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Methodology to design an economic and strategic offshore wind energy Roadmap in Portugal

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Abstract

The main objective of this paper is to establish a roadmap for offshore wind energy in Portugal. It will determine the best sea areas to install fixed and floating offshore wind farms in this region, using spatial analysis of four economic indexes: Internal Rate of Return (IRR), Net Present Value (NPV), Discounted Pay-Back Period (DPBP) and Levelized Cost Of Energy (LCOE). Several economic parameters will be considered (Portuguese offshore tariff, investment and O&M costs, credit values, etc.).Three different discount rates were used into the sensitivity analysis. Several types of physical restrictions will be taking into account: submarine electrical cables, bathymetry, seabed geology, environmental conditions, protected areas in terms of heritage, navigation areas, seismic fault lines, etc. Moreover, location settings as proximity to shipyards or ports will be considered to complement the strategy. All of them will define the resulting area to install offshore wind farms along Portuguese coast. Spatial operations, considering economic, physical and strategic issues, have been carried out using Model Builder of GIS (Geographic Information Systems) software. Results indicate the Portuguese areas economically suitable for installing offshore wind farms.

Keywords: offshore wind energy, roadmap, renewable energy, economic areas, GIS

1. Introduction

A successful roadmap contains a clear statement of the desired outcome followed by a specific pathway for reaching it. This pathway should include the following components: goals, milestones, gaps and barriers, action items, priorities and timelines [1].

The development of the process ensures that a roadmap identifies mutual goals and determines specific

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