



ENVIRONMENTAL MANAGEMENT PLAN

Deliverable n°: D7.5



EC-GA n°

295977

Project full title:

Demonstration of two floating wind turbine systems for power generation in Mediterranean deep waters

Deliverable N° D7.5

Document name: Environmental Management Plan

Responsible Partner: RSK

Due Date of Deliverable: December 2015

WP: 7

WP leader: RSK

Task: W7.5

Task leader: David Watson

Version: 00

Version date: November 2015

Written by: Anastasia Polyakova

Checked by: Rachel Bendell

Approved by: David Watson

Dissemination level:

Document history:

Version	Date	Main Modification	Written by	Checked by	Approved by
00		First draft	Anastasia Polyakova	Rachel Bendell	David Watson

TABLE OF CONTENTS

1. Executive Summary	3
2. Definitions	4
3. Introduction	5
3.1 PURPOSE OF THE EMP	5
3.2 SCOPE OF THE EMP	6
3.3 ENVIRONMENTAL MANAGEMENT INTERFACES	6
4. Project Information	7
4.1 PROJECT DESCRIPTION	7
4.2 SITE LOCATION	8
4.3 PROJECT PROGRAMME	9
5. Policy, Legal and Administrative Framework	11
5.1 APPROVAL CONDITIONS	11
5.2 COMPULSORY LICENCES	11
5.3 OTHER APPLICABLE LEGISLATION	12
5.4 INTERNATIONAL GUIDELINES	12
6. Roles and Responsibilities	14
7. Environmental Specifications: Detailed Design Phase	16
7.1 DETAILED DESIGN OF THE PROTOTYPE	16
7.1.1 GENERAL REQUIREMENTS	16
7.1.2 SAFETY FEATURES	16
7.1.3 FURTHER SECURITY REQUIREMENTS	16
7.2 MICROSITING	17
7.2.1 GEOPHYSICAL REVIEW	17
7.2.2 CULTURAL HERITAGE REVIEW	18
7.3 PROJECT SCHEDULE	18
7.4 TRANSPORT ROUTE	18
7.5 ADVANCE NOTICE TO PUBLIC	19
8. Environmental Specifications: Assembly and Installation	20
8.1 ONSHORE ENVIRONMENTAL MANAGEMENT	20
8.1.1 SHIPYARD ACTIVITIES	20
8.1.2 FABRICATION OF CONCRETE FLOATING PLATFORM	20
8.2 COMMUNITY RELATIONS AND NOTIFICATIONS	21
8.3 GENERAL REQUIREMENTS FOR VESSELS	21
8.4 NAVIGATIONAL SAFETY	22
8.5 MARINE POLLUTION PREVENTION	22
8.5.1 AIR EMISSIONS	23
8.5.2 NOISE AND VIBRATION	23
8.5.3 FUEL AND CHEMICAL STORAGE AND HANDLING	23
8.5.4 OIL SPILL CONTINGENCY PLAN	24
8.6 MANAGEMENT OF OFFSHORE WASTES AND DISCHARGES	25
8.6.1 SOLID WASTE	25
8.6.2 VESSEL DISCHARGES	25

8.7 SCOUR PROTECTION MANAGEMENT PLAN.....	26
8.8 MARINE ECOLOGY	27
8.8.1 PHYTOPLANKTON.....	27
8.8.2 MARINE MAMMAL MANAGEMENT	27
8.8.3 INVASIVE SPECIES.....	27
8.8.4 ECOLOGICAL MONITORING.....	28
8.9 CULTURAL HERITAGE MANAGEMENT	28
8.10 EMERGENCY RESPONSE PLAN	28
9. Environmental Specifications: Operation (Testing).....	30
9.1 COMMUNITY RELATIONS	30
9.2 NAVIGATIONAL RESTRICTIONS.....	30
9.3 MARINE POLLUTION PREVENTION	30
9.4 WASTE AND DISCHARGES MANAGEMENT	30
9.5 SCOUR PROTECTION MANAGEMENT PLAN.....	31
9.6 MARINE ECOLOGY	31
9.7 EMERGENCY RESPONSE PLAN	31
10. Environmental Specifications: Decommissioning.....	32
10.1 GENERAL REQUIREMENTS.....	32
10.2 EMERGENCY RESPONSE PLAN	33
11. Environmental Monitoring Programme.....	34
11.1 GENERAL REQUIREMENTS.....	34
11.2 PRE-CONSTRUCTION SURVEYS	35
11.2.1 ESTABLISHING BASELINE CONDITIONS.....	35
11.3 INSTALLATION MONITORING	35
11.3.1 SHIPYARD RUNOFF MONITORING.....	35
11.3.2 MARINE MAMMALS OBSERVATION	35
11.3.3 POST-INSTALLATION SURVEY	36
11.4 DECOMMISSIONING MONITORING	36
11.5 REPORTING	36
11.6 KEY PERFORMANCE INDICATORS	36
12. Environmental Awareness and Training	38
13. Verification Inspections and Audits	39
14. Action Tracking System (ATS)	40
15. Record Keeping	41
16. References.....	42
Appendix A: Environmental Mitigation Measures and Commitments	43
ENVIRONMENTAL MITIGATION MEASURES.....	43
ENVIRONMENTAL COMMITMENTS.....	44
Appendix B: Approval Conditions.....	47
TESTING OF FLOATING WIND TURBINES AT SEM-REV SITE.....	47
NAVIGATION AT SEM-REV SITE	48
MARKING AND LIGHTING OF WIND TURBINES	48

1. EXECUTIVE SUMMARY

The FLOATGEN project's (Project) objective is to demonstrate the technical and economic viability of floating wind turbines, in order to expand the development potential of offshore renewable energy into windier and deeper waters that are not currently considered commercially viable. A test site (SEM-REV) has been allocated by Ecole Centrale de Nantes (ECN) on the French Atlantic coast offshore from the city of Le Croisic.

This document summarises key measures that are required to be implemented at different stages of the FLOATGEN project in order to:

- minimise or avoid negative impact on the environment and the local community
- realise and enhance any positive impacts on the environment and the local community.

2. DEFINITIONS

ATS	action tracking system
Contractors	includes any construction and maintenance contractors and their subcontractors
ECN	Ecole Centrale de Nantes
EHS	environment, health and safety
ERC	environmental response crew
FLO	Fisheries Liaison Officer
IMO	International Maritime Organisation
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978
MEC	marine energy converter
MMO	marine mammal observer
OSCP	Oil Spill Contingency Plan
Project	assembling and testing of the FLOATGEN prototype
prototype	in the context of FLOATGEN project, a demonstrator floating 2MW Gamesa wind turbine installed on Ideol's ring-shaped floating foundation, which will be installed at SEM-REV test site
SEM-REV	an offshore test site 12 nautical miles off the coast of Le Criosac, France, operated by ECN
SOPEP	Ship Oil Pollution Emergency Plan

3. INTRODUCTION

3.1 PURPOSE OF THE EMP

The FLOATGEN project's objective is to demonstrate the technical and economic viability of floating wind turbines, in order to expand the development potential of offshore renewable energy into windier and deeper waters that are not currently considered commercially viable. A test site (SEM-REV) has been allocated by Ecole Centrale de Nantes (ECN) on the French Atlantic coast offshore from the city of Le Croisic, where a prototype floating wind turbine will be installed and tested. See more detailed description of the FLOATGEN project in Chapter 4 'Project Information'.

