SETatWork Good Practice
Implementation of Combined Cycle Plant 841MW in Power Plant Pocerady – CEZ Czech Republic

Setting	
Prepared by:	Energy Centre, Bratislava, Slovak Republic - Prepared: November 2009
Country	Czech Republic
Location	Počerady
Project start date	October 2010
Project end date	April 2013
Technology keywords	Combined cycle, Advanced technologies, High temperature technologies, Combined heat & power, Heat recovery & storage, District Heating.
Host sector	Main Energy Producer

Technical summary of the project

Objective of the project :

Saturation of energy demand, via implementation of new highest efficiency source with quick ramp-up capabilities and partly replacement of existing brown coal-based energy production

Počerady Plant Description:

In June, 2009 ČEZ concluded a contract with ŠKODA PRAHA Invest. for the design, supply, procurement, erection and commissioning of a Gas Turbine Combined Cycle (GTCC) powerplant capacity 841 MW. to be built in Pocerady. Its construction will start early 2010. Development of this GTCC plant will be in progress in the period from October 2010 to April 2013. Project costs are of the investment amounts approx 800 Mill. EUR.

New GTCC plant Pocerady will be based on Siemens F-class gas turbines technology specified as follows:

Combined cycle configuration		2-2-1 (2 x Gas Turbine Generator {GTG}, 2 x Heat Recovery Steam Generator {HRSG}, 1 x Steam Turbine Generator {STG})
Total installed capacity		841 MW
Guaranteed electrical net efficiency		57.4 %
GTG	Model	Siemens SGT5-4000F
GTG	Capacity	2 x 284 MW
Fuel		Natural gas
STG	Model	Skoda, MTD60CR - Extraction, Condensing with Reheat
STG	Capacity	273 MW
HRSG	Model	SES Tlmace, Triple Pressure, Natural Circulation with reheat

Gas turbine model SGT5-4000F is characterized by high performance, low power generating costs, long intervals between major inspections and an easy-to-service design.

Optimized flow and cooling add up to the highest gas turbine efficiency levels for the most economical power generation in combined-cycle applications. Its state-of-the-art technology is based on proven design features.

GTG Technical features:

- Annular, walk-in combustion chamber with 24 hybrid burners
- Ceramic combustion chamber tiles
- 15-stage axial flow compressor with optimized flow distribution (controlled diffusion airfoils)
- Single-crystal turbine blades with thermal barrier coating and film cooling
- Advanced cooling technology
- Optional multiple fuels capability
- Low-NOx combustion system

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The SKODA 273 MW steam turbine is designed for both operation under the basic load and for peak operation, i.e. the design will allow shutdown of the turbine at night and during weekends. This turbine bears the SKODA MTD60CR designation. It is a pure double-shelled turbine with a high-/ medium-pressure combination section, steam reheat, and a dual low-pressure section. The low-pressure end stage uses blades 1,220 mm long. The present-day 3D blade modeling is used in the through-flow section of both turbine shells.

Project background:

Due to the lowest investment cost per MW installed, short period of construction and a high thermal efficiency, gas-steam power plants have been considerably favoured in comparison to other sources utilizing fossil fuels.

Gas-steam power plants are highly flexible sources, which are able to stabilize the electrical power system. The ČEZ production portfolio has been experiencing a lack of such a source for the time being. Operation of gas-stem power plants serves to cover peak hours of electricity consumption. This source may be connected to the grid in a few minutes after its start-up. Only hydro-electric power plants are able to respond faster.

A characteristic feature of gas-steam power plants is their high flexibility, due to which they are able to respond promptly to the needs of the electrical power system and thus to provide balance between consumption of electricity and its generation.

From the energy industry point of view, the Czech Republic counts itself as being dependent on import of energies. In addition, such national dependence is going to increase, as the national economy is going to run out of domestic deposits of brown coal, regardless the efforts aiming at reduction of energy demand. The only way how to achieve maximum energy security is diversification, namely both from the point of view of countries, from which the Czech Republic imports sources of energy.

GTCC technology has no significant representation in the Czech Republic yet. Based on statistics of the Energy Regulatory Office (Energetický regulační úřad), production of electricity using gas sources in the Czech Republic amounts to 3% annually.

Project development:

In June, 2009 ČEZ concluded an EPC contract with ŠKODA PRAHA Invest. for the design, supply, procurement, erection and commissioning of a Gas Turbine Combined Cycle (GTCC) powerplant capacity 841 MW, with 800 MEUR of total investment costs.

General contractor of its construction, ŠKODA PRAHA Invest, has signed a contract for delivery of two Siemens gas turbines SGT5-4000F , both with the capacity of 284 MW, with the supplier, the Siemens company.

ŠKODA PRAHA Invest also concluded a contract for delivery of a steam turbine MTD60CR generator with ŠKODA POWER On 25 June. The SKODA POWER delivery comprises a double-shell turbine with accessories (turbine, generator, condenser, hydraulics, electro segment etc., as well as engineering, assembly, and operation commencement. The turbine will be delivered to the power plant development site in November 2011. The customer is to accept the turbine in March 2013. Some design works on the turbine's sections have already commenced. It's production will start in 2010.

Contract for delivery of a Tripple Pressure HRSG with natural circulation and with reheat has been signed with SES Tlmace, Slovakia.

The ČEZ energy company has signed also a natural gas supply contract with the RWE Group. Fifteen year gas supply term has been agreed.

At present, proceedings concerning the analysis of impacts of the project on the environment (EIA) are being held. ČEZ submitted the respective application as early as in December 2008.

Although the construction of the GTCC plant is to be commenced by the contractor in October 2010, certain activities have started to be performed in 2009 already, in particular, the designing stage.

The power plant could generate first megawatts of electricity as early as in April 2013.

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Environmental and social benefits	
(Estimate of) Greenhouse Gases abated (in metric tons of CO_2-equivalent)	Annual: Up to and including 2012: 650,000 tCO_2-equivalent Up to a period of 10 years: 650,000 tCO_2-equivalent Up to a period of 15 years: 650,000 tCO_2-equivalent
Number of reduction units (EAU, CER, ERU, AAU)	1,150,000 through 2-year period of 2011-2012
Socio-economic aspects What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project?	This Project will make possible replacement of equivalent power being generated from brown coal from North-west Bohemia. Power generation from brown coal has operation costs higher by 30 EUR/MWh. Costs difference is therefore = 6000 h/a x 841MWh x 31 EUR/MWh = 156,000,000 Eur/a. At the same time Power generation from gas produces by 650,000 tCO_2 per year less.
Methodology used	Approved baseline methodology
Economic data	
Capital costs	Approx 800 MEUR.
Financing scheme	Own equity 30% and 70% debt covered by commercial bank
Financing organisation (if third party)	CSOB Bank
Project developer	
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