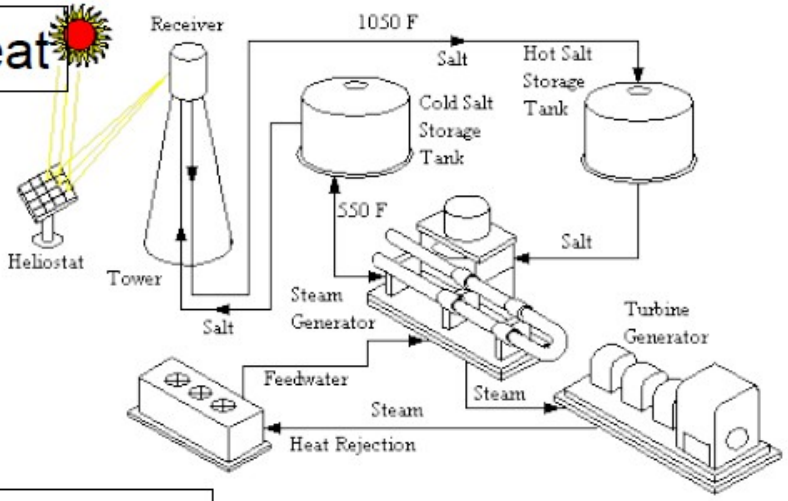
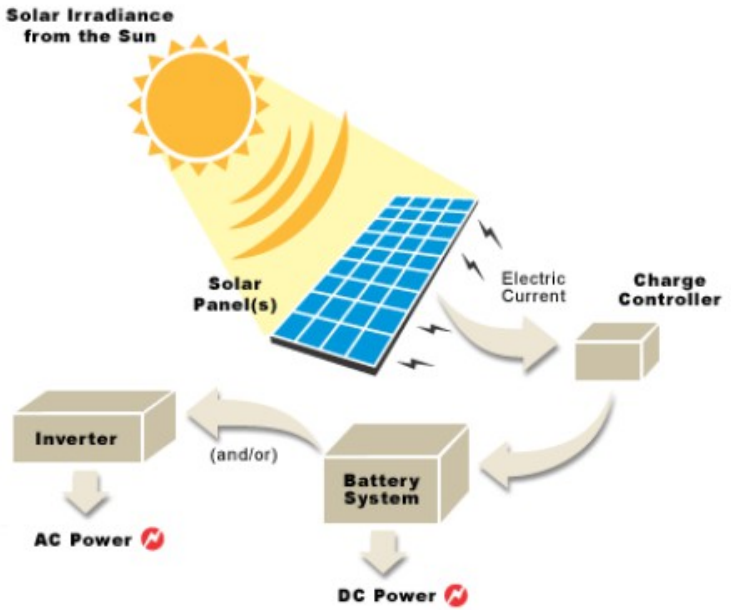

Abengoa's Solana plant in Arizona

Solar Energy

Heat

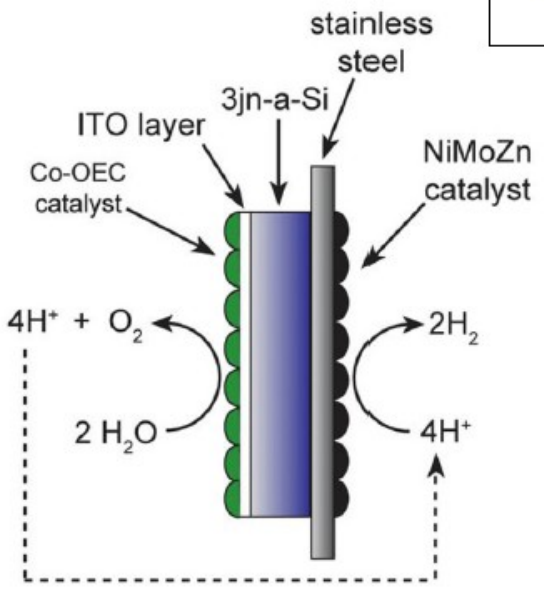


Photovoltaic



Biomass

"Artificial leaf"

