

Title: The Environmental Impact Study of the Biscay Marine Energy Platform (bimep) project.

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Abstract for Poster presentation

The Biscay Marine Energy Platform (*bimep*) is an offshore infrastructure for the demonstration and testing of wave energy harnessing devices promoted by the Basque Entity of Energy (Ente Vasco de la Energía - EVE). *Bimep* is located close to Arminza town (Basque Country, Northern Spain) and it consists on an 5.3 km² sea area between 50 and 90 m depths where four static submarine cables will be placed, operating at 13kV and 5MW. According to the Royal Decree 1/2008 of Environmental Impact Assessment (EIA), the *bimep* project falls into the 4.c category of projects of Annex II of this Decree. Such classification involves that the competent authority for environmental issues, that is, the General Directory for Quality and Environmental Evaluation of the Spanish Ministry of Environment, Rural and Marine Environment, has to decide whether or not the project needs to undergo the complete procedure of an EIA. On the first of June 2009, the General Council on Environmental Quality Assessment of the Ministry of Rural, Marine and Natural Environment of the Spanish Government, on the light of the Environmental Impact Study (EIS) of the *bimep* project undertaken by AZTI in 2008, decided not to submit the project to the whole Environmental Impact Assessment (EIA) process. The EIS considered that the main actions associated with the project that could cause impacts were related to the installation process and the physical presence of structures (i.e. submarine cables, moorings and WECs), which could generate conflicts between different users of the area, as well as underwater noise, electromagnetic fields, reduction of marine energy, etc. The present contribution explains the main findings of the EIS: (i) description of the project; (ii) environmental characteristics of *bimep* area; (iii) expected impacts; (iv) mitigation measures and (iii) environmental monitoring plan.

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The Environmental Impact Study of the Biscay Marine Energy Platform (bimep) project

