

Cost analysis of solar thermal power generators based on parabolic dish and micro gas turbine: Manufacturing, transportation and installation.

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Cost analysis of solar thermal power generators based on parabolic dish and micro gas turbine: Manufacturing, transportation and installation

Giacomo Gavagnin ^a ... Antonio Muñoz ^a

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Highlights

- Cost analysis based on data provided by original equipment manufacturers.
- Manufacturing, transportation and installation costs are considered.
- Installation cost is 3250/3300 \$/kWe for solar-only/hybrid stand-

â€¢ Potential for 25â€“40% cost reduction if the system is mass-produced.

â€¢ Upgraded system capable of achieving 2550â€¢/kWe installed cost.

Abstract

This paper presents a detailed cost analysis of a small-scale Concentrated Solar Power (CSP) generator based on parabolic dish collectors and Micro Gas Turbines (mGT), whose technical feasibility was already demonstrated in previous publications by the consortium. The system can be used for either electric power or combined heat and power generation, whether operating on solar energy only or with fossil fuel backup. Accounting for manufacturing, transportation and erection costs, and with manufacturing cost functions sensitive to system size and production volume, a single-shaft recuperated engine with different technological levels (low and high performance specifications) is considered. The results show that the specific cost of the base-case low performance system (1000 units/year) is slightly lower than 3300â€¢/kWe but can be reduced by 27.3% if the annual production rate is multiplied by ten, or 40.4% if it is multiplied by a thousand. This cost is lower than that of dish-Stirling systems but higher than for photovoltaic panels, even if at very high production volumes. Furthermore, the utilisation of high performance specifications reduces the cost of the system to 2500â€¢/kWe thanks to a substantial reduction of the size of the dish. At this cost level, the system has the potential to become competitive against photovoltaics under favourable environmental, political and market conditions.

Graphical abstract



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Keywords

Concentrated Solar Power; Micro gas turbine; Dish collector; Cost

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