



**Construction of a 410 MW Combined Cycle Gas
Turbine Power Unit at the existing Combined
Heat and Power Plant in Krasnodar
(Subsidiary of OAO "UGK TKG-8"),
Russian Federation**

Non-Technical Summary

February – March 2009



**CONSTRUCTION OF A 410 MW COMBINED-CYCLE GAS TURBINE UNIT
AT THE KRASNODAR CHP PLANT
(SUBSIDIARY OF OAO “UGK TKG-8”),
RUSSIAN FEDERATION**

NON-TECHNICAL SUMMARY

1. PROJECT DESCRIPTION

The Krasnodar combined Heat and Power (CHP) Plant (figures 1, 2) is the main source of heat energy for the city of Krasnodar (population of 708,000) and a major element of the United Electricity Supply Networks of the North Caucasus Federal District in South Russia.

The power generating equipment currently operated at the Krasnodar CHP Plant was built in the 1950-1970s and has a high degree of technical wear. The existing CHP Plant comprises steam boilers using natural gas as the primary fuel for steam generation for heating and for electricity generation in turbine generators. Heating fuel is used as back up fuel. The overall efficiency of all CHP Plant facilities using the above equipment involved in net electricity generation is currently approximately 33%. The residual life of existing turbines of the Plant's first stage is evaluated as 2 to 7 years.

OAO “UGK TKG-8” (Southern Generating Company – Territorial Generating Company No. 8) plans to construct in 2009-2011 a highly efficient power generating facility at the Krasnodar CHP Plant, i.e. a 410 MW combined cycle gas turbine (CCGT) unit. A new building for the unit will be constructed in the northern part of the existing Plant's site.

A detailed technical and environmental design of the project is being undertaken by a Russian general engineering and procurement contractor “E4”. The project will be subject to full permitting under Russian Federal laws. The current stage includes the finalization of a detailed OVOS as part of the Design submitted to the regulators for approval. The finalization of the Design and OVOS as part of the Design will include additional technical solutions. In line with Russian Federation legislation a public hearing will be undertaken.

This document contains an outline of the project and is aimed to enable public consultations and disclosure of the Project related information in accordance with the best international standards.

Commissioning of the 410 MW CCGT unit will enable:

- An increase in the amount of generated electricity and improved reliability of power supply for the city of Krasnodar and for other consumers in the region;
- Improvement of the supply of heat to the residential districts and industrial enterprises of Krasnodar and decommissioning of a number of small boilers, the emissions from which adversely affect the quality of ambient air in the city;

- Start of decommissioning of obsolete equipment (turbines built in the 1950s) at the Krasnodar CHP Plant;
- Improvement of the working conditions for the operating personnel at the Krasnodar CHP Plant.

The implementation of proposed Project will have the following advantages:

- It will be constructed on the land already leased by the Krasnodar CHP Plant without any additional allocation of land of other categories;
- The future power generating unit will use to a maximum extent the existing infrastructure facilities of the plant (gas and water supply and wastewater removal networks) and external electricity and heat energy supply networks;
- It's energy efficiency will meet best international standards as well as the EU's Best available techniques (BAT) requirements.
- The new facilities will be operated by the highly skilled and qualified personnel of the CHP Plant.

At the same time, the Krasnodar CHP Plant is situated within a rather densely populated residential area (the minimum distance from the boundary of the CHP Plant to the nearest residential buildings is approximately 70 m) (figure 3).

The Krasnodar CHP Plant is a major water user: the water abstraction from the Kuban River in 2008 amounted to 446 million m³. A natural oxbow lake has been used historically as a technical canal for delivery of water from the Kuban River and for subsequent discharge of heated water from the CHP Plant. This lake will continue to be used and it is expected that water use will increase at the rate of about 30%.

Due to the recent changes in the RF legislation, the relevant supervisory agencies have not yet issued a Permit for use of the Kuban River and the oxbow lake, as well as the Kalininskaya gulley for discharge of conditionally clean and treated wastewater should be received as well. Efficient fish protection devices to be installed at the water intake facilities at the Kuban River are in the process of final design. These will require the construction of an additional fisheries protection system in line with best practice. A more detailed assessment will be made as part of the Project and the final option will be agreed with the regulators prior to the construction.

The Krasnodar City Administration proposed in 2007 that the Krasnodar CHP Plant will terminate disposal of salt-containing wastewater in the former ash-disposal area (the Plant rents this area of 16 hectares) and return the land to the City Administration.

The limitations listed above which are associated with the location and current environmental situation around the Krasnodar CHP Plant have been taken into consideration in the Project Design for construction of a 410 MW CCGT unit at existing site.

The CCGT technology provides for:

1. Combustion of natural gas (diesel fuel will be used only in case of any failures in the gas supply lines) in the combustion chamber of a gas turbine for electricity generation;
2. Subsequent use of heat energy for water boiler heating (partially the boiler will be heated by direct gas firing) for steam supply to a steam turbine for electricity generation;
3. Utilization of residual heat from the combined off-gas stream for hot water supply.