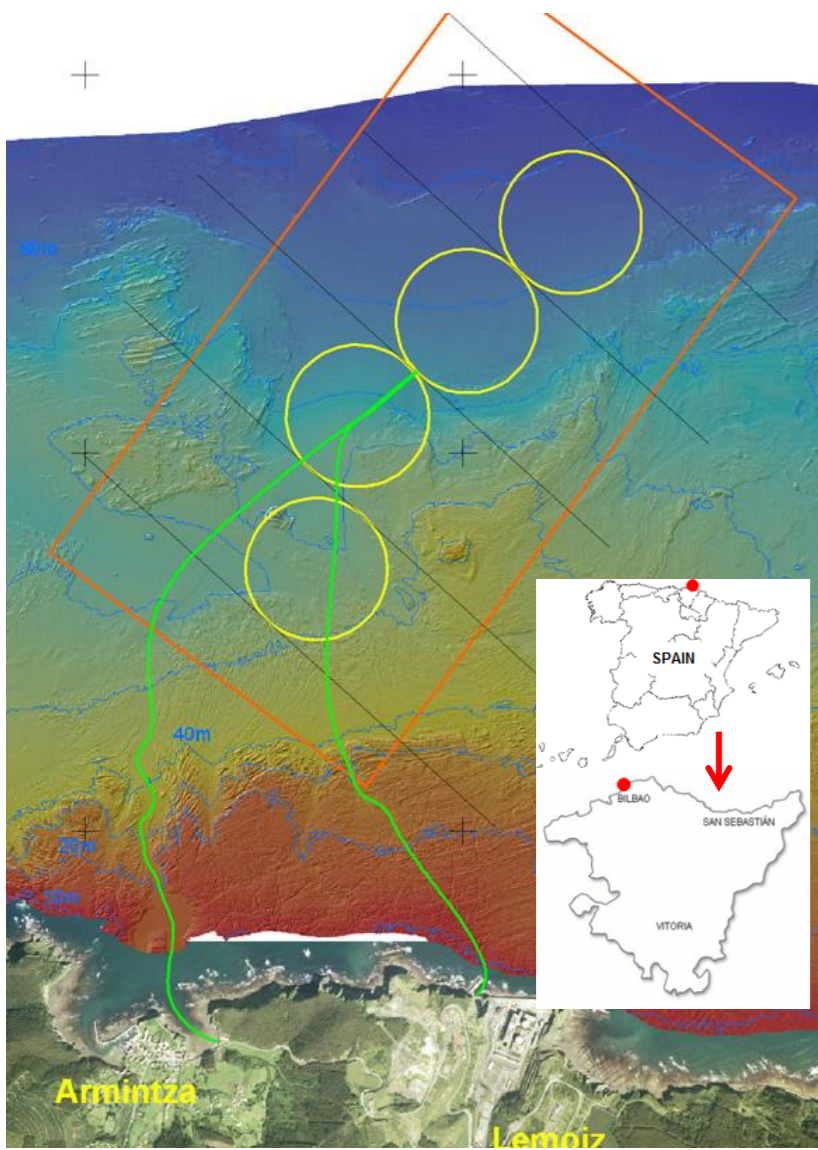
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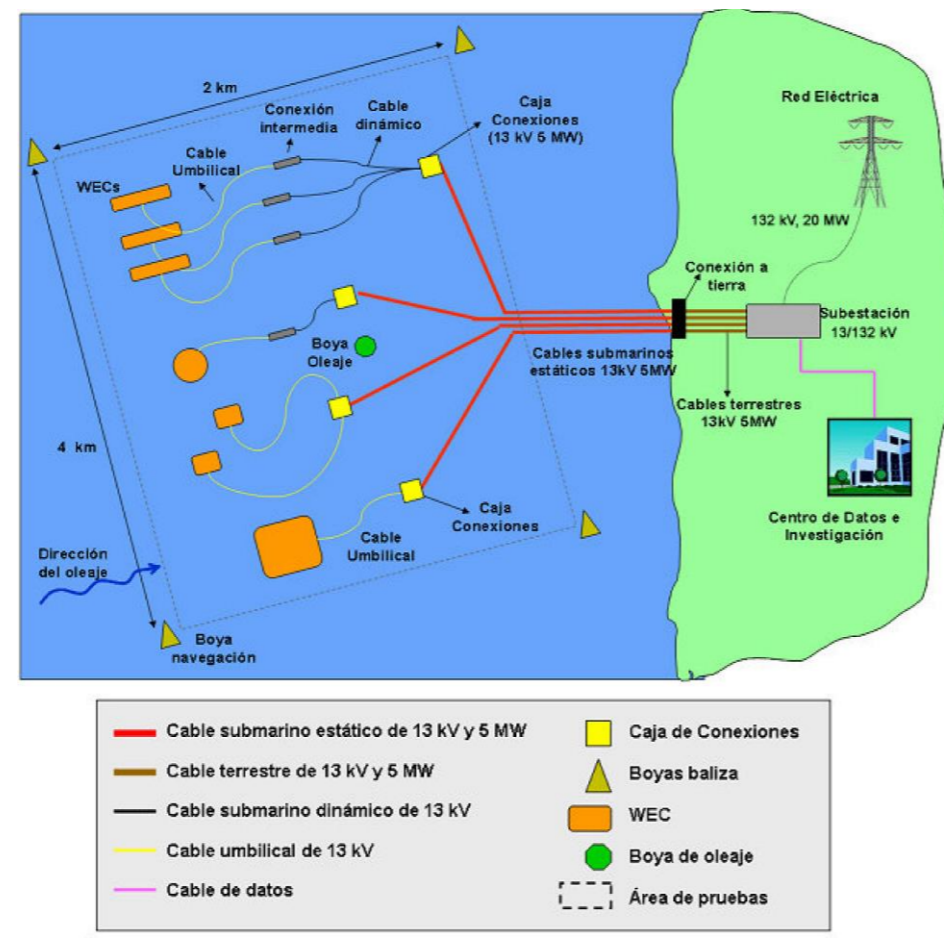
1. INTRODUCTION

- According to the **Basque Country's Energy Strategy**, wave energy is the one of the forms of marine energy for which a significant production is expected in the midterm. The particular geographical characteristics of the **Basque Country** provide suitable conditions for the production of such energy.
- In this context, the **Basque Energy Agency (Ente Vasco de la Energía-EVE)** launched in **2008** the initiative to build the **bimep (Biscay Marine Energy Project)**.
- In 2008, according to **Article 16 of Royal Decree 1/2008 of EIA**, the Promoter (EVE) initiated the administrative procedure in order to achieve the environmental approval of the project.
- For this purpose, in 2008, AZTI developed the **Environmental Impact Study (EIS)** of the BIMEP project.

