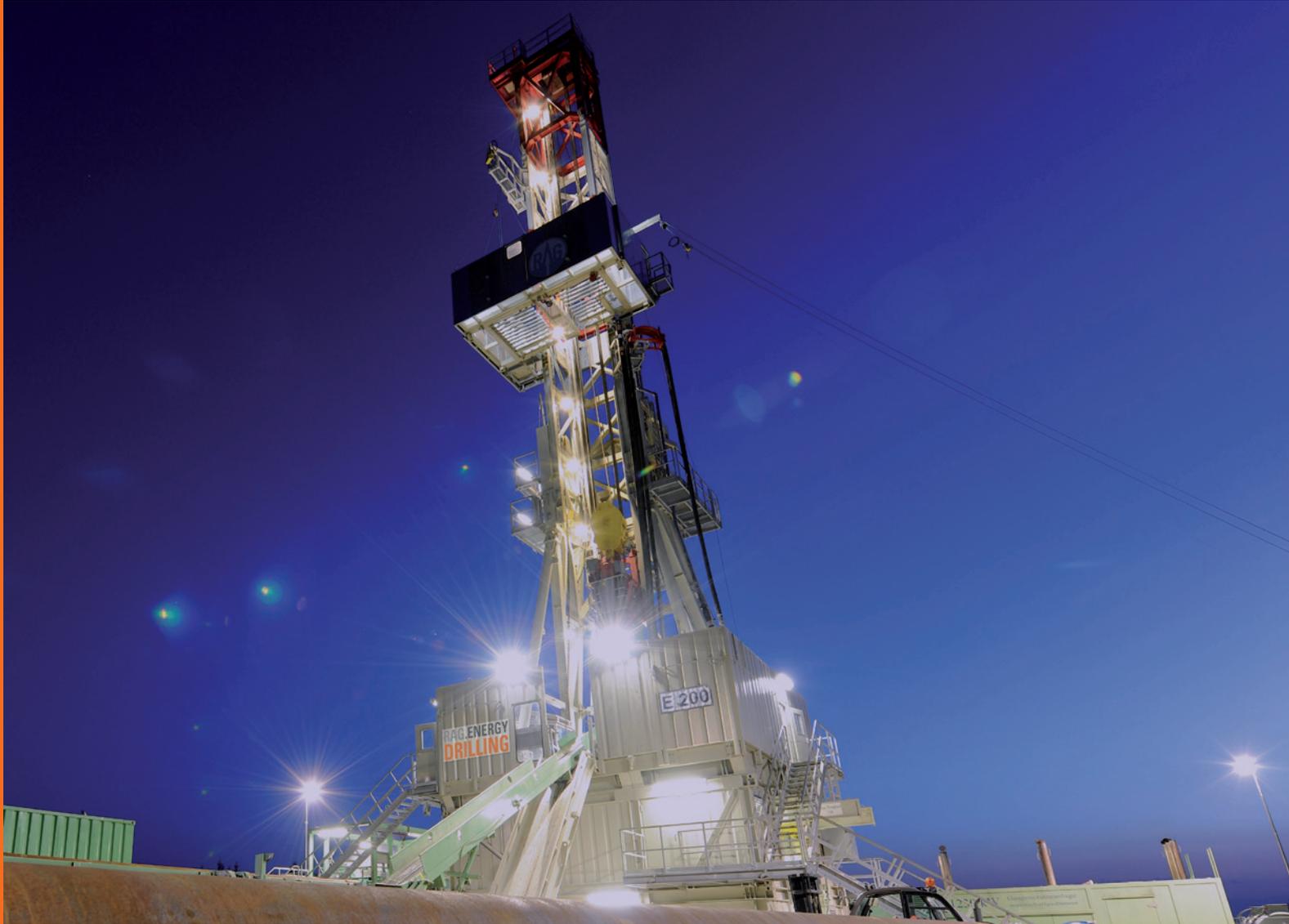


RAG.ENERGY.DRILLING



PREMIUM PARTNER FOR  
PREMIUM **DRILLING** SOLUTIONS

ENGLISH



# Company profile

## RAG.ENERGY.DRILLING

The energy supply for Europe is facing major challenges. To ensure a reliable supply of energy, high technical and economic know-how and innovative ability are an important prerequisite.

