

ESP system increased production 59% for geothermal project

Production constraints

Water production at a geothermal renewable energy project was limited to about 2,200 gpm (139 L/s) per well with line shaft turbine pump systems. The installation times for turbine pump systems are more than double that of electrical submersible pumping (ESP) systems. They are also limited in depth setting, because the shaft string requires constant lubrication, which can contaminate the reservoir.

ESP system

ESP systems from Baker Hughes, a GE company (BHGE), are designed to work efficiently in high-temperature wells at greater depths. For this project, a 725 Series, 800-hp XD motor with a WME 3700 Series pump was installed in one well. The 725 motor is a high-temperature, high-horsepower design that was pioneered by BHGE.

The higher production achieved with the ESP system provided greater geothermal plant capacity and allowed the operator to fine-tune field assets based on demand requirements. Additionally, and unlike line shaft pumps, BHGE ESP systems do not require lubrication fluid pumped into the well—a significant environmental and operating cost advantage for the operator. BHGE ESP systems also eliminate the need for an ancillary pump, which improves efficiency, because there is no line shaft drag. The pumps can also be installed in deviated wellbores.

In this well, the specialized high-temperature, high-horsepower ESP system achieved more than 1,000 days of run time. With the BHGE ESP system installed in just one of the operator's 12 wells, the operator's revenue jumped 4% and his production increased 59%—from 2,200 to 3,500 gal/min (138 to 220 L/s).

Challenges

- High bottomhole temperature
- Line shaft turbine pump system
- Restricted depth setting
- More rig downtime

Results

- Extended run time with high-horsepower electrical submersible pumping system
- Increased production by 59%
- Potential revenue boost more than 4% for entire field
- Greater geothermal plant capacity and production
- Improved efficiency with less downtime

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