2. SUMMARY OF ENVIRONMENTAL AND SOCIAL IMPACTS AND PLANNED MITIGATION MEASURES.

The new CCGT unit will utilize state-of-the-art Japanese and Russian technology to ensure an efficiency of electricity generation in the order of 57%, which is higher by 20% than the efficiency of the power generating equipment currently used at the Plant. The new turbines will be provided by The Company “Mitsubishi Heavy Industry” and will be among the most advanced in the world. The new unit will meet European Union environmental standards as defined by the IPPC Directive’s BREF for Large Combustion Plants with NO_x emissions of below 50 mg/Nm³, which are much less than Russian Federation standards (125 mg/Nm³). The plant will also be fitted with continues emission monitoring system for NO_x to monitor emissions on a continued basis.

Location of the planned CCGT unit and infrastructure at the Krasnodar CHP site is shown in Figure 4.

Specific air emissions from the CCGT unit (in terms of emissions per unit power generating capacity) will be lower by 8 times than that from the currently existing equipment and the gross emissions from the CCGT unit will be as low as 469 tons per annum. This is substantially lower than the currently existing officially permitted emission limit of ca 3,000 tons per annum.

The computations made in the EIA have indicated that the ground-level concentrations of pollutants released from the Krasnodar CHP Plant after the CCGT unit commissioning will comply with the applicable sanitary norms at any distance from the Plant site.

In combination with the monitoring data this will permit the Krasnodar CHP Plant to decrease the dimensions of its sanitary protection zone (SPZ) in the northern direction (where residential buildings will be located at a distance of 260 m from the CCGT chimney as compared with the currently approved 300m wide SPZ from the chimneys).

Greenhouse gas emissions will increase after the CCGT commissioning by approximately 2.5 million tons per annum. However, this will account for only 0.2% of the currently permitted limit for an increase in the GHG emission to reach the 1990 level.

No difficulties are expected in the future with respect to potable water supply for the CHP Plant.

Although the industrial water abstraction for the cooling of equipment of the CCGT unit will be lower in terms per unit output in comparison with the currently used equipment, the overall water requirement from the Kuban River will increase by approximately 200 million m³ per annum. But even in this case the currently approved water abstraction limit for the CHP Plant will be complied with and the impacts on the Kuban River have been assessed as minimal.

The issue of treatment of a combined stream of salt-containing wastewater that will be generated at the Krasnodar CHP Plant after the CCGT commissioning requires additional consideration (its discharge to the former ash-disposal area is to be terminated and blending with storm water runoff is not permitted by the legislation). A technical solution is being reviewed at present and the installation of additional treatment equipment is viewed as the most optimal approach.

The Project Design provides for construction of a local wastewater treatment facility to treat wastewater contaminated with petroleum hydrocarbons from the CCGT unit.

The bulk of wastes will be generated during the construction phase. Their nomenclature has been defined in the Project Design and the quantities generated will be specified more accurately before the construction commencement and before a special permit will be obtained specifying the limits for waste disposal during the construction phase. During the CCGT operation phase the amount of waste generation will be approximately 16 tons per annum and the bulk of waste will be reused at the CHP Plant.

No substantial negative impacts on land, subsoil resources and land-based ecosystems are expected during the CCGT construction and operation phases.

An increase in the water abstraction volume from the Kuban River for the needs of the CCGT unit will entail a proportional increase in the volume of conditionally clean heated water released to the oxbow lake and further to the Kuban River. Final modelling of the thermal fields in the oxbow lake (taking into account both the water heating at the Plant and an increase in the volume of discharged heated water) for the most critical summer period need to be further modelled and assessed once the technical solutions have been presented in the Design. Although the risks are viewed as low, there is a possibility that the plant may need to construct some additional cooling water system equipment or reduce operations during very hot summer periods to reduce risks of the release of heated water to the aquatic ecosystems in both the oxbow lake and in the vicinity of the outlet of heated water from the oxbow lake to the Kuban River. The final technical solution will be presented as part of the final Design and agreed with the local regulators.

The measures provided for in the CCGT construction Design guarantee that the regulatory requirements relating to the working conditions will be complied with during the CCGT construction and operation phases.

A potential negative impact factor affecting the local communities in the nearest residential buildings during the construction phase might be the elevated noise level caused by pile driving (the nearest apartment buildings are located at a distance of 240-300 m from the construction site where pile driving is planned). A number of measures are planned to reduce this impact and these will be fully agreed with the regulators prior to issue of a construction permit.

The plant has concluded a risk assessment of any process failures and evaluation of impacts these would have on the local community. The plant is not treated as hazardous and even a worst case gas explosion from the gas pipeline for the proposed CCGT unit would not have fatal impact on the local community.

3. CONCLUSION

In general, it may be concluded that with the currently existing environmental and location limitations at the Krasnodar CHP Plant site the proposed construction and future operation of the CCGT unit and associated infrastructure facilities will not cause any significant environmental and social risks. The project will employ state-of-the-art technology that will fully meet Russian as well as European Union environmental standards in terms of energy efficiency and harmful emissions.

A number of key technical design issues relating to water and wastewater management, including cooling water needs to be resolved prior to CCGT unit construction. Although the impacts are not judged as substantial, they require some additional assessment and agreements with the regulators. This will be undertaken prior to the issue of a construction permit.

The Company will develop and implement an Environmental, Health and Safety management system for the construction and operational phases of the Project. A summary of the performance of the project will be provided to the general public within a year of the Project commissioning.

Additional information can be obtained from:

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