The FLOATGEN project is subject to SEM-REV facility requirements, presented in D4.5 'SEM-REV Test Site Requirements' (ECN, 2014) and mitigation measures identified in SEM-REV EIAs (CREOCEAN, 2010; 2013), summarised in Appendix A: Environmental Mitigation Measures and Commitments, as well as applicable local, national and international legislation and regulations, and codes and practices that specify design, construction, operation and decommission requirements.

In particular, the goals of this EMP are to:

- help FLOATGEN project:
 - o avoid or mitigate detrimental environmental and social impacts
 - o realise and enhance positive social and environmental impacts
- provide a mechanism for FLOATGEN project to achieve compliance with the SEM-REV test site requirements and legal obligations
- describe requirements that all Project personnel including Contractors shall meet, as applicable, to ensure that all relevant commitments made in the EIA are fully implemented.

As such, the objectives of the FLOATGEN EMP are to:

- summarise regulatory requirements
- allocate requirements and commitments into the project phases as described in the sections below

- describe how adherence to the commitments will be monitored and audited
- describe how non-conformances will be reported and addressed.

The EMP is a 'live' document likely to evolve as the project progresses, consistent with continual improvement approach of ISO 14001, the international environmental management system standard.

3.2 SCOPE OF THE EMP

This EMP covers the following stages of FLOATGEN project, which are:

1. Detailed design
2. Installation (assembly at the shipyard, transportation to the mooring site, connection to export cable)
3. Operation (testing) and
4. Decommissioning.

Outside of the scope of this EMP are the following activities:

- design and fabrication of the wind turbine tower, nacelle and blades, dynamic cable, anchor, mooring lines and other components of the test prototype
- transportation of wind turbine components to and from the shipyard by road
- recycling or disposal of the prototype structures once they have been decommissioned and delivered back to the shipyard.

3.3 ENVIRONMENTAL MANAGEMENT INTERFACES

The regulatory requirements and commitments made in the offshore test site EIA are being managed by SEM-REV through the development of an Environmental Management Plan (SEM-REV EMP). FLOATGEN, as a user of the SEM-REV facility, shall comply with applicable requirements of the SEM-REV EMP which have been incorporated into this FLOATGEN EMP.

4. PROJECT INFORMATION

4.1 PROJECT DESCRIPTION

The FLOATGEN project's objective is to demonstrate the technical and economic viability of floating wind turbines, in order to expand the development potential of offshore renewable energy into windier and deeper waters that are not currently considered commercially viable.

A schematic of the proposed prototype floating wind turbine developed by French company Ideol is shown on Figure 4-1. The floating foundation of the turbine comprises a square-shaped concrete platform with a central opening, and is attached to the seabed via anchors and catenary mooring lines. An adaptation of Gamesa 2MW wind turbine is affixed to the floating foundation. A dynamic cable transmits the generated electricity to a sub-sea junction box, which passes the electricity onshore via a sub-sea static cable.

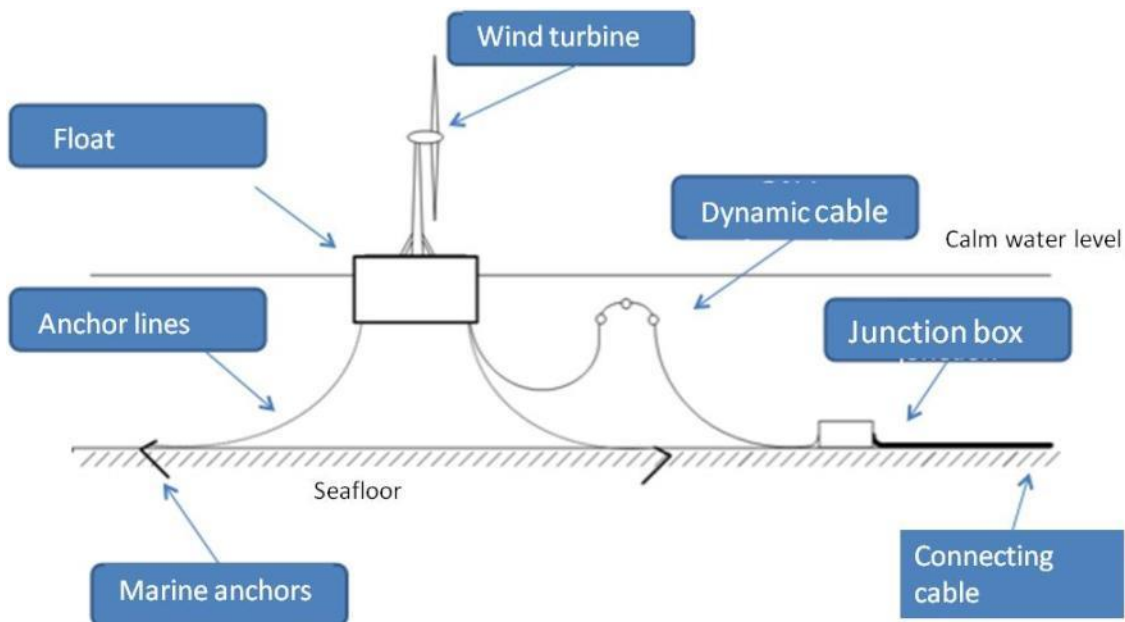


FIGURE 4-1: SCHEMATIC OF A FLOATING WIND TURBINE (CREOCEAN, 2013)

4.2 SITE LOCATION

A test site (SEM-REV) has been allocated by Ecole Centrale de Nantes (ECN) 12 nautical miles from the city of Le Croisic on the French Atlantic coast (Figure 4-2). The SEM-REV test site consists of a 1km² offshore zone, a high voltage electrical export power cable, a subsea connection system, and an onshore electrical substation connected to the national grid.

The demonstrator floating 2MW wind turbine will be installed at the SEM-REV site by Ideol in 2016 as part of the FLOATGEN project. Ideol’s foundation will be manufactured by Bouygues Travaux Publics in the port of Saint Nazaire.

It is anticipated that other floating marine energy converter (MEC) technology developers will apply to ECN to use the SEM-REV test site in the future. The site is also able to accommodate wave energy converters, and there are plans to install two devices in 2016.

