ENVIRONMENTAL EFFECTS METADATA SURVEY FORM

Name of person updating the form	Date submitted
Juan Bald	July 21, 2014

Project name: Biscay Marine Energy Platform (BIMEP)

☐ Planned ☒ In Operation ☐Completed

Project description:

Project Developer: Ente Vasco de la Energía (EVE)

Technology Developer: Ente Vasco de la Energía (EVE)

Technology type: Wave

Resource (wave, tidal): Wave

Project scale (test site, prototype, array, commercial): Test site

Installed capacity (MW): 20 MW

Project Website:

http://www.eve.es/energia_marina/index_cas.htm
http://www.eve.es/web/Energias-Renovables/Energia-marina/bimep.aspx
http://www.azti.es/bimep/

Launch Date: 2008

Additional Description: BIMEP represents an offshore infrastructure for the demonstration and proving of wave energy generation devices over a sustained period of time. It consists on an 8 km2 sea area between 50 and 90 depths were four static submarine cables will be placed, operating at 13kV and 5MW. Wave energy generation devices will be connected to these cables through dynamic submarine cables. In land, BIMEP will provide a research center in Arminza (Bizkaia, Basque Country, Northern Spain) were developers will be able to control de behavior and performance of the devices.

Location:

Ocean/Water body: Atlantic

Closest city: 1.7 km from the coast of Arminza, Basque Country

Country: Northern Spain

Coordinates (please use Mercator): 43°27'05.6" N, 2°52'50.1" W

Depth: Between 50 and 90 m water depth

Process status: In 2011, the Promoter (EVE) proceeded to tackle the final step and obtain the concession of marine-terrestrial public domain which was granted on the 6th of February 2012. Authorisation has been granted for the installation of facilities and contracts awarded for the supply and installation of submarine power lines and ground cables, which will transfer power from the offshore sites to land. In November 2012 the first horizontal drilling work started with the installation of the submarine power cables. On the 20th September 2013 the work for the installation of submarine cables started.

Licensing information (brief description): According to the Basque Country's Energy Strategy, wave energy is the only form of marine energy for which a significant production is expected in the midterm. The technological development and the particular geographical characteristics of the Basque Country provide suitable preconditions for the production of such energy. Furthermore, the presence and current level of development of the naval industry in the Basque Country are determinants for the wave energy sector to be considered as a strategic and promising sector in the Basque Country. In this context, the Basque Energy Board (Ente Vasco de la Energía-EVE) launched in 2008 the initiative to build the BIMEP (Biscay Marine Energy Project).

The BIMEP platform is to be established encompassing part of the inner waters of the Basque Country's continental shelf and the Spanish territorial waters, two miles offshore the shoreline of Armintza (Bizkaia, Basque Country), which is under the jurisdiction of the municipality of Lemoiz (Bizkaia). The establishment of this platform entails the installation of wave energy converters. The installation of such devices requires the closure of a sea area of 5 km^2 to activities like artisanal fishing, navigation, aquaculture and recreational activities.

Besides the technical difficulties of installing the BIMEP platform infrastructure in the chosen location, the installation of BIMEP is also administratively complex; it involves the participation of both national and local administrations. Furthermore, several ministries and departments participate in different sections/steps of the administrative process. Such administrative process generally shares the following common structure:

- ask/consult with the Spanish Ministry for Environment, Rural and Marine Affairs (the Spanish environmental agency) the need for conducting an Environmental Impact Assessment (hereinafter, the environmental procedure);
- request the Spanish Ministry of Industry, Tourism and Trade to provide the administrative authorization for conducting the works and the Provincial Industry and Energy Dependency of the Spanish Government Delegation in Bizkaia to declare its Public Use;
- apply for the concession of marine-terrestrial public domain, which is a two-step process and involves the Spanish Ministry of Public Works and that for Environment, Rural and Marine Affairs.

