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NOKRASCHY ENGINEERING
Mechanical Vibrations and Infrasound under Control
Solar Power for Sustainable and Everlasting Energy

New Technology produces Economic Solar-Electricity combined with seawater desalination

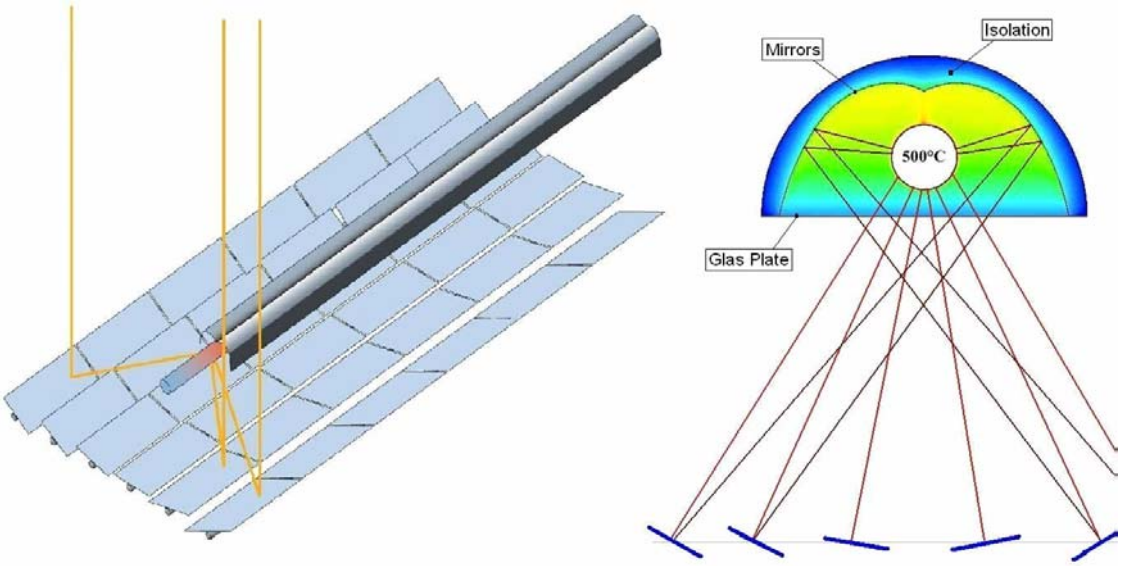
Fossil fuel fired thermal power stations are world wide emitting most of the carbon dioxide in the atmosphere. In the past good efforts were made to produce electricity from water falls and in present time also efforts are made to use the wind energy for electricity production. While water power is economic, wind electricity is only economic at areas with strong and constant air flow like the red sea coast.

Although sun energy is the most available renewable energy in the world, it was not possible to use it on an economic base. The well known direct transformation of sun light to electricity by photovoltaic is still several times more expensive than firing and therefore its applications are limited to small scale in remote areas, where it gives good services as a substitute to connecting an electric line or electricity with a diesel-generation unit.

Concentrating sun power by means of parabolic mirrors to heat a fluid to temperatures that allow steam production and thus drive a conventional steam turbine succeeded in producing electricity on a medium to big range at much lower costs.

The following describes a new technology developed in Europe using a Flat Mirror Solar Collector - rather than parabolic mirrors – thus enabling local manufacturing in Egypt. The situation in Egypt is such that demand for electricity and sun radiation availability are close to one another, giving ideal conditions for economic production of solar electricity and its transfer to the users.

The very simple idea of this new technology is to use flat mirrors, driven to follow the sun from east to west, thus concentrating the sunrays from a large area to a fixed horizontal tube on top containing water under pressure.



Source: Andreas Haeberle in a lecture at SolarPaces international Conference 2002 in Zurich
Calculations of heat losses at 500°C estimated steam temperature with explanations by author

Concentrating the sunrays in this manner raises the temperature to produce steam in the tube, which is used to drive a conventional steam turbine. The supporting construction is made of small steel sections as the wind forces are negligibly small. Periodic cleaning of the mirrors is automated by means of rotating brushes moving under the surface while the mirrors are turned up side down in the night.

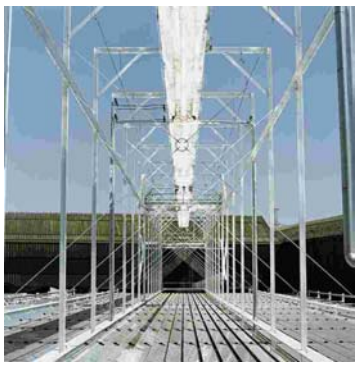
The waste heat at the end of the turbine - usually thrown away by the condenser - may be used to desalinate seawater to help recreation of far dwellings suffering from poor water resources. It can also be used to drive an absorber cooling machine for refrigerators and air conditioning, giving its maximum capacity when the sun gives its top heat to the area.

Ground under the mirror roof can be used for planting and stables for animals in farms or as car parking places and for flat buildings in towns, thus minimizing air conditioning costs because of reduced direct sun radiation.

Source of graph: FHG-ISE. From author suggested decentralised power generation for a Farm in southern Egypt. 80 m² reflector area to produce electricity, desalinated water and cooling for farm inhabitants, animals and food processing industry

The main advantage is that 50-60% of the material used for the solar collector is available in Egypt; these are mirrors, steal structure and cables for the mirror motors, while mirror drive motors including controls and steam pipe have to be delivered from Europe. Erection can be managed after a short training with local personnel.

In collaboration with leading German research centres, the new collector and its components were repeatedly tested in long series to optimize the technology. All parts have proved their capability and reliability.



Flat Mirrors concentrating to Tube on top

General view

Shadowed usable area below flat mirror roof