



Solar Millennium AG

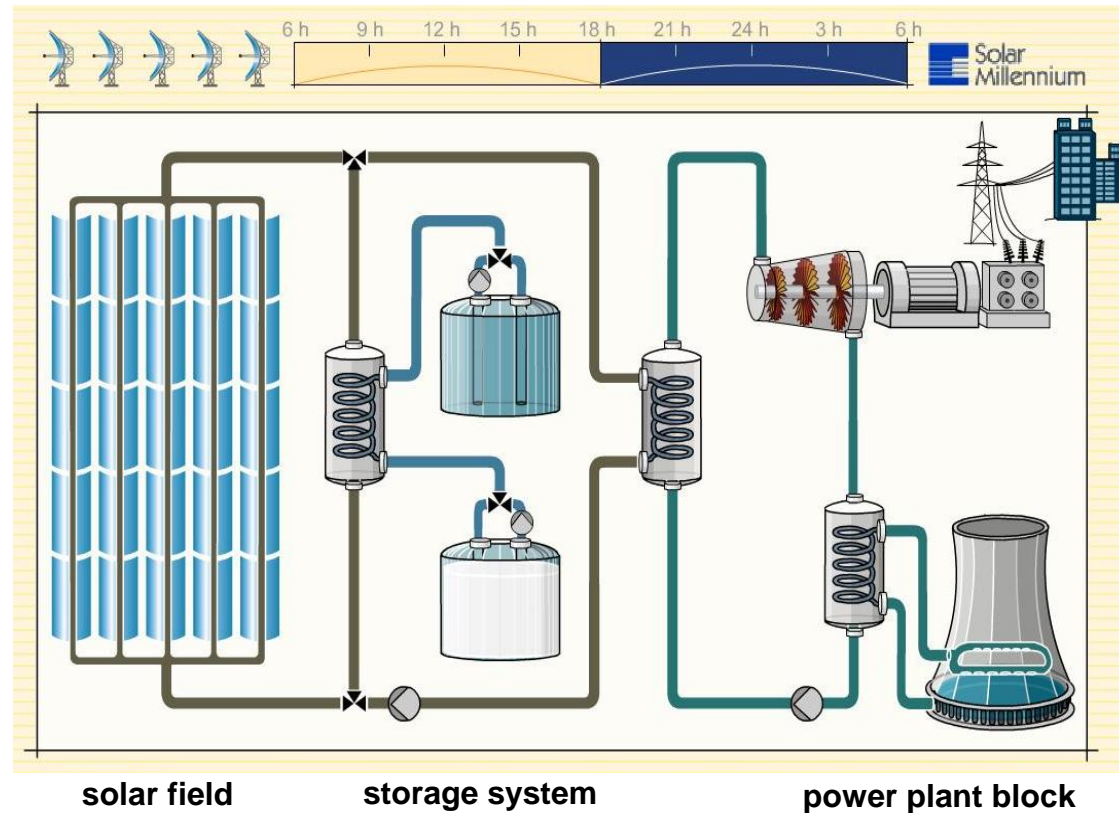
Parabolic trough power plant with
thermal storage

Technical description

Components of the Parabolic Trough Power Plant

A parabolic trough power plant with thermal energy storage mainly consists of three parts:

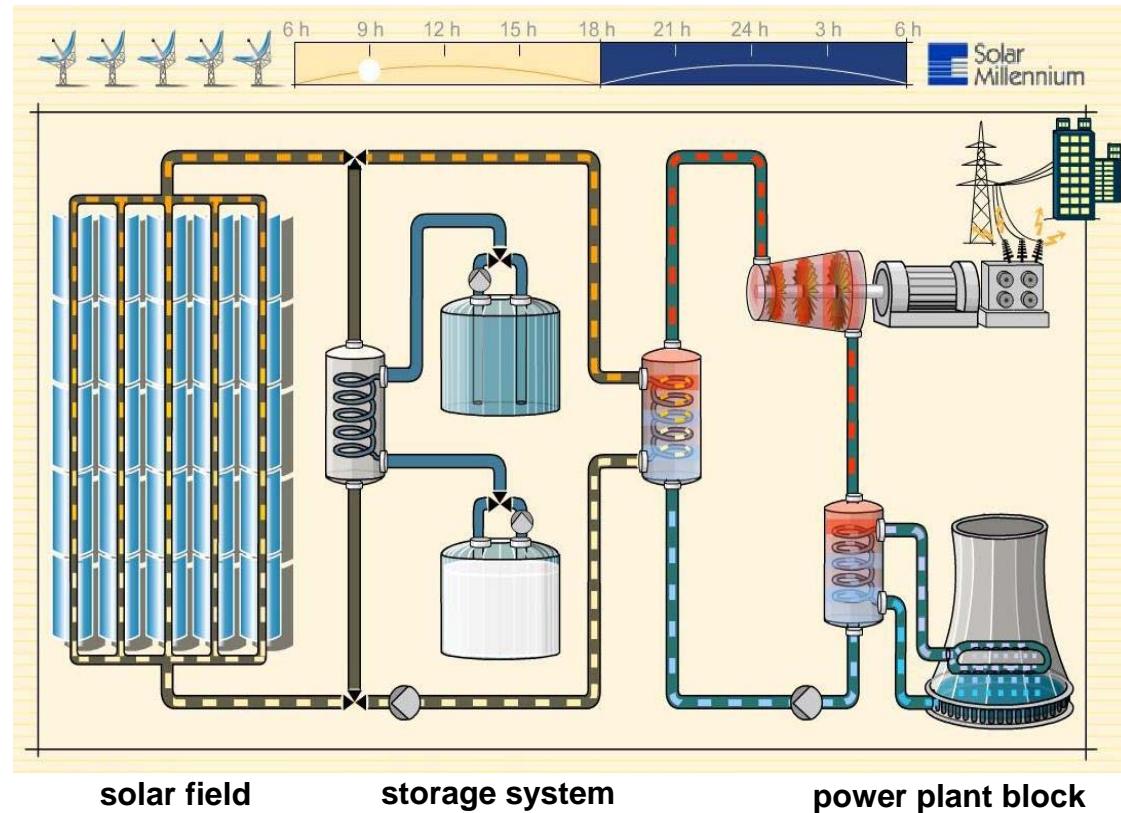
- the solar field with the heat transfer circuit,
- the storage system and
- the power plant block with turbine, generator and cooling circuit



Technical description

Operation in the Mornings

After sunrise, the collectors begin to follow the sun. Parabolic mirrors concentrate the solar radiation to absorber tubes, in which a heat-resistant, synthetic oil circulates as heat transfer fluid. This fluid then transmits its thermal energy to heat exchangers. The steam, which is generated there, drives a turbine and electricity is generated by the connected generator.