In this sense, and in accordance with Article 16 of *Royal Decree 1/2008*, the Promoter (EVE) initiated the environmental procedure in 2008. In the particular case of the BIMEP project, the activity was classified under Section 4.c of Annex II of the aforementioned Royal Decree, and consequently the environmental

procedure aimed at determined the need for a full Environmental Impact Assessment. In order to make an informed decision on whether or not an Environmental Impact Assessment was needed, three documents/steps are required:

- Project submission, including the objective, description and location of the project
- Submission of an additional Environmental analysis document undertaken by AZTI-Tecnalia. This document should cover the following aspects: a) actions that may cause environmental impacts throughout the different stages of the project (i.e. planning, construction, operation and abandonment), b) potential environmental impacts of the project, c) mitigation and corrective measures/strategies to offset the potential negative environmental impacts, and d) an Environmental Monitoring Plan of the project.
- Consultation with stakeholders, which is to be carried out by General Directorate for Environmental Quality and Evaluation (Spanish Ministry for Environment, Rural and Marine Affairs). In this case, the consultation process included key stakeholders, such as fishermen guilds (*cofradias*[1]) and environmental NGOs, amongst others.

Consequently, in July 2008 a preliminary Environmental Impact Study (EIS) of the bimep project was undertaken by AZTI-Tecnalia.

In November 2008, the General Directory of Energy Policy and Mines of the Spanish Ministry of Industry, Tourism and Trade (which is the competent authority to concede the technical permission for the bimep project) sent all the documents of the project to the General Directory of Quality and Environmental Evaluation of the Spanish Ministry of Environment, Rural and Marine Affairs (which is the competent authority to concede the environmental permission of the bimep project).

In April 2009, the General Directory of Quality and Environmental Evaluation of the Spanish Ministry of Environment, Rural and Marine Affairs request for some additional information about the project and their impacts. In order to respond to this request, in April 2009 a complete Environmental Impact Study (EIS) (undertaken in December 2008 by AZTI-Tecnalia) was sent to the above mentioned General Directory and in parallel a personal meeting was held with their representatives

Based on a detailed analysis of these three documents/steps, the Spanish Ministry for Environment, Rural and Marine Affairs adopted in June 2009 the decision for the BIMEP not to be subject to the full Environmental Impact Assessment process. The analysis of the Environmental document had concluded that no significant environmental impacts would be found as a result of the implementation of the BIMEP project. Furthermore, most stakeholders consulted about the potential affection of the BIMEP did not envisage significant impacts on habitats, protected species or environment as a result of the implementation of the BIMEP.

In any case, taking in to account the uncertainties of the impacts due to the early development stage of wave energy harnessing devices and the lack of referenced data accounting for environmental

[1] Spanish *cofradias* (fishing guilds) are institutions with and old tradition that in some cases dates back many centuries. Their aim is to assure collective economic exploitation of fishing resources in coastal area. The *cofradias* are the institutional system for more than 80% of the employment in fisheries in Spain. In addition, more than 50% of landings are under the control of *cofradias*. It is a clear distinction between *cofradias* and other organizations such as boat owners associations or producer organizations. The *cofradias* are related exclusively to coastal fisheries while the other organizations deal with industrial fisheries. The *cofradias* are organized democratically and both the crew and the boat owner have representatives in the executive bodies. These institutions are well recognized by the Spanish and regional law and can propose management rules in their area of influence such as fishing time, allowed fishing gear and area and time closures. The rights of *cofradias* can be considered a form of territorial use rights in fisheries (TURFs).

surveillance of specific projects, the Environmental Statement recommended the implementation of the environmental monitoring program suggested in the Environmental Impact Study of bimep project.

This environmental monitoring program started in August 2011 in their preoperational phase and was undertaken by AZTI-Tecnalia.

Taking into account the aforementioned decision and continuing with the administrative process, in 2009, the Promoter (EVE) requested the administrative authorization for the BIMEP installation and its public use declaration.

For the purpose of obtaining the administrative authorization and public use declaration of the installation of the BIMEP infrastructure, the Promoter (EVE) submitted to Spanish Ministry of Industry, Tourism and Trade and the Provincial Industry and Energy Dependency of the Spanish Government Delegation in Bizkaia several documents, which included, a) the preliminary draft of the project, b) an environmental analysis document, and c) an economic evaluation analysis document.

In accordance with the provisions of Articles 125 and 144 of *Royal Decree 1955/2000* and *Article 27 of Royal Decree 1028/2007*, the preliminary draft was submitted for public consultation and reprints were sent to key administrations and stakeholders. The City Council of Lemoiz, the General Directorate for Planning, the General Directorate of Ports and Maritime Affairs, and the General Directorate for Fisheries and Agriculture of the Basque Government, as well as the Basque Water Agency did not provide any feedback. On the other hand, the Department of Public Works of the Provincial Council of Bizkaia, the Bilbao Bizkaia Water Consortium, the General Directorate for Fisheries and Aquaculture of the Spanish Ministry for Environment, Rural and Marine Affairs and Iberdrola (Spanish energy company) did not present any opposition to the project and, where appropriate, they indicated technical aspects to be considered in drafting the execution project of the BIMEP.

