NOVOMET

CASE STUDY

Geyser Geothermal Submersible Pump Cut Power Use by 28%, Eliminated 1.9 Tons CO_2 Emissions

CHALLENGE

Produce 5000 m^3/day, of geothermal fluid from a 164°C-reservoir for use in producing clean energy.

SOLUTION

Deployed the 185-mm Geyser GSP system powered by a permanent magnet motor.

RESULTS

- Accommodated average flowrate of 5127 m^3/day
- Reduced power consumption by 28% compared to competitor GSP
- Performed reliably in a 164°C-reservoir for 40 weeks and counting
- Saved 3,158 kWh of electricity and prevented 1.9 tons of CO_2 from entering the atmosphere

GEYSER
GEOTHERMAL SUBMERSIBLE PUMPING SYSTEMS

Aydin, Turkey

Looking for a Reliable, High-Temp, High-Flow Pump

An energy producer running a geothermal binary cycle power plant in Turkey needed to install a downhole pumping system that could withstand reservoir temperatures of 164°C (327°F) and produce an average of 5000 m^3/day (58 l/s, 208.3 m^3/hr)—of water for use in generating clean electricity.

Selecting the Geyser Geothermal Submersible Pump

The energy producer decided to install a 185-mm (7.40-in.) Geyser geothermal submersible pumping system from Novomet in 244-mm (9⅝-in.) casing at a depth of 406 m (1,332 ft).

The Geyser geothermal pumping system has been in operation for 280 days and counting and has prevented an additional 1.9 tons of CO_2 emissions from entering the atmosphere compared to a competitor's pump in the same region.

To stand up to the high temperatures and flowrates, we upgraded to a splice-free electrical connector with a water-tight design. We also upgraded the hydro-protector to accommodate the high flowrate, used high-performance cable, and replaced all elastomers with high-temperature materials.

Delivering Results

After coming online, the 185-mm Geyser geothermal submersible pumping (GPS) system easily handled the flowrate, which averaged 5127 m^3/day (59 l/s, 213.6 m^3/hr). At the time of publication, the Geyser system had run reliably for 40 weeks.

Further Reducing CO_2 Emissions

Perhaps more importantly, Novomet is contributing to the producer's goal of reducing carbon emissions. By using high-efficiency pump stages and an energy-saving permanent magnet motor, the Geyser GSP system reduced the electricity required to pump a cubic meter of water. The next closest competing GSP in the region uses 1.25 kWh per cubic meter of water produced. The Geyser system consumes only 0.9 kWh to produce the same volume of water. On average, the Geyser GSP is delivering 28% more fluid per kilowatt, reducing the carbon emissions required to generate clean geothermal electricity.

The Geyser GSP system installed on this well produced 1.44 million cubic meters (316 million gallons) of geothermal fluid. Calculated by taking the average kWh used per day and multiplying that by 280 operating days, the Geyser GSP has saved 3,158 kWh of electricity, and prevented an additional 1735 kg (3,789 lb*) of CO_2 emissions from entering the atmosphere compared to a competitor's submersible pump in the same region.

Using Efficiency to Further Reduce CO_2 Emissions				
Runtime	280 days and counting			
Avg Production	5127 m^3/day	59 l/s	941 gpm	1,354,410 gal/day
Total Production	1 435 560 m^3	1 435 560 kiloliters	316 million US gallons	
Competitor Electricity Used to Produce Geothermal Fluid	1.25 kWh/m^3	1.25kWh/kiloliter	1.25kWh/220 gal	
Geyser Electricity Used to Produce Geothermal Fluid	0.9 kWh/m^3	0.9 kWh/kiloliter	0.9 kWh/220 gal	
Electricity Saved by Using the Geyser Geothermal Pump	3,158 kWh over 280 days			
Carbon Emissions Prevented by Using the Geyser Geothermal Pump	1735 kg		3,789 lb* 1.9 tons	

** Based on 1.2 lb of CO_2 emissions per kilowatt-hour accourding to the most efficient power generation methods reported in the U.S. Carbon Dioxide Emissions in the Electricity Sector projections, published January 7, 2019.*

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