

## INTRODUCTION

The identification of suitable areas to exploit wave energy depends mainly on the available wave resource, but it is not the only factor to be taken into account to assess the viability of a project for harvesting this renewable energy. Thus, factors of technical, socioeconomic, and environmental nature may constitute restrictions preventing the development of the project. As a consequence, areas with a moderate wave power potential could become exploitable, and be possibly advantageous from different points of view.

In the previous context, average wave power availability in deep waters around Canary Islands, as well as its annual variability have received considerable attention and it is well known that presents a significant space-time variability (e.g., Chiri et. al [1], Guedes et al [2]). Thus, it's considerably low in the south and east strips of the archipelago as to be considered for its practical exploitation but increases notably along the north and west flanks of the archipelago, with average values ranging from 12 to 23 kW/m, modulated by a significant seasonal variability (see Fig. 1). In the particular case of Gran Canaria Island, the highest wave potential is found in the North part of the island, where the average potential is close to 25 kW/m (see Fig. 1), making viable the use of some type of wave energy conversion (WEC) devices for its practical exploitation. However, there are no studies examining the viability of this activity in the zone in terms of the possible existence of other socioeconomic activities or environmental aspects limiting or preventing its exploitation.

This study aims at filling this gap by examining activities carried out in this coastal zone and may interfere with wave energy harvesting, as well as the practical interest of its use.

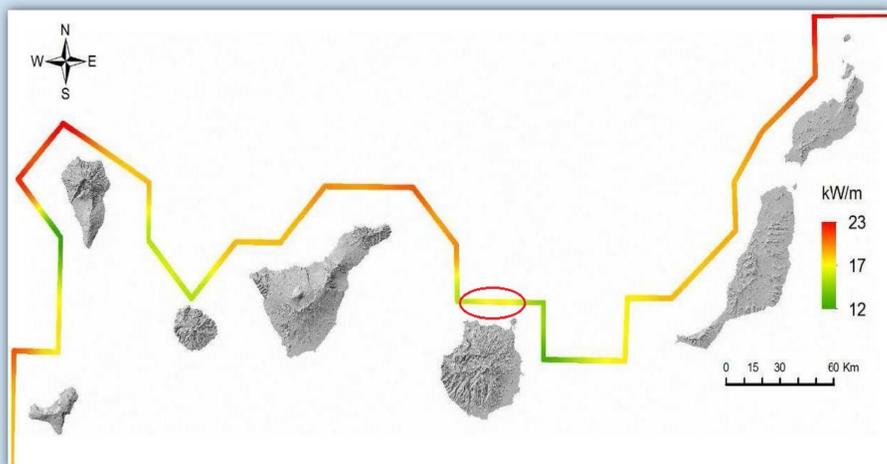


Figure 1. Spatial distribution of wave energy resource around the Canary Archipelago (Source: H. Chiri et. al [1])

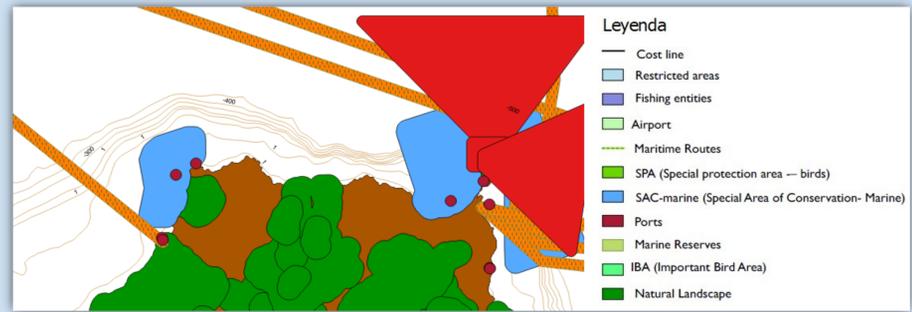


Figure 2. Distribution of socioeconomic activities in the North flank of Gran Canaria Island

The use of the Geographical Information System developed by GRAFCAN (Canary Island's Government) and data provided by Cabildo of Gran Canaria make evident that there are no relevant activities of this type which could interfere with the installation of WECs (see Fig. 2). Furthermore, the study area is riddled with pipelines of sewage treatment and seawater desalination plants (see Fig. 3). These plants need a lot of energy for their operation, so the installation of WECs could be an interesting opportunity to meet their energy demand with a clean power resource.

The main use of the beaches located in the area is the bathing by local population and some specific areas to practice nautical sports, such as surfing or diving (see Fig. 4). The presence of WECs would change wave characteristics and therefore the shoreline configuration, so it would be necessary to study the extend of these changes.

Other important socioeconomic aspects are fishing related activities, such as fishermen associations and first fishing sale points, areas for aquaculture, coastal areas for shellfish or underwater sport fishing sites. These have been identified through the documentation edited by the Canary Government Fisheries and Water Council. This information indicates that there are no well-developed fishing activities near the area, so the installation of WECs would not suppose any drawback in this sense.



Figure 3. Distribution of pipelines around the Gran Canaria Island (source: GRAFCAN)



Figure 4. Distribution of diving sites around the Gran Canaria Island (Source: Cabildo of Gran Canaria)

## RESULTS AND DISCUSSION

The decision for installing WECs in any given zone must be based on multiple criteria, available wave resource and other factors including land and sea uses, the existence of protected or forbidden areas, among other aspects. Hence relevant information on this kind of activities, been provided by national and regional and local public administration, has been collected and examined to explore the viability of wave extraction projects in the selected area.

In terms of the available power, this area exhibits the highest energy potential along the northern side of the island with annual average values around 15-18 kW/m, reaching values exceeding 20 kW/m in autumn and above 30 kW/m during winter.

It is important to know if there are terrestrial or marine areas with environmental protection on the location. The analysis of the information provided by the ministry of Agriculture and Fisheries, Food and Environment reveals that there are no protected areas near this zone (see Fig.2), so the possible environmental impacts in this sense are negligible.

Aspects regarding socioeconomic factors taken into account include the existence of maritime routes, ground uses, location of ports, pipelines, nautical sports sites and beaches.

## CONCLUSIONS

There is no conflicts between wave energy extraction and other socioeconomic or environmental activities in the selected area.

The installation of WEC farms in this zone would represent a considerable improvement for the population centres in the area, whose economy is based on the agricultural activity, both in terms of the use of clean energy and from the socioeconomic point of view. Of special interest is the realistic possibility of using wave power for supplying energy to sewage treatment or seawater desalination plants already existing in the area.

It is necessary to study if the presence of WECs can give rise to change in the wave fields and, as a consequence, in the shoreline configuration.

## REFERENCES

- [1] Chiri, H., Pacheco, M. & Rodríguez, G., *Spatial variability of wave energy resources around the Canary Islands*, WIT Transactions on Ecology and the Environment, Vol 169, 15-26, 2013.
- [2] Guedes Soares C., Gonçalves M., Martinho P., *Assesment of wave energy in the Canary Islands*, Renewable energy, Vol 68, 774-784, 2014.