For many decades to come therefore, the exploration for, and production of traditional energy sources such as natural gas and oil plays an important role. Added to this is the increasing use of geothermal energy. The basis is a high level of competence in the area of „deep well drilling“. To meet these future demands better RED is able to offer the market the know-how of drilling and measurement techniques built up over 75 years. Therefore on January 1st 2014, RAG Rohöl Aufsuchungs Aktiengesellschaft created the 100% owned daughter company RAG Energy Drilling GmbH (RED).

The aim of the new company, RAG Energy Drilling, is to implement a reliable partner for our customers drilling projects.

The range of consulting services include exploration and production wells for oil, gas, gas storage and geothermal drilling.

## Premium Partner for Premium Drilling Solutions

stands for:

- Highest quality implementation of drilling projects with modern technology
- Comprehensive range of services - project management from conception to completion
- Customized solutions
- Compliance with budgets and time frames
- Highest safety and environmental standards
- International certification (SCC \*\*, ISO 14001)
- Decades of experience
- Implementation of projects on request as a general contractor



## Strong track record

We have a long and successful record of operating our own rigs. To date, some 1,100 wells with a total length of about two million metres have been drilled. By 2014 an average of 13 wells per year were drilled. The highest total amount of meters drilled in a year, including contractor rigs, was reached in 2010 with around 66,000 m.

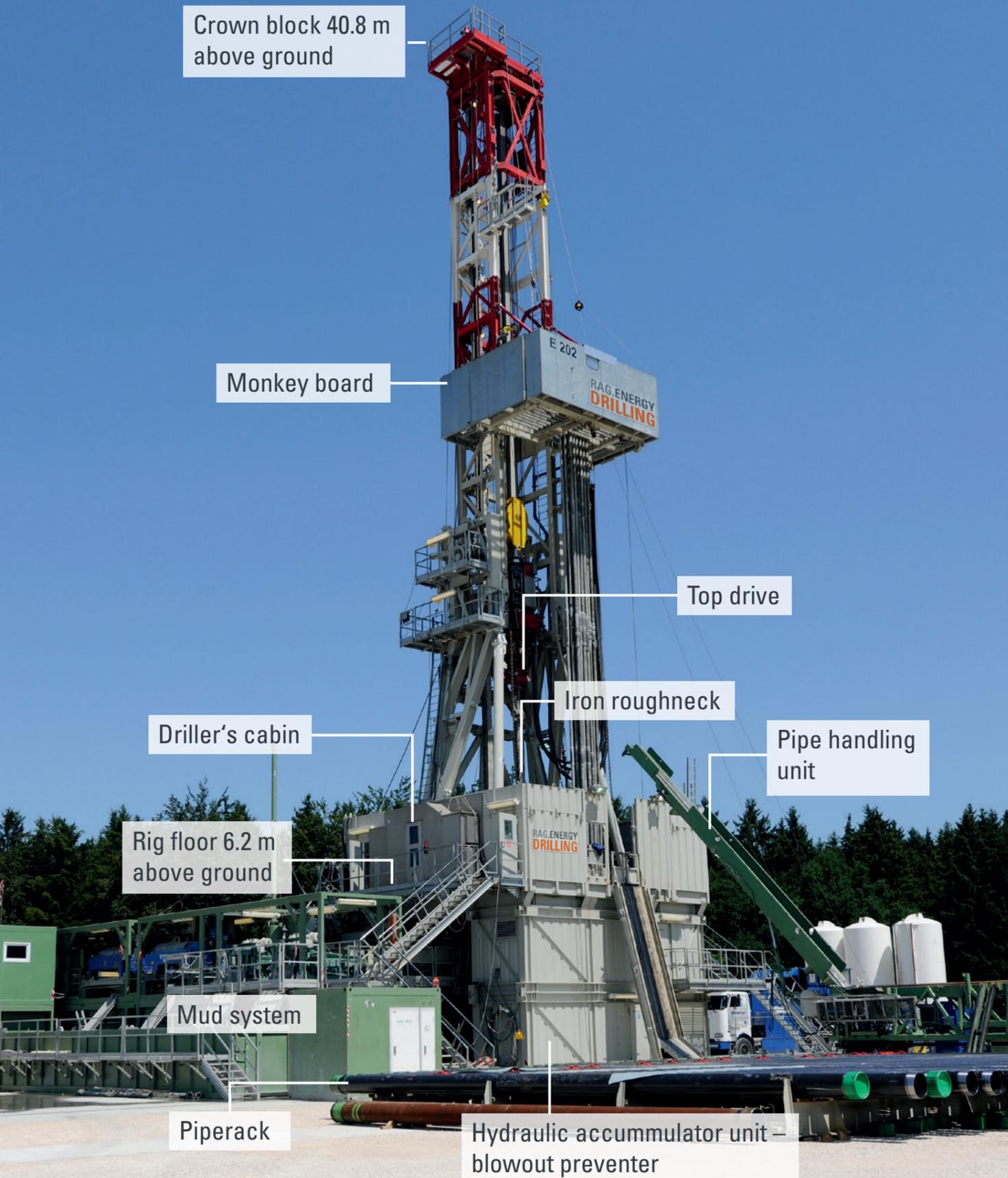
To date RAG has spudded about 170 wells in Lower Austria and 820 in Upper Austria, as well as 90 wells in Salzburg province, 12 in Styria and ten in Bavaria. These figures include geothermal projects in Fürstentfeld, Munich's Riem district, and the twin towns of Simbach and Braunau on the border between Bavaria and Upper Austria. Some of the Styrian spas (including