2. THE BIMEP PROJECT

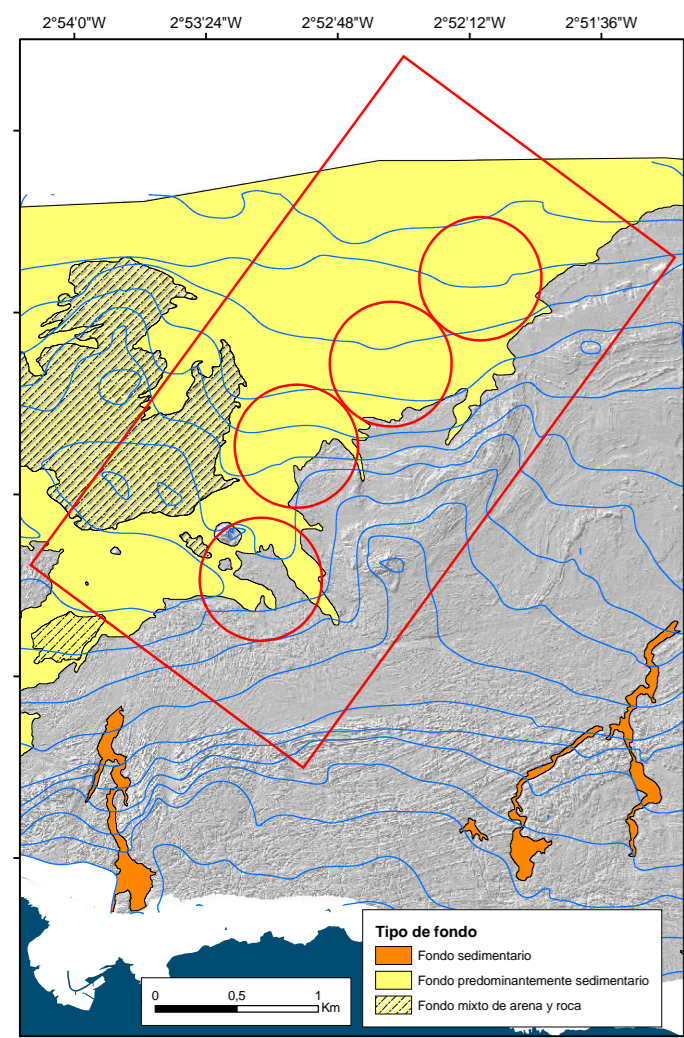


- Promoted by the **Basque Entity of Energy (EVE)**, BIMEP represents an **offshore test site** for the demonstration and proving of **wave energy converters (WEC)**
- It consists of 8 km² sea area between 50 and 90 m depths where four static submarine cables will be placed, operating at 13kV and 5MW.
- Wave energy generation devices will be connected to these cables through dynamic submarine cables.
- In land, bimep will provide a research centre in Arminza town (Bizkaia, Basque Country, Northern Spain) where developers will be able to control the behavior and performance of the devices.



3. PROJECT SITE ENVIRONMENTAL CHARACTERIZATION

3.1 Physical Environment



3.1.1 Geology, geomorphology and sedimentology

2/3 of the occupation area of bimep is over sedimentary sediments or mixed rock-sand sediments with low organic content and high grain size with a good selection degree (see figure on the left). 1/3 of the occupation area of bimep is over rocky bed. Nearshore, there are two paleochannels filled with sand-gravel sediments.

3.1.2 Tides: semidiurnal with a range between 4 and 1,5 m

3.1.3 Waves: the mean energy flux of waves is 21,4 kW/m coming from 50°NW.

3.1.4 Currents: dominated by the wind, the mean speed of currents in water surface is about 10-20 cm·s⁻¹ with a NE-SW direction.

3.1.5 Hydrography: according to the Water Framework Directive requirements (Directive 2000/60/CEE), the physico-chemical status of the water bodies in the bimep area are in a very good status.

