Review of: "Technical and Financial Viability of a 1 MW CSP Power Plant with Organic Rankine Module: Case Study for a Northeastern Brazilian City"

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Potential competing interests: No potential competing interests to declare.

The paper titled "Technical and Financial Viability of a 1 MW CSP Power Plant with Organic Rankine Module: Case Study for a Northeastern Brazilian City" by Jo˜ao G. M. S. Pontea and Paulo A. C. Rochab, explores the feasibility of a 1 MWe parabolic trough concentrating solar power plant using an Organic Rankine Cycle (ORC) to convert thermal power into electricity. Using hourly obtained data, the study mimics the plant's year-round operation using solar data from the Brazilian city of Fortaleza.

The authors took into account a number of setups with different thermal energy storage capacities and collector counts. Based on both technical and budgetary outcomes, the optimal setup consisted of 100 collector assemblies paired with a 48 MWh storage system. With this arrangement, 4815.50 MWh of net yearly energy generation, a 12.08% overall efficiency, and 186.98 US$/MWh of levelized cost of electricity were produced. To determine which parts of the power plant are the most costly, the study also contrasted the capital and operation and maintenance (O&M) expenses of various components. 74% of capital expenditures and 58% of operating and maintenance costs were found to be related to the acquisition of collectors, making it the most significant expense.

The authors came to the conclusion that their work could spark additional research and conversations about this kind of technology in the area, possibly drawing funding from businesses and organisations eager to advance Brazil's renewable energy industry, especially in the country's northeastern region.

Some aspect of the papaer that can be improved are as follow;

1. Limited Geographic Focus: The study only looks at the city of Fortaleza, which is located in Brazil's northeast. Although the information is specific to this place, it might not be useful or applicable to other areas with different infrastructure or climatic circumstances.

2. Lack of Comparative Analysis: It appears that other renewable energy technologies that might be used in the same area are not compared in the paper with the proposed CSP power plant. A more thorough understanding of the top renewable energy choices in the region might be obtained from this comparison.

3. Assumptions in the Model: The study makes a number of assumptions, including the linear reduction in efficiency of the ORC module under base load conditions, of 1% for every 5% in load. These presumptions might not hold true in practical situations, which could have an impact on how accurate the results are.

4. Absence of Discussion on Regulatory or Policy Implications: The suggested CSP power plant's implementation may be impacted by regulatory or policy incentives or impediments, which are not covered in this article. This might have a big impact on whether a project like this is feasible.

5. Limited Environmental Impact Consideration: Although the paper addresses the CSP power plant's technical and financial viability, it doesn't seem to take into account the possible environmental effects of building and running a plant of that kind, which is an important factor in renewable energy projects.

6. Adding more rigorous optimization, sensitivity analysis, benchmarking, multiple sites and uncertainty quantification could significantly strengthen the paper's contributions. This would lead to more robust conclusions on the feasibility of the proposed CSP-ORC plant.