Based on several documents and outcomes of the consultation process, the Spanish Ministry for Industry, Tourism and Trade (of the General Directorate for Energy Policy and Mining) authorized, in 2011, the installation of the BIMEP, and stated in particular the declaration for its public use.

Also In 2011, the Promoter (EVE) proceeded to tackle the final step and obtain the concession of marine-terrestrial public domain which was granted on the 6th of February 2012.

Once authorisation for project execution has been granted for the installation of facilities in 2012 and contracts awarded for the supply and installation of submarine power lines and ground cables, which will transfer power from the offshore sites to land, in November 2012 the first works started with the horizontal drilling for the installation of the submarine power cables. This horizontal drilling allows the landing of the submarine cable from 15 m depth to the shoreline. Finally on the 20th September 2013 the works for the installation of submarine cables started together with the environmental monitoring plan of this phase of the BIMEP project.

Finally, the work for the installation of submarine cables started on September 11th 2011 with the pre-lay grapnel run of the cables route. Between the 20th and 27th of September 2013 the lay of the four submarine cables was done. In parallel to these operations, the environmental monitoring plan of this construction phase was done by AZTI-Tecnalia.

Key Environmental issues: The main environmental factors that the EIS considered that could be affected by the project actions are hydrodynamics, landscape, benthic communities, ichthyofauna, marine mammals, fishing activity and archaeological and cultural resources.

The main actions of the project which could affect the above mentioned environmental factors are related with the installation and presence of structures (submarine cables, moorings and WECs) which can lead to generate a competence with other users, noises, electromagnetic fields, reduction of marine energy, etc.

Environmental webpage: *link to project official environmental webpage (if available)*

Baseline studies and project effects studies: Biscay Marine Energy Platform (BIMEP)				
General description				
Receptor	**Study description including question and/or objective**	**Design and methods** (brief description)	**Results** (brief description)	**Status** (planned, underway, completed, with dates)
Physical Environment	Wave measurements and numerical modelling to predict the potential impacts of WEC devices on the wave regime	Data coming from a measurement platform installed in bimep (Wavescan buoy of Fugro Oceanor) in March 2009, current meters and other buoys were employed	Shoreline wave attenuations of 0-15% might be expected and limited local beach elevation changes were predicted to be limited to less than 0.2m.	Completed
	Sediment characterization	Sediment sampling	No significant contamination identified. Some sediment is expected to be suspended into the water column during construction, but localized and of short duration.	Completed
	Hydrography Characterization	Water quality data analysis coming from the Littoral Water Quality Monitoring and Control Network of the Basque Country that AZTI-Tecnalia undertake since 1995 for the Department of Land Action and	No significant contamination identified. It is not expected significant impact over water quality	Completed

		Environment of the Basque Government		
	Bathymetry	Seabed characterization with a multi-beam echo sounder	This information involves a high resolution Digital Elevation Model (DEM) and topographic products derived, such as slopes' map, shady digital elevation model, rugosity, topographic index, etc.	Completed
	Landscape Characterization	Characterization based on the catalog of Basque Landscapes.	Some significant landscape places near bimep. It is expected slight effects during installation and moderate effects during operation	Completed
Biotic Environment	Benthic communities characterization (soft and hard bottom)	Benthic communities sampling with grab in soft sediments and analysis with AZTI Marine Biotic Index. For hard bottom communities, sampling was done in several intertidal sampling stations.	Benthic community in slight disequilibrium due to the high hydrodynamics of the area. Alteration to benthic communities are expected due to: (i) direct destruction; (ii) alteration in the proportion of hard-soft substratum, (iii) dragging action of anchors and ends; etc.	Completed
	Fish	No specific data available. Thus, an extensive bibliographic and web source information search was done	No specific data available. Moorings, fixed prototypes to the bottom, dikes, docks and similar devices may cause noise and vibration, which generally scares away fish communities. During operation wave devices may cause noise and vibration, which generally scares away fish communities but generally speaking, any artifact located in the sea may cause an attraction effect on fish communities, especially if it is floating.	Completed
	Marine Mammals	Some data coming from sightings of AZTI-Tecnalia personnel in different sampling campaigns	Some data coming from sightings of AZTI-Tecnalia personnel in different sampling campaigns	Completed
	Marine Birds Communities Characterization	No specific data available. Thus, an extensive bibliographic and web source information search was done	Bimep not sited in areas designated of international or national level of importance for seabirds. No significant impact on offshore birds is predicted during brief	Completed

