

PROJECT TITLE

Concentration Solar Thermoelectric Generator (CSTEG)



UNDER THE GUIDANCE OF
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Abstract

Thermoelectric generator is considered as a solid-state device used for electricity production in particular, the low scale applications such as; medical, wearable and communication due to its ability in converting the heat into electrical power. However, the thermoelectric generator (TEG) efficiency is low and the electrical power generation also low. Therefore, integrating more systems such as concentrator or vacuumed systems in one hybrid system will improve the power production and efficiency whether electrical or thermal.

The present work reviews the progress on the concentrating solar thermoelectric generator (SCTEG) with and without vacuumed system. The attention is given to development of the system, modeling and optimizing in numerical and experimental and method of absorbing the heat from the system. The review gives an in depth that the CSTEG system might be useful for small scale electricity production or may be both electrical and thermal. The study will benefit the designer and researchers that interested in improving the CSTEG system

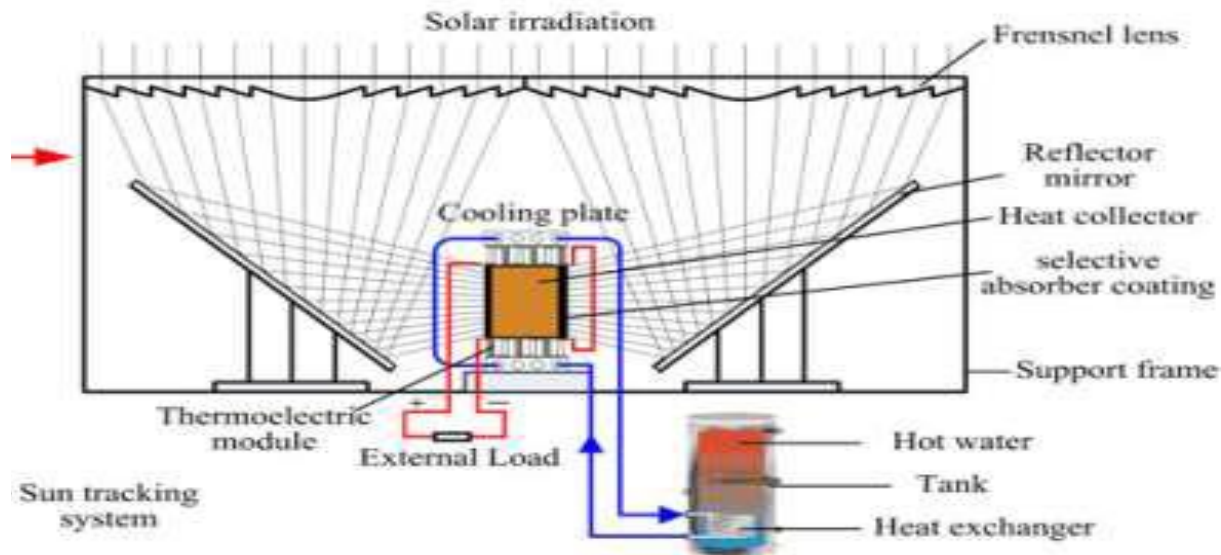
1. Introduction

The key technology for producing sustainable electrical and thermal power is solar energy because it is free available and environmentally friend, in contrast with fossil fuel problem such as limitations and environmental issues. Photovoltaic is one method of converting solar light in electricity and companied with thermal system will producing heat and electricity at the same time.

Thermoelectric is another method producing electricity by the temperature difference across it and also, there is opportunity to produce heat and electricity by integrating TEG with cooling system. Here we are presenting a state of the art of CSTEg hybrid system. The main parts of CSTEg are concentrator system solar thermal absorber or solar thermal collector , thermo electro generator and cooling system. This review paper will be discussing all the parts of the CSTEg hybrid system in details.

The present work is differing from other reviewing paper in focusing on concentrating solar thermoelectric generator by describing all the parts of the system, the stat of art of the CSTEg, the methods of cooling or absorbing the heat and improvement of the system by modeling and optimization.