Loipersdorf, Blumau and Waltersdorf) owe their existence to thermal springs discovered by RAG wells.

Cutting-edge technology and a highly trained team are behind the continuous improvement in our quality, safety and environmental standards, which in turn boosts efficiency and keeps drilling costs down. That explains why we have been capable of mounting successful drilling programs using our own rigs even when business conditions have been tough.

Frequent communication with the relevant public authorities and other stakeholders, and collaborative relationships with contractors and service companies play a major role in our drilling success.

# Drilling Rigs E200/E202



Crown block 40.8 m above ground

Monkey board

Top drive

Iron roughneck

Pipe handling unit

Driller's cabin

Rig floor 6.2 m above ground

Mud system

Piperack

Hydraulic accumulator unit – blowout preventer

## Specifications of the E200 and E202 rigs

### Mast – vertical lift system

Bentec EURO RIG 250:

- Rated hookload: 250t
- Maximum hookload: 300t
- Height: 40.77 m (inc. substructure)
- Substructure height: 6.20 m
- Reeving: 10 lines
- Max. full setback capacity: 3800 m 5" DP
- 5.500 m hole depth with 3½" DP

### Drawworks



Bentec E 1250 AC

- Drive: electric
- Drawworks brake: eddy-current brake

### Top drive



Maritime Hydraulics PTD 500 AC

- Max. load: 500 sh.t
- Max. torque: approx. 41.000 Nm
- Max. revolutions: approx. 250 rpm

### Rotary table



- Maximum opening: 37½" resp. 27½"
- Drive: electric
- Max. revolutions: 40 rpm

### Iron roughneck



NOV ST-80C

- Make-up torque: 81000 Nm
- Break-out torque: 108000 Nm
- Max. joint OD: 8½"

### Pipe handling unit

P.U.L.D. 05 series pipe handling

- Max. diameter: 20"
- Min. diameter: 2½"

## Mud system, mud conditioning, solids control

Modular system (8 transport units)



### Mud pumps

2 x Wirth TPK 1600 AC

- Capacity per pump: 7½" liner – 2600 l/min at 205 bar  
5½" liner – 1400 l/min at 345 bar
- Strokes: 100/min
- Max. pressure: 350 bar
- Drive: electric (1600 PS)

