Cativá Power Plant
87 MW, Panamá

Completed in 2008
for
INVERSIONES Y DESARROLLOS BALBOA S.A.

GDF SUEZ ENERGY CENTRAL AMERICA

GDF SUEZ

BY

BWSC

Project Background

In September 2007, Burmeister & Wain Scandinavian Contractor A/S (BWSC) was contacted by INVERSIONES Y DESARROLLOS BALBOA S.A. (IDB), in the Republic of Panamá, (a subsidiary of GDF Suez Energy Central America) to undertake the balance of plant for 10 new diesel generating units on turnkey basis. The project was on genuine fast track schedule with 10 months only, for having the first five units in operation.

On very short notice, BWSC presented a proposal followed by a period of approximately two weeks of intensive negotiations. Pre-notice to proceed was granted on October 1st, 2007 and procurement and plant design work was initiated.

In co-operation with IDB, BWSC had been able to freeze the new plant layout during the contract negotiations so the extensive and difficult site preparation work could be launched by IDB in accordance with the agreed time schedule.

On November 2nd, 2007 the contract for Engineering, Procurement and Construction (EPC) of Central Termica Cativá was awarded BWSC (equipment supply) and BWSC Panamá S.A. (local construction).

The fast track work to be performed in connection with the project was delivery of one 87 MW diesel power generating facility based on 10 generating units within the premises of the existing Bahia Las Minas Power Plant at Colon, Panamá.

The extremely challenging requirement set by IDB was to have the first five generating units in commercial operation before August 31, 2008 while the remaining five generating Units should be handed over not later than December 2008.

Inauguration Ceremony, December 5th, 2008
President of the Republic of Panamá, Mr. Martin Torrijos Espino, holds the opening speech.

As a result of the prevailing over-heated market for supply of diesel engines and generators, IDB had already secured 10 generating units (engines and generators) and contracted them directly with MAN Diesel North America. Furthermore, IDB provided the two step-up transformers as free issue supply.

The balance of plant was contracted to BWSC on EPC basis. The work comprised plant design, equipment supply, plant construction and test and commissioning, including client's free issue supply. The engine and generator transportation was as well undertaken by BWSC.

Project Execution

One og the main challenges for BWSC was to opt for the most efficient plant layout considering the difficult task to efficiently store the massive amount of containers with incoming machinery and materials and at the same time construct the new power plant within the very limited site area designated at the old Bahia Las Minas power plant premises.

BWSC faced another major challenge as the soil bearing capacity in some areas proved to be poor. Time did not allow for traditional piling foundation. To overcome this obstacle BWSC introduced a unique underground base mat design comprising one common base plate (in reinforced concrete). One common base plate was placed underneath the entire power-house and another base plate under the two stacks. By bringing all heavy equipment "on board" a common foundation base plate, BWSC largely reduced the risk of differential setting due to variations in soil bearing capacity.

In order to build the plant within the contractual time limit of 10 months only, specialized concepts were applied for engineering, manufacturing, logistics and construction. Prefabrication and modularization was used to the greatest possible extent for efficient building construction and for ease of equipment installation.

Civil construction work and electro-mechanical equipment assembling work was carried out by selected Panamanian contractors with proven records under extensive supervision by BWSC key personnel and specialists.

In order to meet the extremely tight schedule, BWSC introduced 2-shifts operation over a period of approximately three months including working Sundays in all critical activities.

The power-house building was supplied by a Danish contractor. The design-supply contract prescribed a modular concept based upon prefabrication and surface treatment of the steel structure for the power-house building. Utilizing prefabricated steel structure and cladding elements enabled erection of the power-house in approximately eight weeks only.

For more efficient electromechanical installation work on site, a concept including a common modular prefabricated main unit for each diesel engine was introduced. The main unit comprises all the auxiliary equipment serving the diesel engine, i.e. cooling, lubrication, and fuel oil supply together with the low voltage switchboard.

Prior to shipment to Panamá, the main unit was manufactured and workshop pre-tested to an extent where all piping and most electrical cabling were complete.

BWSC's scope of supply included three heavy lift shipments of all generating units from Masan, Korea, to Panamá as well as the subsequent land transportation to bring all 10 generating units onto their final position on the foundation in the power-house.

BWSC undertook the test and commissioning work of the new plant under strenuous time pressure. The work also included testing of the diesel generating units delivered by IDB's sub-supplier MAN Diesel SE.

For support of test and commissioning, BWSC included one dedicated on-line access to the plant's DCS control system, enabling direct operation and support from BWSC, Denmark.

All the contractually agreed delivery dates set by IDB were achieved while most deliveries happened even earlier, hence fulfilling the agreed conditions for BWSC to receive bonus payments.

Technical Service Agreement

Following successful completion of the Cativá Power Plant, IDB contracted BWSC for a five year period to provide Technical Service under a Technical Service Agreement.

Summary

Contract
Type ..... EPC, Turnkey
Effective contract ..... November 2007
Handing over phase 1 (5 units)..... August 2008
Handing over phase 2 (5 units) ..... December 2008

Plant generation, installed capacity..... 87 MW

Technical Data

Diesel Engines (Client supply)
Make..... MAN Diesel SE Augsburg, Germany
Manufacturer..... STX Korea
Type..... 10 x 18V 32/40, 4-Stroke
Speed ..... 720 rpm

Alternator (Client supply)
Make..... ABB
Type..... 10 x AMG 1120LS10 DSE
Voltage/frequency..... 13.8 kV / 60 Hz
Rated output ..... 10.94 MVA
Output at 100% load ..... 10 x 8.73 MW at pf 0.8

Step-up transformers (Client supply)
Make:..... Tadeo Czerweny
Type:..... 2 x ONAN/ONAF
Ratio:..... 115kV/13,8kV
Rated Power:..... 39 / 52 MVA

Fuel Oil Treatment
Make..... Westfalia, Germany
Type..... 3 x OSD 60/50
Rated capacity ..... 3 x 12 m3/h

Lube Oil Treatment
Make..... Westfalia, Germany
Type..... 10 x OSD 18/15
Rated capacity ..... 10 x 2.9 m3/h

Radiator Cooler
Make..... GEA, France
Type..... Forced draught
Cooling capacity HT+LT:..... 10 x 3,705 kW
..... + 10 x 2,663kW

Main Unit Supplier
Make..... Pipecon A/S, Denmark

13,8 kV Switchgear
Make..... Siemens
Type..... NXAirP
Voltage/Frequency ..... 13.8 kV / 60 Hz
Current ..... 2500 A

Powerhouse Building and Stack
Supplier..... Rambøll, Denmark
Lenght..... 79 m
Width..... 24 m
Height..... 12.5 m
Overhead crane ..... 10 ton
Stacks ..... 2 x cylindrical
..... /enclosed ea. 5 barrels x 45 m

Major Local Sub-Contractors
Civil work construction ..... COCIGE S.A.
Mechanical erection ..... Celmec S.A.
Electrical erection ..... Celmec S.A.
Tanks and exhaust ducting ..... Industrias Correagua

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