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BETHLEHEM HYDROPOWER DEVELOPMENT

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Bethlehem Hydro have announced that construction has started on the 7MW hydropower project in the Free State Province of South Africa. Bethlehem Hydro breaking new ground in South Africa. It is the first commercial power project to have reached construction in more than two decades and the first project finance transaction ever on a green field independent power project .

The project comprises two generating units of 3MW and 4MW, placed respectively on the As river and the Sol Plaatje Dam, both near the town of Bethlehem. The const ruction process is scheduled to run until the end of 2007 and full commissioning will take place in February of 2008.

Although Bethlehem Hydro's 7MW is paltry compared to the round 40 000MW of generation capacity installed in South Africa, it will provide some 20% of the power needs of the town of Bethlehem — sufficient for the annual power needs of 11 000 low income households. In addition the project will reduce the emission of more than 30 000 tons of greenhouse gas (CO_2) per annum by displacing coal fired electricity.

The blackouts in 2006 provided a wake up call to the power generation sector in South Africa that localised disruptions are becoming a common occurrence and that new generation capacity and transmission system upgrades are urgently needed. It is estimated that South Africa must add 1000MW of capacity per year for the next decade to meet demand growth.

FINANCING

Bethlehem Hydro will cost approximately R67 million (US$8.9 million) to build and is financed by a loan from the Development Bank of Southern Africa (DBSA) and equity investments by NuPlanet, the Central Energy Fund and Hydrowsa. Bethlehem Hydro will produce around 35 GWh of electricity per annum which will be sold under a long term power purchase agreement to the town of Bethlehem. The emission reductions will be sold under the Clean Development Mechanism CDM) to Statkraft (the Netherlands).

CONSTRUCTION

NuPlanet (Pty) Ltd of South Africa developed the project. Ninham Shand Consulting Engineers (South Africa) are responsible for the design and construction management. The construction contract has been awarded to Eigenbau (Pty) Ltd (South Africa) and Boving Fouress Ltd of India will supply the Kaplan turbines and balance of plant equipment.

Two mini hydroelectric plants are to be constructed near the Free State town of Bethlehem, one on the As River and the other at the Sol Plaatje (Saulspoort) Dam. The project will make use of flow (average 24 cubic metres per second) from the Lesotho Highlands Water Project (LHWP) to generate electricity. Total installed capacity of the two power stations will be approximately 7MW.

The first station, with a generating head of 12m and an installed capacity of about 4 MW, will divert water from the As River on the Farm Merino, into a canal. The canal will lead the water to a head pond, which is formed by damming up a channel along which the river is thought to have flowed in the distant past. The power station will be placed at the head pond wall, from where the water will be returned to the river.

The second station, with a generating head of 10m and an installed capacity of about 3 MW, will be constructed on the right bank of the existing Sol Plaatje (Saulspoort) Dam. LHWP water presently flowing over the spillway of the dam will be diverted through the power station turbines. Power generated by the project will be supplied under a Power Purchase Agreement to the town of Bethlehem.

DESIGN, PROCUREMENT AND PROJECT MANAGEMENT

Towards the end of 2005, Bethlehem Hydro appointed Ninham Shand to undertake the following:

- **Design** — The tender and detail designs have modified the original feasibility study proposal to construct the project at Sol Plaatje on the left bank of the dam and the power station will now be constructed on the right bank. This decision has removed many constraints posed to the project on the left bank, including construction of the project outside of the dam stilling basin, greater space for construction of the works and an improving the conditions for abstraction of water at the power station intake. The feasibility proposals for the Merino Site have generally further developed and refined the feasibility layouts.
- **Procurement** — In view of the fact that the local market for hydro turbines is undeveloped, international manufacturers and suppliers were approached. Through a process of pre-qualification, five suppliers of turbines were short listed. Four tenders were received, three from Europe and one from India. Although the Indian turbines supplied by Boving Fouress Limited are of a slightly lower efficiency, they offered price and programme advantages and they were appointed. Due to the tight conditions in the South African civil engineering construction market, the initial enquiry for Tenders did not draw a response. Two Tenders were eventually submitted and Eigenbau has been appointed for the construction of the Civil Works. Gates for the power station waterways, overhead cranes and electrical power lines are in the process of being procured.
- **Project management and construction supervision** — The co-ordination amongst the different suppliers presents