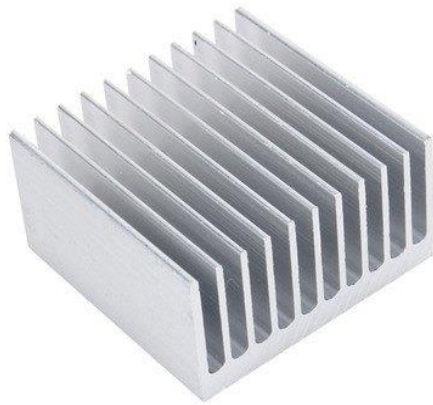
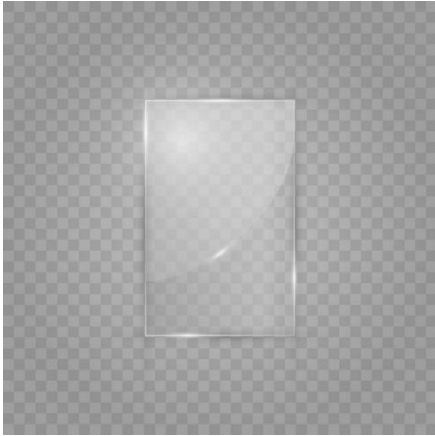
2. Presenting the concentrating solar thermoelectric generator



- The integrating of concentrating solar system with TEG as a power block was addressed by McEnaney et al. 2011.
- The hybrid system has no moving part, scalable and there is no need thermo-mechanical generator as Stirling engine or steam turbine.
- The system has efficiency more than 10% by using bismuth telluride or skutterudite materials with concentration ratio about 45. The results of the mathematical model were agreed with the experiments investigation.
- A theoretical study and a validation by experimental work were done by SHANMUGAM and VEERAPPAN on the behavior of CSTEG.

PARTS

- Fresnel lens
- Transporent glass plate
- Concentrator
- Vacuum chamber
- Heat sink
- Stand
- Dc motor

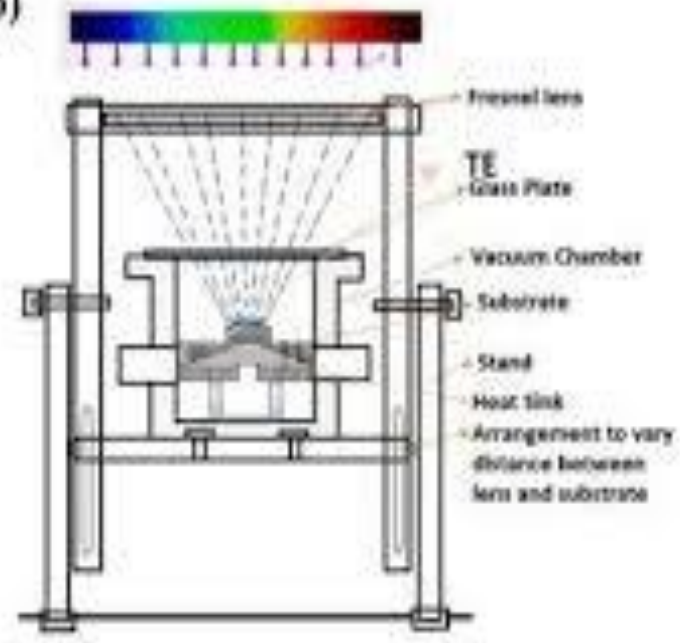


Project final image

(a)



(b)



4. Advantages & Applications

Advantages of solar thermoelectric generator

- As all the components used in this TEG device are solid-state, they have enhanced reliability
- The extreme range of fuel sources
- TEG devices are constructed to deliver power ranging not minimal to that of mW and greater than KW which means they have huge scalability
- These are direct energy transformation devices
- Silently operated
- Minimal size
- These can function even at extreme and zero range of gravitational forces

Applications of solar thermo electric generator

- For enhancing the fuel performance of cars, the TEG device is mostly employed. These generators make use of heat that is generated at the time of vehicle operation
- Seebeck Power Generation is utilized to provide power for the spacecraft.
- Thermoelectric generators to implemented provide power for the remote stations such as weather systems, relay networks, and others

References

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THANK YOU

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