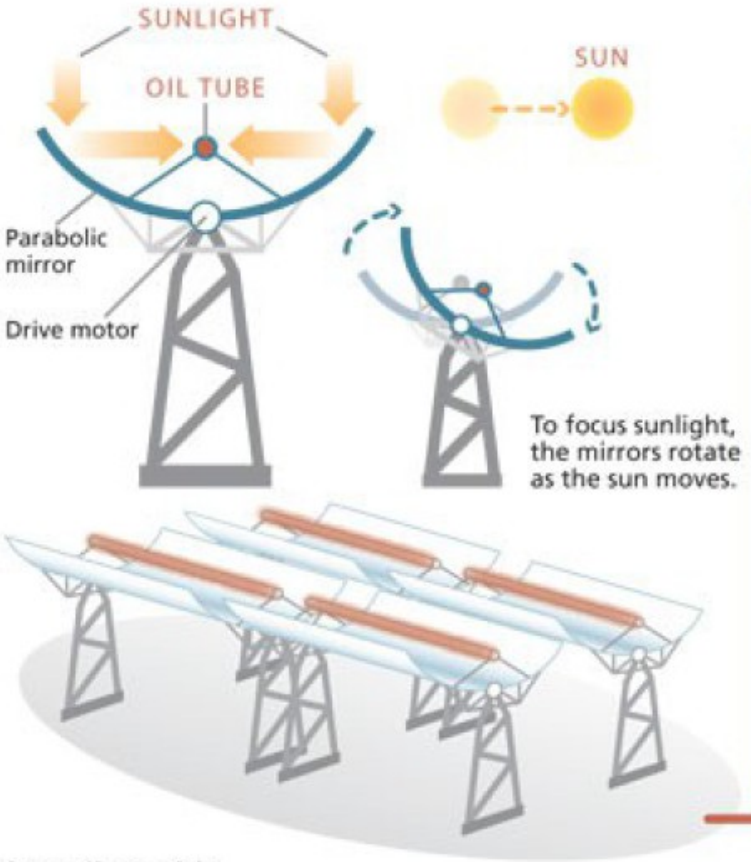


DeCentralized Heating

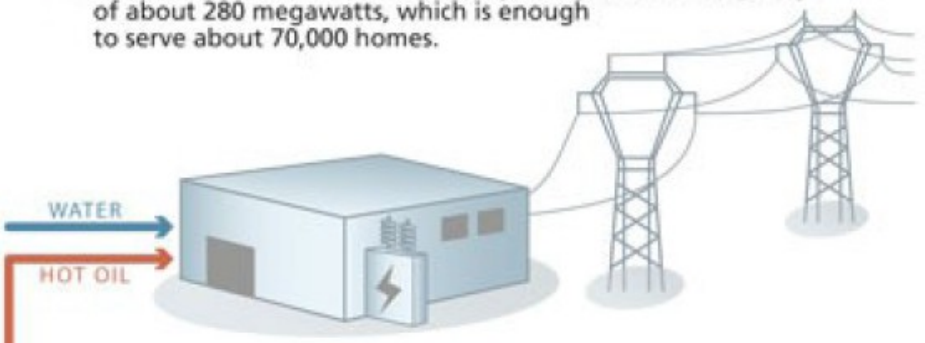
Centralized Heating

How the Solana plant will generate electricity 6 hours after sunset

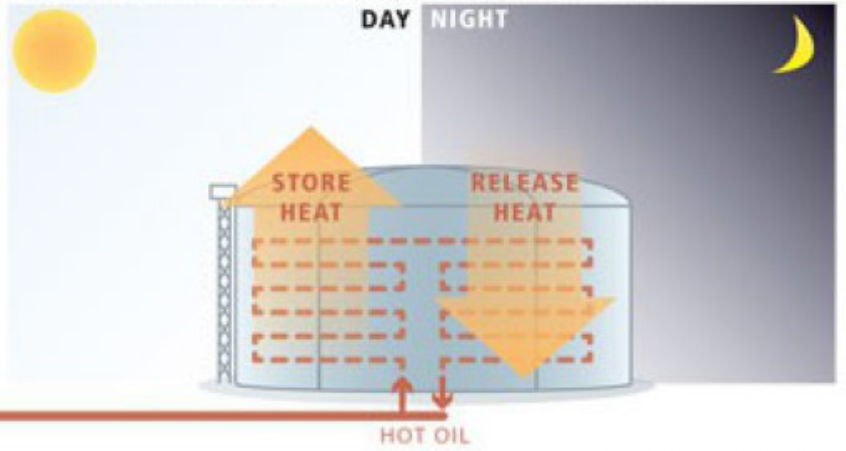
1 **Solar energy is collected.** The solar field of mirrors concentrates sunlight on tubes of oil on the curved mirrors, which are heated to more than 700 degrees.



2 **Power is generated.** The heated oil is used to generate steam, which turns turbines and makes electricity. The plant has a capacity of about 280 megawatts, which is enough to serve about 70,000 homes.



3 **Energy stored for later use:** During the day, some of the heated oil is used to heat salt. The giant salt tanks at Solana never get below about 540 degrees. At night, with no sun, the heat stored in the salt is used to heat the oil and continue making electricity for six hours.



Source: Abengoa Solar

KEDI XIA/THE REPUBLIC

- At day time, the oil was heated up to 250 ^{o}C by the sunlight. Thus, the molten salt was heated to the same temperature at day time.

- At evening, when the sun is lower on the sky, and can only heat the oil to temperature lower than 250 ^{o}C. During this time, the molten salt start to release heat back to the oil to maintain the oil temperature at 250 ^{o}C.

- If the average output power of the solar plant is expected to be 100 MW, which requires the average heat transferring power from the molten slat to the oil to be 150 MW (assuming 50 MW is lost during the process). Based on this power releasing rate, how much (in liters) of the molten salt is needed for the solar plant to run 6 hr after the sunset? Assuming during this heat releasing process, the temperature of the molten salt changes from 250 ^{o}C to 120 ^{o}C.

- Known: specific heat of the molten salt is: 2000 J/kg ^{o}C; and the density of the molten slat is: 1.5 kg/liter