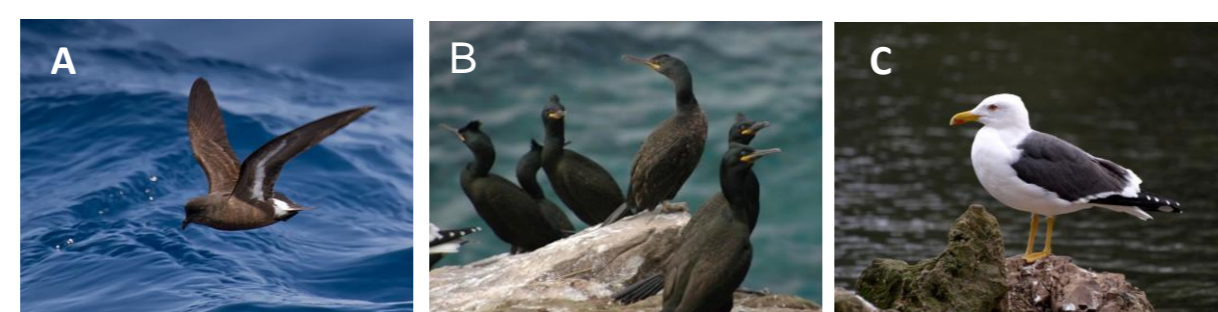
3.1.6 Landscape: all the shoreline near bimep is listed as an area of special interest from the point of view of marine landscape.

3.2 Biotic Environment

3.2.1 Benthos: according to the AZTI Biotic Index developed by AZTI, (<http://ambi.azti.es/es/ambi/>), the benthic communities in the samples taken in bimep (see figure on the left) are representatives of a community dominated by species sensible to the alteration.

3.2.1 Ichthyofauna: there are not specific data on the bimep area.

3.2.1 Marine birds: 3 are the main marine bird species in the bimep area: (a) European storm petrel (*Hydrobates pelagicus*); (b) European shag (*Phalacrocorax aristotelis*) and (c) Yellow-legged gull (*Larus michahellis*). Consequently, the bimep area has been proposed to be declared as an Important Bird Area (IBA).



3.2.4 Marine mammals: the short-beaked common dolphin (*Delphinus delphis*) is a common species in the bimep area.

3.2 Socioeconomic Environment



The main economic activity in the bimep area is the **fishing activity** of 11-14 **small professional artisanal vessels** which account for more than 14,000 kg of captures of more than 10 different species of small pelagic and bottom fishes.

Also, it's significant the **leisure fishing activity** of more than **20 small vessels** when meteorological conditions are suitable.

4. ENVIRONMENTAL IMPACTS

- Very significant impact;
- Significant impact;
- Not significant impact;
- no relation

