A COMPARATIVE CONFIGURATION ASSESSMENT OF A SOLAR THERMAL PLANT IN THE EILATH AREA.

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The Solar Power Plant based on parabolic trough collectors is studied for application in a specific location and operating conditions.

The base case is the LS-3 technology as developed by LUZ, presently owned by SOLEL. The design has matured in commercial applications in the Mojave Desert. In that case, the Solar Boiler (SB) produces superheated steam via a Heat Transfer Fluid (HTF), heated in a Solar Collector Field (SCF), in a set of heat-exchangers. The superheated steam flows to a steam turbine which is a part of the conventional power island based on Rankine Cycle. The back-up power is based on a fossil fuel fired boiler (or oil heater).

The paper deals with different configurations of the SCF as it integrates with fossil fuel fired installations.

In comparison with the base case, integration with Gas Turbine (GT) Combined Cycles (CC) is reviewed.

The CC is now more commonly used as a base load producer. The CC can be employed for peak load as well, especially when it is integrated (combined again) with a SB in a Solar Combined Cycle (SCC).
The preferred situation is that of operating Solar continuously. In the non peak periods, the SB utilizes the steam turbine generating steam at lower than the rated pressure. In peak load periods, the GT operates and the SB generates high pressure steam superheated and possibly reheated in the heat recovery of the GT exhaust gases. This improves the efficiency of the SCC mode when it counts and better utilizes the investment in the GT heat recovery system. Optionally, a supplementary firing can be added to the system for back up to the solar mode, if justified by the rates at the non-solar periods.

The discussion underlines the main advantage of collocating such configuration in a well developed electricity consumption area where a high correlation exists between the system daily cycle characteristics and the typical demand cycle.

The paper proposes a criteria the authors believe to be the appropriate in judging plant configurations for this high insolation and high tourism area.

For the case of peak load operation in the designated area and similar applications, the SCC provides a most efficient mode of contribution to the electricity production.