			construction activities. Similarly, no significant impact was predicted during operation because of the relatively small-scale of the development in the context of the surrounding open sea area.	
Socioeconomic Environment	Fisheries Characterization	Commercial fisheries study (based on fish landing statistics, fisheries surveillance data, academic studies, previous fisheries reports) and consultation with local fishermen.	Short-term interference with fishing activity will be mitigated through navigation measures, Notices to Mariners, liaison with local fishermen and other measures. Potential interference of fishing gear (e.g. snagging) by the sub-sea cable. Exclusion of fishing activity from the deployment area and safety zones around the WECs, potentially displacing established fishing grounds and adding pressure to neighboring fishing areas. Prevention of fishing expected, however, to benefit fish resources within the area in which fishing is excluded and this has the potential to benefit fish resources outside the safety zones.	Completed
	Archaeological resources characterization	Consult on the Sub-aquatic Archaeological Catalog of the Basque Government	A sunken vessel was identified near the bimep area.	Completed
Reports or Papers	• Environmental Impact Study (in Spanish) available through request to Basque Energy Agency (EVE, Ente Vasco de la Energía). • Detailed explanation of the methodology can be consulted in the following paper: Bald, J., A. Del Campo, J. Franco, I. Galparsoro, M. González, P. Liria, I. Muxika, A. Rubio, O. Solaun, A. Uriarte, M. Comesaña, A. Cacabelos, R. Fernández, G. Méndez, D. Prada y L. Zubiate, 2010. Protocol to develop an environmental impact study of wave energy converters. Revista de Investigación Marina, 17 (5):79.			
Research Projects	• The environmental monitoring plan previous to the installation and construction of BIMEP (pre-operational phase) started in August 2011. • In September 2013 started the environmental monitoring plan of the construction phase of BIMEP.			

Monitoring and adaptive management: Biscay Marine Energy Platform (BIMEP) – Pre Operational Phase				
General description	This monitoring phase correspond to the environmental characterization of BIMEP area previous to any installation work, thus complementing the information gathered in the Environmental Impact Study.			
Receptor	**Monitoring program description including question and/or objective**	**Design and methods** (brief description)	**Results**	**Status** (planned, underway, completed, with dates)
Physical Environment	Hydrodynamic characterization	Two Nortek profilers were installed, one in the shadow area of BIMEP, and the other one in a place far beyond from BIMEP in order to act as control area. Additionally, ADCP transects along all the BIMEP area were undertaken.	N/A	Completed
	Underwater noise	For this, a sonobuoy was moored at 40 m depth on the 6 of June 2012 in the bimep area. This sonobuoy was developed by the Laboratory of Bioacoustics Applications of the Polytechnic University of Cataluña (http://www.lab.upc.edu/). The sonobuouy is able to detect and classify automatically all the acoustic events above the ambient noise (presence of cetaceans and noise) and store the information. It was moored on the 6 of June 2012 and during 5 months the presence of marine mammals and underwater ambient noise was monitored.	N/A	Completed
	Landscape	The characterisation process of marine landscape was carried out in 4 stages: (i) defining each Landscape unit's area; (ii) defining each landscape unit's characteristics; (iii) defining activities, visibility and views and; (iv) presentation of landscape characterisation and base visual analysis.	N/A	Completed
Biotic environment	Fish	A) Visual census: (i) Line transects: five 200 m (surveyed 2.5 m each sided of the transect line) transect lines were placed along the tip of a "Isla de las lubinas" submarine mountain; (ii) Stationary methods: four sampling points at a 15 m depth were selected for visual inspection, one in the center of each of the four mooring areas of BIMEP. B) Active acoustic methods: five M3i buoys, developed by Marine Instruments (www.marineinstruments.es), were placed on the 6 of June 2012 in the area, one in each of the four	N/A	Completed

