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|  | **Collaborative Innovation Group Project Idea** **(OPIN Partner-led)** |
| **Date: 18/08/2020** | **Project name: Corrosion Monitoring for Ocean Energy Devices****Document prepared by: Sirris** |
| 1. **Challenge / Opportunity to be explored by the group**

**Challenge** = high impact of corrosion on LCoE + high cost of inspection due to difficult access and limited windows of opportunity**Opportunity** = availability of sensor technology, technology for data transmission and data analysis opens opportunity for remote monitoringTo pave the way to start making full use of the opportunity offered by remote monitoring and build a strong business case showing how remote monitoring can reduce the LCoE of ocean energy devices, the following areas need to be explored:(1) Clearly define the inspection and maintenance challenges faced by asset owners and expectations with respect to corrosion monitoring.(2) Identify existing sensor technologies, with their benefits, drawbacks and technological limitations in relation to the harsh environment in which they are to be deployed (need for maintenance and calibration, durability, accuracy and reliability).(3) Define how an optimal monitoring strategy can be determined depending on the type of device and what elements need to be taken into account (environment, device design, distance from shore, general corrosion management strategy, etc.).(4) Determine what steps need to be taken for monitoring data to meet the expectations defined under (1). (e.g. more reliable sensors, decision support tools, better solutions for data transmission, integration with corrosion modelling and digital twin solutions, integration with structural health monitoring/calculations, etc.)(5) Explore what the cost drivers are for corrosion monitoring (hardware, installation, maintenance, software, etc.). |
| 1. **Current Position (i.e. legislation, research available)**

Corrosion monitoring has traditionally not been used in offshore construction such as O&G platforms, due to the very different nature of their exploitation and different economics. First steps towards corrosion monitoring have however been taken in fixed offshore wind in the last few years (following the highly successful implementation of structural monitoring).Sensor technology to monitor corrosion directly, as well as the corrosive conditions in the environment, are available from the process industry and water monitoring practices (e.g. ocean observations, fresh water monitoring), as well as from other sectors. The ocean energy sector could learn from the pioneering work of the fixed offshore wind sector. There are still gaps in the available technology (sensors, data analysis, data transmission, etc.). Identifying these will show what opportunities there are for the value-chain to create more added value. |
| 1. **Proposed Activities**

Scope: Focus on corrosion of (painted) steel structures**Activities with a collective benefit for the ocean energy sector and value-chain:*** Identify **needs and expectations** of TEC, WEC and floating wind developers/owners (based on surveys and interviews);
* State-of-the-art report on **current practice in fixed offshore wind** (based on desktop research and contacts with fixed offshore wind sector);
* Make an overview of **existing sensor technology** that could be suitable for offshore corrosion monitoring, with benefits, drawbacks and limitations (desktop research);
* Define challenges related to **sensors integration** in a remote, offshore device, including installation, maintenance and data collection and transfer (in discussion with device owners and the corrosion monitoring value chain);
* Identify potential **economic benefits** of corrosion monitoring in terms of a reduction of LCoE (in discussion with device owners);
* Identify remaining **technology gaps** that are barriers to implementation of corrosion monitoring;
* Build consortium to tackle potential technology gaps and search for opportunities to start a **demonstration project** (including potential funding).

**Activities focussed on a specific use-case:**CIG partners will be encouraged to go one step further and work together on a specific use-case. The outputs from the collective activities could then be translated to a certain device type. A case specific corrosion monitoring strategy can be developed, and the business case and valorisation potential discussed. This could form the ideal preparation for a demonstration project. |
| 1. **Potential Outputs**
* Report with requirements, needs and expectations for corrosion monitoring in wave, tidal and floating wind energy devices;
* State-of-the-art report:
	+ Lessons learned from fixed offshore wind
	+ Existing sensor technology
	+ Information on durability and reliability of sensors, maintenance needs
* Guidelines/information on sensor integration;
* Identification of potential economic/technological benefits of remote monitoring (insights in the use of data: how to use the data in decision support, planning of inspections, design validation, lifetime estimations, etc.)
* Insights in methods, technologies and strategies most effective for corrosion monitoring;
* Preparation for a case specific demonstration project.
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| 1. **Cross-sector collaboration opportunities**
* Ocean Energy can learn from experiences in fixed offshore wind;
* Initiate collaboration between ocean energy value-chain and the wider sensing and Internet of Thing (IoT) sector;
* A need to analyse large amounts of data will require links with data analytics and Artificial Intelligence (AI) sector/value-chain;
* Possible links with the space sector for data transmission using satellites.
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| 1. **Lead OPIN partner**

Name: SirrisLocation: BelgiumExpertise: Extensive expertise with structural health monitoring through OWI-Lab (<https://www.owi-lab.be/>). Involved in a number of national and international projects with a focus on corrosion monitoring (SOCORRO, Praktijklab Corrosie&Isolatie, MaxWind). Strong international network with links to major sensor suppliers, relevant research institutes as well as TEC developers and wind farm owners. |
| 1. **Details of organisations needed to tackle the project**
* WEC, TEC and floating wind device owners or developers;
* Developers of corrosion or environmental sensor technology (or with expertise to develop them);
* Companies providing solutions for data transmission (from remote offshore locations);
* Companies/organisations with activities in corrosion management, corrosion modelling and/or data analysis (or interested in developing such activities and with necessary expertise to do so);
* Test sites.
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| 1. **Details of organisations roles in the project**

**(1) WEC, TEC and floating wind device owners or developers:** define needs, experience and technical specifications (what is/isn’t possible, requirements with respect to maintenance, etc.); provide the case for a demonstration project.**(2) Developers of corrosion or environmental sensor technology:** provide input on existing sensor technology (durability, maintenance, cost, installation), discuss technological feasibility to fill potential gaps in sensor technology.**(3) Companies providing solutions for data transmission:** work with (1) and (2) to discuss data transmission from offshore locations.**(4) Companies/organisations with activities in corrosion management, corrosion modelling and/or data analysis:** Work with (1) and (2) to discuss how an effective corrosion monitoring strategy can be developed and how data can be harnessed to effectively manage corrosion and reduce the LCoE.**(5) Test sites:** discuss the potential for early testing, provide expertise on data collection and transfer from past testing. |
| 1. **Contact – Expression of interest**

Organisations interested in participating in this CIG should submit an expression of interest (EoI) to OPIN@seai.ie by 21st of September 2020. Please use the template available on the next page.OPIN Partners will review all EoI submitted and inform organisations who submitted and EoI of the next steps for this CIG. For more information on the CIGs, please refer to this [webpage](https://www.nweurope.eu/projects/project-search/opin-ocean-power-innovation-network/#tab-5). OPIN Privacy Notice is available on the OPIN [website](https://www.nweurope.eu/media/6682/opin_privacy-notice.pdf). |

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|  | **Expression of Interest** |
| **Name of organisation:****Name of contact point within organisation:****Role of contact point within organisation:****Email of contact point within organisation:****Date:** **Organisation type (please tick as appropriate):**[ ]  Consultancy or engineering company[ ]  Offshore renewable energy technology or project developer[ ]  Public sector organisation[ ]  Research performing organisation or academic institute[ ]  Supply chain company[ ]  Other – Please specify: **Is your organisation an SME (Y/N):** |
| **Please provide a brief description of your organisation (200 words max):** |
| **Please list the CIG activitie(s) your organisation would like to contribute to (Section 3):** |
| **Please list the CIG output(s) your organisation would be interested in (Section 4):** |
| **Please list the CIG activities and outputs you would like to see added to this CIG (if any):** |
| **Please detail the role your organisation could play in the CIG (Section 8):** |