Creyke Beck: ABB’s largest ever 132 kV GIS installation in the UK

The new GIS substation took up a fraction of the space occupied by the old AIS substation

New compact gas insulated switchgear (GIS) built within the existing footprint of a time-served outdoor air insulated switchgear (AIS) substation.

The need

In March 2013, ABB put the final finishing touches to a major turnkey project to create Northern Powergrid’s replacement 132 kilovolt (kV) substation at Creyke Beck in Yorkshire’s East Riding. The project saw ABB replace a substation with brand new state-of-the-art gas insulated switchgear (GIS) technology.

Northern Powergrid is the electricity distribution business responsible for delivering electricity safely and reliably to 3.8 million customers across northeast England, Yorkshire and northern Lincolnshire.

The existing Creyke Beck air insulated switchgear (AIS) substation had reached the end of its normal service life and Northern Powergrid required a replacement to ensure continuity of power supply for the significant local population it serves, including the city of Kingston-upon-Hull.
ABB's solution

In 2009, Northern Powergrid placed a turnkey contract with ABB to create the new indoor Creyke Beck GIS substation, which is the largest 132 kV substation built by ABB in the UK to date. The project included:

- Supply of 22 bays of ELK-04 GIS, including 4 bays of bus couplers and bus sections, 4 incoming bays that connect to the supergrid transformers at the adjacent 400 kV National Grid substation and 14 feeder circuits
- Construction of a building on a footprint of around 40 x 25 metres on stilts to enable easy access for cabling and to protect against the risk of flooding
- Design and construction of the new substation, plus installation and commissioning of the GIS and related protection and control equipment
- Cable connections, which included installation and jointing of new XLPE (cross linked polyethylene) insulated cables as well as jointing to existing oil filled substation cables and overhead line connection

Construction of the new GIS substation was completed in May 2011, with the circuits having been transferred across in sequence over two outage seasons. The final stage in the project was for ABB to demolish the old substation and flatten and stone-chip the cleared space, this was completed in early 2013.

Benefits of GIS

Due to the large amount of space occupied by AIS equipment, a like-for-like renewal project was impractical in terms of both availability and cost. There was not enough space available on the site to build a new AIS substation alongside the existing substation and to allow circuits to be transferred bay by bay. So if Northern Powergrid decided to use AIS, it faced either a long outage to allow the old substation to be demolished completely and the new one constructed on the same site, or the purchase of additional land so that a new substation could be built adjacent to the old one.

ABB persuaded Northern Powergrid that its compact GIS technology offered an alternative that was both cost-effective in terms of space requirements, with no purchase of extra land required, and also enabled an offline build to minimise disruption with a smooth transfer of circuits. By condensing a 22 bay outdoor AIS substation into an indoor GIS substation taking up around one sixth of the space (a footprint of around 40 m x 25 m) it was shown that it would be possible, with careful planning and logistics, to build the replacement on the existing site while the old substation remained in service.

Overcoming challenges

One of the major challenges faced by ABB in carrying out the project was the huge space constraint on the construction site, with a live operating substation on one side and a live 132 kV cable on the other. This called for exceptional levels of planning and logistical coordination to ensure that a safe working environment was maintained at all times.

A further challenge was the very high water table, with water struck at a depth of just 600 mm. This was addressed by ABB’s specialist civils contractor using a well pointing dewatering scheme.

“The successful completion of Creyke Beck on schedule is a perfect example of ABB’s capability to deliver substation projects in even the most challenging circumstances as well as demonstrating the space-saving advantages of our GIS technology,” said Jon Downs ABB’s Director for Utility Substations in the UK. “It has further extended our long standing relationship with Northern Powergrid that goes back to 2003, when we built the Norton 132 kV substation. It is also the latest of three high profile GIS substation projects handed over recently to Northern Powergrid, following Wakefield B and Tynemouth.”

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