

Geyser Geothermal Submersible Pump Doubled Production in Binary Cycle Power Plant

CHALLENGE

An operator wanted to increase production and flexibility on a geothermal production well in a binary cycle power plant.

SOLUTION

Deploy a Geyser geothermal submersible pumping system

RESULTS

- Immediately doubled production from 20 l/s to 40 l/s
- Enabled the pump intake to be set four times deeper than that of the line-shaft pump
- Reduced installation time by 75% compared to line-shaft pump installation
- Enabled seasonal pump speed adjustments as needed without losing efficiency

Line-Shaft Pump Not Cutting It

A binary power plant operator in Fludir, Iceland wanted to increase production in a well relying on a line-shaft pump to lift geothermal fluid. Because line-shaft pumps lose efficiency at greater setting depths, the pump had been installed at just 50 m (164 ft) and was producing only 20 l/s (72 m³/h, 1728 m³/d, 317 gpm).

After looking at multiple technologies, including electrical submersible pumps from several oil and gas companies, the operator selected the [Geyser geothermal submersible pumping system](#) to replace the underperforming line-shaft pump.



This Geyser GSP system doubled production compared to the previous line-shaft pump and reduced power consumption by 25–30% compared to other geothermal submersible pumps



Iceland

Geyser GSP System Installation

Choosing the Geyser geothermal submersible pumping (GSP) system enabled the operator to reimagine their production paradigm. No longer did they have to deal with the 50-m pump setting depth limit and maximum production capacity of 20 l/s of the line-shaft pump.

The operator installed the new Geyser GSP at 238 m (781 ft), 188 m (617 ft) deeper than the old pump. The epoxy stator and high-temperature design of the permanent magnet motor is ideal for reliable operation in the 115°C (239°F) geothermal reservoir. A splice-free electrical connection was used to improve runlife and a high-temperature sensor was run along with the system to monitor downhole conditions. Having real-time downhole feedback enables the operator to adjust pump speed as needed to improve operational efficiency.

After pausing just a day for the Geyser GSP installation, the well was re-started. It consistently produced 40 l/s (144 m³/h, 3456 m³/d, 634 gpm), doubling the previous production capacity of the geothermal well. Because the Geyser GSP can be sped up or slowed down without losing efficiency, the operator now has the ability to increase, decrease, or even temporarily stop production as needed to keep pace with power requirements as loads fluctuate.

About the Technology

Geothermal fluid is used for heating and for power production. Geyser GSP systems are well-suited for geothermal wells with temperatures up to 180°C (356°F) used in many of today's binary cycle power plants. They consume 25–30% less power compared to competing submersible pumps and consistently outperform line-shaft pumps at greater depths.

Geyser systems are also ideal for producing the geothermal fluid needed in municipal heating, agriculture, and industrial processing. These geothermal submersible pumps consume significantly less electricity than competing products and can be turned down during warmer seasons without losing efficiency.

When sized properly, Geyser systems consume only 0.9 kW per kiloliter of geothermal fluid pumped. Competing pumps have been shown to consume 1.25 kW per kiloliter or more. Consuming less electricity not only reduces cost for the operator, but it also supports geothermal industry goals of reducing carbon emissions.



Geyser geothermal submersible pumps can be sped up, slowed down, and stopped as needed using a variable speed drive on the surface.