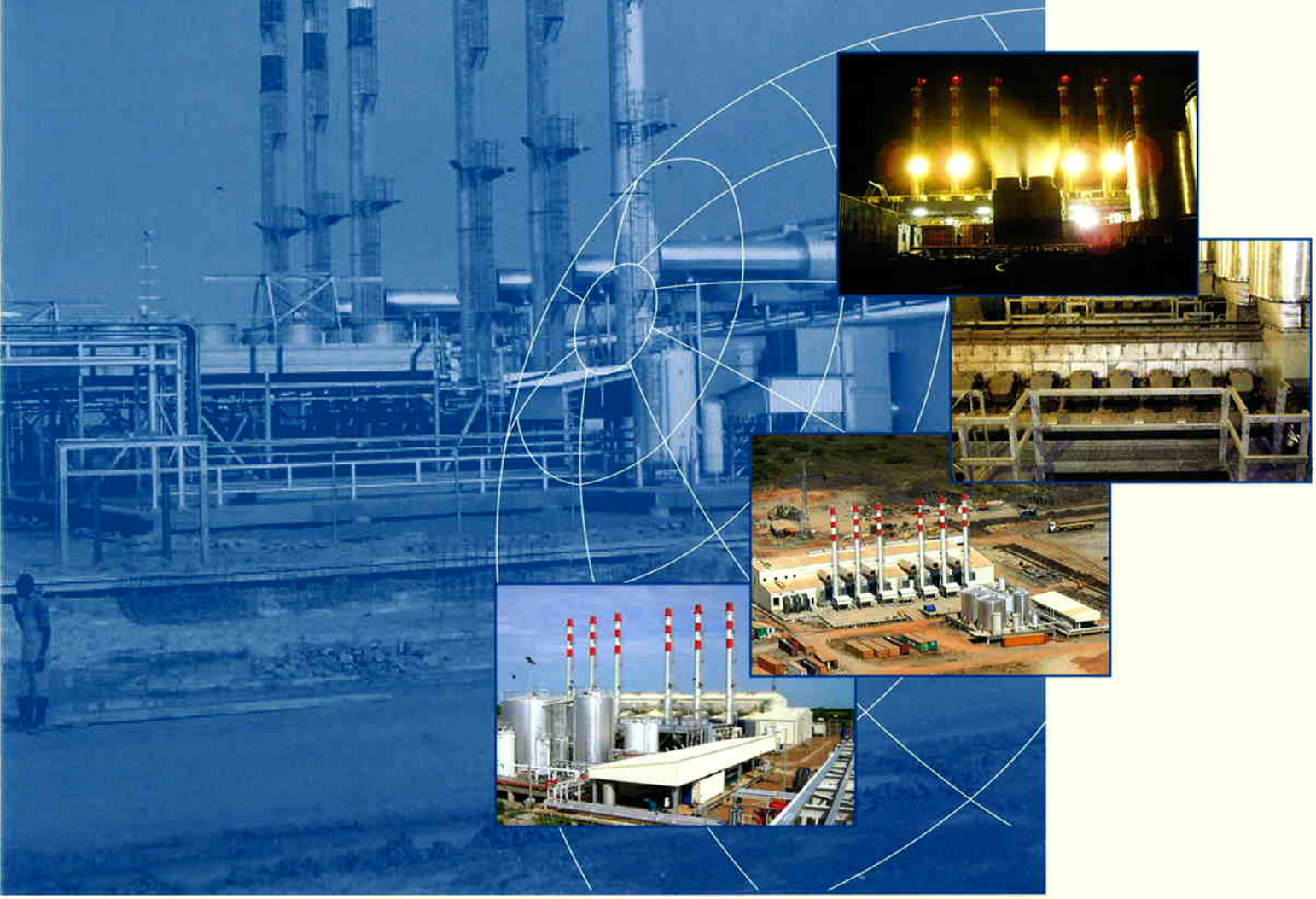
WNPOC - SUDAN

CRUDE OIL POWER PLANT



Built in 2006 for

WNPOC

BY

BWSC

Burmeister & Wain Scandinavian Contractor A/S

MAN

Project Background

The Sudan crude oil power project is a 54 MW plant initiated by White Nile Petroleum Operating Company (WNPOC), who is an operating company engaged in exploration, development and production in Sudan.