### Mud tanks

- 100 m³ max. total Volume in 8 compartments
- Conical tank compartments with agitators
- All lines and valves mounted outside the compartments, no baffles in the compartments
- Integrated triptank, poor boy- and vacuum degasser
- 2 x Cutting Container (35 m³)

### Mud conditioning, solids control

- 2 x VSM 300 shale shaker, NOV Brandt
- 1 x Hiller centrifuge with integrated barite recovery
- 1 x Flottweg centrifuge
- Flocculation unit
- Entire tank system automated, remotely monitored and visualised on a process control system

## Energy supply

Modular Generators (6 units to minimise power use)

- 6 x 532 kW diesel generators
- Option: replacement of 3 x 532 kW diesel generators by 3 x 410 kW CNG-driven generators

## Driller's cabin



# Special features of our E200 and E202 rigs

The requirements that drilling operations must meet are becoming more exacting all the time. High-precision 3D seismic, high-tech materials, cutting-edge drilling techniques and experienced teams are all crucial to successful wells.

Today, thanks to new methods, it is possible to drill far deeper, further and faster. Given the right geological conditions and the efficient use of new technologies, it is possible to achieve daily drilling performances of 500 metres or more. These technologies have recently opened the way for horizontal wells with lengths of up to 3,500 metres, as RAG has shown at its Puchkirchen and Nussdorf storage facilities. Our two drilling rigs (the E200 and E202), with their rated hook loads of

250 tonnes (t) and maximum hook loads of 300t, can reach depths of up to 5,500 metres. Highest environmental standards, low emissions due to the use of natural gas-powered drive units instead of diesel engines, and Safety Certificate Contractor (SCC) certification demonstrates that RAG Energy Drilling meets the highest health, safety and environment standards. And a highly qualified workforce ensures that we maintain our competitive edge when it comes to drilling expertise.



## RED drilling rigs – an integrated system

Our rigs have not stopped working since they entered service. RAG Energy Drilling operates its own custom internal solids control systems, each with a centrifuge, a flucculation unit, and an integrated mud logging unit for data acquisition and measurement.

### Power supply

The drilling rigs are electric. To remove the need for an external power supply, the generators are driven

partly by compressed natural gas (CNG) sourced from our own output or other producers' gathering systems, and partly by diesel fuel. In the interests of fuel economy, each rig has six modular generators. The use of ultra-modern, environmentally friendly drive units keeps emissions to a minimum. The base load power supply comes from natural gas generators, while peak load demand is met by diesel engines with particle filters.

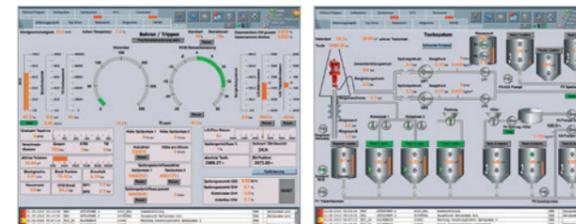


### Noise abatement

All the equipment and drive units have sound enclosures in order to conform to the statutory noise limits. Perimeter sound walls up to 11 metres high can also be erected around drilling sites in sensitive areas. Compliance with the applicable limits is frequently checked by authorized noise surveyors.

### Process control system

The process control system that runs the drilling rigs was developed in house, and is designed for maximum adaptability to operational requirements. Data can be transmitted online from the rigs, via our corporate intranet. The process control system can use logging while drilling (LWD) data, transferred in WITS format. The data generated by the process control system can also be sent to LWD service providers.



Process control system – monitoring drilling progress

Process control system – monitoring the mud circulation system

### Waste management

The commercial waste that arises at the drilling site is stored in special-purpose containers until it can be collected by licensed disposal companies. Detailed records of all the waste streams are kept.