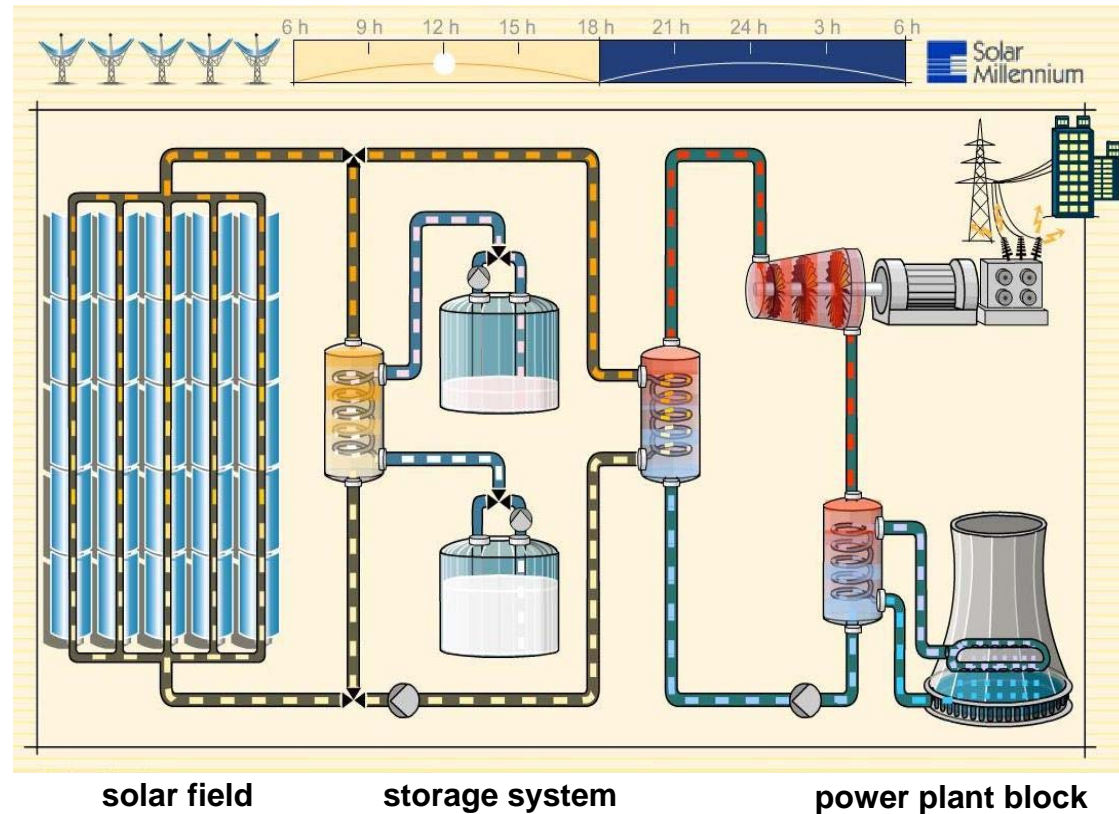
Technical description

Operation during the Day

If sun radiation is strong enough, the solar field supplies sufficient energy to generate electricity and fill up the storage system simultaneously.

The storage system is filled with liquid salt. It consists of a "hot" tank (appr. 380 °C) and a "cold" one (appr. 280 °C).

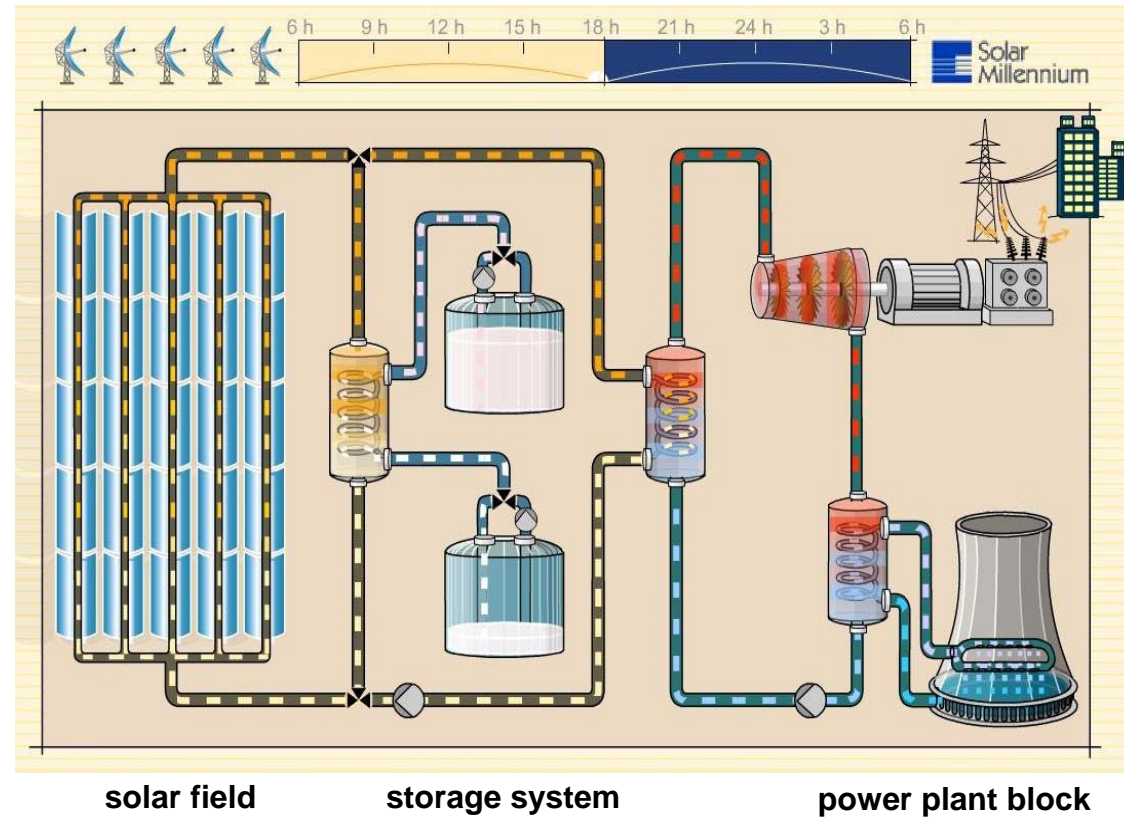
When the storage system is being filled up, cold salt is pumped into the hot tank through an oil to salt heat exchanger.



Technical description

Operation in the Evening

In the evenings or when the sky is cloudy, the solar field can supply the energy, which is required to drive the turbine, together with the storage system. For this purpose, the hot salt is pumped into the cold container, thus giving back the thermal energy to the oil circuit.



Technical description

Operation at Night

After sunset thermal energy is exclusively supplied by the storage system. If the storage system and the solar field have been dimensioned accordingly, the power plant can be operated up to 24 h with solar energy. Also hybrid operation is possible by the combustion of e.g. gas or biomass.