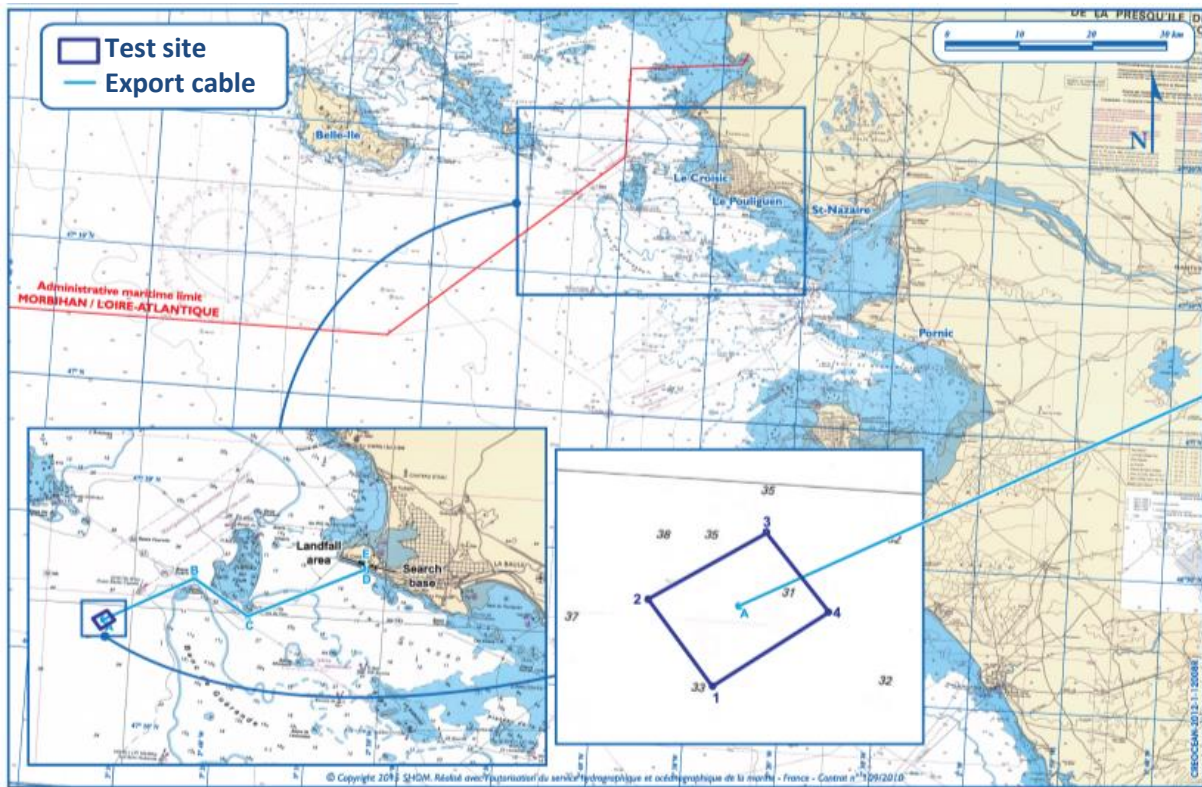


FIGURE 4-2: SEM-REV TEST SITE LOCATION (CREOCEAN, 2013)

4.3 PROJECT PROGRAMME

For the purposes of this EMP, the FLOATGEN project will entail the following activities:

1. Detailed design in accordance with test site requirements (ECN, 2014), including
 - a. Selection of mooring design
 - b. Selection of materials for system components
 - c. Design of dynamic cable connecting the MEC to the SEM-REV static export cable via the subsea termination unit, including the umbilical configuration and the corresponding ancillary equipment
 - d. Optimisation of installation timing
 - e. Sea floor survey (e.g. geotechnical survey for anchor placement, cultural heritage, ecology, etc.)
 - f. Selection of biofouling coatings for sub-sea structures (if required)
 - g. Cathodic protection design (if required)
2. Installation
 - a. Fabrication of concrete floating platform at the port. Load-out of the platform using a slipway, heavy lift crane or by flooding the dry dock (if used)
 - b. Installation of the turbine tower onto the platform, assembly of nacelle and blades onto the tower using onshore crane
 - c. Installation of anchors and moorings using an anchor handling tug and a remotely operated underwater vehicle (ROV)
 - d. Construction of scour protection
 - e. Installation of dynamic cable using a cable lay vessel
 - f. Transportation of the fully assembled platform and turbine to the mooring site using a tugboat
 - g. Connection of the prototype to moorings and dynamic cable
 - h. System test and commissioning
3. Operation (testing of prototype)
 - a. Testing routines and monitoring. Access by test operatives may be required but mostly completed remotely

- b. Routine preventative maintenance carried out in accordance with manufacturer's recommendations every six months. Turbine accessed by a crew transfer vessel
 - c. Unplanned maintenance in case of equipment failure on an ad hoc basis. For major repairs (e.g. change of gearbox) the structure (float and turbine) is disconnected from moorings and dynamic cable and towed back to port by a tugboat
4. Decommissioning
- a. Dismantling and removing the wind turbine and float and transportation to port using a tugboat
 - b. Complete removal of all above seabed structures, including marine anchors, moorings and dynamic cable.

5. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

5.1 APPROVAL CONDITIONS

The FLOATGEN project will be managed in accordance with:

- The applicable requirements of the approval for testing of wind turbines on the SEM-REV test site, as issued on the 23 December 2013 (2013/BPUP/099)¹ (see Appendix B: Approval Conditions)
- Arrêté n°2014/022 regulating the navigation, station-keeping, mooring, trawling, dredging and diving on the SEM-REV site and over a portion of SEM-REV export cable layout
- Arrêté du 13 novembre 2009: Decree taken by the prefect concerning the wind turbine marking application
- Décision ministérielle du 16 mai 2013: Ministerial decision taken the 16/05/2013 concerning the experimental wind turbine marking
- Generic environmental measures identified in the EIAs for the SEM-REV test site (CREOCEAN, 2010; 2013) (see Appendix A Environmental mitigation measures)
- Specific environmental commitments summarised in the 'SEM-REV Test Site Requirements' report (Deliverable n°: D4.5, 15 November 2014) (see Appendix A Environmental commitments)
- The SEM-REV EMP.

5.2 COMPULSORY LICENCES

FLOATGEN is responsible for securing all applicable licences and shall provide a copy of these licences to SEM-REV prior to commencement of installation as stated in Section 6.2.5 of D4.5 SEM-REV Test Site Requirements (ECN, 2014). These mandatory licences include, but may be not limited to, the following:

1. Construction license

¹ Arrêté n°2013/BPUP/099: authorizes the Ecole Centrale de Nantes to extend the SEM-REV test site to include the use of Floating Wind Turbines offshore of the territory belonging to Le Croisic municipality.

2. Airfield license: The MEC must meet the requirements of the Civil and Military Agencies for safety during transport to site
3. Maritime transport license: the prototype must meet the requirements of the Maritime & Coastguard Agency and other regulatory requirements for navigational safety during transport to site and operation on site
4. Sea operation license: the prototype must meet the requirements of the Maritime & Coastguard Agency and other regulatory requirements for navigational safety during its operation and comply with safety rules for offshore platforms
5. Decommissioning license: a commitment to decommission the prototype in addition to securing financial resources to fund decommissioning
6. HSEQ management plan application: FLOATGEN shall return a signed version of the QHSE management plan provided by SEM-REV (it will be included in the forthcoming deliverable D5.3)

5.3 OTHER APPLICABLE LEGISLATION

The project, all its contractors and subcontractors shall conduct their activities in compliance with national and international law. Of particular relevance to the project are:

- The water act (loi sur l'eau) relative to water protection is part of the environmental code (code de l'environnement) under article L214-1. Detailed rules for the application of this law are notified in article R 214-1
- International Convention for the Prevention of Pollution from Ships (MARPOL)
- International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM)
- Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention')
- United Nations Convention on the Law of the Sea (UNCLOS).

5.4 INTERNATIONAL GUIDELINES

Although not a commitment, the project shall endeavour to adopt, as far as practicable, the recommendations of the following international guidelines as a matter of good practice:

- IFC General Environmental, Health and Safety (EHS) Guidelines
- IFC EHS Guidelines for Wind Energy
- EBRD Environmental and Social Guidelines.

6. ROLES AND RESPONSIBILITIES

The following roles have been identified as key to the implementation of this EMP. Provisional description of their responsibilities in relation to environmental management is described below.

SEM-REV test site manager is responsible for

- specifying requirements for users of SEM-REV site
- defining and implementing long-term monitoring programme of test site and associated infrastructure, including static cable layout survey, cable electromagnetic field survey, protection mattress position survey, acoustic survey in accordance with the SEM-REV EMP
- control of chemicals and materials used on site.

FLOATGEN project manager is responsible for:

- providing overall direction on environmental management
- ensuring adequate resources are available for implementation of this EMP.

