

# Gravitas seeks site for prototype foundation

Offshore wind turbine designer Gravitas was this week pitching for sites where it can build a prototype for its gravity base foundation design after securing government development funding.

Gravitas Offshore was awarded £556,000 by the Department of Energy and Climate Change (DECC) to develop a full-scale prototype of its concrete gravity base foundation.

The Gravitas consortium of consultant Arup and contractors Hochtief and Costain had sought development funding since it formed in 2010, as well as looking for suitable sites.

"We're lobbying all developers to make land available [for our prototype]," said Arup director Gordon Jackson. Along with developers, Gravitas Offshore is also looking at two demonstration sites off the coast of Aberdeen in Scotland and Blyth in north-east England for testing the design.

Jackson's main requirement is a water depth of at least 20m. He hopes

to agree a location by the end of the year to ensure the new base can be deployed by 2014 – a condition of DECC's grant.

Gravitas also has to find more industry stakeholders such as wind turbine manufacturers as well as a firm to build the prototype. Jackson said the prototype was likely to be built in the UK, "assuming" UK firms show interest.

He said that successful deployment of the foundation design was essential if the firm was to persuade developers that the technology is a viable alternative to steel foundations.

"Developers need something tangible and are waiting to see a demonstrator," said Jackson. "[If successful] I think it will help transform attitudes and allow gravity base suppliers to be put on the bid list."

If the prototype is successful, it is expected that it will take another two years for Gravitas to produce a commercially available foundation base.

## Crossrail aids City Farm

Crossrail-funded redevelopments of Stepney City Farm were officially opened on 8 September, marking the completion of Crossrail's first major community project.

Crossrail has contributed £1M to reconfigure the farm, with new fencing, a purpose-built barn and new workshop and gallery space in return for the use of some of the farm's land for construction of a shaft at Stepney for the new rail link.

The handover was marked with a special open day with food and music to celebrate completion of the improvements. Tower Hamlets mayor Lutfur Rahman said: "Crossrail will provide transport and economic benefits to the area and we support its work. Crossrail's funding of the animal barn and rural craft centre will provide even greater long-lasting benefits."

The farmland given over to Crossrail is being used by a joint venture of Dragados and Sisk to build a 60m long, 15m wide, 34.5m deep shaft from which the largest sprayed concrete lined caverns in Europe will be built.

## Bauer sales up this year

Bauer has reported rising revenues in its first half results, despite a weaker-than-expected contribution from its ground engineering equipment business.

The company reported a 9.6% rise in sales for the first six months of this year, compared to the same period in 2011, to reach €701.5M (£551M). Orders were also up 16% for the period to €778.6M (£612M). However, sales from its machinery division were lower than expected and have led the company to revise down its full-year profits forecast from €35M (£27.5M) to between €25M and €30M (£19.6M and £23.6M), although revenues are still expected to be €1.45bn (£1.14bn) for the full year due to work starting on a number of major projects. Sales in the equipment division fell 7.4% in the first half of 2012, compared to last year, to €291.2M (£229M).

In a statement, Bauer said: "There is uncertainty and reluctance to place orders due to the problems faced by many economies around the world. Markets in Europe and China, especially, are in decline."

## TALKING POINT

**Geothermal heating and cooling has real potential to cut a building's carbon footprint but, according to Mike Deed, there is more to consider than the geological constraints.**



It comes as no surprise that geothermal systems are being increasingly used in commercial applications. For every British Thermal Unit (Btu) of electricity used, a geothermal heat pump unit typically produces 3-5 Btu, making it 300-500% more efficient than using electric resistance heat and 20-30% more efficient than boiler/tower systems.

But while the hydrogeological conditions can be ideal for such systems, other factors can impact on the operation and prevent them from delivering their full potential.

Open loop geothermal systems are often the most attractive option for larger applications as they are simple to install. However, the effectiveness of these systems depends on borehole yields, and, most critically, flow rates. Many factors can affect flow rates and one that could be easily managed, and yet is becoming an increasing problem, is the reduction in flow rate due to the build-up of residues and biofilms.

Iron oxide and iron bacteria contamination are estimated to affect about 40% of the world's water bores. In a geothermal system, bacterial contamination and its associated residues build up inside the heat exchanger, clogging both the abstraction and recharge wells and increasing the friction losses in the flow section of the system. This is particularly traumatic for open loop geothermal systems because the resultant biofouling severely reduces the system flow rate and thermal transfer, creating ideal conditions for a vicious cycle of accelerated bacterial growth and continual re-contamination of the system.

**"While the hydrogeological conditions can be ideal for geothermal, other factors can impact on the operation"**

The issues are highlighted by a scheme I worked on in Lodi, Italy, where a geothermal plant was installed to service an office air conditioning system. The system was designed with an overall thermal power of 0.6MW, achieved by one heat pump with heat exchangers, a 42m deep abstraction well, a 29m deep recharge well and 100m of pipework. When the system was commissioned it ran into immediate problems as unexpected blockages in the recharge well caused flooding in adjacent areas.

Despite installing a second screen with a hydrochloric acid cleaning system, the problems re-occurred the following year.

A downhole video inspection revealed that both the abstraction and the recharge wells were completely clogged with iron bacteria and iron oxide residues. The slots in both screens in the recharge well were completely sealed, preventing the discharge of purged water into the ground.

The boreholes were treated to disrupt and dissolve the iron bacteria cells and associated iron oxide residues, but it was evident that an on-going maintenance programme was needed to allow the system to function to its design capacity.

In virtually all geothermal evaluations, low maintenance costs are identified as one of the key benefits, but this depends on ensuring maximum flow rates are achieved. Regular proactive maintenance is the most cost-effective approach in the long run and consultants should build in a maintenance programme at the project design stage.

*Mike Deed is managing director of Geoquip Water Solutions*