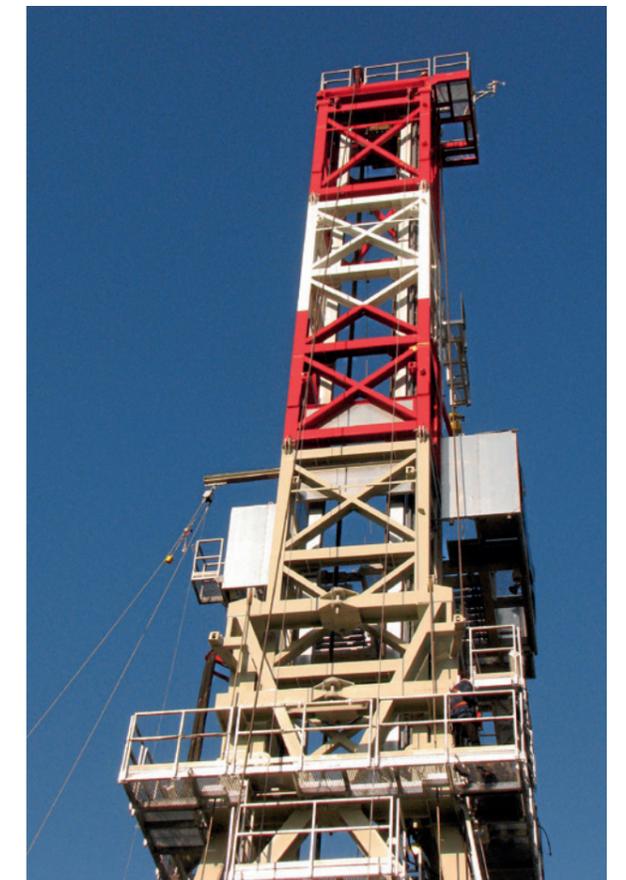
The drill cuttings are removed from the drilling mud after each circulation cycle, meaning that the mud can be re-used. Particles upwards of 4 microns (µm) are

separated from the drilling mud. The filtered solids are used by other industries as raw materials. Reducing the use of mud additives and recycling drilling residues helps to minimise environmental impacts.

