

Sustainable Greenhouses

Providing clean and reliable geothermal heat for sustainable cultivation in Netherlands

Background

The Netherlands is home to more than 90 square kilometers of greenhouse companies. With increased energy costs and ambitious goals to reduce CO2 emissions, geothermal energy is an attractive solution for a variety of residential and commercial heating applications including greenhouse operations.

Hoogweg Paprikakwekerijen has over 160 hectares of greenhouse operations for bell peppers grown in modern greenhouses and is expanding by another 50 hectares without the use of natural gas connections – relying largely on geothermal energy as well as other sustainable energies such as biomass.

For this campaign, Hoogweg planned a series of five additional wells that were drilled, including two production wells and three injection wells in order to generate clean, sustainable, and reliable geothermal heat that is not impacted by external factors (unlike wind or solar power) with an extended life of +/- 30 years.

For the producer wells, a series of 13.375-in. x 18.625-in. liner hanger packer systems and 9.625-in. x 13.375-in. liner hanger packer systems were necessary to complete the well by covering up the chalk formation and producing the geothermal energy from the Slochteren sandstone formation.

For the injector wells, a series of 9.625-in. x 13.375-in. liner hanger packer systems and 7-in. x 9.625-in. liner hanger packer systems with 6.625-in. screen were utilized in order to inject water into the formation. The wells were directionally drilled allowing for spacing of up to 2 km between injected and produced fluids and installed in an urban environment such that once drilling is completed, there is virtually no noise exposure or visual intrusion.

Case study facts

Location: Luttelgeest, Netherlands

Customer: Hoogweg Paprikakwekerijen

Well type: Five Geothermal wells; (Three injector wells and two producer wells)

Production fluid: 80 °C

Well depth: ~2,200 m

Products

- Two sets of 13.375-in. cemented VXP and GSP liner hanger systems
- Three sets of 9.625-in. cemented VXP and GSP liner hanger systems
- Two sets of 9.625-in. uncemented VXP and GSP liner hanger systems tiedback to surface, with tiebacks coated with Tube-Kote™ (TK™) coating
- Three sets of 7.000-in. uncemented SURESET liner hanger systems tiedback to surface with 6.625-in. screen liner
- i-Con™ monitoring tool

Results

Successful geothermal campaign for agricultural industry completed with heat produced equivalent to heating 20,000 to 25,000 homes.



Case Study

Solution

We were selected in large part due to our strong track record of reliable performance as the leading turnkey well construction provider for geothermal wells in Europe. Highlights of the solutions utilized for these wells include:

- NOV was able to provide the full range of well construction equipment including liner hanger packer systems, tieback systems, float equipment, cementing plugs, casing accessories, as well as specialized downhole monitoring technology in all necessary sizes tailored to the needs of Hoogweg for this geothermal application.
- Equipment designed and manufactured in Vechta, Germany within 14 weeks for standard material and 20 weeks for 22Cr duplex material from placement of order to equipment on site at rig.
- Our VXP liner top packer design was selected for the 9.625-in. x 13.375-in. and 13.375-in. x 18.625-in. liner hanger systems. The 9.625-in. VXP liner top packer has completed rigorous API 11D1 V3 testing.
- Specialized reamer shoes and float equipment were mobilized in order to reach TD in challenging open hole environment.
- Our proprietary i-Con™ monitoring tool was run in conjunction with seven of the systems on this series of jobs allowing NOV to provide detailed internal/external pressure, tensile, compression, torque, and temperature in order to continue to fine tuning subsequent jobs using real-world downhole data.
- Specialized system configurations to promote reliable function of running tools with heavy sand environment
- Our Tube-Kote™ (TK™) coating was selected to be used on the 9.625-in. tiebacks to surface, allowing Hoogweg to utilize relatively inexpensive L80 material for the entire tieback on the producers instead of the more expensive 22Cr duplex material utilized for the liner hanger system and liner.

Results

- Ten different liner hanger systems with float equipment and casing accessories run in five wells with no HSE incidents. While backup systems were available, no backup systems were installed.
- Successfully able to wash and ream down when needed to reach critical target depths necessary for geothermal application with no pre-set of equipment.
- i-Con™ Monitoring Tool ran in conjunction with seven of the systems allowing for the data to be used in order to optimize well designs and installation procedures for future geothermal applications.
- All equipment delivered on time directly from Vechta, Germany.
- Geothermal wells are ready for operation in the coming winter months.
- Heat produced from these wells for sustainable cultivation in Netherlands greenhouses will be equivalent to heating 20,000 to 25,000 homes.