FLOATGEN environmental manager is responsible for:

- securing all necessary permits and licenses prior to commencement of each project phase
- environmental performance including ensuring compliance with legal, contract and other requirements
- preparation of and environmental documentation required by this EMP
- review and approval of contractor's environmental management arrangements to ensure they include the requirements of this EMP
- monitoring of implementation of this EMP
- communicating contents of this EMP to contractors and training them to ensure they understand their responsibilities with respect to environmental performance.

Construction contractor is responsible for

- confirming all necessary construction permits and licenses have been obtained prior to commencement of construction
- developing technical procedures, method statements and any environmental documentation required by this EMP associated with the assembly of the prototype,
- monitoring implementation of and adherence to relevant requirements of this EMP
- ensuring non-conformances are reported to the environmental manager and dealt with effectively
- conducting construction monitoring where necessary.

Fisheries liaison officer (FLO) is responsible for:

- ensuring effective communication between the fishermen and the project
- ensuring the timely provision of information regarding planned offshore activities, vessel movements or delays in the project area and its surroundings
- facilitating dissemination of project information of direct relevance to fishing vessels, such as urgent bulletins in the event of any emergency, presence of marine hazards (e.g. unmarked underwater structures, loss of plant onto the seabed etc).

7. ENVIRONMENTAL SPECIFICATIONS: DETAILED DESIGN PHASE

7.1 DETAILED DESIGN OF THE PROTOTYPE

7.1.1 GENERAL REQUIREMENTS

FLOATGEN shall provide the following details concerning the prototype to SEM-REV for review and approval:

1. A complete description of the test prototype and its components
2. Information on the method for anchoring the prototype along with an assessment of scour risk. Anchors selected must be assessed to be the least detrimental to hydrodynamics and wildlife
3. List of proposed chemicals to be used. Any fluids used will be biodegradable and assessed as least toxic to the environment. Choice of antifouling and anticorrosion materials must be based on their toxicity, or by preferentially limiting the requirement for such materials through design
4. Prototype machinery maintenance requirements (frequency, type, offshore/onshore)
5. Methodology for installing, removing and ultimately disposing of the prototype, including provisions for recycling of materials.

7.1.2 SAFETY FEATURES

The prototype wind turbine will be designed in compliance with prefect decree 13/11/2009 (Arrêté du 13 novembre 2009) and ministerial decision 16/05/2013 (Décision ministérielle du 16 mai 2013) concerning safety marking of offshore wind turbines.

An individual Automatic Identification System (AIS) will be installed on the prototype allowing continuous monitoring of its position.

7.1.3 FURTHER SECURITY REQUIREMENTS

SEM-REV is currently reviewing security requirements for the prototype. Once the requirements listed below are established, SEM-REV will communicate them to FLOATGEN. These requirements

will be incorporated into this EMP and other relevant documents and implemented throughout the FLOATGEN project. The security requirements under review are as follows:

1. Navigation Standards
 - a. Security equipment required onboard professional vessels (within 20 nautical miles)
 - b. Individual protection equipment for sailors
2. Offshore platforms Standards
 - a. Safety equipment required on board offshore platforms (such as life raft, crane)
 - b. Necessary accesses and exit to offshore platforms (personnel access from crew boat to boat landing, main and secondary ladders)
 - c. Security equipment required for transfer from crew boats to the floater
 - d. Necessary certificates of the crew (diploma, Individual Survival Techniques)
3. Wind Turbine Standards
 - a. Individual protection equipment required inside a wind turbine
 - b. Protection equipment integrated in a wind turbine
 - c. Necessary accesses and exit for a wind turbine.

7.2 MICROSITING

7.2.1 GEOPHYSICAL REVIEW

Selection of anchors for mooring of the floating platform will depend on the characteristics of the seabed at the proposed site. FLOATGEN shall:

- Conduct geophysical survey of the seabed
- Determine the most suitable design of the anchors, taking into account both technical feasibility and environmental impact of the anchoring system.

7.2.2 CULTURAL HERITAGE REVIEW

Adverse effects on known archaeological features can be avoided through careful siting of seabed equipment. Prior to construction the marine heritage value of the seabed encompassed by the floating system footprint will be assessed based on:

- Records of wrecks and obstructions, known wrecks, documented losses and archaeological finds
- Records of protected wrecks
- Historic records held by onshore and offshore agencies, e.g. coastguard, and
- Geophysical survey records
- Any information, including exclusion zones, provided by SEM-REV.

7.3 PROJECT SCHEDULE

The project activities shall be scheduled to avoid the tourist peak season defined the period between 14 July and 15 August (Section 5.10.2 of ECN, 2014). The schedule will also take into account the schedules of other regular navigation and commercial shipping in the area.

Depending on the type of selected anchor design, where installation of the anchors may be associated with increased sediment suspension, the timing of the anchor installation can take further account of the local tidal regime to minimise the potential impact of suspended sediments on nearshore marine ecology.

The project schedule shall be agreed with relevant local authorities prior to commencement of installation activities.

7.4 TRANSPORT ROUTE

The project will identify the suitable offshore transport route from the port where the prototype will be assembled to the mooring site. Such route will be developed to avoid interference with regular navigation activities occurring off the coast of Le Croisic and will be agreed with relevant authorities.

7.5 ADVANCE NOTICE TO PUBLIC

The project shall disclose to the local stakeholders (such as local authorities, residents and mariners) relevant information on its planned activities, including project description, schedule and agreed transport routes, in advance of construction commencement. Such information shall be communicated directly to the relevant authorities, as well as published on the project website, through local press, and by official notices to mariners. This information shall be updated if required if project details change.

8. ENVIRONMENTAL SPECIFICATIONS: ASSEMBLY AND INSTALLATION

8.1 ONSHORE ENVIRONMENTAL MANAGEMENT

8.1.1 SHIPYARD ACTIVITIES

Part of the installation activities, namely fabrication of the floating platform and assembly of the turbine on the platform, will occur onshore at the port of Nantes – Saint Nazaire, which has triple certification under ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007. All standard project shipyard activities, such as assembly of the structure and its load out using onshore mobile cranes and other shipyard machinery, shall be carried out in compliance with the port's environmental, health and safety and quality requirements, and therefore have not been included in this document. Additional best practice measures are described below in relation to fabrication of the concrete floating structure, specific for this project.

8.1.2 FABRICATION OF CONCRETE FLOATING PLATFORM

Ideol's floating platform will be cast at the port of Nantes – Saint Nazaire. The following measures shall be implemented to avoid potential negative impacts on the environment:

- The concrete form shall be designed to prevent fresh cement or contact water leaking into the surrounding environment
- When pouring concrete into the form, all spills of fresh concrete shall be prevented by using sealed chutes, or ensuring that all hose and pipe connections are sealed and locked securely. Concrete forms shall not be filled to overflowing
- Concrete wash water and stormwater that comes into contact with uncured concrete shall be collected, treated and disposed of in a manner to prevent migration or spill of chemicals into the environment
- During concrete curing, the runoff pH shall be monitored. If pH is outside of allowable limit, it shall be collected and neutralised
- All concrete waste, such as sediments, debris, fines, wash or contact water, shall not be discharged into marine environment

- All concrete waste shall be recycled where possible, or disposed of in an environmentally sound manner
- Clean-up measures shall be implemented immediately after a spill of fresh concrete or concrete waste has occurred.