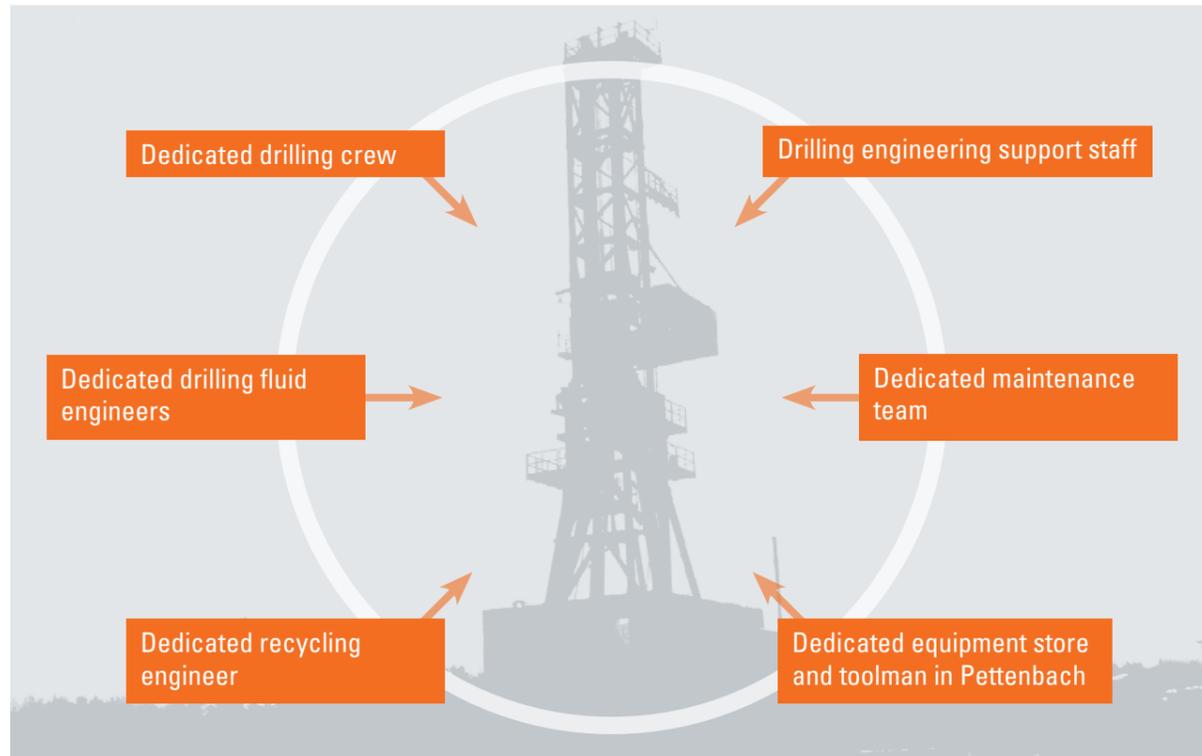
### Plant safety

Monitoring of the entire rig is computer controlled. This makes it possible to immediately identify deviations from the normal operating condition of the equipment and take corrective action. Our drilling operations enjoy unrestricted certification under the international SCC\*\* health, safety and environment standard. The conformity of all operations is independently audited on an annual basis. We achieved 95% compliance with the SCC\*\* requirements during the first two years, and have since been fully compliant.

- SCC\*\* certification first awarded on 14 July 2000
- Annual SCC\*\* surveillance audits
- SCC\*\* recertification audits every three years
- Safety officer detailed to each drilling rig
- First-aid training given to all staff
- Basic blowout control training given to all staff
- Training and mentoring scheme
- Staff training database to ensure that deadlines for repeat training sessions are met



# Rig and support staff



## Drilling crew

Our identical E200 and E202 rigs have their own highly trained drilling teams – no consultants are employed. A drilling team consists of a drilling supervisor, a driller, an assistant driller, a derrickman, rough-necks, a mud engineer, a rig electrician and a rig mechanic. Rotating the drilling supervisors results in knowledge transfers between the rig crews. Standardised training, close cooperation between shifts and low staff turnover make for seamless shift handovers around the clock.



## Strong support

### Drilling engineering support staff

- Use of Landmark software applications (Compass, Stresscheck, Wellcat, etc.)

### In-house drilling fluid engineers

- Proprietary mud circulation system ( $K_2CO_3$ )
- Range of cutting recycling options in place

### Dedicated equipment store and toolman in Pettenbach

- Drill pipes, heavyweight pipes, drill collars, stabilisers, etc.
- Coring tools
- Casing, packers and completion materials

### Support team

- Mechanical and electrical maintenance departments
- Maintenance contracts with the manufacturers of the main components (Bentec, Aker MH, Aker Wirth, IGP, etc.)
- High maintenance standards thanks to annual inspections from commissioning onwards
- High levels of replacement part coverage for critical rig components such as top drives, mud pumps and drawworks.

### Drill site preparation – in-house construction coordination unit

Coordination unit - Central office for liaison with public authorities

## Drilling crew training

RAG Energy Drilling treats good drilling crew training as a top priority because of its impact on quality, efficiency and safety. Every crew member has completed an apprenticeship as a metalworker, mechanic, fitter, electrician, toolmaker, etc.

**Every employee** must complete foundation training courses in:

- Well control and blowout prevention
- Working at height
- Firefighting
- SCC\*\*
- Forklift truck driving
- Loader crane driving
- Cargo securing
- Heavy goods vehicle driving at drilling sites (where the driver does not have an HGV licence)
- Safe and defensive driving
- First aid

In addition to the basic training, assistant drillers, drillers and drilling supervisors must successfully complete other specialised courses and be able to demonstrate experience in their fields. For example, a drilling supervisor must have at least ten years' overall rig experience and five years' experience as a driller. Medical examinations to determine whether staff are still capable of working in harsh environments are carried out at regular intervals.





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Heimo Heinzle graduated from the University of Leoben and held a variety of positions as a drilling engineer in Austria and abroad, and is now the technical director at RED. Oliver Kowald held commercial management positions before taking over as commercial director at RED.

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