

Ouarzazate, Morocco Solar Power Stations: Noor 1, 2 and 3

Ouarzazate Solar Power Station (OSPS), also called **Noor Power Station** (Arabic for “light”) is a solar power complex located in the Drâa-Tafilalet region in Morocco, 10 kilometers from ancient city of Ouarzazate. The entire Solar Project is planned to produce 580 MW at peak when finished and is being built in three phases and in four parts. The total project is expected to cost \$9 billion.



The plant is able to store solar energy in the form of heated molten salt, allowing for production of electricity into the night. Phase 1 comes with a full-load molten salt storage capacity of 3 hours. Noor II, commissioned in 2018, and Noor III, opening later in 2018, store energy for up to eight hours. It will cover an area of 6,178 acres.

The project is being developed with the help of the Spanish consortium TSK-Acciona-Sener and is the first in a series of planned developments at the Ouarzazate Solar Complex by the Moroccan Agency for Solar Energy (MASEN). Water consumption for the Ouarzazate Noor complex is estimated at 2.5 to 3 million m³ per year for one wet-cooling project (Noor I) and two dry-cooling projects (Noor II and III) -- to clean the reflectors regularly.



Noor 1 Ouarzazate Solar Power Station (OSPS) – Phase 1, also referred to as **Noor I CSP**, has an installed capacity of 160MW. It was connected to the Moroccan power grid in February 2016. It covers 1,112 acres and delivers 370 GWh per year. The plant is a parabolic trough type with a molten salt storage for 3 hours of low-light producing capacity. The cost of the project when it began operations was \$3.9 billion. It uses half a million mirrors.

The design uses wet cooling and the need to regularly clean the reflectors means that the water use is high – 1.7 million m³ per year or 4.6 liters per kWh. Water usage is more than double the water usage of a wet cooled coal power station and 23 times the water use per kWh of a dry cooled coal power station, though life-cycle greenhouse gas emissions of solar thermal plants show that generating comparable energy from coal typically releases around 20 times more carbon dioxide than renewable sources. The electricity is sold at \$0.19/kWh.



Noor II CSP is the second phase of the Ouarzazate Solar Power Station. It is a 200MW CSP solar plant using parabolic troughs. It has a 7 hours storage capacity. It covers an area of 1,680 acres and is expected to supply



600 GWh per year. Noor II was commissioned in January 2018. It uses a dry cooling system to decrease water use.

Noor III is the third part of the Ouarzazate Solar Power Station. It is a 150 MW (gross) CSP solar project using reflecting mirrors onto a central Solar Power Tower with 8 hours energy storage. Its solar tracking mirrors cover an area of 1,853 acres and it is expected to supply 500 GWh per year. It uses a dry cooling system to decrease water use.

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