



# Enel Green Power chooses Tenaris technical services and products for major geothermal operation in Italy

Tenaris supported ENEL Green Power in string design and material selection for the Venelle-2 well. This European scientific project funded through the Horizon 2020 program will provide tested information on how to successfully reach and exploit deep and super-critical geothermal reservoirs.

## Summary

Italian energy company ENEL Green Power chose Tenaris to provide string design and material selection services in the tender phase of the DESCRAMBLE (Drilling in dEep, Super-Critical AMBients of continental Europe) project, financed by the European Union through the Horizon 2020 program. This major EU research and innovation program has about 80 billion Euros of funding available for the period between 2014 and 2020.

The Venelle-2 is an exploratory, energy rich, geothermal well located in Italy, in a small Tuscan village called Larderello. The region has important geothermal reservoirs and a long history with this renewable energy, as the world's first experimental application of geothermal energy was conducted in Larderello in 1904.

The well design presented by ENEL Green Power and Tenaris for the challenging Venelle-2 well included TenarisHydril Blue® Dopeless®, TenarisHydril ER™ connections manufactured in sour service steel grades.

ENEL Green Power led the DESCRAMBLE project, reaching a formation with extremely high temperatures (above 450 Celsius). The drilling conditions of this operation are similar to the ones found in wells located in other European countries and regions of the world. Therefore, this project will provide valuable information on how to successfully reach and exploit deep and super-critical geothermal reservoirs.

## Challenges

### Extreme pressure and temperature

The reservoirs of the geothermal system are typically located at depths ranging between 1,000m and 4,000m, with temperatures that exceed 250°C. The operation at the Venelle-2 well targeted a formation located at around 3,000m TVD, with an expected

## PROJECT PROFILE

### Operator

ENEL Green Power

### Location

Larderello, Italy

### Type of well

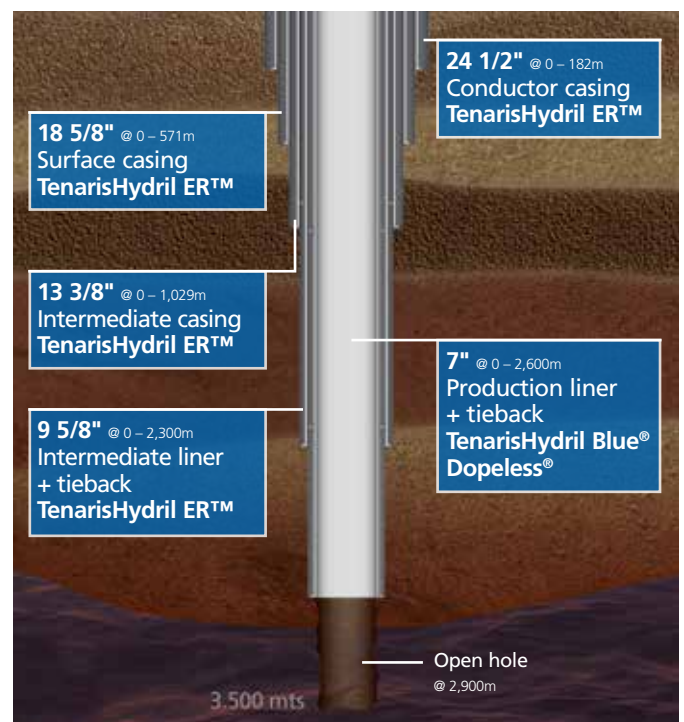
Geothermal

### Products highlighted

- TenarisHydril Blue® Dopeless®
- TenarisHydril ER™

### Services highlighted

- Rig Direct® including:
  - Technical Consulting Services
  - Demand planning and On site Delivery
  - Field Services



temperature above 450°C and a pore pressure of 300 bars. In these extreme conditions, steam exists in its supercritical phase and the fluid dynamics are unpredictable, representing the biggest challenge in this kind of operations.

The well was already cased and cemented at a depth of 1,029 meters and needed to be re-entered to drill the 12 1/4" and the 8 1/2" sections.

ENEL Green Power requested Tenaris's string design and material selection services for the 9 5/8" liner (1,000m to 2,300m MD) plus tie-back (0m to 1,000m MD), the 7" production liners (1,100m to 2,600m MD) plus tie-back, and the 5" contingency liner (2,550m to 2,900 MD; it was not run in hole during well construction operations).

## Beautiful surroundings

Tuscany is known for its historical, geographical and artistic heritage. In addition, this Italian region is a major touristic destination. Any drilling operation taking place in the area must find the means to minimize the environmental impact.

## Solutions

### Qualified performance at demanding environments

After analyzing the loading conditions, Tenaris and ENEL Green Power engineers concluded that the 7" production casing string was the most critical section of the well due to the expected thermal compressive stresses.

Tenaris recommended the use of TenarisHydril Blue® Dopeless® connections, designed for high performance. With metal-to-metal seal, this connection has been successfully tested to comply with the ISO 13679 and API 5C5 CAL IV testing standards. It was also tested at high temperatures according to the Thermal Well Casing Connection Evaluation Protocol (TWCCEP, ISO 12835) and field proven in the most complex operating conditions around the world.

### A reliable, field-proven coupled connection

TenarisHydril ER™ connection, from Tenaris Legacy Series, has been selected for the 9 5/8" casing. This high-performance coupled connection offers easy stabbing and fast make-up with minimum

cross threading risk. During the past 20 years it has been deployed (with zero failures reported) in most of the over 500 geothermal wells that Enel Green Power has drilled in the area.

### The threat of corrosion: preventing failures

Many downhole conditions were unknown during the string design phase, being Venelle-2 an exploratory well. However, ENEL Green Power was prepared to face the possible presence of H<sub>2</sub>S, which can lead to Sulfide Stress Cracking (SSC).

To be ready to face corrosive conditions and promote high structural resistance, ENEL Green Power selected the Tenaris proprietary sour service steel grade TN 125SS for the 7" production tie-back and the first 7" production liner, T95 for the last section of the 7" production liner and L80 for the 9 5/8" string.

### Dope-free reliability

Dopeless® technology is a dry, multifunctional coating applied in a fully automatic process at Tenaris mills, guaranteeing that the exact amount of lubricant is applied on each connection. By reducing the risk of make-up problems, this solution makes the installation more reliable.

In standard operations, dope is applied manually in the field with a brush and it therefore can reach the rig floors, from where it might end in the surroundings during the process of cleaning. Dopeless® technology makes thread compounds obsolete, promoting safety at the rig site and minimizing the environmental impact of drilling operations.

## Results

### Collaboration and support in the European Union

Tenaris cooperated with ENEL Green Power to win the bid of the Horizon 2020 program. The Italian energy company obtained the funds for the DESCRAMBLE project. ENEL Green Power led and coordinated the implementation of this project, while Tenaris supplied its customer with the products selected for the well profile, providing the assistance of Tenaris Field Service Specialists during casing running operations.

Well construction operations have been successfully completed in November 2017.



For contact information, please visit our site:  
[www.tenaris.com](http://www.tenaris.com)