

## World's Largest Solar Power Plant Delivers 24-Hour Energy

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ASSOCIATION

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This monthly column features steelStories from worldsteel, covering automotive, construction and building, infrastructure, and innovation.

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Noor power station in Morocco is the largest concentrated solar power plant on the planet and uses molten salt storage to produce electricity at night.

Known as the gateway to the Sahara, the city of Ouarzazate is located in the Agadir district of southern Morocco, where the region has some of the highest amounts of sunlight in the world — up to 2,635 kWh/m<sup>2</sup> annually.

A few kilometers north of the city a dazzling ring made from hundreds of thousands of mirrored surfaces make up a sprawling, 2,500-hectare solar power plant. Called Noor after the Arabic word for “light,” the gigantic solar complex allows Morocco to provide nearly half of its energy from renewable sources.

Made up of three distinct facilities, Noor I, Noor II and Noor III, the site is able to power more than a million homes and is estimated to save 760,000 metric tons of carbon emissions every year.

The Noor I site alone features 537,000 parabolic mirrors that are controlled by computers so that they constantly face the sun.

These mirrors focus the sun’s rays, heating a special thermal oil that runs through stainless steel pipes throughout the facility. This synthetic oil, which can be heated to around 390°C, travels to the central power plant where it produces steam to drive the main turbine and generate electricity.

While the scale and output of Noor are impressive, it is the third and most recent power plant to come on-line that represents a significant technological leap that could herald a bright future for sustainable energy generation.

### Storing Sunshine With Steel and Salt

The facility’s solar thermal power plants convert energy from the sun into electricity, but the Noor III complex combines its solar power



tower with a central receiver that superheats molten salts to more than 500°C.

These molten salts can store heat and allow the plant to produce power at full capacity even during hours of darkness. For this to work, huge quantities of these special salts, which are a mixture of potassium and sodium nitrate, are held in massive steel tanks.

Each of the 19,400 m<sup>3</sup> tanks is made from specialized UR™ 347 stainless steel grade. Due to the highly corrosive nature of the salts contained within, it would be impossible to operate this innovative heat storage method without this niobium-stabilized austenitic steel.

Steel underpins the entire facility, as it was used for the production of the heat exchangers, steam generators, high-temperature pipes and molten salt storage tanks. This is due to its incredible corrosion resistance, combined with its flexibility of use, as this special grade can be easily formed and welded.

With the molten salt storage tanks able to provide enough heat to maintain operation of the plant for seven hours after dark, the Noor complex is able to provide 24-hour energy and represents a game changer for solar as part of the future renewable energy mix.

With countries in the “sunbelt” that stretches 40° north and south of the equator investing heavily in solar power, Noor represents a vision of the future. A future where glistening steel mega structures are able to renewably power entire regions around the clock.

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