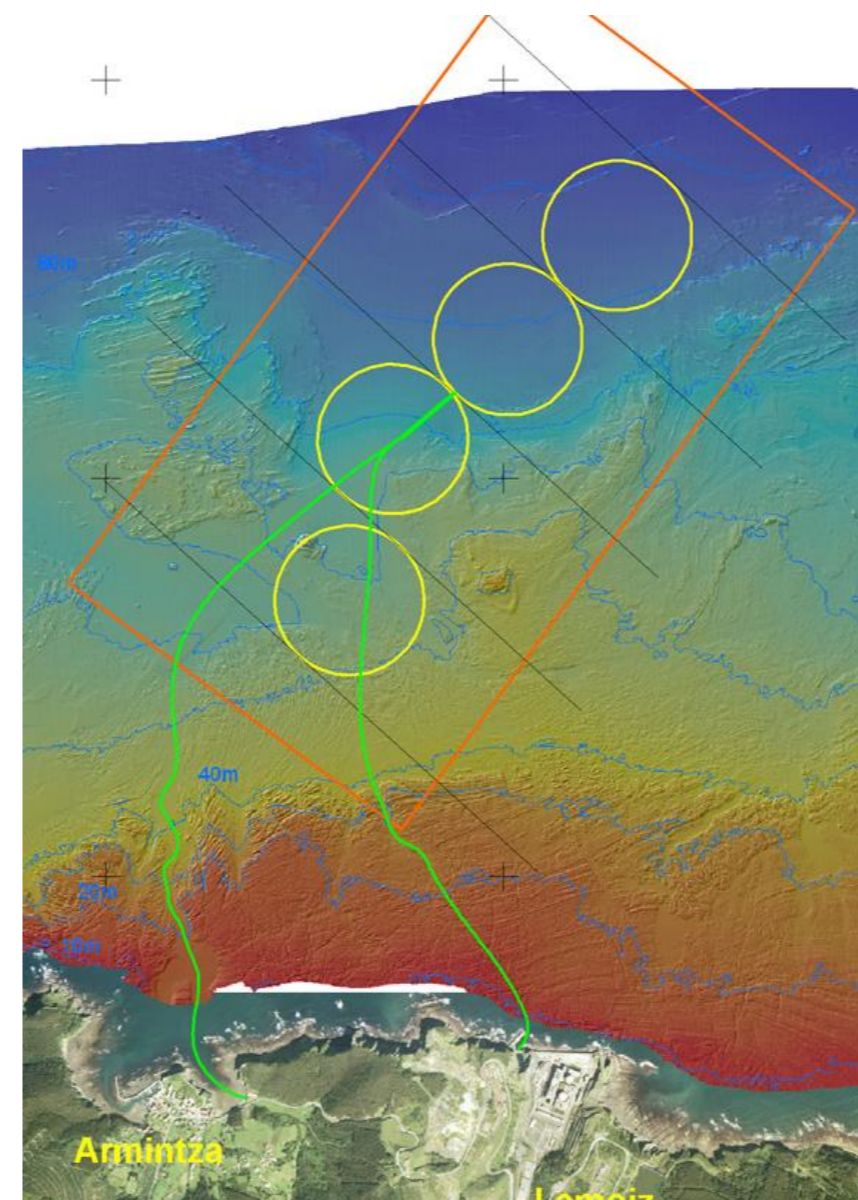
	Hydrodynamic	Water Quality	Sediments	Benthos	Ichthyofauna	Marine birds	Marine mammals	Fisheries	Cultural and archaeological values	Protected species and areas	Landscape	Socioeconomy
Installation	---	○	●	●	●	○	●	●	○	○	○	●
Exploitation	●	○	●	●	●	○	●	●	○	○	●	●
Dismantling	---	○	●	●	●	○	●	●	○	○	○	●

5. IMPACT HYERARCHY

Very significant impact Significant impact No impact No relation	PROJECT ACTIVITIES												Impact (%)
	a = installation; b = operation; c = decommissioning												
	Estructuras			Submarine cables			Beach Man Hole			Power lines			
	a	b	c	a	b	c	a	b	c	a	b	c	
PHYSIC ENVIRONMENT													
Sediments	1	3	1	1	1	1							33,30
Water quality	1	1	1	1	1	1							25,00
Hydrodynamics	1	1	1	1	1	1							25,00
Landscape	1	1	1	1		1	1	1	1	1	1	1	25,00
BIOTIC ENVIRONMENT													
Benthos	2	3	2	2	2	2							54,10
Ichthyofauna	2	2	2	2	2	2							50,00
Marine birds	2	2	2	2		2							50,00
Marine mammals	3	2	2	3	2	3							62,50
SOCIOECONOMIC ENVIRONMENT													
Fishing	3	3	3	1		1							50,00
Socioeconomy	+	+	+	+	+	+	+	+	+	+	+	+	66,60
Archaeological underwater resources													25
Protected areas and species	2	2	2	3	3	3							62,50
IMPACT (%)	45,00	50,00	42,50	45,40	44,40	43,7	25	25	25	50	50	37,50	
		45,80			44,50			25		45,80			

