



HERRENKNECHT Press Release

August 24, 2012

TUNNEL FOR NEW ENERGY CENTER IN BERN

In June 2012 the Bernese energy supply company Energie Wasser Bern (ewb) began with the gradual commissioning of the new Forsthaus energy center. The production concept of district heating, steam and electricity is unique in Switzerland and implements the federal capital's sustainable energy strategy. A tunnel boring machine from Herrenknecht (AVND, diameter 3.6 m) excavated two utility tunnels to the nearest district heating hub, all in all more than 500 meters in length.

Bern, Switzerland / Schwanau, Germany, August 24, 2012. The Swiss federal capital Bern has set itself the goal of supplying the population and business with electricity entirely from renewable energy sources by 2039. This is the result of a referendum in the year 2010 that helps Bern take a pioneering role in comparison with other Swiss municipalities. In June 2012 the energy supplier Energie Wasser Bern (ewb) reached a milestone on the way to this goal. It gave the go-ahead for the commissioning of the newly built Forsthaus energy center. With a planned start in early 2013, it will replace a 60-year-old waste incineration facility and produce about 290,000 megawatt hours (MWh) of district heating, 40,000 MWh of steam and 360,000 MWh of electricity per year. Among other things, this will cover about a third of Bernese electricity requirements. A first in Switzerland is the combination of a waste incineration facility with a wood-fired heat and power station and a combined gas and steam power plant. These are complemented by a photovoltaic system on the roof of the energy center. The fresh, scrap and waste wood for utilization in the plant is to be entirely locally sourced in order to keep transport distances short. With the Forsthaus energy center Energie Wasser Bern is focusing on efficiency and renewable and independent energy. According to ewb the new plant will reduce the total CO₂ emissions for Bern's power supply by 57,000 tonnes per year.

The specialists from construction company Implenia Bau AG used a 130 tonne Herrenknecht tunnel boring machine (TBM) to excavate two tunnels for district heating, steam and electricity. They run at a depth of between seven and 18 meters through gravelly and clayey subsoil and connect the Forsthaus energy center to the district heating network. In the first 485 meter long section the AVND2500AH type microtunnelling machine (diameter 3,600 mm) crossed beneath the SBB railway tracks at the nearby freight depot, where it was essential that no subsidence should be caused. The underground team steered the AVND from Herrenknecht so precisely that ongoing rail operations were not disturbed. Machines of this type are successfully used worldwide in the construction of supply and disposal tunnels; they are ideal for tunnelling through groundwater and can work in a wide range of soil geologies. The cutting wheel excavates the soil, which is transported out of the tunnel via slurry lines. At the same time the next pipe segments to secure the tunnel are pushed forward from the launch shaft using the pipe jacking method. In this way the pipeline is pushed forward together with the machine.

After only nine weeks of tunnelling and the first successful breakthrough on the Bernese construction site, in the intermediate shaft the drilling team turned the Herrenknecht TBM 90 degrees in the direction of the next section. For the second excavation the supply logistics for the machine (for example, the cycle of delivering and removing the flushing liquid) had to be

adapted in such a way that the aboveground equipment (for example, the separation plant) could remain in the original launch shaft. On the 80 meter long path to the final destination a 300 year old oak tree had to be passed under without damaging its roots. Following successful completion of the tunnelling work in 2011 the lines for district heating, steam and electricity were installed.

In early 2013 the new Forsthaus energy center will be connected to the district heating network and normal operations will begin. Parallel to this, demolition work around the old waste incineration facility will already be underway. Noise and odor pollution will thus be considerably reduced for local residents and space will be created for a new residential development in the Swiss capital Bern.

Forsthaus West energy center utility tunnels, Bern, Switzerland

Machine data

Machine type: AVND2500AH

Drill diameter: 3,600 mm

Cutter head power: 400 kW

Max. torque: 1600 kNm

Weight: 130 t

Project data

Site owner: Energie Wasser Bern

Customer: Implenia Bau AG

Drive lengths: 485 m + 80 m

Inner diameter: 2000 mm

Geology: Gravel, clay

Herrenknecht AG

Herrenknecht is the only company worldwide to deliver tunnel boring machines for all ground conditions and all diameters – ranging from 0.10 to 19 meters. The product range includes custom machines for transport tunnels and supply and disposal tunnels as well as additional equipment and service packages. Herrenknecht also manufactures drilling rigs for vertical and sloping shafts as well as deep drilling rigs. In 2011 the Herrenknecht Group achieved total revenues of 1.104 billion euros. The Herrenknecht Group employs around 4,000 people worldwide and trains over 240 young people. With 77 domestic and overseas subsidiaries and associated companies working in related fields Herrenknecht provides comprehensive services close to each project and customer.

Utility Tunnelling

The market for Utility Tunnelling technology is characterized by sustainable megatrends such as population growth, urbanization and resource scarcity. Oil, gas, water, electricity and data must be transported efficiently and without loss even over great distances and waste water must be transported away in efficient systems. Having delivered more than 1,600 systems worldwide, Herrenknecht has the highest density of references regarding both standardized micro machines as well as project-specific customized special machines. Currently around the world some 850 tunnel projects are being realized with utility tunnelling systems from Herrenknecht with diameters up to 4.20 meters. Here, trenchless tunnelling technology offers a range of advantages compared to conventional construction methods: transport, business and the environment remain largely unaffected when micro machines, HDD rigs or shaft sinking equipment are deployed.