8.2 COMMUNITY RELATIONS AND NOTIFICATIONS

FLOATGEN shall also inform the following stakeholders 10 days prior to the planned commencement of installation activities on the SEM-REV site:

- The Maritime Prefecture
- Maritime and Coastguard Agency (CROSS)
- The Water Police (la Police de l'Eau)
- The North Defence Aerial Zone that coordinates the Piriac Semaphore
- Local administration.

The project shall disclose an appropriate level of detail, including vessel movements and planned activities on the test site.

The following notices shall be issued to public:

- Official notices to mariners
- Information on the project website and local media.

8.3 GENERAL REQUIREMENTS FOR VESSELS

Vessels engaged in construction or supply of equipment or personnel shall comply as a minimum requirement with the MARPOL Convention for the prevention of marine pollution. The vessels shall also comply with all relevant national and local regulations.

8.4 NAVIGATIONAL SAFETY

A layout depicting the access to the prototype shall be provided to SEM-REV. This information shall be transmittable to the Maritime & Coastguard Agency (CROSS).

All construction vessels shall follow a defined route, agreed with the relevant authorities. All installation activities shall stay within the agreed site boundaries. The project vessels shall meet the requirements of the Civil and Military Agencies (Maritime Prefecture) for safety during transport to site; and the requirements of the Maritime and Coastguard Agency and other regulatory requirements for navigational safety during transport to site and operation on site.

The mooring lines will not extend outside the SEM-REV's borders. However, the extent of the anchoring system may be allowed to exceed the size of the slot assigned to the project (especially during the installation phases). A 10m radius tolerance is acceptable for the anchors/dead weight location (in comparison to the anticipated coordinates of their positions inside the SEM-REV test area).

In accordance with decree N° 2014/022, navigation, berthing and anchorage of any non-project vessels or recreational boats are prohibited on SEM-REV test site. Fishing and scuba diving activities are also forbidden on site. A FLO shall be present during marine transport and installation activities in order to ensure that fishing vessels stay at a safe distance and do not engage in activities within project working area that may interfere with prototype installation.

8.5 MARINE POLLUTION PREVENTION

In accordance with SEM-REV requirements, the project shall put in place systems and equipment to manage effluents and waste and prevent pollution incidents. Specific pollution prevention measures that will be utilised by the project are described below.

8.5.1 AIR EMISSIONS

The project shall use vessels and equipment that are suitable for the task, modern, well maintained and in good working order. Pre-mobilisation inspection shall be carried out to ensure the vessels are sound and safe. Idling shall be minimised, and equipment shall be turned off when not in use.

8.5.2 NOISE AND VIBRATION

Sources of noise and vibration during prototype installation include operation of marine vessels and equipment, and installation of driven pile anchors (if such design is selected).

Where installation activities have the potential to cause discomfort or disturbance to marine fauna and human receptors due to noise and vibration, the following measures shall be implemented as appropriate:

- Activities shall be generally confined to working hours agreed with SEM-REV and local authorities
- Noisy activities shall be scheduled to take place concurrently if possible
- Marine users shall be notified of planned activities through official notices to mariners
- Appropriate good practice of noise abatement shall be utilised as far as practicable.

8.5.3 FUEL AND CHEMICAL STORAGE AND HANDLING

8.5.3.1 CHEMICALS

Fluids (oils, paints, corrosion protection products) used for the operation of the prototypes shall be non-toxic to the marine environment.

The project shall provide the list of all fluids on board the vessels involved in project activities. The project shall demonstrate to ECN that materials used (such as hydraulic fluids, anti-fouling paints, anti-corrosion products) comply with current standards in accordance with the 'Concession d'utilisation du Domaine Public Maritime' and are non-toxic (bio degradable) in the marine environment.

The project shall ensure that all chemicals are stored securely in suitable containers in bunded areas, capable of retaining 110% of the storage containers plus 10% of the aggregate tank volume within the containment area, or as otherwise specified by regulatory requirements.

8.5.3.2 REFUELLING AND MAINTENANCE

Construction vessel and plant refuelling and maintenance shall be carried out under controlled conditions at port. Refuelling at sea is prohibited.

8.5.4 OIL SPILL CONTINGENCY PLAN

Spill kits shall be easily available at any location where chemicals/lubricants/fuels and liquid and hazardous waste are stored or handled. The spill kits shall be appropriate to the activities the work team are involved in. All relevant personnel shall be trained in effective use of spill kits.

The project shall develop:

- a Project-specific Oil Spill Contingency Plan (OSCP)
- a Ship Oil Pollution Emergency Plan (SOPEP) (vessel specific (OSCP)) if required by the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)
- a description of the details of an environmental response crew (ERC), including contact information. Contractor is responsible for organising an ERC and ensuring that a marine vessel appropriate to access current construction works is always available for their use.

All spills shall be reported to SEM-REV. Incidents that could have impact on the health, safety, livelihoods and well being of people and/or have visible impacts (smoke etc.) will be communicated to the public via the emergency response system of SEM-REV.

8.6 MANAGEMENT OF OFFSHORE WASTES AND DISCHARGES

8.6.1 SOLID WASTE

The project shall adopt a waste hierarchy, aiming to minimise waste generation through prevention, reuse and recycle where practicable. Any waste that cannot be reused or recycled shall be disposed of in environmentally sound manner and in accordance with applicable legislation.

All solid waste shall be collected on board the ship in appropriate containers and brought onshore. Waste materials shall be segregated into non-hazardous and hazardous wastes. These wastes will be pre-classified as recyclable and non-recyclable. No wastes shall be thrown into the sea.

Project vessels covered by MARPOL Convention shall develop a Vessel Garbage Plan detailing how each type of waste will be stored onboard. Manifests shall be kept on board all construction vessels of all waste streams transferred to shore.

8.6.2 VESSEL DISCHARGES

8.6.2.1 SEWAGE

The project shall ensure that all vessels involved in the project dispose of sewage and grey water according to the minimum requirements of Annex IV of MARPOL 73/78. MARPOL describes facilities aboard vessels for the treatment of sewage and for reception facilities in ports and harbours. MARPOL prohibits vessels in excess of 400 gross tonnes discharging raw sewage within a 12 nautical mile territorial limit.

It is likely that many of the construction or supply vessels involved in the Project will be equipped with a MARPOL approved waste water treatment plant designed to treat sewage and grey water to reduce the levels of BOD, E. coli, MPN and suspended solids in sewage prior to discharge.

In this eventuality the contractor shall ensure the following:

- That the treatment plant and holding tanks complies with applicable MARPOL regulations
- That ECN are provided with copies of valid International Sewage Pollution Prevention Certificates for vessels equipped with treatment facilities
- Vessels equipped with compliant treatment plants may discharge treated sewage to the sea provided that the vessel is in excess of 4 nautical miles (nm) offshore in accordance with legislation
- Vessels without treatment facilities or with non-compliant sewage treatment facilities must only discharge sewage to the sea if they are in excess of 12nm offshore in accordance with legislation.

It is the responsibility of the Contractor to ensure that sewage is either treated aboard vessels, and discharged while in open offshore areas (4nm minimum from the coast), not treated and discharged while in open offshore areas (12nm minimum from the coast), or pumped out to appropriate shore reception facilities. These procedures should be applied to all vessels involved in the project activities regardless of the vessel size.

8.6.2.2 BALLAST WATER

Where applicable, project vessels shall operate Ballast Water and Sediments Management Plan in accordance with the IMO Ballast Water Directive, and carry a Ballast Water Record Book.

