ONE GIGAWATT SOLAR THERMAL PROJECT TO GENERATE STEAM FOR OIL PRODUCTION

Project Overview

Miraah will be one of the world’s largest solar plants. The solar thermal facility will harness the sun’s energy to produce steam used in oil production. Once complete, it will deliver the largest peak energy output of any solar plant in the world. The scale of this landmark project underscores the massive market for deploying solar in the oil and gas industry.

The 1 GWth project will reduce the amount of natural gas used to generate steam for thermal enhanced oil recovery (EOR). In thermal EOR, steam is injected into an oil reservoir to heat the oil, making it easier to pump to the surface. Miraah will generate an average of 6,000 tons of solar steam each day, providing a substantial portion of the steam required at the Amal oilfield operated by Petroleum Development Oman (PDO).

The mega project dwarfs all previous solar EOR installations and is more than 100 times larger than the pilot project built by GlassPoint for PDO in 2012. The pilot was completed safely, on time and on budget, and has been operating successfully since 2013. The pilot exceeded PDO’s expectations for steam delivery and system reliability, paving the way for this significant expansion.

Quick Facts

- **ENERGY PRODUCTION**
  1,021 MW thermal (1 GW)

- **DAILY STEAM OUTPUT**
  6,000 tons

- **SOLAR FIELD AREA**
  1.9 km² or 470 acres

- **TOTAL PROJECT AREA**
  3 km² or 741 acres

- **TECHNOLOGY**
  GlassPoint enclosed trough

- **GREENHOUSE BLOCKS**
  36

- **CONSTRUCTION START**
  2015

- **FIRST STEAM**
  2017

- **GAS SAVINGS**
  5.6 trillion Btus per year

- **CO₂ EMISSIONS SAVED**
  300,000 tons per year

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Economic Benefits
Natural gas not consumed at the field can be used for industrial development, power generation or LNG export.

Diversifies Oman’s oil-based economy by establishing a new solar power industry.

Creates jobs and training in engineering, construction, operations and administration.

Generates in-country value (ICV) through local supply chain development.

Customer
Petroleum Development Oman (PDO) is the largest oil and gas producer in Oman. It is a joint venture between the government of Oman, Shell, Total and Partex.

Technology Provider
GlassPoint is the leader in solar energy for the oil and gas industry. The company’s enclosed trough technology is the only solar thermal system designed specifically for oilfield deployment.

Technology Overview
The enclosed trough solar field uses curved mirrors to focus sunlight onto a pipe filled with water. The concentrated sunlight boils the water to create steam, which is fed directly to the oilfield’s existing steam distribution network. The steam generated is exactly the same quality, temperature and pressure as steam produced by burning natural gas.

A greenhouse protects the solar array from harsh oilfield conditions like wind and dust storms. As a result, GlassPoint can use lightweight and inexpensive components inside the greenhouse. Automated washing reduces costs further and preserves scarce water resources.

Miraah is built using a sequenced deployment process which divides the construction process into standardized, easily repeatable steps. Specialized teams move from block to block completing a specific task—like greenhouse glazing or the installation of our lightweight parabolic mirrors—optimizing the process along the way to speed deployment, control costs and ensure consistent quality.

Status
The first block of Miraah was completed safely and successfully delivered first steam to the Amal West oilfield on schedule and on budget. GlassPoint and PDO continue to build on their strong safety record with over one million safe man hours without lost time injury (LTI) and counting. Construction of the remaining blocks is ongoing.

“Our partnership with GlassPoint and our investment in solar steam generation is a long-term strategy to expand PDO’s heavy oil production and free gas for economic development across Oman.”
- Raoul Restucci, PDO Managing Director

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