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"Reliability assessment of offshore floating renewable structures by AHP methodology"

Abstract

Energy efficiency is among the main factors for ensuring sustainable development. Hence, the vast energy reserves of renewable energy sources can help to ensure that future adequacy with low cost and to provide independence from fossil energy sources. However the key factors that should be taken into account for the viability of renewable energy power systems are environment adaptation technology advances, economic feasibility and social acceptance. In our day offshore renewable energies installations show a great potential for further exploitations in this framework. Thus exploitation aim of the abundant energy resources, either from the wind or from sea waves should be investigated and ensure that in the long term, the supply of energy will come from reliable, safe, efficient and economical accessible natural sources. In this article the uses of multi criteria decision method on offshore energy structures is resented in order to provide, through the application of AHP method, a model for assessing reliability based on qualitative (historical data) and quantitative (experts opinion) characteristics. According to the above method data are evaluated and compared in pairs and the results may provide information on the improvements that will be included in the development of offshore structures in order to increase the probability of success, the structure reliability in energy production and its sustainability, depending on the choice of technology which will be installed. A field study for a floating desalination unit working with wind and waves installed in an isolated Greek island is presented to verify the proposed methodology. The results will assist the development of similar designs large scale floating offshore installations which are essential in fighting water scarcity and electrification of isolated insular areas.