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Abstract Submission

Sustainable Energy Supply for EL-Gouna Touristic City in EGYPT "New study covering all the aspect from analysis to proposal"

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Abstract

This paper presents a complete study dealing with several aspects on how to reach sustainable energy supply mix for a touristic city in Egypt. First introduction of renewable energy to the area took place in Kuraymat were a combined solar CSP Gas-turbine steam cycle power plant was built. A well balanced mix of variable and flexible renewable power plants with conventional backup can cover any electricity load on demand. In this paper an economic, competitive, secure, and compatible power generation mix for El-Gouna is proposed.

After studying the current energy situation in the area, a full analysis was done including financial issues, policy regulations, demanding load and last but not least the socioeconomic impacts along with the environmental impacts assessment. Finally 8 scenarios where suggested with the most optimized scenario chosen to have 86% renewable energy share including 43% CSP, 9% PV and 48% wind with surplus of 6%. This mix leads to Levelized Electricity Cost (LEC) of 0.083 €/KWh and a capital cost of 281.56 mil €.

A policy framework is proposed as well for the red sea governorate to best suit renewable energies introduction into the market. Simulations and graphs were done through Excel sheets, developed

models with equations and criteria for hourly data prediction, based on weather data extracted from Meteonorm software.

The integration scenarios has shown a diverse range of results that makes optimization decisions very crucial in order to achieve the most optimized solution. Technical integration challenges are addressed to overcome trade-offs present due to RE technologies' intermittent nature. After comparing the results the following was concluded:

1. The lowest total capital cost is scenario 1, composed of 3.5 MW PV installed capacity, 17MW Wind and 15MW CSP
2. The lowest Levelized Cost of Electricity Scenario 6 (15 MW Wind and 17 MW CSP)
3. The lowest fuel consumption Scenario 8 (100% CSP)
4. Comparing all these indices, we can see that the best scenario is number 2

The best choice is an optimization between the number of hours below the part load factor and the number of hours that having peaks above the installed capacity to select the appropriate installed capacity. This paper represents the base for future prosperity in terms of renewable energy. A complete detailed feasibility study still needed to be done to further encourage both the investors and the political decision makers towards achieving such strategy of sustainable renewable energy mix.