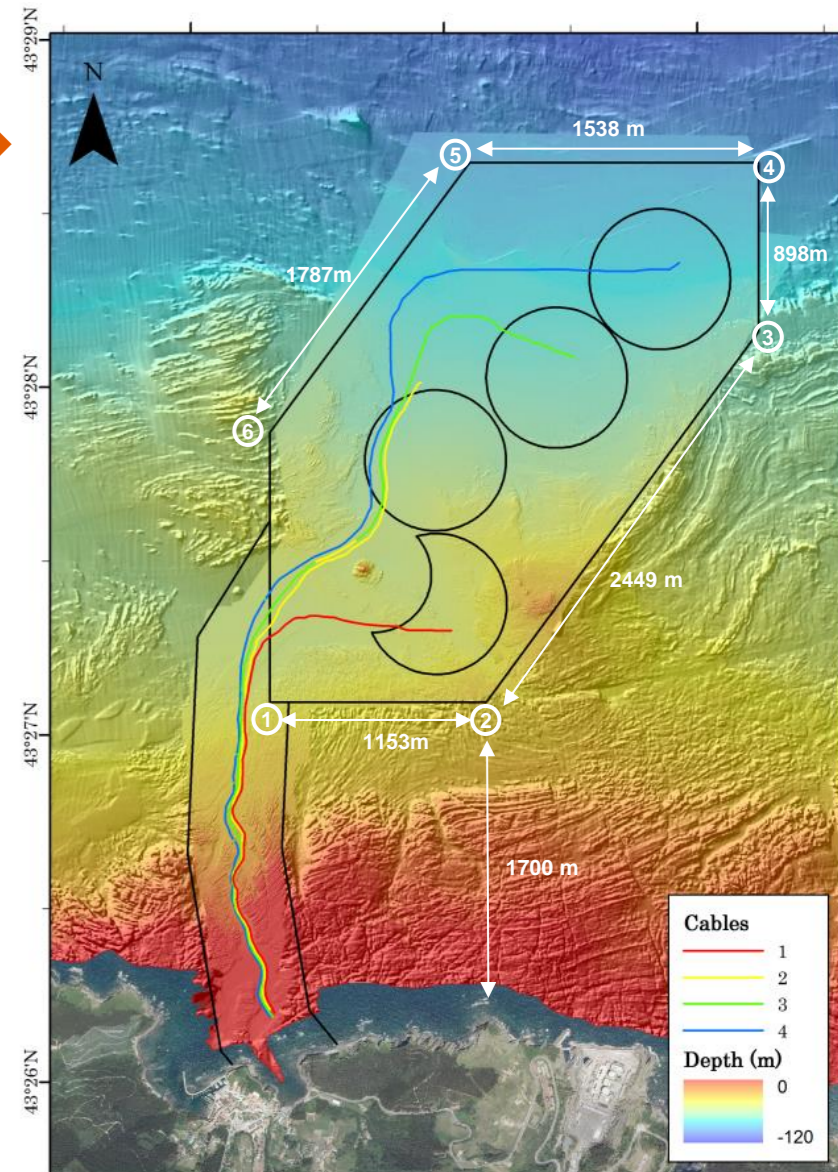
- The **structures** (WECs, moorings and mooring lines) produce a 45,8% of impact, specially during the operation phase.
- The **submarine cable** produce a 44,5% of impact, specially during installation and decommissioning.
- The **biotic environment** receive a 54,3% of impact, specially over **marine mammals** and **benthic communities**.
- The **socioeconomic environment** receive a 43,5% of impact, specially over the **fishing activity**.