8.6.2.3 BILGE WATER

Bilge water shall be treated to be discharged with less than 15ppm oil in water in accordance with MARPOL Annex 1. All water discharges will be conducted in accordance with the relevant MARPOL 73/78 requirements and provisions and relevant national and local regulations.

8.7 SCOUR PROTECTION MANAGEMENT PLAN

As the design of mooring anchors has not yet been defined, the requirement for scour protection is unknown. If scour protection is deemed necessary, a Scour Protection Management Plan shall be developed, aimed at avoiding or minimising negative impacts on the environment. The plan will draw

on the requirements specified in this EMP in relation to operation of vessels, with addition of measures specific for installation of scour protection.

8.8 MARINE ECOLOGY

8.8.1 PHYTOPLANKTON

In order to avoid impacts affecting phytoplankton production, construction vessels shall:

- Fully comply with provisions of MARPOL Convention
- Apply correct anchor handling to minimise suspension of sediments
- Manage vessel discharge as described in Section 8.6.2.

8.8.2 MARINE MAMMAL MANAGEMENT

If requested by local authorities and/or SEM-REV, a trained Marine Mammal Observer (MMO) shall be present during installation of the prototype. The MMO will advise the appropriate actions for the installation team if a marine mammal is identified in the construction area.

Depending on the selected designs and installation techniques, installation of the prototype may involve noisy activities that could negatively impact marine fauna, such as installation of driven pile-type anchors. If this is the case, a soft start procedure shall be used in order to alert animals and allow them to swim away before the noise levels reach potentially harmful levels.

Night-time lighting on board the project vessels shall be minimised in order to avoid disturbance to marine fauna and other vessels present in the area, without compromising visual navigation lighting, human safety and ability to carry out project activities in the hours of darkness as required.

8.8.3 INVASIVE SPECIES

Project vessels shall not intentionally introduce or release any alien species into native habitats and exercise diligence to prevent accidental or unintended introductions of alien species. Ballast water

procedures shall be adhered to as described in Section 8.6.2.2 in order to prevent the spread of harmful aquatic organisms that may be present in ships' ballast waters and sediments.

8.8.4 ECOLOGICAL MONITORING

The project will conduct ecological monitoring in the project area during and post installation of the prototype in order to ensure that proposed mitigation measures are implemented and to identify any changes that occur during installation. Ecological monitoring is described in Section 11.3 installation monitoring.

8.9 CULTURAL HERITAGE MANAGEMENT

Chance finds are defined as potential cultural heritage objects, features, or sites that are identified outside of or after a formal site reconnaissance, normally as a result of construction monitoring. All chance finds shall be reported to a qualified archaeologist appointed by ECN, who will advise on further actions.

8.10 EMERGENCY RESPONSE PLAN

An emergency response plan shall be developed in conjunction with SEM-REV. It shall specify measures to manage and minimise the environmental impact of an emergency event (e.g. fire, equipment loss, drift). It will include details of how any predicted incidents will be managed, responsibility for managing the incident response, communicating accurate information to the regulatory authorities and emergency services.

The emergency response plan shall incorporate the following requirements:

- Where an incident is likely to lead to pollution, the FLOATGEN project manager shall immediately take the necessary measures in order to limit the effect of the incident on the environment, and to avoid the repetition of the incident.

- The Water Police (la Police de l'Eau) service and Le Croisic municipality shall be informed within 24 hours of this incident and the undertaken mitigation measures, and within 15 days of the incident of all the corrective measures taken to reduce the risk of accidental pollution.
- The Water Police will be allowed free access to the SEM-REV test site.

9. ENVIRONMENTAL SPECIFICATIONS: OPERATION (TESTING)

9.1 COMMUNITY RELATIONS

Planned maintenance will be scheduled to take place outside of tourist peak season, which is defined as the period between 14 July and 15 August.

The project shall inform the maritime prefecture at least 15 days in advance of its planned maintenance activities. Where there is a need for an unplanned activity on the test site, the project shall notify ECN and the relevant authorities as soon as possible. Details of the project activities shall be included into the official notices to mariners.

9.2 NAVIGATIONAL RESTRICTIONS

In accordance with decree N° 2014/022, navigation, berthing and anchorage of any non-project vessels or recreational boats are prohibited on SEM-REV test site. Fishing and scuba diving activities are also forbidden on site. SEM-REV shall be responsible for maintaining appropriate equipment marking out the exclusion zone.

The project vessels shall use agreed navigational routes for planned and emergency maintenance.

9.3 MARINE POLLUTION PREVENTION

During the operational phase project vessels shall adopt the similar pollution prevention measures as described in Section 8.5.

9.4 WASTE AND DISCHARGES MANAGEMENT

During the operational phase of the project, wastes generated are likely to be associated with operation of the vessels engaged in prototype maintenance. Requirements for managing waste are specified in Section 8.6 above.

9.5 SCOUR PROTECTION MANAGEMENT PLAN

See Section 8.7 above.

9.6 MARINE ECOLOGY

See Section 8.8 above.

9.7 EMERGENCY RESPONSE PLAN

See Section 8.10 above.

10. ENVIRONMENTAL SPECIFICATIONS: DECOMMISSIONING

10.1 GENERAL REQUIREMENTS

The testing of the floating system is intended to continue for 1-2 years. On completion of testing, the floating system will be decommissioned. The approval for testing of wind turbines on the SEM-REV test site No. 2013/BPUP/099 includes the following provisions for decommissioning:

- At the end of the test site operation the facilities will be dismantled and items recovered and recycled.

The decommissioning of the prototype aims at returning the site to its initial state. According to the “Concession d’utilisation du Domaine Public Maritime” the developers using the SEM-REV site shall proceed to the complete demolition of the infrastructures established and hosted on SEM-REV concession (including complete mooring systems or foundations), and cover the corresponding operational costs.

Financial dispositions will have to be taken concerning the decommissioning of the prototypes tested on site. The Developer shall leave to the “Caisse des Dépôts et Consignation” (CDC) a deposit equal to the total amount of the dismantlement in order to ensure the prototypes removal.

The nature of decommissioning works shall largely be similar to the assembly and installation activities, but in reverse order. During decommissioning, the project shall implement the measures described in Section 8 Environmental Specifications: Assembly and Installation, with addition of the following:

- Any hazardous or potentially polluting fluids or materials shall be removed from the nacelle in so far as risk assessment identifies them as posing a potential hazard to the environment during turbine dismantling
- Turbine components maybe overhauled and reused
- Recovered material such as steel from the towers or other components would be recycled where possible and other materials disposed of in an approved manner.

10.2 EMERGENCY RESPONSE PLAN

See Section 8.10 above.

11. ENVIRONMENTAL MONITORING PROGRAMME

11.1 GENERAL REQUIREMENTS

One of the objectives of the FLOATGEN project is to assess and validate the environmental impacts of installation, operation and decommissioning of an innovative offshore wind turbine combined with a floating structure performing at deep waters over 40m depth. A monitoring programme studying the effects of the prototype on the environment is therefore an integral part of the FLOATGEN project and will be carried out by the developer.

Furthermore, the Approval for testing of wind turbines on the SEM-REV test site No. 2013/BPUP/099 includes the following requirements for monitoring:

- Annual monitoring of the depth of burial of the export cable and the status of any concrete protection mattresses
- Monitoring of the acoustic impact of the prototype operation on marine organisms
- Monitoring of the status of benthic communities following decommissioning, at the test site and in the vicinity of the export cable.

The monitoring programme will be updated within two months of any changes in legal and/or other requirements or changes within the Project.