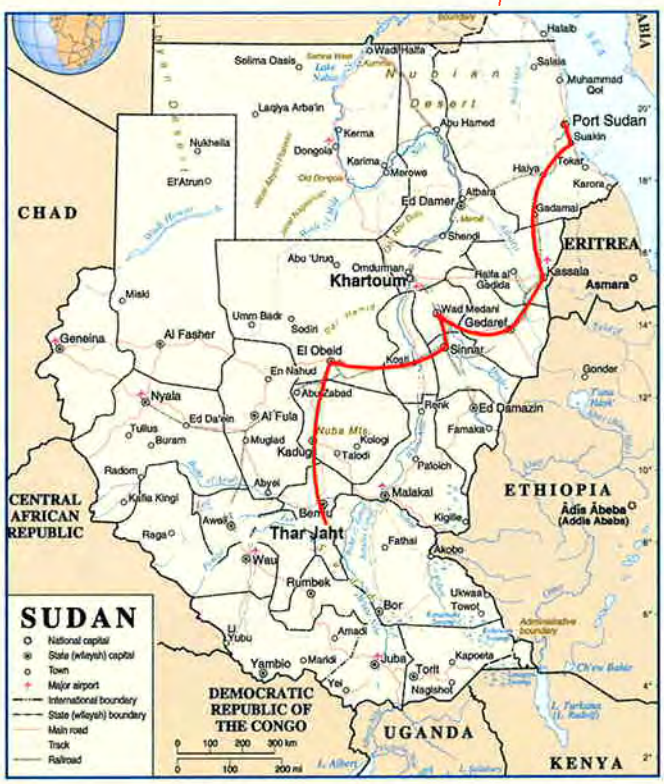
Following an international tender, WNPOC, who is owned by Petronas, Malaysia, ONGP, India & Sudapet, Sudan, signed the turnkey construction contract for the plant with Burmeister & Wain Scandinavian Contractors A/S and MAN Diesel SE in February 2005.

Project Execution

The power plant was completed within the agreed period of 14 months. This was achieved as a result of the professional cooperation between the Client WNPOC, the Engineers OGP/Sudapet, and BWSC/MAN and their cooperation partners.

The power plant is located in the Thar Jaht area, 700 km south of Khartoum. The local airstrip is located some kilometers north of the power plant near the accommodation area, which has been established by BWSC for the construction phase and by WNPOC for the operational phase.

– Transportation route



The power plant has a plant utilization capacity of 30 MW at an outside temperature of 55 °C, plus 15 MW as standby. The power plant can be extended if the oil facility is expanded. The generation voltage is 11 kV.

The project includes a powerhouse with an electrical annex, a diesel oil and crude oil storage tank farm, a crude oil treatment building, fire fighting, and a water treatment building, as well as a common control room, four offices for administration, and a storage/workshop integrated in the same building as the power house. The whole plant is "floating" on a deck of 800 piles one meter above ground, due to the swampy area.

The 6 diesel engines are located in the powerhouse engine hall in two separate compartments, to secure power availability in the event of safety shutdowns. A separate building is erected to house the fuel oil treatment, including the crude oil separation units. There are two overhead traveling cranes, one in each engine hall and including the unloading area, enabling an easy maintenance of the facility. Adjacent to the engine hall is the electrical annex accommodating both the control system and the switchgear. The floor is elevated, giving easy access during maintenance.

Auxiliary components such as ventilation units, oil bath intake filters, fuel oil booster units, stacks, radiator coolers, and transformers are located close to the powerhouse.

