XEnergy

Parabolic trough plant Noor Ouarzazate I

SENER XENERGY / XRENEWABLE AND LOW-CARBON SOLUTIONS GENERATION / XSOLAR

PARABOLIC TROUGH PLANT NOOR OUARZA-ZATE I

Cliente: ACWA POWER

Sener, ACCIONA and TSK make up the construction consortium with the turnkey contract, or EPC, for Noor Ouarzazate I, a high-efficiency modern power station. With 160 MWe of power and 3.5 hours of thermal storage it supply 500 GWh of solar power per year, enough to meet the demands of 115,000 homes.

Noor Ouarzazate I avert annual emissions of 120,000 metric tons of CO_2 into the atmosphere.

- 160 MWe of power and 3 hours of thermal storage
- 500 GWh of solar power per year, enough to meet the demands of 115,000 homes
- Noor Ouarzazate I will avert annual emissions of 120,000 metric tons of CO_2 into the atmosphere

In addition to Noor Ouarzazate I, SENER is a participant in the other two thermosolar phases of the project, Noor Ouarzazate II and Noor Ouarzazate III, in the same turnkey construction consortium. The three thermosolar plants are to provide a total of 510 MWe of power. All of them equipped with thermal storage systems, enabling them to continue to produce electricity in the absence of solar radiation. As a matter of fact, the time with the greatest demand for power in Morocco is nightfall, so the integration of these facilities in the Moroccan electricity system will be one of optimal efficiency. Altogether, they will avert

annual emissions of 470,000 metric tons of CO_2 into the atmosphere.

- Proyect data:
- Total reflective area: 1,308,000 m^2.
- Number of SCA/loops: 1,600/400 (SENERtrough®).
- Surface area of the solar field: 400 Ha.
- Nominal solar field thermal output: 680 MWt.
- Thermal storage capacity: 1,490 MWht.
- Turbine power capacity: 160 MWe.
- Contract type: EPC.
- How it works
- **SENERtrough® collectors**
  Solar radiation beams on the SENERtrough® collectors which concentrate said radiation in the central tube through which fluid heated to very high temperatures circulates. This fluid, generically called HTF (Heat Transfer Fluid), is in this case similar to oil in composition.
- **Steam generator system**
  The HTF is pumped through the piping system to the steam generator, where it transfers its heat to vaporize water.
- **Steam turbine**
  The steam produced under high pressure is used to move the turbine. The turbine is connected to an alternator that generates electric power.
- **Condenser**
  The steam released from the turbine condenses into water that is again incorporated into the cycle.
- **Cooling tower**
  The cooling tower provides the cooling needed to condense the steam turbine exhaust.
- **Heat exchanger**
  When there is excess thermal energy in the solar field, it is stored. This is done by diverting some of the heated HTF to the exchanger, where it comes into contact with the salts, transferring its heat to them.
- **Thermal storage system**
  To fill up the storage system, cold salt is pumped from the cold-salt tank to the heat exchanger, where the HTF heats it. The salts are then stored in the hot-salt tank.

During discharge, the stored hot salt is pumped to the same heat exchanger to heat the HTF and continue generating electricity even during periods when there is no solar radiation.