Rights

The current IPR background and foreground has been summarized in the following table:

IPR Background	IPR Foreground
The different partners collaborating in the project own their specific models that have already been registered.	The foreground will include newly developed NID solutions that can be integrated into floating platforms. The plan is to develop a TLP FOW turbine substructure design including ARS and design guidelines for FOW turbine developers on how to include ARS and NIDs

during their design process. The IPR is described in previous KERs.

Table 20 KER 7 IPR

8.7.6 Actions

The key actions for the exploitation of KER7 are:

1. The Norwegian Ocean Technology Centre: SINTEF is together with NTNU - Norwegian University of Science and Technology developing the Norwegian Ocean Technology Centre that will develop new knowledge and technology with the ocean being the common denominator. This will include educating engineers and researchers, basic research, commissioned research and test assignments for Norwegian and international trade and industry. The Centre will be operating from 2028 and the innovations and learnings from INF4INITY will be the basis for new research initiatives
2. EERA DeepWind conference: SINTEF Ocean is involved in EERA JP Wind and coordinating the sub-program Sustainability and Circularity. The EERA DeepWind conference takes place every January in Trondheim, Norway. EERA DeepWind is an international event aiming to present the best ongoing research and innovation related to deep sea OWF, both bottom-fixed and floating. The conference has been developing every year since 2004 and is established as an important venue on deep sea offshore wind R&D organized by SINTEF, NTNU and EERA JP wind. Among other topics, the conference focuses on societal impact, controversies and regulatory framework and environmental impact of offshore renewables where the INFINITY results would fit in.
3. SINTEF co-hosting events: The Centre for the Ocean and the Arctic is appointed by the Norwegian Government to compile, analyse and communicate knowledge about the blue economy. The ambition is to contribute to greater value creation and sustainable development of existing and novel blue business. The chief task is to create a solid knowledge base for decision-makers, businesses, and the Norwegian people. This will enable SINTEF to leverage the growth potential of ocean-based enterprise, identify bottlenecks, and create synergies. Through reliable knowledge, partnerships, and open social discourse, we will find the solutions of the future. Hence, collaborating with this centre would be a good basis for sharing results from our project. SINTEF has already co-hosted events together with this centre focusing on Coexistence and sustainability.
4. Reach policy makers.
5. Updated SINTEF consultancy services.
6. Search for research funding and collaborations to apply findings.

8.7.7 Roles

SINTEF is leading the exploitation of KER 7, but all the partners will be involved in the exploitation.

8.7.8 Milestones

The list of the milestones and KPIs to be used for monitoring the implementation of the actions is listed below.

1. Share results with the research community and industrial partners.
2. Dedicated sessions at relevant conferences, i.e DeepWind 2028.
3. Webinars in the last part years of the project.
4. Extend the project to Detail Design Engineering.

5. Extend the project to pilot scale.
6. SINTEF to update catalogue of services.

8.7.9 Financial cost

An approximate cost for communication and dissemination activities regarding multiuse of the oceans during the first 3 years after the end of the project could be in the order of [Confidential].

The cost for development of DDE is covered by KER 2.

8.7.10 Other sources of coverage

There will be resources needed to bridge the investment needed to increase the TRL and ensure that the results are used. Typically, industry partners own budget used during promotion of the new designs in presentations/publications. The research partners like SINTEF need to develop new research projects to build on the INF4INITY results to further develop new knowledge.

8.7.11 Impact in 3-year time

The marine spatial use reduction caused by the development of FOW can have significant impacts on various sectors and ecosystems in the future. As offshore wind energy continues to expand to meet global renewable energy goals, its influence on marine space and activities will likely intensify. There some are key aspects in terms of the space used and the related impacts including the impact on fishing, shipping and navigation, aquaculture, marine biodiversity and communities. KER 7 will contribute to the reduction of the footprint of FOW with all the impact associated to this action.

9 Conclusions

The INF4INITY project has identified and defined an ambitious set of exploitation objectives, covering new designs, methodologies and data to improve the performance of FOW, the reduction of the possible impacts of FOW on protected habitats and species, the increase of the sustainability of FOW technologies and the improvement of the marine space use. The exploitation strategy and roadmap developed by D8.3 will help promote the products, tools and data for use beyond the end of the project and help partners define what they own and will continue to exploit. INF4INITY's innovative KERs contribute to the development of FOW in harmony with other marine activities, ecosystems and communities as well as with fostering stakeholder collaboration. Clear pathways for the exploitation of this project will be critical to support the mitigation of marine spatial conflicts and maximise socio-economic benefits.

INF4INITY aims to achieve most of the exploitation objectives described in D8.3 and is already contributing to the next generation of projects and products for the FOW sector.

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