The power plant is designed for continuous operation on crude oil and includes transfer pumps, crude oil separators, exports pumps, and various service tanks. The engines can be operated on diesel oil as well.

Easy and reliable operation of the power station takes place from the control room by a comprehensive SCADA system controlling the entire power plant.

The power plant is equipped with fire fighting and fire/Ex detection systems, meeting international oil and power production standards.

The full turnkey project was undertaken by a Consortium of BWSC and MAN, with BWSC as Consortium Leader and responsible for the plant design, engineering, supply of balance of plant, transport, erection, construction and test and commissioning of the complete plant. MAN was responsible for supplying and commissioning the diesel generator set.

Logistics

The transportation of all the building components and operational equipment for the power plant is a complex and challenging logistical task. All transportation must follow very specific procedures and predefined routes. More than 200 containers for the project have been shipped from European ports to the Sudanese Port Sudan, and then trucked from Port Sudan to the site at Thar Jaht, a journey of 2200 kilometres.

The greatest challenge was the transportation of the 6 individual engines, each weighing almost 100 tons. A thorough survey of the entire road from Port Sudan to the construction site was undertaken to ensure adequate load-bearing capacity and to secure the safe arrival of the entire plant. The road survey included checking the capacity of all bridges to be crossed and new surfacing of some roads parts.

WNPOC Crude Oil Treatment Plant Under Construction

Engine transportation

Summary

Contract

Type ..... Turnkey
Contract award ..... February 2005
Handing over ..... March/May 2006

Technical Data for each Site

Diesel Engines

Make ..... MAN Diesel SE, Augsburg, Germany
Type ..... 6 x 18V32/40, 4-stroke
Speed ..... 750 rpm

Synchronous Alternators

Make ..... ABB, Finland
Type ..... 6 x AMG 1120 MR08 PSE
Rating ..... 9.858 KVA (at 50°)
Voltage/frequency ..... 11 kV / 50 Hz
Output at 100% load ... 6 x 7886 kWe at Pf 0.8 & 50°

Main Unit

Builder ..... Pipecon, Denmark/Poland

Lube Oil Treatment

Make ..... Westfalia, Germany
Type ..... 6 x OSD 18-0196-067/15
Rated capacity ..... 6 x 2.85 m³/h

Radiator Coolers

Make ..... GEA, France
Type ..... Induced draught
Cooling capacity ..... HT+LT: 6 x 3203 kW + 6 x 2185 kW

Fuel Oil Treatment

Make ..... Westfalia, Germany
Type ..... 3 x OSD 35-91-567/35
Rated capacity ..... 3 x 8.00 m³/h
Overhead crane ..... 1 x 1 ton

PowerHouse Building

Supplier ..... Rambøll, Denmark
Length ..... 75,6 m
Width ..... 26,54 m
Height ..... 12,1 m
Overhead crane ..... 2 x 3 ton
Stacks ..... 6 x 30 m

11 kV Switchgear

Make ..... ABB, Denmark
Type ..... UNIGEAR Type ZS1
Voltage/frequency ..... 11 kV / 50 Hz
Current ..... 2500 A

Generator Set Offloading & Assembly

Following the complex and challenging logistical task of road and sea transportation, the offloading and assembling of the generator sets commenced at site. In the absence of adequate crane capacity in Southern Sudan, BWSC decided to use a sophisticated lifting gear for the operation that was durable and flexible, i.e. easy to erect, easy to dismantle, and that could be utilised for all six units. The assembling procedure consisted of several sequences of lifting and sliding of the heavy main components. Within a week for each set, all six generating sets were sited on their foundations.

Engine unloading

Engine on foundation

Ganty crane in operation

Project Management Consultant

BWSC

Burmeister & Wain Scandinavian Contractor A/S
Gydevang 35 • P.O. Box 235 • DK-3450 Allerød, Denmark
Phone: +45 48 14 00 22 • Fax: +45 48 14 01 50 • E-mail: sales@bwsc.dk • Homepage: www.bwsc.dk