		mooring areas and one far enough from BIMEP area to act as control site. The M3i buoys are equipped with a GPS and echo-sounder (50 kHz and 500 W) and solar electric panels as their energy source. While the GPS of the buoy allows tracking the position of the buoy itself, the echo-sounder allows measuring the relative biomass below the buoy.		
	Benthic communities	The characterization of benthic communities was done by means of: (i) in situ sampling with a Shipeck grab sampler soft bottom sediments in five locations (4 samples inside the BIMEP area and one far beyond in order to act as control area) and by divers in five locations near the landing point of the submarine cable (Figure 2) and (ii) visual inspection with a submarine camera in 36 points distributed all along the submarine cable route and the mooring areas.	N/A	Completed
	Marine mammals	For this, a sonobuoy was moored at 40 m depth on the 6 of June 2012 in the BIMEP area. This sonobuoy was developed by the Laboratory of Bioacoustics Applications of the Polytechnic University of Cataluña (http://www.lab.upc.edu/). The sonobuouy is able to detect and classify automatically all the acoustic events above the ambient noise (presence of cetaceans and noise) and store the information. It was moored on the 6 of June 2012 and during 5 months the presence of marine mammals and underwater ambient noise was monitored.	N/A	Completed
Reports or Papers	Report (in Spanish) available through request to Basque Energy Agency (EVE, Ente Vasco de la Energía). A paper describing the methodology of the preoperational phase of the environmental monitoring plan presented in the 4th International Conference on Ocean Energy, 17 October held in Dublin can be downloaded in the following link. http://www.icoe2012dublin.com/ICOE_2012/downloads/papers/day3/POSTER%20SESSION%204/Juan%20Bald,%20AZTI-Tecnalia.pdf			
Research Projects	N/A			

Monitoring and adaptive management: Biscay Marine Energy Platform (BIMEP) – Construction Phase				
General description	This monitoring phase correspond to the environmental monitoring of submarine cable installation in BIMEP which begun on the 20th September 2013.			
Receptor	**Monitoring program description including question and/or objective**	**Design and methods** (brief description)	**Results**	**Status** (planned, underway, completed, with dates)
Physical Environment	Underwater noise	Two sampling campaigns where undertaken: (i) the first one was done prior to the installation of the cables. The objective of this campaign was the establishment of the baseline noise levels in *bimep*; (ii) the second one was done during the installation of one of the submarine cables. The sampling campaign was done with an icListen HF 200 kHz hydrophone of Ocean Sonics (http://oceansonics.com/). In each campaign 5 minutes measurements at 10 m depth where done in 15 sampling points all along the cable route. With all the information gathered, a sound propagation model will be developed in order to modelize the sound propagation of the installation of the submarine cables and then to evaluate the extent and impact of these operations.	N/A	Underway
Biotic environment	Fish	Active acoustic methods: five M3i buoys, developed by Marine Instruments (www.marineinstruments.es), were placed on the 6 of June 2012 in the area, one in each of the four mooring areas and one far enough from BIMEP area to act as control site. The M3i buoys are equipped with a GPS and echo-sounder (50 kHz and 500 W) and solar electric panels as their energy source. While the GPS of the buoy allows tracking the position of the buoy itself, the echo-sounder allows measuring the relative biomass below the buoy.	N/A	Underway

	Benthic communities	The characterization of benthic communities was done by means of: (i) in situ sampling with a Shipeck grab sampler soft bottom sediments in five locations (4 samples inside the BIMEP area and one far beyond in order to act as control area) and by divers in five locations near the landing point of the submarine cable (Figure 2) and (ii) visual inspection with a submarine camera in 36 points distributed all along the submarine cable route and the mooring areas.	N/A	Underway
Reports or Papers	The first results about the impacts of the submarine cables installation over the benthic communities and seafloor integrity where presented at the 2nd International Conference on Environmental Interactions of Marine Renewable Energy Technologies (EIMR2014), 28 April – 02 May 2014, Stornoway, Isle of Lewis, Outer Hebrides, Scotland. The paper and presentation are freely accessible in the following links: Paper: http://mhk.pnnl.gov/sites/default/files/attachments/EIMR2014_622_Bald.pdf Presentation: http://mhk.pnnl.gov/sites/default/files/attachments/EIMR2014_622_Bald.pdf All the contributions to the conference can be consulted at the following link: http://mhk.pnnl.gov/eimr-international-conference-2014			
Research Projects	N/A			