

Concentrating solar thermal energy systems

It is widely accepted today that the global energy production and consumption system is subjected to strong environmental, economic and social pressures, which render it non-viable in its present form. Within this frame, the utilization of concentrating solar technologies constitutes a major strategic challenge, particularly for countries which enjoy abundant solar radiation.

The advantage of concentrating solar systems is that the thermal energy produced is available over a wide range, encompassing medium (80°- 250°C) and high (>250°C) temperatures, exhibiting an exploitation potential in numerous applications, such as power generation, industrial processes, production of hydrogen and capturing of CO₂. The relevant technologies encompass line-focusing systems, such as the parabolic-trough (Exhibit 1) or linear Fresnel-reflector (Exhibit 2), or point-focusing types such as the Fresnel-lens systems (Exhibit 3) which can attain higher temperatures. The heat absorbed is converted into electricity using suitable solar-driven engines, such as the Rankine-type engine (Exhibit 4).

The Solar & other Energy Systems Laboratory of NCSR "Demokritos" has long-standing research and development activities in solar thermal energy utilization. Current research efforts focus on developing new designs and materials and the evaluation of innovative technological solutions, aiming at the transition from the laboratory to manufacturing and subsequently to the energy economy of tomorrow.



Exhibit 1

Linear parabolic-trough collector



Exhibit 2

Linear Fresnel reflector system

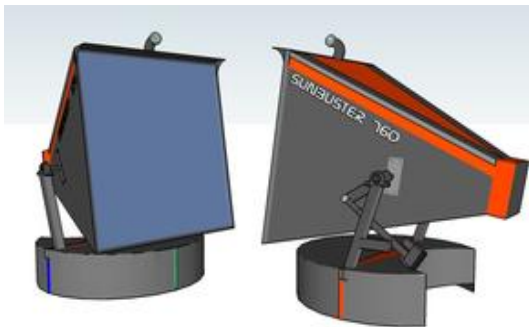


Exhibit 3

Fresnel-lens concentrating solar collector



Exhibit 4

Solar-driven engine for power generation