METHODOLOGY FOR ENERGY TRANSITION EVALUATION. CASE STUDY: THE BALEARIC ISLANDS, SPAIN

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ABSTRACT

In a world full of inequalities, energy disparity directly affects development. Developed societies are focused on renewable energies while developing countries are investing in all types of energy resources. However, all countries have something in common, the necessity to provide energy to society under the best economic and environmental conditions. This study describes a global methodology for energy transition evaluation applied to the Balearic Islands. This region is an archipelago well-known as part of the environmental protection program Natura 2000 network. In terms of electricity generation, it is a semi-isolated system where the islands are interconnected and have a connection to the peninsular electric system that covers part of the energy demand. Almost 95% of the remaining demand is supplied by non-renewable resources. Since European legislation has set goals to promote cleaner energy generation, this document studies all the technical and legislative viable energy resources in this region and evaluates the trade-offs of transitioning following different strategies. In the first part, in-place technologies are accepted as potential future resources. In addition, new options like microwind, distributed solar PV, hybrid and concentrating solar, and biomass are classified as viable while others are discarded. In the second part, energy transition in the period 2020-2030 is evaluated according to 4 scenarios to meet demand. The parameters considered include tourism rates, EV penetration, electricity prices, and 5 environmental impact indexes. Results show that coal and diesel are responsible for higher environmental impacts, renewables land use could limit their expansion, natural gas use is subject to energy security constraints, and submarine connection expansion, although the best option, could encounter social challenges. In conclusion, this methodology identifies trade-offs of different approaches becoming useful for technical and strategic analysis.

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