The monitoring programme described in this chapter shall be carried out by FLOATGEN project. A more comprehensive monitoring programme will be carried out by ECN and will include cable layout and electromagnetic surveys, protection mattress survey, acoustic survey, survey of the electromagnetic field produced by dynamic cable, landscape impact survey and scouring survey (Section 4.8.1 in ECN, 2014). Details of the ECN SEM-REV monitoring programme are provided in SEM-REV EMP.

The project shall:

- allow ECN to carry out the necessary surveys
- inform ECN of characteristics of the project that could have an impact on the environment

- implement every useful measure if the survey highlights an unacceptable impact which was initially underestimated
- ensure that the data is collected in such a way that it can be compared with the ECN long-term monitoring programme
- share the results of its own monitoring with ECN.

11.2 PRE-CONSTRUCTION SURVEYS

11.2.1 ESTABLISHING BASELINE CONDITIONS

Existing baseline data collected for the SEM-REV EIAs (CREOCEAN, 2010; 2013) have been reviewed and are deemed sufficient for monitoring purposes. Where any additional baseline data is required, permission to collect additional data will be requested from ECN. ECN will review this request and inform the Project of its decision within 10 working days.

11.3 INSTALLATION MONITORING

11.3.1 SHIPYARD RUNOFF MONITORING

During fabrication of the concrete floating platform, the runoff shall be monitored for pH level. In the event that the pH is outside of the acceptable level, the runoff shall be collected and neutralised prior to disposal.

11.3.2 MARINE MAMMALS OBSERVATION

A marine mammal observer (MMO) shall be present during installation of the anchors and moorings, and connection of the prototype to the moorings. MMO shall act immediately to protect species of concern should they enter an exclusion zone prior to and or during operations. MMO shall record behaviour and sightings of marine mammals in the project area. The collected data shall be passed on to ECN to supplement their long-term monitoring programme.

11.3.3 POST-INSTALLATION SURVEY

The project may use the results of post-installation engineering survey to record the condition of the seabed. The project shall ensure that no restrictions on marine area usage remain in place other than those already agreed upon.

11.4 DECOMMISSIONING MONITORING

Requirements described in Sections 11.3.2 and 11.3.3 shall apply during decommissioning phase of the project.

11.5 REPORTING

Results of the monitoring activities shall be reported to ECN. Where a non-conformance has been identified, it will be recorded in an Action Tracking System, and the means of rectification of such non-conformance shall be agreed with ECN.

11.6 KEY PERFORMANCE INDICATORS

The project will collect the data concerning its performance listed in Table 11-1. On project completion the data shall be analysed, and lessons learned shall be used to improve future projects that will utilise the prototype floating wind turbine technology.

TABLE 11-1 FLOATGEN KEY PERFORMANCE INDICATORS

No.	Measure	Target
1	Percentage of inspections completed versus planned	100%
2	Volume of waste reused, recycled and landfilled	40%
3	Open non-conformances	0
4	Non-conformances, by type	Measure
5	Number of spills of oil, fuel and chemical spills	0
6	Amount of fuel consumed to run vessels and equipment	Measure
7	Number of complaints received from the public, broken down by categories (e.g. noise, navigational safety, visual impact, etc.)	Measure

No.	Measure	Target
8	Training delivered in accordance with planned training activities	100%
9	Value of materials and services purchased locally	Measure

12. ENVIRONMENTAL AWARENESS AND TRAINING

The project shall ensure that all personnel, including contractors and subcontractors, who perform or manage project work that may have a significant impact on the environment are trained appropriately. Such training will include information on sensitive receptors (both environmental and social), potential impacts of project activities and mitigation measures that the project commits to implement in order to avoid or mitigate such potential negative impacts.

Personnel responsible for conducting monitoring and inspections shall be trained to carry out these activities effectively.

Records of training undertaken will be kept and made available to ECN or a relevant authority for inspection upon request.

13. VERIFICATION INSPECTIONS AND AUDITS

In order to ensure that the provisions of this EMP are implemented effectively, the project shall:

- Conduct documented daily inspections, where possible, which will entail walk-around inspections of all project activities to visually assess implementation of mitigation measures specified in this EMP
- Conduct an audit at least annually, or more frequently if required (e.g. if inspections have identified recurrent non-conformances)
- Record any findings and non-compliances in an Action Tracking System and agree with ECN the means by which such non-compliance shall be rectified.

It is noted that the ECN may carry out verification monitoring of project activities.

14. ACTION TRACKING SYSTEM (ATS)

The project shall develop an action tracking system (ATS) that shall record any actions that are required:

1. to rectify any non-conformances identified during audits, inspections, other monitoring activities
2. to address feedback received during the project, including that from:
 - a. third parties such as the public, ECN
 - b. project personnel (including contractors and sub-contractors)
3. to ensure any improvement suggestions are captured and realised.

Every action within the ATS should be SMART:

S – specific – the action should clearly state what needs to be done

M – measurable - it should be clear when the action is considered complete

A – assignable – have an agreed actionee (the action should be agreed with the nominated actionee)

R – realistic – the action should be achievable within the timeframe agreed with available resources

T – timebound – have a deadline for completion agreed with the actionee.

Where relevant, actions should be assigned to not only correct an issue (corrective action) but also prevent such an issue (preventative action) occurring again in the future. Each action should be tracked until it is completed and the status recorded in the ATS. The contents of the ATS will be reviewed regularly:

- to identify any trends in actions raised with the aims of identifying underlying issues that may need improvement
- to chase any overdue actions that may be listed in the ATS.

15. RECORD KEEPING

The project shall keep all monitoring data, training records and records of inspections within its document control system. All above listed records shall be made available to ECN upon request.

16. REFERENCES

Arrêté du 13 novembre 2009: Decree taken by the prefect concerning the wind turbine marking application.

Arrêté n°2013/BPUP/099: authorizes the Ecole Centrale de Nantes to extend the SEM-REV test site to the use of Floating Wind Turbines offshore the territory belonging to Le Croisic municipality

Arrêté n°2014/022: regulates the navigation, station-keeping, mooring, trawling, dredging and diving on the SEM-REV and over a portion of SEM-REV export cable layout.

CREOCEAN. 2010. Impact Assessment for the Construction of Experimental Marine Infrastructure for Recovery of Wave Energy. Doc: 1-09134-R.

CREOCEAN. 2013. Impact Assessment to Request Extension of SEMREV Approval for Floating Wind Turbines. Doc: 1-12008-R.

Décision ministérielle du 16 mai 2013: Ministerial decision taken the 16/05/2013 concerning the experimental wind turbine marking.

ECN. 2014. Deliverable N° 4.5 SEM-REV Test Site Requirements.

RSK. 2015. Compilation of environmental regulations and obligations for floating wind turbine systems (Deliverable N° 7.4).

