

# Pembroke CCGT, Pembroke, West Wales



RWE Npower is constructing a new state-of-the-art 2000MW combined cycle gas turbine (CCGT) power station at its Pembroke site in West Wales. The new power station will cost around £1 billion to build and will take approximately three years to construct. The future power station comprises 5no. single shaft generating units of about 400MW, each capable of generating power to about 3 million homes. When completed, it will be the largest CCGT plant in the UK. Alstom was awarded the EPC (Engineering, procurement and construction) contract.

BAUER Technologies have won the £5 million contract for the installation of the piled foundations. Each unit consists of a variety of sub-structures covering a total area of 40,000sqm. The scope

of the piling contract comprises the construction of the piling platform, preliminary trial bores to verify ground conditions and rock head level in the piling area, a preliminary pile testing regime including a fully instrumented test pile, construction of 2,307no. 600mm reinforced CFA piles, 421no. 900mm unreinforced CFA piles and installation of 10no. 1,200mm diameter steel liners to 10m depth at the condensate pit, including all associated piling attendances.

Due to the variation of bedrock level within the site two pile types were selected: friction and end bearing piles. The friction piles are installed within the overburden to an average depth of 22m whereas the end bearing piles are installed to a refusal criterion

of 220kNm, which generally coincides with an embedment into bedrock. The piles are installed through a layer of Made Ground, underlain by firm to stiff Glacial Till, becoming very stiff with depth, which in turn overlies bedrock. The type of bedrock is variable on site and consists of strong Limestone in the southern area and Siltstone and Mudstone on the northern side.

The high variation in bedrock level was considered challenging from the start particularly for the dynamic behaviour of the turbine structures. BAUER Technologies, in collaboration with Alstom, carried out further investigation of rock levels within sensitive areas prior to commencement of piling works.

Results obtained from this investigation were ultimately used for updating the pile design and layout and enabled Alstom to manage potential risks associated with such variations in bedrock level ahead of the piling works.

Following the review of the ground conditions, BAUER proposed to carry out an instrumented test pile during the preliminary testing phase. Analysis of the test confirmed that the piles could actually be shortened yielding a significant saving to Alstom.

Piling started in May 2009 and installation of the CFA piles was carried out using 3no. BAUER BG28 rigs capable of delivering a maximum torque of 275kNm. Installation of end bearing piles confirmed the high-torque capability of the BG28 as embedment into rock was achieved before reaching the refusal criterion.

In addition to the installation of CFA piles, BAUER Technologies installed 10no. 1,200mm liners to reduce the cost of the temporary works required in the condensate pit. The liners were installed using one of the BG28 rigs by converting it to rotary mode.

The entire contract was completed to budget and almost 8 weeks ahead of schedule.



<b>Client:</b>	RWE Npower
<b>EPC Contractor:</b>	Alstom Power Ltd
<b>Piling Contractor:</b>	BAUER Technologies Ltd
<b>Contract Period:</b>	May 2009 to October 2009
<b>Scope of Works:</b>	<ul style="list-style-type: none"> <li>- 40,000m<sup>2</sup> piling platform</li> <li>- Preliminary test piles incl. compression, tension, lateral load testing</li> <li>- Instrumented test pile</li> <li>- 2,307no. 600mm diameter reinforced CFA piles</li> <li>- 421no. 900mm diameter unreinforced CFA piles</li> <li>- Installation of 10no. 1,200mm steel liners to 10m depth</li> <li>- Working load tests</li> <li>- Pile attendances</li> </ul>
<b>Turnover:</b>	£5.0 million
<b>Equipment:</b>	3no. BG28 piling rigs