ocean plug
portuguese pilot zone

RENX
Description of the Portuguese Pilot Zone

The Portuguese Pilot Zone (PPZ) includes an area of 320 km² and it is located near the town of S. Pedro de Moel, between Figueira da Foz (North) and Nazaré (South).

The Portuguese Pilot Zone constitutes the maritime space delimited, under national sovereignty or jurisdiction, in waters whose depths are between 30 and 90 meters.

Its main objective is to become an open space, in the Atlantic coast, devoted to the development of oceanic energies, from early conception stages until full commercialization stages, with special emphasis in the wave energy.
Characteristics of the Portuguese Pilot Zone

- Good resource, without being too destructive;
- Few storms each year, mainly in Winter;
- Good installation/maintenance conditions happen frequently;
- Low intensity of ocean currents and absence of tidal currents;
- Maritime traffic with low intensity;
- Seabed composed mainly of sand and gravel, with no outcrops;
- Proximity to ports and shipyards.

Profile of the seabed in ZP ➔
Legal Framework

- **Creation:** Decree No. 5/2008 of 8 January
- **Base Lease:** Decree No. 238/2008 of 15 December
- **Concession Agreement:** RCM No. 49/2010 of 1 July

In the 23rd of January 2012, the **Decree No. 15/2012** was published in order to update the Decree No. 5/2008 and to alter the Decree No. 238/2008, concerning issues related not only to the privatization of the company, but also to the characterization of the initial costs.

Currently, OceanPlug is working with the Government for the discussion and approval, at the Parliament, of the new Decree-Law, that will extend the scope of the Pilot Zone to other forms of offshore renewable energies beside the waves.
OceanPlug’s Responsibilities

- Licensing of electricity production facilities, including the monitoring of the equipment’s tests, operation and removal phases;
- Supervision of all the electricity production facilities;
- Development of the Rules of Accessing to the Pilot Zone;
- Installation and Maintenance of all the common infrastructures, mainly electrical, maritime and security ones;
- Proposal of the Feed-In Tariff to be assigned to every project, in each development phase;
- Ensure proper mechanism of dissemination and promotion of the Pilot Zone and the production of electricity through oceanic energies.
Development Plan for the Portuguese Pilot Zone

Phase 1 (2011 – 2014):

- **Aim** – Development of the ZP so that it can receive, in a demonstration of concepts scheme, electricity generation equipment (wind and waves) in the summer of 2014.
- **Objective** – Installation of the electric infrastructure that allows the injection of 12 MW (4x3MW) in the central grid.

Phases 2 and 3 (as needed):

- Pre-comercial Stage (phase 2) – Injection of up to 80 MW
- Comercial Stage (phase 3) – Injection of up to 250 MW
**Portuguese Pilot Zone’s Characteristics**

**Portuguese Pilot Zone**

- Local: São Pedro de Moel, Portugal
- Depths: 30-90m
- Capacity: 12 MW (Concept Demonstration)
- Area: 320 km²
- Distance to Shore: ~5km to ~20 km

**Budget:** ~€15m

- Geophysical Characterization Studies
- Environmental Studies
- Electrical infrastructure Project
- Engineering:
  - Submarine Power Cables
  - Onshore Substation
  - Submarine Cables’ Joints
  - Submarine Hubs
  - Submarine Cable’s Terminations
  - Installation of Equipment
  - Command & Control

[Map of the Portuguese Pilot Zone]
Portuguese Pilot Zone’s Characteristics

Command, Control & Communication
Services available near the Portuguese Pilot Zone

- Universities and Institutes devoted for offshore R&D
- Shipyards
- Electrical Industry
- Maritime Operators
- Ports
- Others (see at www.globalfind.globalparques.pt)
Work Developed

Geophysical Characterization of the Pilot Zone:

- Realized by *Instituto Hidrográfico*, it comprises aspects such as:

<table>
<thead>
<tr>
<th>✔ Bathymetry and morphology</th>
<th>✔ Sedimentary structures</th>
<th>✔ Cartography of the sedimentary cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔ Establishment of a baseline for water quality and sediment</td>
<td>✔ Object detection</td>
<td>✔ Oceanography</td>
</tr>
<tr>
<td>✔ Sediment dynamics in coastal areas and corridors</td>
<td>✔ Safety of navigation</td>
<td>✔ Data integration and presentation</td>
</tr>
</tbody>
</table>

- According to preliminary data, the Pilot Zone has a **great energetic potential**, with great exposure to the oceanographic elements, especially winds and waves.

- All the information collected is **free and fully available** to the general public (please contact OceanPlug for further information)
Work Developed

Geophysical Characterization of the Pilot Zone:
Some Geophysical Data

Geophysical Characterization of the Pilot Zone:

<table>
<thead>
<tr>
<th>Power Class (P) [kW/m]</th>
<th>Global</th>
<th>Summer</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>P ≤ 5</td>
<td>34,43</td>
<td>14,45</td>
<td>3,92</td>
</tr>
<tr>
<td>5 &lt; P ≤ 10</td>
<td>15,68</td>
<td>55,46</td>
<td>26,33</td>
</tr>
<tr>
<td>10 &lt; P ≤ 20</td>
<td>17,11</td>
<td>15,75</td>
<td>18,47</td>
</tr>
<tr>
<td>20 &lt; P ≤ 50</td>
<td>18,90</td>
<td>10,63</td>
<td>27,19</td>
</tr>
<tr>
<td>50 &lt; P ≤ 100</td>
<td>8,65</td>
<td>2,83</td>
<td>14,49</td>
</tr>
<tr>
<td>100 &lt; P ≤ 200</td>
<td>4,02</td>
<td>0,80</td>
<td>7,25</td>
</tr>
<tr>
<td>P ≥ 200</td>
<td>1,21</td>
<td>0,08</td>
<td>2,35</td>
</tr>
</tbody>
</table>
Some Geophysical Data

Geophysical Characterization of the Pilot Zone:

- Backscatter variation due to the presence or proximity of gravel deposits.
- Sedimentary Deposits.
- Total Current for 10, 20, 30 and 40m of depth.
- Peak wave Direction and Energy Distribution (Summer and Winter).
Work in Development

Several tasks are in progress:

- Development of the Pilot Zone’s Access Regulation.
- Assessment of Environmental Impacts.
- Development of the full electrical project for the Phase 1, to be installed in the Pilot Zone’s electrical infrastructures.
- Building of a Services Portfolio, comprising the national enterprises that are able to provide all kinds of services to every promoter that wishes to develop its project in the Pilot Zone.
Renewable Energy Integration in the Power Grid.

With 10,848 MW of electrical energy production from renewable sources, Portugal is the 3rd country in the EU with the largest integration of renewable power.

Experience in that area dictates the following:

- The total electrical energy production must be known in real-time.
- Voltage dips must be safeguarded (mainly in wind power).
- Wind forecast plays a very important role.
- There must be no dependency on installed wind power for peaks.