6. PROTECTION, AMENDMENT AND COMPENSATING MEASURES



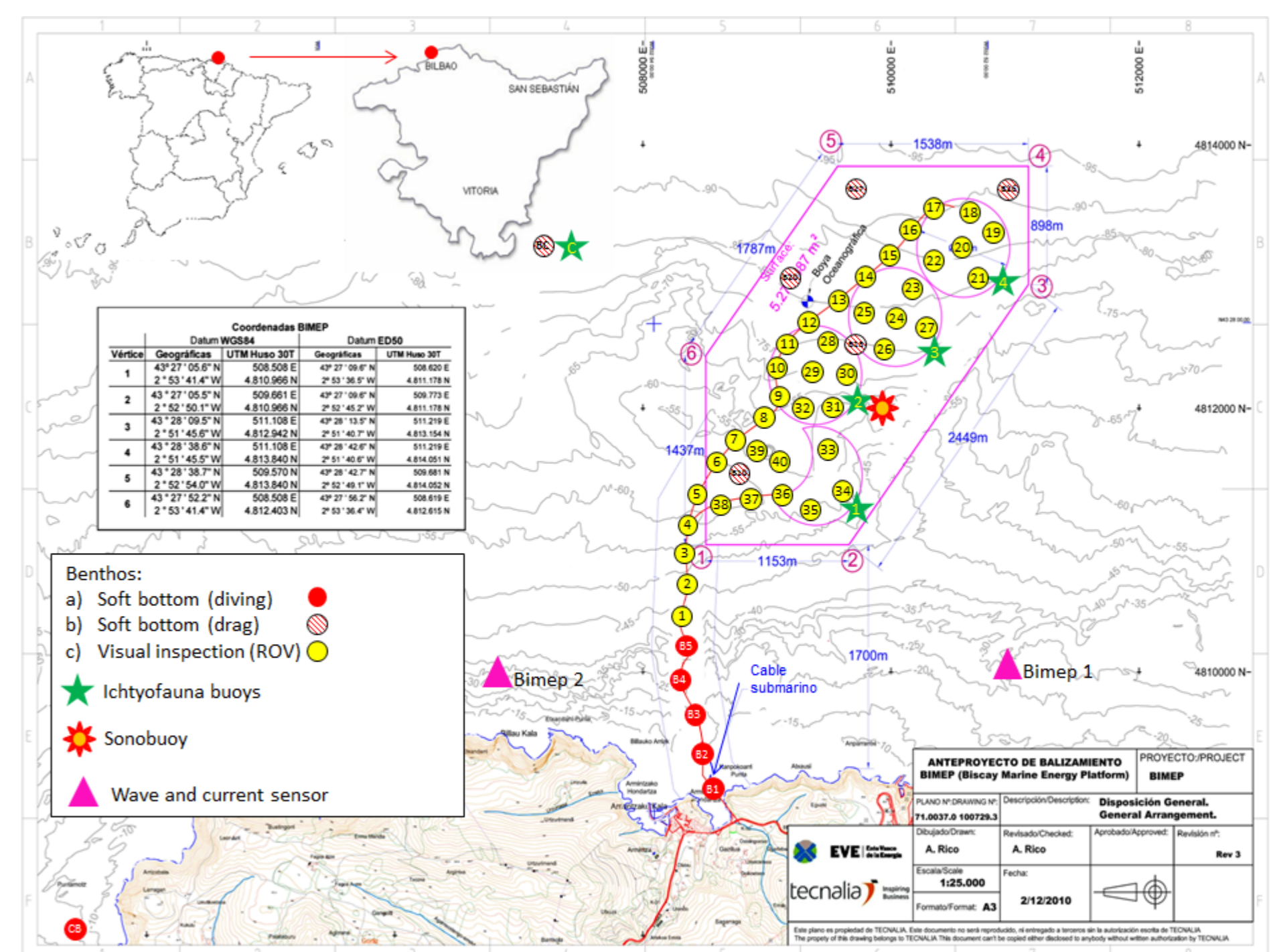
PROJECT MODIFICATION

- Project area:** 8 km² → 5,3 km²
- Submarine cables route:**
 - Avoid rocky bottom.
 - 100 m distance from some geologic structures.
- WEC moorage areas:** one of the moorage area has been reshaped in order to avoid the impact over some geologic structures.
- Economic compensation** to the **fishing sector** due to the competence of bimep with the same space of activity.



7. ENVIRONMENTAL MONITORING PLAN (EMP)

The Environmental Monitoring Plan focus on the monitoring of **benthic communities** (drag samples and visual inspections with ROV), **Ichthyofauna** (active acoustics buoys), **underwater sound** and **marine mammals** (passive acoustic), **hydrodynamics** (wave and current profiler installation), **archaeological resources** (visual inspections with ROV), **electromagnetic fields**, **marine birds** (following of the results of the annual census made in the nesting colonies near bimep) and coastline **landscape** characterization.



8. CONCLUSIONS

- On the first of June 2009, the General Council on Environmental Quality Assessment of the **Ministry of Rural, Marine and Natural Environment of the Spanish Government**, on the light of the **Environmental Impact Assessment (EIS)** of the **BIMEP project** undertaken by AZTI-Tecnalia, decided to **not submit** the project to the whole Environmental Impact Assessment (EIA) process.
- In any case, the **Environmental Impact Statement (EIS)** of the Ministry, taking into account the great uncertainties about some predicted environmental impacts, underlined the **need to implement** the proposed **Environmental Monitoring Program (EMP)** of the EIS.

Acknowledgements



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