APPENDIX A: ENVIRONMENTAL MITIGATION MEASURES AND COMMITMENTS

ENVIRONMENTAL MITIGATION MEASURES

The EIAs produced for the SEM-REV test site (CREOCEAN, 2010; 2013) provide generic environmental mitigation measures to which developers planning to use the SEM-REV test site should adhere, as listed below. The developer must:

- Have systems and equipment in place to manage effluents and waste and prevent pollution incidents.
- Provide advance information to local stakeholders (residents and users of the site) regarding the equipment installation and testing phases through notifications on the website, informing the mayor, local press, and by maritime notifications.
- Submit a complete description of the test prototype and its components.
- Submit information on the method for anchoring the prototype along with an assessment of scour risk. Anchors selected must be assessed to be the least detrimental to hydrodynamics and wildlife.
- Ensure that the prototype is fitted with GPS so that its position can be continuously monitored.
- Ensure that the prototype meets environmental constraints. Any fluids used will be biodegradable and assessed as least toxic to the environment. Choice of antifouling and anticorrosion materials must be based on their toxicity, or by preferentially limiting the requirement for such materials through design.
- Specify prototype machinery maintenance requirements (frequency, type, at sea / on land)
- Define the methodology for installing, removing and ultimately disposing of the prototype, including provisions for recycling of materials.
- Define their liability for navigation incidents (e.g. collision), and pollution incidents.
- Clarify the proposed monitoring programme for the prototype.
- Study the environmental effects of the prototype on the environment.
- In accordance with the SEM-REV permit, assess the effects of noise associated with operation of the prototype on marine organisms.

ENVIRONMENTAL COMMITMENTS

In addition to the generic mitigation measures outlined in the SEM-REV EIAs, the 'SEM-REV Test Site Requirements' report (Deliverable n°: D4.5, 15 November 2014) provides more specific environmental commitments (and technical commitments) based on the recommendations of the different state services. Developers planning to use the test site should adhere to these requirements. The environmental commitments are listed below.

In terms of environmental impact the developer must:

- Allow the organisation (ECN) to carry out necessary measurements at applicable site infrastructure and the marine energy convertor.
- Identify any prototype specificity that could lead to an environment modification.
- Implement further measurements if the survey highlights an unacceptable impact that was initially underestimated.
- Conduct a post-experiment survey following prototype removal in order to identify and understand the way the marine environment has changed/responded (or not) following the 2-3 years experimentation phase.
- Select a marine energy converter mooring system which has lowest impacts to both flora/fauna and the hydrodynamics of the area (ECN will verify conformity).
- Assess the risk of scouring at the base of the mooring structure.

In terms of installation and operation the developer must:

- Obtain approval from the organisation (ECN) for all operations on the SEM-REV site.
- Meet the requirements of the Civil and Military Agencies (Maritime Prefecture) for safety during transport to site; and the requirements of the Maritime and Coastguard Agency and other regulatory requirements for navigational safety during transport to site and operation on site.
- Consult with the North Defence Aerial Zone that coordinates the Piriac Semaphore in order to define the installation process for the floating wind turbines.
- Ensure that necessary precautions are taken to avoid the discharge of polluting products to sea.

- Limit operations in the period 14th July to 15th August (if practicable) to limit impacts on tourism.
- Provide a list of all fluids on board, permit testing of acoustic transmission frequency and power estimates, respect the height above the sea level, the maximum blade-tip velocity and the type and dimensions of moorings.
- Demonstrate that materials used on site (i.e., fluids, anti-fouling paints, anti-corrosion products) comply with current standards in accordance with the 'Concession d'utilisation du Domaine Public Maritime' and are non-toxic (bio degradable) in the marine environment.
- Return a signed version of the QHSE management plan provided by the organisation.

In terms of accidental pollution incidents the developer must:

- Take necessary measures to limit its effect on the environment, and to avoid repetition of incidents.
- Inform the water policy service and "Le Croisic" municipality within 24 hours of an incident and the mitigation measures which have been taken.

In terms of decommissioning the developer must:

- Carry out complete demolition of the infrastructures established and hosted on the SEM-REV concession (including complete mooring systems and foundations) and recover / recycle.
- Leave to the "Caisse des Dépôts et Consignation" a deposit equal to the estimated total amount of decommissioning costs in order to ensure the removal of the prototype can be completed.

In terms of hazard identification the developer must:

- Carry out qualitative and quantitative risk analysis to assess risks regarding technical, human and environmental aspects of the prototype during installation, operation, maintenance and decommissioning. If the resulting risk is high the developer must propose mitigation measures in order to minimise the risk. The favoured method for risk analysis is the Formal Safety Assessment approach chosen by the International Maritime Organisation.

In terms of civil liability the developer must:

- Provide a copy of the prototype's Civil Liability regarding damage it could cause to environment, ships, other prototypes, people, or ECN facilities, during installation, operation, maintenance or decommissioning phases. Civil liability needs to cover all operational modes and maintenance works which the developer will use during those phases.

APPENDIX B: APPROVAL CONDITIONS

TESTING OF FLOATING WIND TURBINES AT SEM-REV SITE

The approval for testing of wind turbines on the SEM-REV test site was issued on the 23 December 2013 (2013/BPUP/099).² The Approval includes the following obligations for the construction and operation phase:

- The prototypes will be tested to meet technical and environmental constraints, in particular the anchoring arrangements and the possibility of scour.
- The prototypes will be equipped with automatic identification systems to track their position continuously.
- The Water Police (la Police de l'Eau) will be informed prior to the installation and decommissioning of the prototypes. They will be informed of any incidents during the work and will be allowed free access to the site.
- All necessary measures will be taken to ensure safety of life at sea (lighting, markings, etc).
- Fluids (oils, paints, corrosion protection products) used for the operation of the prototypes will be non-toxic to the marine environment.
- In case of any incident that causes pollution, the operator will take immediate steps to limit the impact on the environment. The Water Police and Le Croisic municipality will be informed within 24 hours, along with the measures taken to address the incident and within 15 days of the incident of all the corrective measures taken to reduce the risk of accidental pollution.
- The Ecole Centrale de Nantes will distribute public information on SEMREV activities during the test phase.

The Approval includes the following provisions for monitoring:

- Annual monitoring of the depth of burial of the export cable and the status of any concrete protection mattresses.
- Monitoring of the acoustic impact of the prototype on marine organisms.

² Arrêté n°2013/BPUP/099: authorises the Ecole Centrale de Nantes to extend the SEM-REV test site to include the use of Floating Wind Turbines offshore of the territory belonging to Le Croisic municipality.

- Monitoring of the status of benthic communities following decommissioning, at the test site and in the vicinity of the export cable.

The Approval includes the following provisions for decommissioning:

- At the end of the test site operation the facilities will be dismantled and items recovered and recycled.

NAVIGATION AT SEM-REV SITE

Navigation rules inside the SEM-REV test area are regulated by decree N° 2014/022³ issued by the Prefecture maritime for the French Atlantic Coast. Navigation, berthing and anchorage of any vessels or recreational boats are prohibited on SEM-REV test site. Fishing and scuba diving activities are also forbidden on the site.

The Developer must meet the requirements of the Civil and Military Agencies (Maritime Prefecture) for safety during transport to site and the requirements of the Maritime & Coastguard Agency for navigational safety during transport to site and operation on site. The installation process of the floating wind turbines shall be defined by consulting the North Defence Aerial Zone that coordinates the Piriac Semaphore system.

MARKING AND LIGHTING OF WIND TURBINES

The developer will conform with the marking and lighting decree issued by the Prefect⁴ and the ministerial decision taken 16/05/13⁵ concerning experimental wind turbine marking. A synthesis of this information is provided in Deliverable 4.5: SEM-REV Test Site Requirements.

³ Arrêté n°2014/022: regulates navigation, station-keeping, mooring, trawling, dredging and diving on the SEMREV site and over a portion of the SEMREV export cable route.

⁴ Arrêté du 13 novembre 2009: Decree taken by the Prefect concerning the wind turbine marking application.

⁵ Décision ministérielle du 16 mai 2013: Ministerial decision taken the 16/05/2013 concerning the experimental wind turbine marking.