

Solar Electricity

Many power plants today use fossil fuels as a heat source to boil water. The steam from the boiling water rotates a large turbine, which activates a generator that produces electricity. However, a new generation of power plants, with concentrating solar power systems, uses the sun as a heat source. There are three main types of concentrating solar power systems: *parabolic-trough*, *dish/engine*, and *power tower*.

Parabolic-trough systems concentrate the sun's energy through long rectangular, curved (U-shaped) mirrors. The mirrors are tilted toward the sun, focusing sunlight on a pipe that runs down the centre of the trough. This heats the oil flowing through the pipe. The hot oil then is used to boil water in a conventional steam generator to produce electricity.



A 25-kilowatt Dish Stirling System catches its last rays of light at the end of the day. Credit: Stirling Energy Systems

A dish/engine system uses a mirrored dish (similar to a very large satellite dish). The dish-shaped surface collects and concentrates the sun's heat onto a receiver, which absorbs the heat and transfers it to fluid within the engine. The heat causes the fluid to expand against a piston or turbine to produce mechanical power. The mechanical power is then used to run a generator or alternator to produce electricity.

A power tower system uses a large field of mirrors to concentrate sunlight onto the top of a tower, where a receiver sits. This heats molten salt flowing through the receiver. Then, the salt's heat is used to generate electricity through a conventional steam generator. Molten salt retains heat efficiently, so it can be stored for days before being converted into electricity. That means electricity can be produced on cloudy days or even several hours after sunset.