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# WIND-SOLAR HYBRID PLANT ECONOMIC RISK ANALYSIS: A CASE STUDY FOR CAETITE PLANT

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**Statement of the problem:** The use of renewable sources for generating electric energy has been growing in many countries around the world. Particularly, in Brazil, a hybrid of wind and solar plants has been implanted recently for energy large-scale production in the energetic market. Although this hybrid system is clean, it depends on natural resources to generate energy, i.e., it only provides energy if these resources are abundant locally. Here, the energy sector investors must be attentive once electric energy production fluctuation from wind and solar plants could increase the risk of an unprofitable enterprise. The purpose of this work is to present a method, which is able to quantify hybrid plant owners' financial risk as well as suggest a case study in order to evaluate the proposed methodology.

**Methodology & Theoretical Orientation:** An economical risk study is accomplished by using Net Present Value (NPV) and Monte Carlo Simulation (MCS). To perform the study, the wind and solar plants' power is modelled mathematically whereas local wind speed and solar irradiation data are collected. Furthermore, the hybrid plant's total revenues and costs are estimated in order to build the cash flow of the project. Finally, statistical analyses are considered to run the MCS.

**Findings:** Real data from a Brazilian hybrid plant were considered to estimate its financial risk. By utilizing all the plant parameters, it was found that the hybrid plant set made of 81.8% of nominal power from wind power and 18.2% of nominal power from solar power has the same economical risk to owners that a set of a plant made of 100% of wind power.

**Conclusion & Significance:** The proposed methodology has attended the expectations and allowed to identify the owner's risk in funding a hybrid plant. In addition, it was possible to verify that this risk increases as the percentage of solar energy in the hybrid plant increases.

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