Aera Energy is building California’s largest solar energy project at the Belridge oilfield outside Bakersfield. The integrated solar project will be the first of its kind in the world, using solar steam and solar electricity to power oilfield operations. Once complete, it will deliver the largest peak energy output of any solar plant in California.

Background

Bakersfield’s Aera Energy is one of California’s largest oil and gas producers, accounting for nearly 25% of the state’s production. Jointly owned by Shell and ExxonMobil, Aera represents 100 years of California oil industry leadership.

The company has an outstanding safety track record and commitment to environmental responsibility. It is known for its dynamic company culture, which values innovative business solutions and the implementation of advanced technology.

The Belridge oilfield, located about 45 miles northwest of Bakersfield, has been producing for over 100 years and is one of the largest onshore fields in the United States. Today, the field produces more than 80,000 barrels of oil per day (bopd), which are sold in-state to California refineries for processing into gasoline and other fuels.

Aera’s production at Belridge is largely heavy oil, which is thick and more difficult to produce than light oil found elsewhere. To enable production, the water mixed with the oil in the ground and produced along with it, is separated and boiled into steam. The steam is reinjected to heat the heavy oil so it’s easier to pump to the surface.
The Belridge field began steam injection, also known as Enhanced Oil Recovery (EOR), in the 1960s. Steam injection proved very successful, increasing production tenfold in just a few short years. While effective, steam injection can be energy intensive and expensive to maintain over a field’s lifetime. The process requires large amounts of natural gas, which is burned to heat and boil water turning it into steam.

As a responsible and innovative operator, Aera sought a solution that would reduce its energy consumption and carbon footprint.

Integrating new and old energy

Aera is partnering with GlassPoint Solar, the leading supplier of solar for the oil and gas industry, to develop an integrated solar powered oilfield. The project will consist of an 850 MW solar thermal facility, generating 12 million barrels of steam a year, and a 26.5 MW photovoltaic facility, generating electricity. Aera will use the solar energy onsite at the Belridge field, reducing natural gas currently used to power oilfield operations.

GlassPoint, a Fremont, California-based company, began piloting its solar thermal technology in Kern County in an oilfield operated by Berry Petroleum in 2011. The technology is now proven in California and the Middle East, providing a sustainable and reliable alternative to traditional oil recovery methods.

Technology

GlassPoint’s enclosed trough technology was designed specifically for the oil and gas industry. It uses curved mirrors to focus sunlight onto pipes filled with produced water. The concentrated sunlight boils the water, turning it directly into steam. The solar steam will be fed to the existing steam distribution network at Belridge.

The enclosed troughs integrate seamlessly with existing oilfield operations, accepting the exact same feedwater used today by fuel-fired steam generators. Because the system is designed to generate steam directly from produced water (the water produced onsite from the oil well) it does not compete for fresh water resources.

Unlike traditional solar thermal systems, GlassPoint uses a greenhouse, similar to those used for decades by the region’s agriculture industry, to protect the mirrors from wind and dust. As a result, lightweight and inexpensive components are used inside the greenhouse, dramatically reducing the overall cost of the system.

A robotic washing system cleans the greenhouse at night removing dust and dirt to maintain optimal performance. The automated system is highly efficient and conserves wash water, collecting and recycling about 90% of the water used in the cleaning cycle.

GlassPoint was selected due to its proven track record on oilfields and its technology’s low impact design that conserves land and water resources. Compared to traditional systems with exposed mirrors, the enclosed trough uses three to five times less land and half the amount of steel.

Impact

The Belridge solar facility will save more than 376,000 metric tons of carbon dioxide emissions per year. That’s equivalent to offsetting 80,000 cars—more than a third of the cars in Bakersfield today.

Solar powered oil production is a sustainable and economical solution in the transition to a lower carbon future. In addition to helping achieve California’s climate goals, the project will help Aera reduce its production costs and boost the local economy.

During peak construction, the Belridge solar facility will create upwards of 500 construction jobs, in addition to hundreds of indirect jobs in California throughout the oil and gas supply chain and supporting industries and services.

Oil operators around the world are seeking cost effective and environmentally responsible solutions to meet today’s rising energy demand. The Aera and GlassPoint project is a leading example of how new and old energy sources can complement one another, delivering valuable energy with a lower carbon footprint.